DIGITAL REVIEW of Asia Pacific

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This edition reports on 29 economies together with three sub regional chapters on the Pacific Island States, ASEAN and APEC, and four special thematic chapters on:

- Building information societies: Bridging the digital divide in Asia Pacific
- Internet governance and the Asia Pacific: Urgent issues for the region
- Social, political and cultural aspects of ICTs: E-governance, popular participation and international politics
- Appropriate ICT for the Asia Pacific: Opting for open source, localisation, internationalisation and free access
DIGITAL REVIEW of Asia Pacific
2005/2006

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This edition of the
Digital Review of Asia Pacific
is dedicated to the memory of

Narantsetseg Baljin

who helped network Mongolia
to the world.
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**Pan Asia Networking Programme of the International Development Research Centre**

The International Development Research Centre (IDRC) is a public corporation created by the Parliament of Canada in 1970 to help developing countries use science and technology to find practical, long-term solutions to the social, economic and environmental problems they face. Support is directed towards developing an indigenous research capacity to sustain policies and technologies developing countries need to build healthier, more equitable and more prosperous societies. IDRC’s Pan Asia Networking (PAN) Programme promotes socially responsible ICT application and innovation in developing countries, especially for deprived communities, through participatory and applied research in Asia. PAN examines the impact of ICT project interventions on people, livelihood, culture and gender and conducts research into how they impact on the economy and society as a whole with policy-relevant studies.

http://www.idrc.ca

**Orbicom**

Jointly created in 1994 by UNESCO and Université du Québec à Montréal, Orbicom, the network of UNESCO Chairs in Communications, embodies 28 Chairs and over 250 associate members in 71 countries with representation from communications research, ICT for development, journalism, multimedia, public relations, communications law and more. The international collaboration of academics, corporate decision makers, policy consultants and media specialists makes Orbicom a unique network and constitutes a truly multidisciplinary approach to the promotion of communications development. Since 1996, Orbicom has general consultative status with the Economic and Social Council of the United Nations. Orbicom is engaged in a number of efforts focusing on ICTs, including assessment instruments such as *Digital Review of Asia Pacific* and *Monitoring the Digital and Knowledge Divides*. In 2002, Orbicom received the UNESCO/UNITWIN award for the quality of its projects. To find out more about Orbicom, visit its trilingual website http://www.orbicom.uqam.ca or email orbicom@uqam.ca.

**Asia-Pacific Development Information Programme of the United Nations Development Programme**

In the Asia-Pacific region, the United Nations Development Programme (UNDP) has established the Asia-Pacific Development Information Programme (APDIP) to promote the strategic and effective use of information and communications technology (ICT) for poverty alleviation and sustainable human development. Launched in 1997 and based in Kuala Lumpur, APDIP operates at both national and regional levels through a network of 25 UNDP country offices covering 42 countries in the Asia Pacific. At the national level, APDIP assists national and sub-national institutions by providing ICT technical and policy support as well as building capacities. At the regional level, APDIP strives to build synergies between national ICT programmes and activities and provide a regional platform to facilitate multi-country co-operative approaches to ICT for development. http://www.apdip.net

**Southbound**

Southbound is an independent scholarly publishing house specialising in development communication and information issues. It has co-published widely with international R&D and development agencies in these areas. Southbound was founded in 1990 and its work has closely tracked the advent and diffusion of ICTs in developing countries. During this time, it has evolved a focus on participatory communication processes, and its current work explores the fit of the new ICTs into existing communications and social systems.

http://www.southbound.com.my
The key development parameters of the recent past are not predominantly about economic productivity, but have more to do with equity and access to information and enhancing the knowledge base. Thus the most important assets of nations are not raw materials, physical goods or economic production, but human resources keyed into the information and knowledge revolution.

Schoolnet Research (2002)

The Digital Review of Asia Pacific reports on the state of deployment and innovation of ICT in the region. It also attempts analytical syntheses of how the region deals with issues and concerns that come to the fore as new technologies are deployed to advance the socio-economic development of Asia-Pacific information societies.

Four organisations collaborate in this initiative as co-publishers: the Pan Asia Networking Programme (PAN) of the International Development Research Centre (IDRC), the Asia-Pacific Development Information Programme (APDIP) of the United Nations Development Programme (UNDP), and the Network of UNESCO Chairs in Communications (ORBICOM) in close collaboration with Southbound.

This publication is the second volume in the series. It incorporates data from the Digital Divide Index, an initiative of Orbicom directed by George Sciadas. While the 2003-2004 edition focused on initiatives to transform the digital divide into digital opportunities in 27 economies, the 2005-2006 edition focuses on the use of ICT for development and in building information societies.

A panel of distinguished authors from 29 economies of the region convened at the ASEAN Foundation in Jakarta, Indonesia under the kind auspices of the ASEAN Secretary General, H.E. Ong Keng Yong and the leadership of the chief editor, Chin Saik Yoon, to prepare the present edition.

The 2005/2006 edition provides updates on the 27 individual economies covered in the last edition and extends coverage to two additional economies: Iran and the Maldives. It also includes an entirely new thematic section which introduces a series of discussions on (1) bridging the digital divide, (2) Internet governance, (3) social, political and cultural aspects of ICT, and (4) appropriate ICT. This edition also provides overview chapters on the Pacific Island States, the Association of Southeast Asian Nations (ASEAN), and the Asia-Pacific Economic Cooperation (APEC).

In their research and debates on how ICT for development contributes to the building of information societies in the region, the authors invite all of us, from the government, the industry and civil society, to face a major challenge in terms of converging divergent interests:

The economies of the region are approaching the Tunis phase of the World Summit on the Information Society (WSIS) in 2005 with different economic interests that threaten to fragment, rather than unite, the region. A deep chasm now separates the advanced ICT powerhouses on one side of the digital divide from the countries that are painstakingly rebuilding their infrastructure from scratch on the other side.

(2005: 10)

While other regions of the world, such as Europe and the Americas, shift progressively towards regional integration, the Asia-Pacific region faces a threat of fragmentation. This challenge is so important that it will continue to be present in the dynamics of development well beyond the Tunis phase of the World Summit on the Information Society.

Fragmentation may constitute a very important risk in the current globalisation process which helps to “flatten” the world. The process involves workflow software, outsourcing, offshoring, supply-chaining, insourcing, and other components elucidated by Thomas L. Friedman (2005) in his latest book, The World is Flat: A Brief History of the Twenty-First Century. While some talk about the knowledge society or the information economy others, like Friedman, argue with the metaphor of the “Flat World”. They posit that while some rituals and debates are taking place at WSIS and elsewhere, globalisation forces continue to grow (bringing with it successes as well as discontent) and that some economies may face a new type of dependency within our networked society which may be manifested in very different ways than those anticipated by Kenichi Ohamae (1995).

If appropriation of information and ICT were to be the building blocks of an information economy and that of a knowledge society, our authors warn us of another major and urgent challenge confronting all of us:

The chief obstacle to the development of the information society is turning out to be the stifling copyright
restrictions and intellectual property mechanisms asserted by economies with well-developed ICT industries. This stranglehold on knowledge has overtaken the lack of access to technologies as the main cause of the digital divide.

(2005: 3)

And beyond the challenge of removing this type of stranglehold on knowledge, another issue remains regarding the urgency of including and involving all sectors of society in ICT policy dialogues:

In Asia-Pacific, where governments and intergovernmental organisations tend to dominate the policy-making arena, we should ensure that ICT policy dialogues include all sectors. In particular, the role of civil society, which is often the missing player in these discussions, needs to be strengthened. The Geneva summit recommended that institutional arrangements for the governance of the Internet and the drafting of ICT policy should be multilateral, transparent, democratic, and open to all stakeholders. These principles for good Internet governance should be embraced in our region.

(2005: 28)

Should this principle of inclusion be progressively implemented in terms of an enabling environment in a region that aims to move progressively towards coherence rather than fragmentation? And should we also recognise that “the most important assets of nations are not raw materials, physical goods or economic production, but human resources keyed into the information and knowledge revolution”?

Our acceptance of both would lead us to shape a participatory paradigm of communication for development that goes beyond the modernisation and dependency paradigms. The corresponding emphasis on the role of human capital in building the knowledge economy, and its central function of nurturing information societies, in turn assigns to ICT significant promise that these new technologies may offer. The information economy is indispensable, material basis for such a new economy. (1998: 66)

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Notes

1. The Digital Divide Index diagrams have been completely revised by George Sciadas for publication in this edition of the Digital Review of the Asia Pacific. Further information about the index, which covers all regions of the world, are available in the following two publications:


2. Manuel Castells (1998) defines the information economy in these terms: “A new economy has emerged in the last two decades on a worldwide scale. I call it informational and global to identify its fundamental distinctive features and to emphasize their intertwining. It is informational because the productivity and competitiveness of units or agents in this economy (be it firms, regions, or nations) fundamentally depend upon their capacity to generate, process, and apply efficiently knowledge-based information. It is global because the core activities of production consumption, and circulation, as well as their components (capital, labour, raw materials, management, information, technology, markets) are organized on a global scale, either directly or through a network of linkages between economic agents. It is informational and global because, under the new historical conditions, productivity is generated through and competition is played out in a global network of interaction. And it has emerged in the last quarter of the twentieth century because the Information Technology Revolution provides the indispensable, material basis for such a new economy. (1998: 66)

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<td>2nd Generation wireless format</td>
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<td>3G</td>
<td>3rd Generation wireless format</td>
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<td>ADSL</td>
<td>Asymmetric Digital Subscriber Line</td>
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<td>AMPS</td>
<td>Advanced Mobile Phone System</td>
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<td>APDIP</td>
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<td>APEC TEL</td>
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<tr>
<td>AS</td>
<td>Administrative System, or Administrative Site</td>
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<td>ASCII</td>
<td>American Standard Code for Information Interchange</td>
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<td>ASEAN</td>
<td>Association of Southeast Asian Nations</td>
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<td>ATM</td>
<td>Automated Teller Machine</td>
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<td>B2B</td>
<td>Business-to-Business</td>
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<td>CDMA</td>
<td>Code Division Multiple Access</td>
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<td>CD-ROM</td>
<td>Compact Disc Read-Only Memory</td>
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<td>CERT</td>
<td>Computer Emergency Response Team</td>
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<td>CPU</td>
<td>Central Processing Unit</td>
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<td>dirAP</td>
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<td>Dynamic Random Access Memory</td>
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<td>DSL</td>
<td>Digital Subscriber Line</td>
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<td>ECG</td>
<td>Electrocardiogram</td>
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<td>GPS</td>
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<td>HTML</td>
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<td>IEEE</td>
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<td>IETF</td>
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<td>IP</td>
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<td>Mbps</td>
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<td>Random Access Memory</td>
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<td>RFID</td>
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RIR  Regional Internet Registry
SARS  Severe Acute Respiratory Syndrome
SDH  Synchronous Digital Hierarchy
SEA-ME-WE  South East Asia-Middle East-Western
           Europe submarine fibre optic network
SIM  Subscriber Identity Module
SMS  Short Message Service
TDMA  Time Division Multiple Access
TD-SCDMA  Time Division Synchronous Code Division
           Multiple Access
TLD  Top-Level Domain
TRIPS  Agreement on Trade-Related Aspects of
           Intellectual Property Rights
UHF  Ultra-High Frequency
UK  United Kingdom
UN  United Nations
UNCITRAL  United Nations Commission on
           International Trade Law
UNCTAD  United Nations Conference on Trade and
           Development
UNDP  United Nations Development Programme
UNESCAP  United Nations Economic and Social
           Commission for Asia and the Pacific
UNESCO  United Nations Educational, Scientific and
           Cultural Organization
UNII  Unlicensed National Information Infrastructure
URL  Uniform Resource Locator
USA  United States of America
UTP  Unshielded Twisted Pair
VAN  Value-Added Network, or Virtual Area Network
VCD  Video Compact Disc
VCR  Videocassette Recorder
VHF  Very High Frequency
VHS  Video Home System
VoIP  Voice over Internet Protocol
VPN  Virtual Private Network
VSAT  Very Small Aperture Terminal
WAN  Wide Area Network
WAP  Wireless Application Protocol
WGIG  Working Group on Internet Governance
WiFi  Wireless Fidelity
WiMAX  Worldwide Interoperability for Microwave
           Access
WIPO  World Intellectual Property Organization
WLAN  Wireless Local Area Network
WLL  Wireless Local Loop
WSIS  World Summit on the Information Society
WTO  World Trade Organization
xDSL  x Digital Subscriber Line (of any type)
XML  eXtensible Mark-up Language
Stifling intellectual property rights regimes are quickly replacing the lack of Internet connectivity as the main obstacle to nurturing information societies in the region. While many of us from the ICT sector have been preoccupied with the WSIS process over the past years, trade agreements have been negotiated and concluded that have begun to further curb the flow of information and technologies. Unlike WSIS resolutions, these negotiations led to binding treaties and agreements that compel governments to comply with the trade regimes which they created. These regimes will prove to be long-term barriers to future attempts to close the digital divide.

Asia Pacific has done well in areas where we have the latitude to thrive. Several economies in the region continue to lead in a number of areas: from broadband services to chip foundries, and from e-government to SMS. Even among the developing economies ICT awareness has heightened and experiments to introduce these technologies into isolated, rural communities have begun to show promising results. Most encouraging is increasing awareness that ICT is not only about computers and the Internet but refers to all means and processes for communication and information exchange. And that information societies are not downloaded from a plug in the wall but arise from nurturing participatory development communication processes that trigger and support social change.

Our communication system and processes were severely tested the morning of 26 December 2004 after the earthquake struck Aceh and sent a tsunami racing across the Indian Ocean. We largely failed this test. Many of the communities struck by the waves were hit about two hours after the earthquake that triggered them. Anecdotal reports emerging in the aftermath of the catastrophe told of isolated teams of experts who tracked the progress of the tsunami remotely but did not have the means to raise the alarm among communities in harm’s way. There were also disturbing anecdotes of other experts who had fore warning about the tsunami but held back from raising the alarm due to apprehensions about reprisals from restrictive gate keeping regimes in case disaster did not occur.

We came across only a very small number of cases where ICT did save lives. In one case Vijayakumar Gunasekaran, a 27-year old son of a fisherman from Nallavadu village, Pondicherry on the eastern coast of India, who works in Singapore, saved his village with one telephone call. He told
to emergencies. The case also shows that installing ICT is only the start. Even more important is ensuring relevancy and building trust in what we install. And perhaps most important of all, strengthening a community’s collective skill in processing data and information to create meaning so that people can grow a body of knowledge upon which they can base their actions.

This edition of the *Digital Review of Asia Pacific* begins with four thematic chapters that explore some elements of these emerging lessons. These chapters also flag salient issues we should address during the Tunis phase of WSIS. We review the challenges we face in building information societies from the perspective of the lines of action that emerged from the Geneva phase of WSIS in the first thematic chapter. It concludes with concrete proposals for the digital solidarity agenda aimed at addressing the particular needs of the Asia Pacific.

The second thematic chapter maps urgent issues relating to Internet governance. It introduces the background to the global debate on the theme and examines key policy issues and provides some perspective from the region. The chapter first examines the role of ICANN before moving on to discuss Internet governance broadly including issues such as international charging arrangements for Internet services, exchange points and regional backbones, spam, cyber security and crimes, and legislation for ICT related sectors.

The third chapter focuses on crucial social, political and cultural aspects of ICT that have largely been ignored in the past as we concentrated on building the infrastructure rather than the use of ICT. It discusses e-governance and the potential of ICT for enhancing democratic exchange at a global level thereby enabling people to address issues such as the environment, human rights, poverty and injustice from an international perspective. It also sets out to answer the tricky question: Does technology change society?

The fourth and last thematic chapter considers what may be appropriate ICT which will meet the particular needs of the Asia Pacific with its diversity of languages, and complex mix of demographic, economic, geographical and industrial environments. It describes examples drawn from across the region of efforts to localise technologies and devise appropriate and low-cost ways of deploying ICT. The chapter also discusses efforts underway to adopt open source software in building tools that meet the special needs of users in the region.

The chasm that separates the most developed and the least connected economies are clearly illustrated in the diagrams of the Digital Divide Index that illustrate the chapters that review the individual Internet domains. We cover a total of 29 domains in this edition, two more than the last. Iran and the Maldives are the additional economies reviewed. The other 27 chapters on individual domains set out to update information as well as cover aspects of ICT usage and deployment not reviewed in the 2003/2004 edition.

The Pacific Island States are reviewed in a sub regional chapter. It covers altogether 22 island states and some of their sub regional collaboration underway. Besides the Pacific islands we have expanded our sub regional coverage to include two other groupings; there is a chapter each on the ICT-related initiatives of the Association of Southeast Asian Nations and the Asia Pacific Economic Cooperation forum.

This edition covers diverse technological environments all undergoing rapid and constant change. We cope with this change by publishing updates contributed by our authors who live and work in the economies they report on at our website [http://www.digital-review.org](http://www.digital-review.org). I look forward to seeing you online.

Chin Saik Yoon
Chief Editor
Quantitative evidence for the digital divide

George Sciadas

The unequal access to and utilisation of ICT has emerged as one of the predominant issues of our times. It assumed additional importance when the link between ICT and development started to be made. There is a widely held belief, and increasing evidence, that the diffusion and appropriate utilisation of ICT not only presents enormous opportunities for economic and social development, but that its absence seriously threatens to accentuate already existing and sizeable gaps between haves and have-nots. Thus, the digital divide represents the newest addition to the enormous chasm in the stage of development and the standard of living between different countries around the world.

Moreover, the issue of the digital divide occupies the area of overlap between economic, social and cultural matters, and it is rooted in the heart of the information society. Unquestionably, it was the principal driving force behind the twin meetings of the World Summit on the Information Society (WSIS) – Geneva 2003 and Tunis 2005. From early on, it became evident that our understanding of what it involves and how to react to it from a policy perspective was in dire need of quantification. Many voices were raised and pleas were heard for the reliable measurement and analysis of the digital divide.

Clearly, the issue is applicable wherever masses of people live. It attracted early attention in connection with internal country divides, where research in the USA (Falling through the Net series by the Department of Commerce), Canada (Dickinson & Sciadas, 1996, 1997, 1999; Sciadas, 2000, 2002) and elsewhere addressed its key dimensions, provided measurements and contributed to our understanding of the problem. Given the nature of ICT and the transformations it induces everywhere, across all walks of life, the interest soon encompassed the international dimension of the divide, involving comparisons across countries.

Such research efforts have been challenged by the dearth of statistical information on the diffusion and use of ICT that is comparable across a large number of countries and at the desired level of detail. They have also been hindered by the lack of a quality instrument capable of systematically quantifying the digital divide over a large number of countries as well as monitoring its evolution over time – a tool indispensable in guiding informed decision-making.

With respect to the data gaps, several efforts have been undertaken in recent years to make the case for the need, particularly among developing nations, as well as to demonstrate the linkage between ICT and UNDP’s Millennium Development Goals (UN ICT Task Force, 2003). These efforts have now culminated in a promising international partnership, which is underway, involving most UN bodies as well as other international, regional and national organisations (UNCTAD, 2004). The list of expected outputs includes an agreement on a set of core indicators, subject matter training and the eventual creation of an international database. Clearly, this represents a forward-looking exercise. To the extent that it will be supported widely and succeed, it will go a long way towards providing valuable information in the longer term that will greatly facilitate the required coverage of the measurements and enhance their international comparability.

With regard to an instrument, significant progress has also been made through a number of approaches that have been advanced to quantify aspects of the information society (for a review, see Sciadas 2004). Specific to the digital divide, a well-known initiative is the Monitoring the Digital Divide project, which is being led by Orbicom in collaboration with development agencies and a growing number of international organisations. Based on the development of a conceptual framework and an operational model conducive to empirical application, it makes maximum sense out of existing data sources to illuminate the issue at hand. A synopsis of the project is provided below.

Orbicom’s infostate project

The overall objective of the project has been to quantify the digital divide and monitor its evolution both across countries at a given point in time and within countries over time. Its design was guided by the following terms of reference:

- To place emphasis on developing countries
- To rely on a modelling approach that yields policy-relevant results
- To focus on ICT but be broader in scope than pure connectivity measures

The conceptual framework

The nature of ICTs is dual: they are both productive assets as well as consumables. In that setting, the framework utilises the notion of a country’s infodensity and info-use. Infodensity
refers to the slice of a country’s overall capital and labour stocks which is related to ICT – that is, ICT capital and ICT labour stocks – and is indicative of productive capacity. Info-use refers to the consumption flows of ICTs. The aggregation of the two results in a country’s degree of “ICT-isation”, or infostate. The digital divide is then defined as the relative difference in infostates between countries.

As regards infodensity, the productive capacity of a country is determined by the quantity and quality of its factors of production. At any given point in time, the productive capacity is fixed because the factor stocks and the technology with which they are combined in production are fixed, but over time they are all expandable. Factor growth, technological improvements and productivity gains are instrumental, and ICT affects them all. ICT and non-ICT factor inputs are combined to produce ICT and non-ICT goods and services, without a one-to-one correspondence. The same holds true for labour skills, produced and consumed. Attrition, obsolescence, training, movements in and out of the labour force, and brain drain all affect the skills stock. All these are measurable.

ICT capital comprises all kinds of material goods, from wires and cables to keyboards, printers, sophisticated routers and switches. They combine to form machinery, equipment and networks. ICT labour is perceived not so much as a collection of individuals but as the set of ICT skills of those in the labour force. In this formulation, produced output will be an increasing function of these ICT stocks, as it is for all other forms of capital and labour.

In terms of info-use, clearly the uptake of ICT goods is indispensable for the consumption of ICT services that would satisfy ultimate needs. In fact, ICT consumption involves the use of both ICT capital and skills, both of which are becoming increasingly complex as consumption expands from staples to complex technological goods and services. Thus, building “consumptive capacity” is a prerequisite to generating consumption flows. In that vein, a distinction is made between ICT uptake and ICT intensity of use. The following figure provides a schematic of the conceptual framework.

What really matters for economic development is the utilisation of the productive stocks rather than their availability. Having underutilised roads, abandoned factories and rusted telecommunications networks does not increase productive capacity. The same holds true for unemployed or underutilised labour and its skills. The supply side refers clearly to the productive capacity of the country, but it is differentiated from actual production both because of capacity underutilisation and because of trade.

Considering the intuitive and inextricable link of ICTs with the overall factor stocks and the continuous introduction of new ICTs in consumption, ICTs are clearly not bounded upwards but instead are expandable over time. Even as consumables, achieving complete uptake today means nothing for tomorrow. For instance, if every available ICT had achieved 100 percent penetration and usage rates prior to the arrival of the Internet, the ceiling would have moved upwards immediately after. The same holds true for skills,
with obvious implications for productivity. Consequently, there is no preset, absolute upper limit for infostates that can be achieved over time.

The empirical model

For measurement purposes, the framework serves as a guide for an operational model which approximates pragmatically the purity of the concepts. Such an exercise involves several limitations, including the constraints of existing indicators and their lopsided availability among countries. Statistical manipulation must be combined with, and guided by, subject matter considerations and the project’s terms of reference.

While alternative empirical applications are admissible under the framework, the modelling approach relies on indicators. Practically, each component of the model is populated by suitable indicators. In total, 21 indicators are used; these are converted to indices, which allow their aggregation across different units of measurement. The exercise is carried out from the bottom up in order to be able to trace analytically the explanations for the findings back to their origin.

Consistent with the need for policy relevance of the model, as opposed to its business usefulness, infostates are expressed in relative terms. Thus, a small country like Luxembourg can have a higher infostate than a much larger one, say, India. In absolute terms, something like that is unlikely to happen, and this matters for businesses with an eye on market size.

Considering the relative nature of the digital divide, which is due to the continuous evolution of infostates everywhere, the model calls for a reference country and a reference year. The reference country facilitates benchmarking, while the reference year makes possible the monitoring of the evolution of each country’s infostate components over time. The year 2001 was chosen as the reference (base) year owing to the availability of additional indicators for that year. Rather than using a real country as a reference, Hypothetica was created, a country that represents the average values of all the countries examined. This offers immediate and intuitive initial benchmarking. As an alternative benchmark, Planetia was also created and included in the calculations. In this case, the values are those of the planet as a whole, if viewed as one country. (In this setting, each country could be seen as a region of the planet.)

While adhering to the use of existing data from credible sources, a total of 192 countries are included in measurements of networks, covering 99 percent of the population of the planet, 153 countries in skills and therefore infodensity, covering 98 percent of the population, 143 countries in in-use and 139 in overall infostate, covering more than 95 percent of the global population. (The countries for which data do not exist are mostly small in terms of population.)

Distinguishing features

While work in this area is full of challenges, this approach contributes to the overall research agenda and offers the following advantages:

- A cohesive framework which provides a perspective as well as makes possible analytical linkages, economic or otherwise
- A realistic depiction of the digital divide and its decomposition into constituent parts, all of which are unbounded upwards, in the context of both developed and developing countries
- Time series data that enable the monitoring of evolution, not only levels, so benchmarking and analysis of evolutions are no longer constrained to comparing changed rankings from one period to the next
- The use of the best existing data available, reliable and accessible to all, combined with a reproducible, transparent and defensible methodology

The way forward

The first phase of the project developed the conceptual framework and presented a pilot application (Orbicom, 2002). The second phase included a full-scale empirical application covering up to 192 countries over a six-year period, 1996–2001 (Sciadas, 2003). The unique features of the approach, such as the logical incorporation of skills, the intuitive micro–macro analytical linkages, the synthesis of the best data available, and its by-design ability to trace each country’s infostate year after year, set a higher standard in international benchmarking. The new approach is received well by the international community, with rave reviews for its vigour and contribution, and it is already making a noticeable impact. Today, people talk of infostates as a matter of fact and use the new instrument to add value to their own work. This has led to widespread interest to continue and expand this project.

Therefore, considering the speed of developments, the empirical application and the ensuing basic analysis will be extended to the latest year for which new data become available (2003) to gauge the relative progress for the WSIS Tunis meeting and beyond, in keeping with the Action Plan of WSIS. This will be the cornerstone of the new phase and will provide a valuable contribution to the summit discussions.

With results from the core empirical application consolidated, the analytical potential afforded by the model will be exploited more fully. Detailed studies on policies will take place at the country level in Latin America, Africa and Asia to investigate the different movements of the indices. There are reasons behind the movements, and it will
be instructive to dig further into the “whys”. Many valuable lessons wait to be learnt from such detailed analyses that will link the quantitative findings with policies at the country and regional levels. Moreover, quantitative and qualitative work on issues concerning ICT and gender will be incorporated into the project.

How to read the diagrams and statistical tables in this book

Based on data from ITU, the UNESCO Institute for Statistics and other sources, a database is constructed for the empirical application of the infostate model. These data are used for the construction of the diagrams and tables that appear in this publication at the start of each chapter. As explained above, since the digital divide is a relative concept, the model calls for a reference country and a reference year. The global average of all countries and 2001 were chosen as the reference country and year, respectively.

The data in the diagrams are expressed in index form to enable visual comparisons across variables with different scales. All indices are based on the global average having values equal to 100 in 2001. Each diagram conveys the following information: the thick line refers to the country’s index values in 2003 and shows the latest available state; the thin line refers to the country’s situation in 1995 and can be compared with the 2003 line to demonstrate the progress made; and the dotted line shows the global average for 2003, which allows comparison between the country and the global average. When actual indicators rather than indices are included, this is clearly indicated – as is the case in the tables for Afghanistan and Bhutan, as well as the table in the chapter devoted to the Pacific Island States.

Indicators are expressed in appropriate units, whether by population or households. Some indicators used in the infostate model are simple; others are composite. Among those shown in the diagrams, simple indicators are mobile phone subscribers, literacy, television-equipped households, residential telephone lines, PCs and Internet users. The indicator for fixed telephone lines includes adjustments for waiting lines and digitisation of the network; that for Internet hosts includes secure servers; enrolment is calculated as a weighted average of gross enrolment for primary, secondary and tertiary education; and international telephone traffic reflects the average minutes of both outgoing and incoming international calls.

Note

This chapter draws heavily from Sciadas, G. (Ed.) (2003), Monitoring the Digital Divide . . . and Beyond, Montreal/Ottawa: Orbicom/National Research Council Canada.

References


Building information societies: Bridging the digital divide in Asia Pacific

Gopi Pradhan, Chin Saik Yoon, João Câncio Freitas, Malika Ibrahim, Huixin Ke, Muhammad Aimal Marjan, Jamshed Masood and Esther Batiri Williams

The World Summit on the Information Society (WSIS) was conceived during the euphoria of the dotcom boom but convened only in the aftermath of its crash. The timing provided the summit with a sobering perspective of the true potentials of ICT as well as the daunting challenges we face in bridging the chasm that separates those economies that have managed to seize the opportunities offered by ICT during the past decade and those that have not. The “level-playing field” that the new technologies had previously promised is long gone. Ironically, instead of levelling relationships, the information and communication sectors have become more uneven with the advent of ICT. And the sharp divide, already well entrenched within the global mass media and telecommunications sectors, has deepened further.

At the same time, the boundary between the “new” technologies, exemplified by the computer and the Internet, and the “old” technologies of television, telephone, radio and print has been permanently blurred. The convergence of the new, digital technologies with the content and the industrial and business processes of their analogue predecessors has made a misnomer of the “digital” label in describing the divide. The chasm really referred to an information, knowledge and entrepreneurial divide by the time representatives of governments, civil society, academe and businesses met in Geneva in December 2003 during the first phase of WSIS.

This chapter picks up where WSIS Geneva left off. It focuses on two principal areas of the WSIS Plan of Action that were adopted at the end of the meeting. The first refers to section C, “Action Lines”, and the second to section D, “Digital Solidarity Agenda”. The chapter will propose, for salient elements of the plan of action, policies and activities that when implemented will nurture information societies across Asia Pacific. These proposals will aim to selectively address issues that are urgent for the region, rather than comprehensively cover all the action steps proposed in the WSIS plan.

Asia Pacific is a stark example of how far the divide extends. Examples of the most and least connected economies of the world can be found all at once in the region. South Korea, Singapore, Japan, Taiwan and Hong Kong are all prime examples of highly networked societies consuming a stunning variety of content, services and entertainment online. Also located in the region are countries like Afghanistan and Timor-Leste that are painstakingly rebuilding their basic ICT infrastructure from the ground up after near total devastation during recent conflict. The region is also home to economies such as North Korea that have elected to tightly manage access to ICTs, including the Internet, fax, telephone and mass media, and curb their growth.

Because of these large differences, the more advanced economies of the region are aligned more closely with North America and Europe than with the Asia-Pacific region in terms of economic interests. For the same reason, the economies that have only recently begun to rebuild their ICT infrastructure will find that they are facing challenges more like those of Africa than those of Asia Pacific. In this sense, the region is diverging.

However, there is evidence to suggest the possibility of convergence of the disparate interests of the Asia-Pacific economies. The region comprises the most promising untapped segments for the fast-saturating global markets for goods and services. Geography has also permanently fused the cultural, political and strategic interests of neighbouring economies; and recent history has proven that Asia Pacific has more to gain from working in unity than from competition with each other. The divide provides a unique opportunity to bring about this convergence to safeguard the region’s long-term interests.

Action lines

Role of governments and stakeholders

Adopting a participatory approach

The success stories of the Asia-Pacific region clearly show that the information society thrives and ICT industries prosper when the government adopts a participatory approach that involves civil society and the private sector in...
designing national strategies and drafting legislation related to ICT. Widespread participation is vital for building awareness about the new technologies among the populace and for releasing pent-up demand where awareness already exists. It also builds trust in the efficacy of ICT among potential providers and users of services while at the same time mobilising them to roll out and use the services. Just as important, participation facilitates the implementation of e-programmes rather than hinders it.

Participation has been achieved by many countries through first raising public awareness about ICT-related issues, followed by the organisation of various national events such as conferences and seminars. These events help to identify key stakeholders who will assist in setting up working groups and online networks as well as identifying champions to spearhead policy, legislative, social and business activities which need to be carried out on different fronts to establish the communal and technical infrastructures and processes required for successful transition to the information society. Think tanks established to draft policies and plan strategies produce the best results when they involve members who effectively represent the government, civil society and the private sector.

Customising local approaches
The divide exists in various societies for different combinations of reasons. These causes may relate to the unique socioeconomic status, geographic location and political climate of an economy. As the causes are unique, so the solutions need to be customised and planned from the perspective of the unique factors resting behind each facet of the divide. There are no universal solutions. An important role of the government, civil society and the private sector is to work together in visioning the information society they wish to nurture together and planning the strategies they need to adopt to realise this vision. The solution may involve the deployment of significantly smaller packages of digital technologies, such as computers and the Internet, than the early debates about the digital divide had recommended. For example, in many rural communities across Asia Pacific, the radio remains for now and the foreseeable future the most accessible ICT for carrying development messages. The customised approach may be to deploy digital technologies to enhance the effectiveness of radio rather than to replace it. The Kothmale project on “radio browsing of the Internet” was an interesting experiment to fuse the new and old technologies. The experiment did not evolve into a long-term information and communication initiative largely because members of the community were not provided with the opportunity to manage the radio station themselves in the way a community station is normally run. Customising solutions also means placing people, rather than ICT, at the heart of the information society.

Making sure no one is left behind
Liberalisation of the telecommunications sector has been presented as the most expedient way to strengthen infrastructure and diffuse ICT. While the experience across the region has proven this approach to be largely effective, it is also the role of the government to make sure that no one is left behind in the process. Private sector service providers are driven by profit and will focus their operations in areas that generate attractive returns. Invariably, they will shy away from unprofitable and marginally profitable areas if given the choice. Governments should therefore ensure that universal service requirements are included in liberalisation schemes and, more importantly, that these requirements are met. They should at the same time use a portion of the revenue generated by liberalisation programmes to support the development, prototyping and implementation of new and innovative methods of providing ICT access to disadvantaged communities and individuals. They can also leverage their own procurement of Internet services to foster open access and growth of online markets at the local level in less developed places.

Information and communication infrastructure

Making ICT affordable
The Internet is more popular among the richer countries than the poorer nations because price is an important factor influencing its use. An office worker in Bhutan has to work three hours to pay for an hour-long access to the Internet. In Cambodia, most people earn an average of US$1.5 in a day but must pay US$4 for a minute of an international telephone call. Where there are facilities, the high cost of services may be the simple reason why people do not use telephones or the Internet. A large portion of the divide results from disparities in income. Aside from this, it is often the irresistibly low cost of mass media, such as radio and print, that makes people reluctant to adopt the new technologies. Although the prices of computers and other new ICTs have fallen significantly in recent years, they remain beyond the affordable range of many people in the region.

The price barrier applies even within the richer Asia-Pacific countries. Users of regular dial-up Internet services tend to resist switching over to broadband services until prices fall within what they perceive as their level of affordability. Regulators found that the most effective way of lowering fees and making services more affordable to a larger group of users is to liberalise the ICT sector and introduce competition into the marketplace. This has worked very well in India, where many additional types of services have been offered at much lower prices following liberalisation of the ICT sector. China also witnessed tremendous growth in Internet subscriptions after the licensing of more ISPs.
Public funding is another way of making services universally affordable. Although the current trend of privatisation and liberalisation may make public funding of services seem archaic, it remains one of the most effective and expedient ways of delivering and promoting services that are deemed essential and strategically mandatory. Both developed and developing countries publicly fund schools and libraries, both of which are necessary to the building of the information society. Local governments in cities such as Taipei in Taiwan as well as San Francisco and San Jose in Silicon Valley of California have begun to set up broadband WiFi hotspots to ensure that all their citizens will have access to and be actively engaged in services and processes that support the information society.

Pressures from funding agencies to engage in only “self-sustaining” initiatives should not discourage policy makers from publicly funding critical services especially among communities lacking the immediate capability to pay for these services. Such funding is a proven and viable operating model for public broadcasting services, community mobilisation efforts, continuing education programmes, R&D initiatives and worker retraining programmes. It is an approach used extensively in developed countries and therefore should be retained as an option for developing countries. Many development projects have adopted business models in attempts to “sustain” initiatives such as telecentres. Even when such business models do work in helping to recover operating expenses, they invariably fail in reaching out to the poor, who may need the services of telecentres the most.

**Liberalising and “future-proofing” the marketplace**

Liberalisation of the telecommunications industry and promotion of a free market in the ICT sector is definitely one of the key strategies policy makers should consider adopting in concert with other initiatives. For a number of countries in the region, this may be the only viable policy they can adopt in developing the sector and upgrading the infrastructure. Policies aimed at accomplishing this level of development should encourage domestic and foreign investment in the infrastructure sector. This often entails providing a package of incentives that normally includes tax breaks, capital security guarantee and copyright legislation.

The challenge to regulators in successfully managing the liberalisation process rests partly in determining the optimum number of licences to issue within a particular market and partly in negotiating terms which not only generate revenue for the government but also guarantee that disadvantaged and isolated communities are not excluded from service delivery. Australian decision makers in regional and rural areas went a step further and sought a “future-proof guarantee” that telecommunications services in their areas would not decline relative to those in cities after the full privatisation of Telstra, the government-owned provider. The government responded with a commitment to continue a programme of regular inquiries into any differences in service provision between metropolitan and non-metropolitan areas. All regulators in Asia Pacific should adopt similar efforts to ensure uniform ICT service provision during the liberalisation process.

**Allowing the grassroots to take over**

Although most governments play the leading role in implementing ICT programmes in the region, this is not the case in Indonesia, where the impetus and investment have come mainly from the people themselves. Remarkably, this people-driven effort has made progress in spite of official policies and regulations that either banned or discouraged some of the innovative technologies developed locally by Indonesian ICT engineers and ISPs.

Indonesians’ innovativeness is exemplified by their quest to overcome the high cost of Internet access due in a large part to telephone rental and other tariffs levied by the telecommunications company. A local ICT expert eventually found a low-cost broadband solution using off-the-shelf WiFi equipment that was adapted locally to build affordable neighbourhood broadband networks. Having found the solution for building alternative high-speed metropolitan area networks, Indonesian users are now considering means of building alternative regional networks in the country, using either a satellite backbone or the fibre/microwave backbone of cellular phone operators.

Another controversial technology that challenges existing regulations and policies is Internet telephony, or VoIP. Indonesia’s VoIP Maverick Network, or VoIP Merdeka in the Indonesian language, was started in response to the government’s plan to increase telephone tariffs in January 2003. The community-based VoIP network, which provides a free service, is one of the most complex countrywide Internet telephony infrastructures ever set up.

**Access to information and knowledge**

**Removing the stranglehold on knowledge**

The chief obstacle to the development of the information society is turning out to be the stifling copyright restrictions and intellectual property mechanisms asserted by economies with well-developed ICT industries. This stranglehold on knowledge has overtaken the lack of access to technologies as the main cause of the digital divide.

The recently negotiated Australian–US Free Trade Agreement (AUSFTA) is a worrying example of the growing trend to restrain the sharing of information and knowledge. AUSFTA proposes to extend copyright from 50 years to 70 years after the original author’s death. This is an initiative...
championed by lobby groups in Hollywood on behalf of corporations that have acquired copyrights and merchandising franchises. If this proposal does not seem worrying enough, Australia has already been advised that 70 years is an interim goal; the USA would prefer 95 years’ copyright after an author’s death.

It is ironic that intellectual property rights should form part of an agreement that has the aim of advancing free trade, as these rights are generally seen as preserving monopoly and inhibiting technological development.

Earlier, in 2000, Australia’s Intellectual Property and Competition Review had recommended that, in the public interest, the term of copyright should not be extended beyond the existing 50 years and that it should never be extended without first weighing all costs and benefits. This recommendation was ignored in the rush to ratify AUSFTA.

Advocates against this growing trend have proposed alternative instruments such as the Creative Commons whereby originators of information, media material and creative works can decide to share their works freely and let others know that their works are available for sharing at a searchable index. Other advocates have begun to tackle the problem head-on. An eminent group of 500 individuals, including Nobel laureates, launched their Declaration on the Future of the World Intellectual Property Organization (WIPO) calling for the inclusion of a development agenda in the work of the organisation. The declaration points out that “humanity faces a global crisis in the governance of knowledge, technology and culture”. It goes on to assert that the crisis is manifesting in the following ways:

- Without access to essential medicines, millions suffer and die.
- Morally repugnant inequality of access to education, knowledge and technology undermines development and social cohesion.
- Anti-competitive practices in the knowledge economy impose enormous costs on consumers and retard innovation.
- Authors, artists and inventors face mounting barriers to follow-on innovation.
- Concentrated ownership and control of knowledge, technology, biological resources and culture harms development, diversity and democratic institutions.
- Technological measures designed to enforce intellectual property rights in digital environments threaten core exceptions in copyright laws for disabled persons, libraries, educators, authors and consumers, besides undermining privacy and freedom.
- Key mechanisms to compensate and support creative individuals and communities are unfair to both creative persons and consumers.
- Private interests misappropriate social and public goods and lock up the public domain.

At about the same time, representatives of Argentina and Brazil presented to the General Assembly of WIPO the Proposal for the Establishment of a Development Agenda for WIPO (which is often referred to as “Item 12”, the order in which it is listed on the agenda of the October 2004 meeting). This proposal was strongly supported by developing countries, as well as a large group of civil society organisations. The representative for Sri Lanka spoke in support of Item 12 on behalf of the Asian group of countries saying the proposal was timely and that a working group should be set up to move the proposal forward. The representative from India also spoke in support of Item 12 pointing to the damage caused by the WTO intellectual property agreement, TRIPS, which had raised public awareness about problems regarding intellectual property. The attempt to reform WTO is only just beginning; the success or failure of this attempt will go a long way in deciding if the information society will have the space to flourish, especially in developing countries.

Localising technologies to increase information access

Computer and Internet-based technologies are not equipped to process many Asian languages. At the basic access level, standardised versions of many Asian scripts and fonts are not available to allow Asian users to communicate effectively through these new technologies, or to deploy them in basic tasks such as storing, sorting and managing digitised data prepared in local languages. The situation has improved for major regional language groups, such as Chinese, Japanese and Korean, who now have access to popular computer and online applications with localised desktops, dialogue boxes and keyboards. Most of the other regional languages and scripts do not have such accessibility.

Regional efforts are underway to localise the new technologies. The PAN Localization research project, a regional initiative that is now working on solutions for nine Asian languages – Bangla (Bengali), Dari, Dzongkha, Khmer, Lao, Nepali, Pashto, Sinhalese (Sinhala) and Tamil – is a major effort on this front. It aims to develop regional expertise in the R&D of local-language technology and to raise current levels of technological support for Asian languages. The researchers found that there has been a limited number of studies that examine local-language problems with the aim of devising and recommending effective policy frameworks to solve problems related to the accessibility to and publication of relevant content using ICT.

The project team also found an urgent need to standardise content translation mechanisms. Such standardisation will allow cross-border sharing of resources and information despite language barriers. Developing countries still rely largely on paper to disseminate data and information. The team feels that the digitisation of such information and data will be beneficial. It will be advocating for concerted local, national, regional and global efforts to archive these resources.
Opting for multi-channel strategies for sharing information

The euphoria of the dotcom boom focused most development communication efforts on the new ICTs. Interpersonal communication channels, radio, television and print were sidelined as people rushed to get content online. Although computers and the Internet are superior in many ways to the old technologies, they also have major limitations that alienate non-user groups, especially people who are illiterate or who do not have a working knowledge of a major European language.

The preoccupation with digital technologies also emphasized one type of information. The Internet and computers are very efficient at processing and sharing information and knowledge that is produced through formal activities such as scientific research and formal education. Such “privilege knowledge” is considered the most valid in the West because it is thought to be objective, transparent and repeatable.8 Largely absent on the Web is a second type of knowledge, which is derived from practice and now considered to be as important as privilege knowledge. The information society requires both types of knowledge in order to thrive. A more effective strategy for building these two complementary sets of knowledge within the information society is the simultaneous deployment of multiple channels for sharing information and experiences.

Communicators have long ago discovered the flaws of depending on a single channel of communication. Research has shown that people simply do not communicate in that way. People tend to obtain their information for a particular topic from a number of sources and in a variety of ways to ensure the usefulness and credibility of the information gathered. The importance of the different sources and ways may vary at different times and for different situations. Grandparents may be the most authoritative sources on cultural matters most effectively consulted over a number of afternoons sipping tea, while computers are trusted with providing the most accurate statistics obtained by researching online for an hour at the telecentre.

We opted for a flawed communication and information strategy during the dotcom boom by paying far too much attention to digital technologies and not enough to the other media and channels of communication. We need to adopt a balanced approach by mixing channels and media when planning ICT programmes and policies. Members of the information society whom these programmes and policies are meant to support should be consulted closely in determining what this mix ought to be. Such consultation may serve as one of the starting points for the building of the information society.

Capacity building

Building technical expertise in open source approaches

The most viable long-term strategy for all countries in the region, whether rich or poor, may be to adopt open source approaches in the development of both software and hardware. These approaches help to make businesses more cost-efficient while at the same time increasing the security of their data and ICT processes.

Ironically, developing countries, which stand to benefit the most from using open source technologies, are least able to deploy these technologies because of a serious lack of expertise in this area. Open source solutions tend to require more customising than expensive “plug-and-play” products.

With the growing trend of joining trade pacts, more and more developing countries are required to crack down on software piracy according to the terms of the trade agreements. However, it is very important that their governments promote open source solutions while cracking down on pirated software. Users must be provided with affordable alternatives instead of being forced to use expensive proprietary products.

Open source software is just as good as and often superior to proprietary products because of the larger number of technical experts contributing to its refinement and upgrading. The existence of cheap pirated versions of proprietary software has discouraged users from adopting open source applications, which require some amount of customising and retraining on the part of users. The pressure to clamp down on software piracy can be positively viewed as an opportunity to motivate users to switch over to more efficient, lower-cost open source software.

An open source promotional campaign should begin with the development of specialists who will provide technical support for the new software. Governments should at the same time fund the development of local versions of popular open source applications such as word processing, spreadsheets, Internet browsers, email and database management for free release. They can also boost the diffusion of open source software by opting to use such software throughout the public sector. As the government is usually the main user of ICT, particularly in developing countries, such a move will very quickly build a critical mass of open source users and mainstream the use of open source software in the country.

Strengthening the capacity of national representatives to engage in international forums

The Asia-Pacific countries had become a major Internet user group in the world by the end of 2001,9 but they still have very little say on how the Internet is managed. The least developed economies in the region have made only minimal input in multilateral debates on how the Internet should be governed and have largely failed to engage with powerful
technical decision-making bodies such as ICANN. This lack of capacity of the region to participate effectively in international forums has resulted in policies and technical arrangements which have exacerbated the digital divide. A good example is the current arrangement whereby all the countries in the region pay for all Internet connections to the USA. A fairer arrangement would be for the USA to share these costs, as in existing agreements relating to long-distance telephone calls. The current arrangement with the USA means a user in Silicon Valley, one of the richest communities of Internet users in the world, gets to visit websites hosted in Laos and send email to Laos for free because Laotian users are paying for the bandwidth connecting the two countries.

Regional efforts are needed urgently to strengthen the negotiating and advocacy skills of national representatives engaging with important decision-making forums such as ICANN and WSIS that decide on long-term arrangements relating to technical standards and infrastructure as well as policies and programmes.

Governments also need to recognise that the current emphasis on trade talks has shifted the most important issues relating to the information society into the ambit of multilateral trade treaties, which are far more binding than, say, the declaration of WSIS. They should invest half of their efforts to address the digital divide in negotiating for fairer trading arrangements that will help to narrow the divide. Efforts must be extended beyond WSIS and ICANN to powerful multilateral forums such as WTO and WIPO. Representatives of governments to these bodies need to be sensitised on the unique vulnerabilities of the information society to the harsh implications of “free” trade. They also should be made aware that many elements of the information society should be excluded from trade treaties. For example, just as religious matters are excluded from trade negotiations, so should core elements of the information society such as cultural products and services.

Agreeing to disagree

There is a slight sense of engaging with danger when making comments online in some parts of the region. The incarceration of a number of highly respected personalities for posting on the Web forthright analysis and criticism of government of information in order to enable the information society to develop to its full potential. In the case of the Internet, regulators can consider adopting international norms in managing the flow of information. The norm is to restrict control to a minimum number of categories of information, such as child pornography, libellous material, scams, and material that may incite religious and ethnic hatred.

Strengthening public media literacy

Regulators and policy makers are validly concerned with the potential impact of the unrestrained flow of information, commentary and entertainment content on the Web. The most effective strategy for addressing this concern is to conduct media literacy programmes. Ubiquitous international media services, made possible by the new technologies, render attempts to filter the content from these sources futile. Attempts to do so are often counter-productive, as outlawing any of the sources will only help to add to their appeal. Media literacy may be added to the school curriculum as a long-term measure.

Media literacy campaigns should not only aim to promote the understanding of the workings of the media and how their angle of analysis and presentation may distort facts, but also cover other important aspects such as the erosion of cultural values by advertisements and entertainment programmes, the stereotyping of gender roles, the degradation of women, and the excessive portrayal of violence.

Enabling environment

Freeing frequencies for WiFi

WiFi technologies are enabling people to go online in more efficient ways without being tethered to a cable. But in building the information society, WiFi’s most exciting potential is in providing connectivity to the millions of people who do not have any kind of access. WiFi can help communities without access to a network of land lines to get connected quickly, particularly in regions with difficult terrain where the cost of installing telephone cables is prohibitively high.

WiFi is also relevant in communities with land lines owned by telecommunications companies operating on exclusive licences that place the last-mile connection of the Internet in their stranglehold. However, it is often the exclusivity of such licensing which has prevented people from using WiFi technologies. The region is replete with instances of telecommunications companies and regulators restricting public access to the frequencies used by WiFi equipment so that the providers can preserve their monopoly at the cost of hindering the growth of the information society.
Governments in the region should adopt policies and amend regulations to free up the 2.4- and 5.8-GHz frequencies for public WiFi. This will bring the region into line with most European and North American countries, which have already opened up these frequencies for the use of their rapidly maturing information societies.

**Licensing community radio**
Community radio is another technology that has been given very little opportunity to grow as a support to development initiatives. It has been available for several decades but has not taken off because of widespread regulations in the region banning community-managed radio stations. Research in development communication has shown that community radio stations work better than stations operated by the government or commercial broadcasters because of the active participation of members of the community in deciding the content and format of broadcasts. Community participation helps to ensure that the most relevant messages are broadcast and in formats that people find interesting and engaging.

Low-power radio transmitters may now be purchased and installed for nearly the equivalent cost of a PC. These transmitters have a range that covers the area of a large village or several smaller villages. At the listener’s end, radio receivers are the most widely available ICT tool in homes of poor communities in the region. It is a tool that reaches illiterates and literates, young and old, males and females. More importantly, community radio draws on the strengths of the oral traditions of many Asia-Pacific communities. The nuances, emotions and subtleties of information and messages communicated in these traditions can be effectively relayed by radio. Websites are not able to do this.

Regulators should consider lifting the requirement for community radio stations to be licensed. Development agencies could at the same time consider resuming support for efforts to launch community broadcasting as well as sustaining stations that are already on the air.

**Facilitating e-commerce and selling of services**
A significant number of entrepreneurs in several countries in the region have encountered difficulties when processing payments received from abroad via e-commerce and the selling of services. The difficulties stem from strict foreign exchange regulations, which often pose problems even for proceeds from the export of goods and services.

Some officials have been known to quiz service providers on the “actual” sources of funds because there were no bills of lading for services exported. They do not seem to grasp the concept that these exports are “invisible” and do not need bills of lading as required by physical goods.

Many e-commerce merchants are forced to place their online payment facility with service providers outside their countries. Governments need to update relevant fiscal policies and regulations, at the same time as those for the ICT sector, to enable local entrepreneurs in the new industry to operate effectively and not be discouraged into relocating their businesses abroad.

**Cultural diversity and identity**

**Getting illiterate people online**
One of the chief obstacles to going online in the less developed parts of Asia Pacific is the bias in the design of most ICT applications and services towards serving only literate users. The bulk of the new technologies are based on the alphanumeric system. Users need to be literate in a language and have sufficient familiarity with the Latin font to be able to input an address or URL in order to navigate cyberspace. Large numbers of people in the developing world do not have these minimum skills to operate ICTs and as a result find themselves excluded from the emerging information society. The UNESCO Institute for Statistics forecasted that 614 million Asians, or 21.8 percent of the region’s population, would be illiterate in 2005. Of this total, 398 million would be female and 216 million male.

WSIS Action Line C8, “Cultural diversity and identity, linguistic diversity and local content”, needs to focus efforts on developing appropriate ICTs which are visual and voice based to accommodate the oral traditions of many of the rural communities in the region. Some of the action may be focused on developing low-cost voice- and icon-activated devices to replace the computer and keyboard, and the rest of the action aimed at hooking up the new technologies to the older communication channels and media, which may include the conventional telephone system, radio and television.

ICTs built with multimedia capabilities can avoid running text-based applications that alienate most rural users in developing countries. Touch-screen navigation and the use of icons, visuals and audio can all potentially help illiterate people to get online. A variety of strategies have been piloted in the region for making the Internet available to not only illiterate people but also other unconnected members of communities. For example, the experiment carried out in Pondicherry in the south of India by the M.S. Swaminathan Research Foundation involves project staff downloading a map from a US Navy website every day. Information such as wave heights and wind directions contained in the map is then read aloud over loudspeakers to members of the fishing community served by the project. This simple web-to-voice experiment is literally saving lives by steering people away from dangerous sea conditions.

The time is opportune for practitioners and industries in the region to develop their own voice- and audio-based technologies to extend the benefits of ICT to everyone here. The solution may be in the form of a simple low-cost village PDA that enables users to navigate the Web using voice and audio facilities and WiFi connections. It may also evolve...
Many other Asian scripts are associated with similar far-flung and diverse stakeholder groups, who need to participate in resolving various aspects of rendering domain names in their respective scripts. The political will of the countries in the region is essential for resolving the technical – and cultural – issues which will make it possible for Asians to navigate the Internet in their own scripts.

While the technical issues dealing with the internationalisation of the DNS seem to be in competent hands, others dealing with the design of digital fonts for the hundreds of languages which are still absent in cyberspace remain urgent. In some instances, they lack attention. In other instances, duplication of efforts has stalled work to effectively deploy additional languages on the Internet as policy makers, members of the industry and users wrestle with incompatible digital versions of the same script.

This problem is a major obstacle to the operation of email services in the affected languages. This is a huge blow to free expression as email services are more widely available than content on the Web. Email continues to be the central application of the Internet. It is also the most meaningful, and important, to those isolated regions of the world with limited communication services. It has the potential to keep the large numbers of Asian migrant workers in touch with their families and friends at home. It is an indispensable tool to commerce. And it is a powerful two-way communication channel through which problems and aspirations may be exchanged and solutions and encouragement shared.

Media

Minimising gate-keeping mechanisms

The new ICTs, and the Internet in particular, abide by universally accepted principles of free flow of information that often conflict with the antiquated gate-keeping mechanisms built into older information societies. The customising of solutions to the digital divide may usefully dispense with or minimise gate-keeping mechanisms. The Internet and other new ICTs have breached previously impermeable borders, as such these mechanisms are indefensible in the long term and are likely to retard the growth of information societies and undermine national economic interests.

The Third Annual Worldwide Press Freedom Index, released by Reporters Without Borders in October 2004, ranks the Asia-Pacific region as having the most restrictive control over the news media, an important component of the information society. Six countries from the region are listed among the ten countries ranked as the most restrictive worldwide.
Digital solidarity agenda

Priorities and strategies

Building national and regional capacities to participate in international forums
This item tops the list of priorities because pivotal issues that will profoundly affect information societies in the decades ahead are presently being negotiated without effective participation from most Asia-Pacific countries. This problem stems partly from a lack of recognition of the importance of these issues among many policy makers and partly from a scarcity of national representatives who can confidently engage in these issues at key international forums. Ironically, the most important forums do not appear to be those to which ICT practitioners and policy makers are devoting most of their efforts.

The really crucial forums are those dealing with trading arrangements that lead up to the finalisation of binding treaties and agreements encompassing ICT-related issues of intellectual property rights and access to markets for a variety of goods and services including cultural materials. These issues when aggregated have the power to impact on key facets of how social and business processes may be conducted, how much restriction may be imposed on presently free and open communication processes, how intellectual property will be protected and accessed, and how trade in information and communication goods and services will be managed.

For a start, regional policy roundtables on WTO, WIPO, ICANN and WSIS need to be organised very urgently where negotiators from the region will be briefed and sensitised on the long-term implications of the various treaties, agreements and other multilateral and bilateral instruments that are being negotiated. These briefings should be accompanied by presentations by experienced negotiators on the most effective strategies for engaging in the various rounds of talks and negotiations. The roundtables may also usefully set aside time for unstructured sessions during which countries sharing common needs and facing similar challenges may convene their own working groups to find solutions to their common problems and concerns.

Understanding how ICT helps to bring about socioeconomic development
Most ICT specialists working on development projects have a gut feel of how technologies can help to bring about change but not well-grounded knowledge about the complex processes which connect the sharing of information to the alleviation of poverty. In the absence of such knowledge, ICT projects are often designed to facilitate development without a firm foundation of underlying experiences upon which to base such designs. Priority must be given to synthesizing and analysing the rich pool of experiences generated over the past decades to arrive at knowledge that can help us test the popular assumptions which underpin most project designs. The synthesis will at the same time be invaluable to the conception and planning of future projects.

Involving communities in project design
People whom ICT initiatives are intended to support must be actively involved in the design and implementation of activities that are supposed to benefit them. Their involvement will ensure that project objectives address priority needs of the communities and better choices are made of technological solutions to be deployed. Too many ICT projects have been implemented in recent years with computers and Internet access as default solutions not open to negotiation. Often, what the people really want is a public telephone that works dependably, or literate facilitators who can assist them with bureaucratic procedures. A method for conducting such group decision-making processes may be quickly evolved from existing participatory problem-solving methodologies. A community of practice may be formed among practitioners in the region who are able to facilitate these processes to help train other facilitators as well as to refine the methodologies on a continuous basis.

Customising new digital technologies
India and Sri Lanka have led the region in efforts to design and manufacture appropriate digital hardware that may be used by developing communities. India invented the Simputer, while Sri Lanka conceptualised the village PDA.

World-class ICT hardware manufacturers in Taiwan, Japan, South Korea and Singapore need to be encouraged to collaborate with their counterparts in developing countries to refine their inventions and, more importantly, to help bring down the cost of appropriate technologies to levels that are affordable to their intended users. For example, both the Indian and Sri Lankan inventions were designed using chips and other components imported from large Asian chip foundries and parts manufacturers, which have a potentially central role to play in influencing the retail prices of these devices.

Developing low-cost technologies to enable illiterate people to go online
The 614 million illiterate people across Asia Pacific who cannot make use of the Internet in its present form must be provided with technologies that enable them to get online. A regional R&D team needs to be formed with the priority task of developing these technologies. Because of the complexity of the challenge, the team must comprise social scientists, development communicators and indigenous-knowledge experts, in addition to ICT specialists. The multidisciplinary composition of the R&D team will ensure
Continuing assistance to improve developing communities’ access to ICT
Financial and technical assistance to developing communities for establishing the infrastructure required for making effective use of ICT needs to continue. However, such assistance is best allocated to isolated rural communities that private sector providers will avoid. Aid of this nature has been focused on building Internet access facilities in the past; future assistance should consider adopting an integrated development communication approach by involving intended users in the selection of the technology package to be deployed. Such a package may include community media, group events, formal and non-formal education programmes, in addition to Internet access. Such integrated ICT packages can better respond to people’s information-seeking behaviour and help to develop a diversity of information sources and a multiplicity of communication channels for the information society that the people are working to build.

Building local capacity in open source software
Developing local open source capacity is a priority that the economies in the region can work on collectively. Regional and subregional R&D centres should be established to adapt open source software to local requirements and to develop local expertise in the use and localisation of such software. The trained personnel should then be provided with financial assistance for conducting training after returning to their own countries.

As noted earlier, anti-piracy campaigns must be accompanied by the promotion of open source software as an alternative so as to prevent the widening of the digital divide resulting from a lack of affordable software applications. Such national and regional open source initiatives need long-term support in order to firmly establish the use of open source software and to stamp out software piracy.

Strengthening national expertise in the localisation of software
A community of practice of software localisation specialists may be formed to share their expertise with other practitioners beginning work in this area. Effective sharing of expertise may be facilitated through centralised training events followed by online technical backstopping.

Governments in the region should convene technical working groups with a formal mandate to establish technical standards for open source software after a predetermined period of public consultation. The immediate task is to resolve the problem of the lack of standardised fonts for many languages in the region. These working groups may individually, or as a subregional group, collaborate with international technical working groups such as Unicode and multinational software companies on font standardisation.

Establishing a region-wide Creative Commons
The trend of protecting intellectual property rights through various multilateral treaties and trading arrangements has presented the region with the prospect of a widening digital divide as poor communities cannot afford the information they need in building the information society. The region can help to halt this trend by joining global efforts to build the Creative Commons, which advocates free access to intellectual property.

A network of facilitators representing the various language groups in the region is needed to champion the building of the Asia-Pacific Creative Commons. Originators of content should be encouraged to contribute works to the Creative Commons, and content in the various languages can be made available to people of other language groups through the use of gist translation facilities.

Priority should be given to the establishment of the network of champions and facilitators for the Creative Commons. It will be expedient to turn to personnel from broadcasting, news and R&D networks to play this role so that a network of networks may be formed in a short time. Civic groups, indigenous people, and artists should be enlisted at the same time.

Converging divergent interests
The economies of the region are approaching the Tunis phase of WSIS in 2005 with different economic interests that threaten to fragment, rather than unite, the region. A deep chasm now separates the advanced ICT powerhouses on one side of the digital divide from the countries that are painstakingly rebuilding their infrastructure from scratch on the other side. The current trend of establishing rigid and binding treaties, copyright regimes and trading arrangements that further impede the free flow of knowledge and innovations promises to widen that gulf.

Governments, civil society and the development community need to urgently restore balance to this trade-driven approach towards closer collaboration between economies in the region. Promising first steps have been taken in this direction by ASEAN and APEC (see the chapters on ASEAN and APEC). The former launched the ASEAN Regional Forum on convergence in October 2004 in collaboration with the Pan Asia Networking programme of IDRC. The forum will support the development of a convergence framework for ASEAN member states, share convergence best practices, and provide a focal point for the presentation of activities to address convergence issues by member countries and selected non-member Southeast Asian states.
The economic-centric emphasis currently prevalent across the region, if left unchecked, will eventually weaken the core values that have made Asia Pacific resilient. Overemphasis on trade will likely also lead us down the path to conflict. The digital divide has provided us with an opportunity to work together in reinforcing the cultural foundations of the region as a valuable asset for human development. We will find in our joint efforts to build the information society a great many more common interests that bind the peoples of Asia Pacific than divide us.

Notes

Internet governance:
Urgent issues for Asia Pacific

Adam Peake

During 2004, Internet governance became the focus of global discussion and one of the most contentious issues for the World Summit on the Information Society (WSIS). The concept of Internet governance is ill-defined and confusing, and the appropriate roles and responsibilities of the various stakeholders are the subject of strong disagreement. In response to a request by WSIS, the UN Secretary General established a working group tasked to look into the various issues related to Internet governance and to develop a common understanding of the different roles of the stakeholders.

As an indication of how quickly ICT priorities can change, a little over a year ago the 2003/2004 edition of Digital Review of Asia Pacific only touched lightly on these issues. However, the authors presciently identified the subject at the heart of the debate today: the lack of representation and participation of developing nations – many of them in Asia Pacific – in international policy forums addressing Internet-related issues.

This chapter introduces the background to the global debate and examines the key policy issues while providing a perspective from the Asia-Pacific region.

WSIS and governance of the Internet

The UN-initiated WSIS is being held in two phases spanning a period of over three years. The first phase culminated with a summit in Geneva in December 2003, while the second phase will conclude in Tunis in November 2005. The Geneva summit produced two documents: a Declaration of Principles, which provides a statement of the political will to establish an information society for all, and a Plan of Action, which recommends specific actions that have to be taken to achieve that political vision. Internet governance was one of two issues (the other being the implementation of new financing mechanisms for ICT development) on which governments were unable to reach agreement during the Geneva phase, and it will be one of the key issues at the Tunis summit.

Early in the preparatory process for the Geneva summit, governments took opposing positions on what they considered the problems of Internet governance. Unable to reach agreement, they approached the UN Secretary General to set up what has since become the Working Group on Internet Governance (WGIG) to develop a working definition of Internet governance and to identify the public policy issues involved. The working group was formally established on 12 November 2004, leaving it little time to accomplish a difficult and complex task. It operates independently of the WSIS preparatory process, thus it has been able to adopt a more open and transparent multi-stakeholder approach rather than the formal intergovernmental negotiating style used in WSIS. The working group will present its report at WSIS Tunis.

Enabling meaningful participation

The “rules of the game” for the information society are being made in many different global policy-making frameworks, and at the heart of the debate about Internet governance is the lack of representation and participation of developing nations in many of these policy forums and discussions. Having been repeatedly told how important ICT is for their development goals, governments and other representatives from developing nations have come to realise they are absent from most of the related policy development processes. Rightly, they see this as an unfair situation and a very significant manifestation of the digital divide. Developing nations are demanding a greater role in all ICT policy forums.

The Geneva Declaration of Principles and Plan of Action state that institutional arrangements for Internet governance should be multilateral, transparent, democratic, and open to all stakeholders. These are important principles, but inclusive governance mechanisms cannot be achieved without also building technical and policy capacity. Recommendations on capacity building are beyond the scope of this chapter, but there are many organisations working on ICT and Internet capacity building in the Asia-Pacific region. These range
from traditional intergovernmental processes, such as those organised by the Asia-Pacific Telecommunity and the Asia-Pacific Development Information Programme of the regional office of UNDP, to private-sector and volunteer-led activities working on more specific issues such as Internet security (APCERT), spam (APCAUCE), the operation and management of country code top-level domains (APNIC), and Internet technical training (APRICOT). These and other similar organisations and bodies are responsible for many Internet successes in the region and should be built on, not replaced.

**Defining Internet governance: Scope and responsibility**

Disagreement among governments in WSIS over Internet governance has revolved around two issues: the scope of its definition and who should be responsible for it.

In terms of scope, some envisage a narrow or restricted definition of governance of the Internet, in terms of technical coordination issues such as those managed by ICANN. Others take a broader or extensive view of governance on the Internet, relating to what the Internet carries and enables, with consideration given to a wide range of issues, such as e-commerce, intellectual property, technical standards, privacy and content. However, there is general agreement by both groups that ICANN is central to the debate.

The second area of disagreement is over responsibility for Internet governance and whether a new intergovernmental process is required or whether to stick with the status quo. Many developing nations, particularly China, South Africa, Brazil and most Arab states, have expressed the view that Internet governance is a matter related to national sovereignty and that an intergovernmental process, preferably under the UN (with ITU being specifically mentioned), is needed where governments could discuss policy issues of international scope. For developing nations, this “one-stop shop” for Internet and ICT-related policy activities has obvious appeal.

Most developed nations, including the USA, the European Union, Japan, Canada and Australia, have supported the current system of private sector leadership. They are referring to the narrower definition of Internet governance, particularly to ICANN’s responsibilities, while at the same time recognising that the Internet has developed successfully through self-regulation and so this should be encouraged to continue. They are proposing that, since private sector leadership works, there is no need for wholesale change.

The divergence of views between the developed and the developing world, and the challenge to the current system of Internet governance, is illustrated by the position stated by China at a meeting in September 2004 to discuss the formation of WGIG. The Chinese delegate commented that private sector leadership in Internet governance had served well up to now, but that was the past and it was time to move on. The Internet was too important and the biggest problem of today’s Internet was the lack of a legitimate organisation under the UN.

WGIG is taking a broad view of what constitutes Internet governance, reasoning that it must begin by taking an inclusive approach or risk immediately alienating some from the process. It has not taken any position on issues of responsibility.

The Internet is recognised as the foundation of the information society. It provides an innovative environment that enables faster and cheaper communication. It is becoming the basis of global trade and an important means to help achieve many essential development goals. But the price of this success includes not only the effects of increased scale but also tensions arising from operating in a global environment which is multilingual, multicultural, multi-jurisdictional and cross-border. These tensions manifest themselves in problems associated with the allocation of Internet resources such as those ICANN oversees, multilingualism, interconnection arrangements and pricing, spam, cyber crime and security, and they are also the issues most often and most emphatically raised as those WGIG should address. They are the focus of this chapter as well.

**Defining Internet governance: Key issues**

The Internet Corporation for Assigned Names and Numbers (ICANN) – along with the domain name system (DNS), particularly country code top-level domains (ccTLDs), IP addresses, the root server system, and multilingual or internationalised domain names – has been the focus of the Internet governance debate. During the Geneva phase of WSIS, some developing nations complained that they were unable to participate in many of the decision-making processes about domain name policies or to manage resources they believed they had a right to manage, particularly a sovereign right in the case of ccTLDs. The disagreement was exacerbated by the perception of US domination of the Internet and its governance.

**ICANN and the US government: Control of the root servers**

ICANN is a California-based non-profit corporation established in November 1998 by the US government to take responsibility for the management of the DNS. The intention behind ICANN’s creation was to privatise and internationalise the DNS, to introduce competition, and over time to hand over responsibility for DNS management to the global Internet community.

The development and management of the DNS had historically been carried out by an organisation called the Internet Assigned Numbers Authority (IANA) under
research and other grants from the US government. IANA is more a set of technical functions than an actual entity; and ICANN, upon its creation, took responsibility for the IANA functions under a contract with the US Department of Commerce. Those functions include the assignment of technical protocol parameters, coordination of IP address space allocation, oversight and implementation of policies for DNS registries and registrars, and oversight of the root server system. ICANN also took responsibility for the Department of Commerce’s contract with Network Solutions Inc. to manage the generic top-level domains (gTLDs) “.com”, “.net” and “.org.”

ICANN’s relationship with the US government is defined in two documents. The first is a memorandum of understanding (MoU) which lays out a set of milestones ICANN must achieve to assure the government that ICANN and the private sector are capable of assuming the responsibilities related to the technical management of the DNS. The MoU is due to lapse in September 2006, at which time ICANN should be able to assume responsibility for the DNS. The second is a contract for the performance of IANA functions. It is a yearly contract with options extending to March 2006.

Root servers: Spreading the load across the world

The DNS root servers provide the master, or root, level of the hierarchical DNS directory. Collectively, they manage a single directory called the root zone file, which contains a reference to all top-level DNS servers, including gTLD and ccTLD servers. For a top-level domain (TLD) like “.com”, “.jp” or “.my” to appear on the global Internet, it must be installed in the root zone file by the operators of the DNS root servers.

There are 13 root servers around the world; the number is limited to 13 by the technical design of the protocols on which the DNS runs and cannot be changed. Ten root servers are located in the USA. The locations of the root servers are partly historic, the Internet being conceived and developed in the USA, but they are also based on the practical consideration that root servers should be sited so that the maximum number of users enjoy the minimum response time when sending DNS requests, that is, as close to as many users as possible. As Internet traffic has historically concentrated on the Internet exchange points located on the US east and west coasts, having root servers nearby makes sense. Root servers are also difficult to move, not physically but in terms of IP address routing.

Anycast and the deployment of “regional” root servers

The WSIS Plan of Action recommends that action should be taken to promote regional root servers in order to overcome barriers to access. The document does not explain

Ten urgent issues and their solutions

The UNDP Asia-Pacific Development Information Programme launched a major initiative called the Open Regional Dialogue on Internet Governance (ORDIG) in October 2004 with support from IDRC. The first phase of ORDIG, carried out from October 2004 to February 2005, focused on raising awareness and canvassing the views and priority concerns about Internet governance of all stakeholder groups in the Asia-Pacific region.

The initiative sponsored a series of consultations on Internet governance at civil society, governmental and Internet industry meetings across the region. This face-to-face activity was supplemented with a five-week online forum that attracted 180 participants from more than 25 countries in the region. The spirited debate and the wealth of case studies that emerged in both the consultations and the online forum clearly highlighted that Internet governance is far from being an abstract affair, but that it is closely intertwined with and influences the practical experience of providing and using the Internet in many significant ways.

The consultations brought to light a considerable disconnect and some misunderstanding between different stakeholder groups, underscoring the need for a more sustained dialogue and a stronger focus on concrete Internet policy issues, rather than abstract dichotomies such as government versus markets that tend to exaggerate differences and unduly polarise the debate.

The following are the major Internet governance issues that emerged from these regional consultations and from preliminary analysis of a survey that covered 1,240 respondents: (1) viruses; (2) online fraud and cyber crime; (3) spam, or unsolicited commercial email; (4) privacy and personal data protection; (5) domain names and IP address management; (6) harmful content; (7) wireless Internet policies; (8) availability and affordability issues; (9) reliability and speed issues; and (10) availability of public information. Suggested solutions to these problems varied significantly. However, it was generally recognised that no quick fixes exist and most problems require active cooperation between different stakeholder groups for effective solution.

what regional root servers are. They were discussed during the preparatory process, but what they are, how they would be implemented and would function, and what problem they would solve were not discussed. However, the recommendation seems to envision moving a root server from a current location (probably the USA) to some other place, as there certainly cannot be more than the current 13. The recommendation to create regional root servers highlights one of the potential dangers of a process like WSIS; that governments will make political demands that are technically infeasible and potentially extremely harmful.

During 2003, while WSIS was in progress, a technique called anycast was deployed that enables one root server to be “cloned” in multiple locations. By January 2004, there were more functioning root servers outside the USA than inside its borders. An anycast root server is an exact copy or mirror of one of the authoritative 13 servers, containing identical data and performing exactly the same function, but it can be located anywhere in the world. One of the 13 root servers is located in the Asia-Pacific region, in Tokyo, but there are now anycast mirrors of other root servers in multiple cities throughout the region: Australia, China, Hong Kong, Taiwan, Singapore, New Zealand, Thailand, Malaysia and Indonesia each host at least one anycast root server. In addition to operational benefits, anycast root servers go some way to reducing geopolitical pressures for countries to “own” a root server.

Since the beginning of 2003, cloned root servers have appeared on every continent, to date in 31 countries and territories. Anycast has significantly changed how DNS root services are distributed. Yet, it has been implemented with minimal involvement of ICANN, no formal policy development process, and no official consultation with the US Department of Commerce. That such a fundamental change to how the Internet works can take place with so little oversight certainly casts doubt on the view that ICANN rigidly controls the Internet as some in WSIS have claimed. However, the US Department of Commerce does control the root.

Unilateral control of the root

IANA is responsible for publishing the content of the root zone file. The contract with the US Department of Commerce specifically prohibits IANA – or ICANN, which holds the contract for IANA functions – from making any “modifications, additions, or deletions to the root zone file or associated information that constitute delegation or re-delegation of top level domains” without permission. There are two implications to this, one regarding deletion and the other redelegation, and they represent the key problems with ICANN and the DNS raised during WSIS.

The IANA contract gives the US Department of Commerce the final authority on what appears or does not appear in the root. This situation where the USA has the potential to remove a country from the root, and therefore from the Internet, is obviously a serious concern for many nations. While it is extremely unlikely that the USA would use this potential power to remove a ccTLD, it is unacceptable to these nations that one country should have such control over the resources and rights of another. It also impacts on the good governance of ccTLDs and affects the introduction of future DNS services such as internationalised domain names.

Governments must have the assurance that their country’s TLD will appear in the root: it is an essential matter of national sovereignty. It should be a particular concern to countries in Asia Pacific, where there is a strong need for internationalised domain names.

ccTLD redelegation

The IANA contract also states that the US Department of Commerce must authorise the delegation or redelegation of any TLD. Consequently, the US government has the final authority on who is responsible for administering a country’s TLD.

Historically, IANA assigned the right to administer a ccTLD to the first technically capable person from a country showing interest in this task. It made the assignment to a ccTLD manager on the basis that the manager is performing a public service on behalf of the Internet community, and the assigned person or organisation is a trustee, not owner, of the ccTLD. Some of these early delegations have become contentious as they were made before many countries had any knowledge of the Internet. Governments are now aware of the importance of the Internet and either wish to take control of the ccTLD directly or assign control to an organisation they consider more appropriate.

To begin a transfer of a ccTLD from one designated manager to another, the old and new managers must inform ICANN that the transfer is mutually agreed and that the new manager understands the responsibilities involved. ICANN procedures say it is also helpful to have supporting correspondence from other parties affected by the transfer and that it pays particular attention to the wishes of governments. Where there is a conflict – perhaps the old manager refuses to give up the responsibility – ICANN tries to have the two parties agree rather than force a decision and become involved in local politics. This can be a very long process, one that many governments that have experienced contested redelegations have found very frustrating.

This complex process is necessary as ICANN cannot redelegate a ccTLD simply because someone asks it to do so. There are occasions when it is difficult to know who is speaking for the legitimate and responsible arm of a government. There are also technical considerations to the redelegation. One of ICANN’s key responsibilities is to ensure the security and stability of the Internet, and a poorly
operated or failing ccTLD could impact the operation of other parts of the global network as well as provide bad service to users of the ccTLD locally. However, under the current arrangement, no government (except the USA) owns its country’s TLD, and so it cannot order ICANN or the US Department of Commerce to make any changes regarding its country’s TLD.

Beyond the requirements of the contract with the US Department of Commerce, ICANN actually exerts very little control over ccTLD operations. It does not say what fee a ccTLD operator should charge for a domain name and sets no requirements on the structure of the ccTLD’s name space. Some ccTLDs are run as de facto gTLDs; they do not serve their local community but instead compete with the true gTLDs. Tuvalu, the Pacific island nation with the ccTLD “.tv”, sold the right to market the ccTLD to a corporation which promotes the name as a competitor to “.com” and the other gTLDs. There are many similar examples, such as “.to”, “.nu” and “.cc”.

However, the US government’s control over the root zone file and over the redelegation of TLDs casts a cloud over how ICANN is viewed by many governments. At the meeting to discuss the formation of WGIG, a representative of the Brazilian government said, “It is a myth that there really is such a thing as independent, private sector management of the Internet addressing system. In fact ICANN’s MoU with the US Department of Commerce reveals that it is closer to a government.” There will be no solution to disagreements over Internet governance until the US government makes some concessions to the legitimate concerns of other nations regarding these simple and obvious sovereign issues.

It is also important to note that while the current MoU between ICANN and the US government is expected to be the last, with ICANN assuming responsibility in September 2006, the IANA contract is a separate arrangement. The contract is linked to the MoU, but it is unclear whether the US government will also allow this contract to end in 2006 and let control of the root servers pass over permanently to ICANN.

Stakeholders from the Asia-Pacific region should make every effort to find a resolution to this problem.

Internet address space: IP numbers

IP addresses are numbers used to identify computers and devices on the Internet. No two devices on the public Internet can have the same IP address, so the addresses must be uniquely assigned; and this requires some degree of global coordination. The current IPv4 address pool has a limited number of addresses, so assignments are made with a view to conservation.

Today, organisations known as regional Internet registries (RIRs) manage the IP address space. The Asia Pacific Network Information Centre (APNIC) is responsible for Internet resource distribution in the Asia-Pacific region. The distribution of the IP addresses allocated since 1999 among the various RIRs is as follows: APNIC (for Asia-Pacific region) 32 percent, RIPE NCC (Réseaux IP Européens Network Coordination Centre, for Europe, Middle East and North Africa) 29 percent, ARIN (American Registry for Internet Numbers, for North America and Southern Africa) 37 percent, LACNIC (Latin American and Caribbean Internet Addresses Registry, for Latin America and the Caribbean) 2 percent.

All the RIRs are open, fee-based not-for-profit membership organisations. They each develop policy through open, consensus-based policy development processes. The policy development process and policy decisions are archived so that they are publicly accessible. At the global level, IANA allocates IP addresses from pools of unallocated addresses to the RIRs according to their needs. The RIRs do not contract with the US government and are not subject to US government policy.

In the ICANN structure, the RIRs form the Address Supporting Organisation (ASO) and provide the ICANN board with advice on global policy issues regarding the assignment of IP addresses. The RIRs recently established a new organisation, the Number Resource Organisation (NRO), as a focal point for their global activities. NRO and ICANN signed an MoU establishing how NRO will fulfil the role, responsibilities and functions of ASO as outlined in the ICANN bylaws.

The RIRs have been operating fair and equitable allocation processes since the mid-1990s. However, that this is not understood by some governments is an indication that the relationship between the RIRs and national governments needs to be strengthened. Many governments are clearly not aware of how the RIRs operate. The RIR system of “bottom-up” processes, in particular, may be alien when compared to ITU’s system (which assigns responsibility for the management of the telephone numbering plan to nation-states).

IPv6 allocation

IPv6 was adopted by the Internet Engineering Task Force (IETF) as the successor to IPv4 over ten years ago to provide more address space and functionality. The IPv6 address space is many orders of magnitude larger than that of IPv4 and, while not infinite, is enough to meet all foreseeable requirements. Wasteful and ill-considered allocations can of course exhaust any finite resource, but the IPv6 address space is large enough to make the conservation-oriented allocation policy adopted for IPv4 unnecessary.

Adoption of IPv6 has been much slower than anticipated, and national governments are becoming increasingly involved in developing policy to encourage deployment. Japan is typical of many Asia-Pacific countries in making IPv6 deployment an important element of the national ICT policy in the hope of stimulating innovation, for example in
ubiquitous services, and strengthening the domestic IT industry. China, South Korea and Japan have begun joint initiatives to develop and promote IPv6. Governments that make IPv6 an element of their national ICT strategy will consequently take a much greater interest in allocation policies than they did for IPv4. However, like Japan, they can be expected to limit their interest to their national strategy so long as allocations are made on a fair and non-discriminatory basis.

Houlin Zhao, director of ITU’s Telecommunication Standardisation Bureau, recently suggested that concerns over sovereignty made it necessary for nation-states to take greater control of IP address allocation and that the availability of almost unlimited IPv6 addresses made this possible. However, the primary concern regarding IP addresses, whether scarce or plentiful, is that they are globally uniquely assigned. Sovereignty, if it exists at all as a legitimate concern, is at best a secondary consideration to global uniqueness. Running a new nation-state based system side by side with the existing RIR process may result in excessive fragmentation of IPv6 address space and may cause a failure of the routing system resulting in discontinuation of services to parts of the Internet.

In Asia Pacific, where control of content by some governments is a concern, allocation of IP addresses by governments would enable questionable applications such as censorship and the tracking or restriction of the content of communications. As well as being a violation of human rights, such uses would undermine the fundamental architectural principles of the Internet.

Good governance of Internet resources

As the RIRs are responsible for the allocation of critical resources, and given the importance of the Internet, it would be irresponsible of any government not to take an interest in allocation matters. The misunderstanding that governments have about IP address allocation is an indication that the RIRs need to continue to improve their relationships with governments. However, there has been little substantive criticism during the Geneva phase of WSIS of the RIRs’ work, policies or processes, and governments taking an interest should not mean taking control or trying to enforce regulation. A positive response from the RIRs to the attention of WSIS would be to not only increase their outreach to governments but also seek to involve representatives of public interest from civil society.

Like the RIRs, the root server operators have developed their systems and processes over time in ways that have grown to meet the technology demands and increased scale and importance of the Internet. However, unlike the RIRs, their operations and processes are neither transparent nor well defined. While technologically sophisticated and extremely competent, their operational and administrative processes do not meet the standard required of critical infrastructure providers. A government representative at the first meeting of WIGIG in November 2004 said that those who had been managing the root servers had done so very well so far, but there was no legal guarantee that this would continue.

Root server operators are very diverse in their organisational structures – some are run by government agencies, some by R&D organisations, and others by the not-for-profit and the private sector – and in the technical systems and equipment they deploy. Such diversity is a recognised strength against the risks of monoculture. But the root server operators’ operational practices, such as how they are financed and their financial stability, are not clear. They have no agreements among themselves or with the TLD managers they serve as to the level of service they will provide or regarding best practices. They have no agreement with ICANN to provide service. Should it be necessary to select a new root server operator, there are no published technical qualifications or characteristics required of a successor operator. It is a problem of transparency and visibility, and governments have a right to know if the critical infrastructure will continue to function. The Internet today is far too important for ad hoc processes.

Operational processes and standards for root server operators should be agreed, and agreements among the root server operators and between the root server operators and ICANN signed. Reporting procedures should be put in place to show that operational standards are being met and will be met in the future. Without such procedures, it is reasonable to expect that some, if not many, governments will intensify demands for increased oversight and control.

Internationalised domain names and the promotion of multilingualism

Until the early 1980s, each computer on the Internet was identified by an IP number, a string of numbers uniquely assigned to every computer on the network. As the Internet grew, domain names were invented to map combinations of letters and numbers to an IP number so that people could identify their computers in more meaningful ways. For example, a computer that had been known as 157.150.195.46 could be identified by the much easier to remember and recognise “un.org” (the UN). But this is only easier if you understand and recognise Roman characters. The DNS is based on the Latin alphabet. It is estimated that about 80 percent of people in the Asia-Pacific region do not understand English, and many of them do not even recognise English characters. For these people, domain names might as well be numbers.

The promotion of multilingualism in the information society is one of the central features of WSIS. While the text in email or in webpages can be produced in most of the
world’s languages and scripts, domain names must be typed in a subset of ASCII characters. Work has been going on since 1998 to develop internationalised domain names (IDNs) which use non-ASCII characters, and until recently barriers to the deployment of IDNs had been technical. However, standards are now in place, and the main obstacles to IDN deployment today are a lack of resources and perhaps also a lack of determination among some of the key players to undertake what will be a very challenging global activity.

IETF had developed most of the technical standards for IDNs by early 2003, while some important work on administrative guidelines for Chinese, Korean and Japanese characters was completed in April 2004. ICANN began work identifying the technical and policy issues in 2001, issued a comprehensive report in autumn 2002 and finalised guidelines for the implementation of IDNs in June 2003. Unfortunately, since then all sense of urgency seems to have been lost.

There are other barriers to deployment. The Internet Explorer web browser used by 90 percent of Internet users worldwide does not have native support for IDNs, and a plug-in must be installed. Microsoft is highly unlikely to support IDNs until it releases the next version of its Windows operating system known as Longhorn, expected sometime in 2006.

IDNs will also complicate law enforcement efforts to track activities across borders involving domain names and registration information that officers are unable to read. Many Chinese characters look very similar, particularly on a computer screen, and we can expect more cases of fraud as people are directed to hoax websites that have domain names looking similar to that of an online bank or payment system they are familiar with but that have actually been set up to steal their money, identity and so on.

IDNs at the second level are slowly being commercially introduced. The second level is fine for Western languages that use diacritical marks, such as French or German, as they can use an IDN below their ccTLD “.fr” or “.de” or in a gTLD such as “.com”. But for non-Western languages, like many used in Asia Pacific, their scripts also need to be used at the top level.

The introduction of a fully internationalised system will require cooperation between countries and ccTLD managers, particularly between countries of the same language group. Internationalised top-level domain names may require new governance structures and policy development processes that are representative of the language groups they will serve. It is reasonable to assume that these structures will be very different from the current systems based on a national or global scope. Furthermore, new internationalised TLDs will require entry into the root zone file, and this will make continued US unilateral control over the system even more contentious.

IDN experts admit they do not have answers to all the problems of internationalised top-level domain names. Every proposal put forward so far has some problems, be they technical, operational, political or, worst, unknown. However, the community has waited far too long and the need is becoming too great. Hence, some are suggesting that implementation of internationalised TLDs should begin as soon as possible in order to gain operational experience and to work through problems as they come along. Therefore, clear rules and procedures for applying to operate internationalised TLDs coupled with open and transparent processes for making selections of TLD managers should be established quickly by ICANN.

An IDN system is a critical enabling technology that will make the Internet more usable and attractive to the majority of the world’s population who do not recognise English. IDNs will encourage local communication and local content creation. The non-English-speaking countries of Asia Pacific have the most to gain from IDNs and must take the lead in their deployment. ICANN is currently the right forum to lead discussion and work on deploying IDNs.

ICANN has brought together technical experts from IETF and other forums, people concerned with Internet security and stability, ccTLD managers and governments, gTLD registries and registrars, and an expert policy community from the private sector, civil society and intergovernmental organisations. Implementation of IDNs will be a very significant global undertaking and no single organisation has the capacity to do all that is required, but ICANN is well placed to bring all the relevant actors together. However, ICANN has been slow since issuing its policy guidelines some years ago, and it should recognise that it is in danger of becoming an obstacle to progress. The need for IDNs is obvious, and ICANN must be willing to take some risk, shared with its community, to make sure they are deployed.

Internet governance broadly

WGIG is beginning discussion by considering a very comprehensive list of public policy issues as potentially under the scope of the definition of Internet governance. The inventory lists 32 separate items, all of which have been raised at some point during discussions and are important ICT policy concerns. However, the focus of the debate has been on enabling equitable and universal participation in policy processes, on topics associated with ICANN and multilingualism, and on ensuring affordable and reliable access to the Internet in a secure and safe environment. Internet pricing and interconnection, spam as well as network and information security, and online content are essential themes that have been frequently raised in WSIS Internet governance discussions to date. Whether the debate is broad or narrow, these issues must be taken into consideration and are consequently discussed in detail in the remainder of this chapter.
Internet pricing and interconnection

In traditional telecommunications, the cost of international connectivity has typically been shared, either by each party paying half the cost of the connection or by settlements based on the amount of traffic exchanged. Unlike the telecommunications industry, which has evolved complex systems of international charging agreements over a period of about 100 years, there has been no economic regulation of the Internet. The Internet industry is based on mutual peering and on an economic model of bilateral agreements between customers and providers. The result of this regime is that ISPs wanting to connect to the Internet backbone, usually in the USA, have to initiate the connection and often pay for the full cost of the circuit from their country to a large American ISP or Internet exchange. Many consider this situation to be unfair and a barrier to ICT development in many developing nations.

The following diagram shows a very simplified picture of the Internet industry and how traffic and payments flow when email is sent from one country to another. From the top down, the diagram illustrates how providers at each layer resell Internet connectivity to providers at the layer below. Connectivity flows down and money flows up. It is important to note that this model is independent of distance: end-users pay the same fee to access resources located on a server half the world away as they do for the webpage of a local newspaper.

The end-user buys connectivity from a local ISP. To carry the user’s email across the Internet, the local ISP sends it to an upstream provider, a national or perhaps regional provider that has a network connecting different towns and cities in that country or region. The local ISP, known as a tier-three provider, pays the larger tier-two provider for this connectivity.

To carry the email internationally, the national ISP routes traffic via global carriers, known as Internet backbones or tier-one providers. These are companies with high-capacity continental and international connections. Again, payment is made from the customer to the provider of service, that is, from tier two to tier one.

Tier-one providers connect with other tier-one providers, usually on the basis of peering. Their traffic flows are about equal, so it is mutually beneficial for them to simply exchange traffic as equals. Unless there is a large imbalance of traffic, tier-one providers do not usually pay each other. Instead, they operate on a “sender keeps all” model, keeping the fees they receive from the providers below them. After peering across the tier-one providers’ networks, traffic then flows downstream, from tier one to tier two and on to the end-user. But money only flows upstream. At each layer, the customer receives service from a provider and pays for that service.

Tier-one providers must make very significant investments in network infrastructure, and the sender-keeps-all arrangement is the best way to recover these high costs. The result of this model is that developing nations and smaller ISPs must pay for the full cost of connectivity to the Internet, and they regard this as fundamentally unfair.

Comparison with the most commonly used traditional telecommunications settlement regime only makes matters worse. International telecommunications settlements tend to
favour high-cost monopoly carriers over those operating at lower costs in competitive markets. Settlements are made on the basis of the volume of calls terminated by one country in another; and the payers under the regime tend to be developed nations, and the recipients developing nations. Settlements are made in US dollars and can amount to hundreds of millions of dollars each year. For many developing countries, telecommunications settlements are among their most important sources of hard currency.

The telecommunications settlement regime was already failing before the Internet emerged as a significant portion of international communications traffic. Commercial services such as callback and refile were developed to take advantage of the pricing imbalance created by the settlement regime. ITU estimated that callback accounted for 22 percent of traffic from Asia to the USA in 1995. So the suggestion that a settlement-type regime could be introduced for the Internet overlooks that the old telecommunications model was already failing before the Internet came along.

### International charging arrangements for Internet services

The problem of Internet interconnection pricing is especially relevant to the Asia-Pacific region. It was first raised by the APEC Telecommunications and Information Working Group (APECTEL) in 1998 in a study called International Charging Arrangements for Internet Services (ICAIS). The ICAIS study was based on the concern of Australian and Asian carriers that they are paying the entire cost of lines across the Pacific to reach the Internet backbone and resources in the USA.

ITU has now become the main forum where these issues are discussed. Unfortunately, most of the relevant documents are only available to ITU members (national governments and ITU sector members), meetings are typically for members only or for invited experts, and decisions are made by members. Three main types of connection relationship are being discussed:

- **Peering:** The largest international ISPs, tier-one providers, operate peering arrangements for the exchange of traffic. The payment structure is “sender keeps all”. The providers consider themselves peers and anticipate a rough balance in traffic exchanged. Peering arrangements tend not to be transparent.
- **Transit:** The client, usually a tier-two or tier-three provider, supplies the access line in both directions and pays the full charge to connect to the upstream Internet supplier. Most providers connecting to the USA and the Internet backbone use a transit arrangement, and this is the model that is being challenged by developing nations in WSIS as being unfair.
- **Settlement peering:** The cost of the connection is shared and traffic is measured. The party with more traffic pays the difference. Such arrangements involve negotiated bilateral commercial agreements between providers.

The ITU working group is now trying to reach agreement between two proposed solutions. One is based on allowing market forces and negotiations between providers to determine appropriate interconnection rates and conditions (with a provision for development aid to support countries where there is market failure). This position is supported by “industry”, mainly large telecommunications operators. The second is a solution based on settlement peering where if a mutually satisfactory negotiated agreement cannot be reached the entities involved may use economic measures and traffic flow to determine who pays what. However, Internet traffic (packets) is much more difficult to measure than voice calls, and this seems to be the main sticking point in negotiations at the moment. This second solution has been supported by China and some other developing countries.

ITU established a study group to discuss international Internet connectivity in 1998 and has been unable to reach a solution. A new study period stretching from 2005 to 2008 was recently agreed. This is a critical issue, but one that is very difficult to follow as most of the discussions and documents are not publicly available. As an issue of importance to the Asia-Pacific region, encouraging transparency in ITU processes would be beneficial.

### Internet exchange points and regional backbones

The WSIS Declaration of Principles and Plan of Action avoid addressing the ICAIS issue directly and, instead, recommend measures to keep Internet traffic as local as possible as part of the answer to the problems of Internet charging and interconnection. They encourage the establishment of local and national Internet exchange points (IXPs) to keep traffic within the country that might otherwise be sent to the US backbone before returning, as well as the creation of regional Internet backbones so that traffic to neighbouring countries does not need to flow via more expensive international routes. It is important to note that when traffic is kept within a country the money paid for transport stays within that country.

IXPs can be established relatively easily and cheaply and can bring significant benefits to the local Internet in terms of cost, reliability, and ease and speed of connection. IXPs also aggregate demand for bandwidth and so are in a better position to negotiate rates for international connectivity. In Asia Pacific, various network operator groups have been active and successful in deploying IXPs. There are important policy issues involved, particularly in countries where the communications regime is being liberalised and regulations on interconnection and the exchange of traffic may prevent service providers from using an IXP.
Spam

Spam is a global scourge and is currently probably the most significant problem facing the Internet. At a conference organised by ITU in July 2004, it was revealed that 76 percent of all email was spam, costing national economies US$25 billion a year. The volume of spam is a significant pricing factor for ISPs of all sizes, and their costs are passed on to end-users. Given the problems of Internet pricing and interconnection just described, the effect of spam on developing nations is especially severe. It also degrades the quality of service, particularly on the low-bandwidth and already congested links of poorer users.

Spamming is also strongly associated with network security breaches. Spammers use software viruses and worms to infect computers and hijack users’ email address books as a source of more addresses to spam. The year 2004 saw a great increase in the incidence of attacks by viruses that can take control of an infected computer so that it can be used as a launch pad for sending spam. Known as zombies or spam Trojans, these machines are controlled without their owners’ knowledge by the virus writer to send large quantities of spam. Control of these zombie machines can also be sold by virus writers working in tandem with professional spammers and crooks.

Stopping spam

Many countries are beginning to introduce legal and regulatory measures to combat spam and, combined with other consumer protection and business laws, to make many of the practices used by spammers illegal or in contravention of existing regulations. Yet, these efforts are clearly not enough. Spam continues to grow rapidly, accounting for 10 percent of Internet email in 2000, 48 percent in May 2003, and 64 percent in April 2004; estimates today suggest it is nearer 80 percent. Spammers hide their tracks well, and finding and prosecuting them is difficult and costly, particularly across jurisdictions. International cooperation is clearly essential, but countries should also examine their existing enforcement measures, add new measures where required, and enforce them if or once they exist.

With one or two notable exceptions, Asia-Pacific nations have been slow to introduce legal measures to counter spamming. To date, only Australia, Japan and South Korea have passed specific anti-spam legislation. All other countries in the region are at best relying on piecemeal solutions offered by existing laws, making it difficult to take legal action against spammers. It is also confusing for industry self-regulation efforts and hampers international cooperation. Some countries, such as China, Malaysia, New Zealand and Singapore, are at an advanced stage of drafting legislation.13

Asia part of the global spam problem

America has always been the main source of spam. The most prolific spammers, the actual originators of spam, have tended to be US companies and individuals. The most recent estimates suggest that around 42 percent of all spam originates from the USA. However, South Korea and China, with around 15 percent and 10 percent respectively, are the next worst offenders. South Korea’s very high penetration of always-on broadband-connected PCs has been exploited by virus writers, and the country is the source of many zombie- and Trojan-generated messages. The answer to South Korea’s problems, and as a lesson for all countries with an expanding broadband market, is to focus on improving security by equipment vendors, ISPs and end-users.

China presents a different type of problem. During 2004, it became a haven for spammers. Estimates by anti-spam firms Commtouch and Spamhaus suggest that in August and September 2004 almost 70 percent of websites referenced in spam are hosted on servers in China.

China’s Internet infrastructure has developed very rapidly over the past few years and is now both very advanced and very cheap to operate. High-bandwidth web-hosting services capable of hosting thousands of spam sites are available very cheaply. Unsolicited email is legal and currently virtually unregulated, so both domestic and international authorities are unable to act against the culprits. Spamhaus research also found that China was the main market for buying and selling lists of zombie and Trojan PCs. These lists of compromised computers combined with cheap website hosting are all a spammer needs to set up business. The lists change rapidly: research by Commtouch found that approximately 2.55 million URLs were used in spam messages in October 2004, and 99.2 percent of those URLs were not used in spam messages the previous month.

China’s Internet policy has focused on keeping out disruptive influences. Gateways very effectively block websites that are critical of the Chinese regime or have content that the authorities judge to be inappropriate. However, while strictly controlling the inflow of information, China has done virtually nothing to control the spam that flows out from its networks.

As the spam industry has grown in sophistication and towards increasingly criminal activities, spammers have moved their activities offshore to avoid detection by law enforcement. Like other high-tech offshoring, Asia offers cheap and safe solutions. Chinese ISPs are hosting fraudulent schemes with impunity, particularly phishing scams. Phishing uses fraudulent email to lure people to fake websites where they hand over sensitive information such as passwords, credit-card details and other personal information. The email uses spoofed headers to pretend to be a trustworthy party such as an online banking or auction service – Citibank

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and eBay are common targets – and directs users to a website designed to fool them into giving up their personal data. The email and websites look very authentic, and a study by the Gartner Group claimed that phishing attacks cost US credit-card companies and banks US$1.2 billion in 2003.

Commtouch reported that ChinaNet Henan and ChinaNet Chongqing were the number 1 and 2 spam ISPs in October 2004, with ChinaNet Hainan at number 5. ChinaNet is a subsidiary of China Telecom and is by far the largest ISP in the country.

ISPs around the world have responded by blocking email traffic from many Chinese providers. This practice, known as blackholing, has caused the Internet Society of China to complain that international organisations are trying to harm China’s Internet growth. There were signs at the end of 2004 that China was beginning to do something about the problem. Indications are that the number of hosted spam sites decreased in the last months of the year. Time will tell, but clearly the short-term profit gained from hosting spam sites is doing long-term harm to the Chinese Internet industry; and if such services continue, China will be increasingly isolated from the rest of the network. China must begin to devote as much energy to controlling outbound traffic as it does to monitoring what comes in.

China’s problems should be a lesson to other parts of Asia Pacific where the Internet infrastructure is also developing rapidly. Such rapid growth often creates problems that traditional legal systems are unable to keep pace with.

Despite China, over 80 percent of spam is currently generated by OECD nations. But as more people come online, spammers will no doubt be among the new online population. Nations in the process of developing e-strategies and ICT policies should ensure that anti-spam measures are included and appropriate laws and regulations are in place.

Taking into account what has worked for other countries can be an effective way of getting started in the legislative process. Topping the list of best practices at the moment is Australia, which introduced legislation in April 2004 that has been universally praised. The law is based on an opt-in requirement: email addresses cannot be used for promotional mailings without consent. The law covers all unsolicited commercial mass email marketing and includes a package of measures backed by fines of over A$1 million per day of operation for repeat offenders. The Australian direct marketing association and ISP association introduced new best practices and self-regulation guidelines to complement the new law.

Whether spam and other issues are matters of Internet governance is for WGG and the community that responds to its work to decide. But the reasoning put forward for considering spam is that not only is it an abuse of Internet resources and a problem that is very strongly associated with fraud and consumer protection but also it requires international cooperation and coordination to resolve.

International cooperation on spam

It is abundantly clear that spam is a cross-border problem and solutions will require some form of international cooperation and coordination. Yet, there is no common international agreement on what constitutes spam, even at a fundamental definitional level. In the USA, commercial speech can be regulated, but other forms of speech cannot. Consequently, in North America, spam is usually described as “unsolicited commercial email”, whereas many other parts of the world refer to it as “unsolicited bulk email”. In cross-border situations, lack of common agreement on what spam is leads to confusion over what law or regulation may have been broken.

International regulatory bodies are becoming increasingly involved in discussions about countering spamming, and regional organisations such as ASEAN and APEC TEL are natural forums for such discussions. A risk associated with regulating spamming, particularly any centralised international regime, is that it might easily become a first step in the global regulation of Internet content. Given cultural and other differences, and the nature of the decentralised Internet, a centralised regime would unlikely be effective, and any temptation to coordinate broader content regulation must be resisted.

In the Asia-Pacific region, where too many governments have been quick to restrict freedom of speech on the Internet, the regulation of spamming could lead to severe restrictions on this basic human right. In New Zealand, the Office of the Privacy Commissioner is the government department responsible for controlling spamming, and the privacy code of practice and legislation that the country is developing may become valuable models taken alongside the Australian legislation. Spam is harming consumer trust in e-commerce; enforcing privacy protection alongside measures to ensure security will go a long way to reestablishing faith in e-commerce.

The development and sharing of technical and operational best practices should be supported, as should knowledge and acknowledgement of different legal and regulatory systems. Industry practices from developed countries that have been shown to be effective must be shared with industry in the developing world. Such exchanges should be one of the foundations of an international system of industry self-management and self-regulation. For Asia Pacific, with its mix of economies and experiences, this would be a natural step to take.

Mutual recognition through bilateral agreements and MoUs can give more binding power to loose arrangements; but for mutual recognition to be workable, specific anti-spam laws need to be enacted. Monitoring compliance is important, and regional organisations such as OECD, APEC and the European Union, as well as individual governments and civil society, must be willing to “name and shame” nations that persist as major generators of spam.

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Limited impact of anti-spam technical solutions

Technical solutions to spam are having only a limited impact. Client and server filtering software is available for incoming mail, and these filters identify and reject spam quite effectively. Large ISPs filter email as it travels across their networks. But spammers have responded by devising methods to fool the filters, and economics is on the side of spammers, who can easily and cheaply send more and more spam in the knowledge that some will get through. Filters are not perfect and often reject legitimate email along with unwanted spam. User surveys indicate that most people believe filters prevent some of the email they send from being delivered, and some email sent to them from being received. Filters also tend to be a defensive measure as they do nothing to stop spam at its source.

IETF, the Internet’s main standards-making body, has been discussing spam for some years and recently began work on a solution to counter spam by authenticating that the email is being sent from a real email address. The measure will prevent a common spamming technique called spoofing that fakes an email header to make it look as though the message comes from a legitimate sender. Preventing spoofing will only eliminate a small proportion of spam, but it will prevent the increasingly common online fraud known as phishing. Microsoft and Yahoo are also developing email authentication systems to prevent address spoofing.

With so much spam now being sent by hijacked zombie PCs, more must be done to ensure security throughout the network. The vulnerability of the Microsoft Windows operating system to viruses is a significant problem, and one that will not be fixed until the next major release of Windows sometime in 2006. Furthermore, Microsoft has stopped providing security updates for older versions of its operating systems, many of which are still used particularly in developing nations. It has also stopped providing security patches for pirated copies of Windows; and while it makes perfect business sense not to endorse theft, this does mean unsafe computers are widely present on the Internet.

Creating a trusted environment in cyberspace is essential for the development of the information society, and it was one of the central themes of the WSIS process. The summit documents suggest that network security, information security, privacy and consumer protection should be considered in a holistic way, that is, security and the fight against cyber crime should not come at the cost of infringement of privacy and other rights.

Cyber attacks and the state

Organised hacking attacks, or cyber attacks, have been a feature of Internet security breaches in the Asia-Pacific region since the 1990s. Typically, these attacks are organised and focus on the official websites of other governments. For example, Chinese hackers have attacked Japanese and Taiwanese official websites during negotiations over disputed territories. Japanese and other hackers, likewise, have attacked Chinese websites. Such attacks often seem to be well organised and coordinated, giving the impression that they may have at least the tacit approval of the domestic authorities.

In 2001, after publication of a Japanese high-school history textbook that glossed over Japan’s occupation and aggression in Asia during World War II, hackers from China and South Korea attacked Japanese government websites, particularly that of the Ministry of Education. Most attacks take the form of website hacking or denial of service, but a Korean response to the Japanese textbook issue showed a different kind of online activism. Korean online discussion forums encouraged users to coordinate a collective “attack” on the Japanese Ministry of Education, picking a day and time when everyone would attempt to access the ministry’s website. The effect was the same as a software-driven denial-of-service attack: the website was crippled by the huge volume of hits it received. But instead of being the act of a few hackers, it represented a collective action – the online equivalent of people taking to the streets in protest, except this protest was made virtually and had a cross-border impact.

Hacking attacks, viruses, worms, spam and other email-borne malevolent software are a serious threat to the security and stability of the Internet. Users can take some measures to combat these threats by, for example, using anti-virus software and by following good network practices when using the Internet and when downloading files. Service
providers should ensure the security of their networks and servers by acting promptly on security alerts, upgrading equipment, installing patches and taking other appropriate measures. National strategies to use FOSS in place of more vulnerable proprietary systems can be effective; and FOSS is being promoted heavily throughout the region, as many of the country chapters in this edition attest. There are also initiatives between countries, such as those between China, Japan and South Korea, to support the development and deployment of FOSS in the region.

There are no easy solutions, and responses must be coordinated internationally. This might include supporting and improving the network of centres that are coordinating information about computer and network security incidents, as well as adopting model legal conventions to create more binding international cooperation.

Computer Emergency Response Teams

Organisations known as Computer Emergency Response Teams (CERTs) have been operating nationally and internationally since the early 1990s as focal points for information about computer and network security incidents. Usually operating at a national level, they also provide advice on best practices and training. There is a CERT or an organisation with a similar function in most developed nations, but there are too few in the developing world and too few Asia-Pacific countries have a functioning CERT. APCERT (Asia Pacific Computer Emergency Response Team) is a coalition of CERTs from 12 economies across Asia Pacific.

Creating new CERTs across the region was the focus of an APEC CERT seminar held in Kuala Lumpur in March 2003, with the goal of ensuring that the business and government sectors in each APEC economy have access to the services of a local CERT that will help them to prepare for, respond to and recover from attacks. The project has so far provided CERT training in Thailand, Vietnam and the Philippines, which are members of APCERT. There is clearly much work to be done in many other countries. Ensuring effective security response and training is an essential practical aspect of Internet governance.

Model laws and international agreements

The Council of Europe Convention on Cybercrime (2001) has been discussed in WSIS – before and after the Geneva summit – as a potential model international legal agreement to address online criminal activities. The council has stated that it hopes WGIG will consider the convention as a model law.

Council of Europe members as well as non-member states can become signatories of the convention. In fact, Japan was involved in the drafting of the convention, and as such the convention could become the basis for harmonising national laws on a foundation of internationally accepted principles. A joint statement of the APEC Ministerial Meeting in Chile, held in November 2004, agreed to strengthen member economies’ ability to combat cyber crime by enacting domestic legislation consistent with the provisions of international legal instruments, including the said convention and relevant UN General Assembly resolutions.

The convention is in fact three separate treaties in one. First, it is a treaty that calls for the harmonisation of substantive laws and criminalisation of specific activities, such as network security violations, copyright infringement, and fraud. Second, it is an enabling device that calls on countries to create surveillance power, such as interception of communications, search and seizure. It does not limit the application of surveillance power to the crimes defined in the “first” treaty. Third, it is one of the largest international agreements to date calling for surveillance across borders, establishing a mutual legal assistance arrangement where countries can compel others to assist in investigations.

The convention provides a starting point in the fight against cyber crime, but it is controversial, particularly in expanding the power for cooperation in international law enforcement and extending cross-border surveillance. Governments may also be compelled to investigate and collect evidence on their citizens for sharing with foreign governments, without any claim of criminal activity. That means the convention does not require dual criminality as a prerequisite for cooperation, resulting in the surveillance of individuals who have broken no law. The impact of the convention to Asia Pacific could be substantial, particularly if its power is exploited by authoritarian regimes.

The convention also offers weak support for human rights and privacy, instead relying heavily on individual signatory national regimes to protect these essential freedoms, something that is lacking in many Asia-Pacific countries. For example, the exchange of information under the convention must always adhere to national legislation. However, where such provisions are absent in a nation, there is a lot of information that could be exchanged with little or no protection.

The Convention on Cybercrime is problematic as a model for many developed and developing nations, and for the Asia-Pacific region in particular. If WGIG is to consider adopting the convention, it must clearly identify these weaknesses and make sure that protection mechanisms against them are in place before the convention can be in anyway endorsed by WSIS.

Regulation of content

The regulation and control of content will be a difficult issue for WGIG to address. If it makes any recommendation that smacks of supporting censorship – except for the most heinous and globally agreed forms of illegal content – the
resulting uproar will overshadow its other work. However, many governments in Asia Pacific are imposing strict control on Internet content. A recent report by Reporters Without Borders, entitled “Internet under Surveillance”, about obstacles to the free flow of information online was damning about the policies of many Asia-Pacific countries.

The degree of control imposed by governments ranges from the extreme, such as in Myanmar where not only is content limited but all access to the Internet is severely restricted, to the minimal, as in South Korea and Japan. The extent of control often reflects the general situation of the society in each country. As already mentioned, the Internet in China is closely controlled. All Internet traffic passes through a small number of gateways and is filtered for undesirable content. Email is filtered, as are requested webpages.

China blocks many hundreds of thousands of websites, and the list is updated very frequently. Anecdotal evidence suggests that new websites supporting well-known “disruptive” causes such as Falun Dafa and Falun Gong are blocked within 30 minutes of going online. China has also a reputation for jailing cyber dissidents, according to Reporters Without Borders. As of early May 2004, 61 people had been detained for posting messages or articles on the Internet that were considered subversive.

Singapore is often presented as a Big Brother state, the government being everywhere and watching. But its treatment of the Internet is by contrast quite light. It filters around 100 high-profile websites that are considered as undermining public security, national defence and personal dignity, but this filtering is little more than a symbolic gesture. Malaysia and more recently Thailand have been more aggressive in clamping down on material critical of their governments. The Malaysian government has regularly harassed the online newspaper Malaysiakini for articles critical of the government and its supporters. In Thailand, the government, and particularly Prime Minister Thaksin Shinawatra, has used defamation law to restrict freedom of expression. Malaysia has strived to become an IT hub, spending billions of dollars building infrastructure and industries, and promoted itself vigorously as a cyber paradise. Heavy-handed treatment of publications like Malaysiakini quickly tarnishes the reputation the country has carefully tried to build.

Top-down control processes do not work on the Internet: they are not appropriate when applied to the technology, while they stifle innovation and creativity when applied to content.

The common vision developed during WSIS is of a “people-centred, inclusive and development-oriented Information Society”, that is, an information society for everyone: “This implies that every person must have access to the means of communication and must be able to exercise their right to freedom of opinion and expression, which includes the right to hold opinions and to seek, receive and impart information and ideas through any media and regardless of frontiers.”15 If WGIG is to make any recommendation on issues of content, these words from the Civil Society Declaration to the Geneva summit of WSIS provide it with a good starting point. The principles enshrined in the UN Charter and in the Universal Declaration of Human Rights, particularly Article 19, should be respected by the countries of Asia Pacific.

Conclusion: Good governance in the region

Sometime during summer 2005, WGIG will issue its report. The working group will have been together for a little over seven months, a short time in which to address such a wide range of complex and often rapidly changing issues. We should not expect the report to be full of specific problem-solving recommendations. It will be the start of a process rather than the end.

Clearly, work must begin to counter the most pressing problems, including launching concrete efforts to build technical and policy capacity, tackling spam, and addressing the fundamental problems of the DNS regarding the unilateral control and uncertain future of the root servers and regarding multilingualism. These are issues that are very relevant to the Asia-Pacific region, and we need to begin a regional multi-sectoral dialogue extending beyond the lifetime of WGIG to discuss how they can be addressed.

In Asia Pacific, where governments and inter-governmental organisations tend to dominate the policy-making arena, we should ensure that ICT policy dialogues include all sectors. In particular, the role of civil society, which is often the missing player in these discussions, needs to be strengthened. The Geneva summit recommended that institutional arrangements for the governance of the Internet and the drafting of ICT policy should be multilateral, transparent, democratic, and open to all stakeholders. These principles for good Internet governance should be embraced in our region.

Notes

1. This paper owes much to the initial work of Mr Pindar Wong and the presentations he prepared for the Digital Review of Asia Pacific and the Asia-Pacific Development Information Programme. It is also loosely based on an earlier paper commissioned from the author by the Association for Progressive Communication (http://www.apc.org).
2. See http://www.itu.int/itsis.
3. WGIG includes a number of representatives from the Asia-Pacific region. Its membership is well balanced between representatives from national governments and those from civil society and the private sector and between developing and developed nation representatives (http://www.wgig.org).
4. Work of the G8 Digital Opportunity Task Force (DOT Force), the UN ICT Task Force and others has identified that universal participation in governance processes can only be achieved through building appropriate technical and policy capacity. A study by the Commonwealth Telecommunications Organisation and Panos London, entitled “Louder Voices”, on strengthening developing nation participation in ICT policy processes is highly recommended reading on this issue (http://www.panos.org.uk/resources/bookdetails.asp?id=1065&null=1002&). Important recommendations on capacity building in the context of WSIS have also been made by Don MacLean (a WGIG member) in “Herding Schrodinger’s Cats: Some Conceptual Tools for Thinking about Internet Governance” (http://www.itu.int/osg/spu/forum/intgov04/index.html). Capacity-building programmes that are part of the Asia-Pacific Telecommunity’s Bangkok Agenda for broadband and ICT development in Asia Pacific may be useful.

5. The following is a snapshot of some of the many regional organisations providing technical and policy training: UN Economic and Social Commission for Asia and the Pacific (UNESCAP), Asia Pacific Coalition Against Unsolicited Commercial Email (APCAUCE), Asia Pacific Regional Internet Conference on Operational Technologies (APRICOT), Asia Pacific Networking Group (APNG), South Asian Network Operators Group (SANOG), Pacific Internet Users Group (PIGNET), Asia Pacific Top Level Domain Association (APTLD), and Asia Pacific Computer Emergency Response Team (APCERT).

6. This chapter does not attempt to present a definition of Internet governance. However, Richard Hill of ITU has compiled a list of proposed definitions (see http://www.wgig.org/docs/IG-definitions.doc).

7. The contract to run the “.org” top-level domain was redelegated to the Internet Society and the Public Interest Registry in 2002 as part of ICANN’s agenda to introduce greater competition to the domain name industry. VeriSign Inc. bought Network Solutions in March 2000.

8. LACNIC began operating only at the end of 2002. A new RIR called AfriNIC (African Network Information Center) is being formed to serve Africa. Africa currently receives IP addresses from RIPE NCC and ARIN.

9. James Seng (http://james.seng.cc) provides valuable comments about IDNs.


11. APRICOT (http://www.apricot.net) is the main forum where these expert groups tend to meet.

12. IXPs can flourish in liberalised regimes. The regime should permit easy interconnection on non-discriminatory, cost-based or at least reasonable commercial terms.

13. ITU’s website publishes information about spam laws, conferences and resources (http://www.itu.int/osg/spu/spam/index.phtml). Information on the amount of spam and its sources is usually provided by Internet security and anti-spam services companies. Data vary from company to company, such as Sophos (http://www.sophos.com), Sandvine (http://www.sandvine.com) and Commtouch (http://www.commtouch.com).


Social, political and
cultural aspects of ICT:
E-governance, popular participation
and international politics

Lelia Green, Emmanuel Lallana, Zaharom Nain and Masoud Shafiee

This chapter sets out to examine ICT as it impacts upon and reflects social and political processes, culture, gender and values. In representing a region as diverse and vibrant as Asia Pacific, we cannot hope to analyse, or even describe, all the various ways in which these aspects of society are manifested. We embrace and celebrate the diversity of the region, and we have no wish to make it appear uniform or to stifle discussion of national, cultural or religious differences. However, we have accepted the challenge of writing this chapter as if with one voice, and we have chosen to do this according to the following structure.

The framework adopted in this chapter takes us from the regional environment through national, local and domestic contexts, with some historical perspectives. However, this is not a theory-free zone, and there is some discussion of the nature of e-governance (and the potential it offers in addition to effective e-government). Similarly, we look at the potential of ICT for enhancing democratic exchange, allowing citizens to come together to discuss and address concerns of a global nature: the environment, human rights, poverty and injustice. This discussion of activism leads on to the matter of indigenous peoples and their development of a collective voice through which to speak to global forums.

Does technology change society? We investigate the social and cultural implications of technology use and also why information behaves very differently from material goods. We then turn to the problems faced by countries that “try to keep up” with technological advances. To some extent, the magnitude of these problems depends upon the attitudes of not only their citizens but also their governments to the promise (or threat) of the digital future. At the level of the individual and the community, we once again assume a big-picture perspective, analysing the potential of the Internet as the doorway to the information economy and the resulting tensions and problems that may arise within households and between households separated by the digital divide. Finally, we address gender disparities.

Issues in the Asia-Pacific context

The book of which this chapter forms a part is a unique collaboration brought into being by the combined vision of APDIP of UNDP, PAN-IDRC of Canada, Orbicom of UNESCO Chairs in Communications, and Southbound in Penang. It is the product of a great many minds and hearts, but especially it represents the financial investment of a range of UN-supported organisations and agencies. Through the UN, voices of countries excluded from many forums of rich and powerful nations can be heard. These excluded countries are often aware that their voices are not heard or are ignored. This situation creates a context within which a country’s concerns about relative information poverty, and its resulting oppression in global forums, may be amplified. Indeed, after the events of 2003 and the run-up to the second Gulf War, many people are pessimistic about the UN being able to reach its potential as an effective voice for justice and inclusive participation in global democracy – even if the international response to the tragic aftermath of the Asian tsunami in December 2004 has brought a new sense of interconnectedness.

Interestingly, at both the national and local levels, the information poor who are frustrated with their circumstances are unlikely to participate in discussions about information and communication policy: they protest instead, or try to find creative ways around the impasse. For example, citizens of poorer nations are often excluded from access to ICT networks owing to a lack of appropriate fonts for their written language. Cambodia and Bhutan are two of the many countries whose national governments are working hard to help their populations access the digital world using their mother tongue.1 If ingenuity fails, and people become more vocal – making demands to redress the situation of information imbalance – these protesters tend not to be categorised by the rich as “information poor”, but as being “unreasonable” or “unrealistic”. At the international level, the history of the New World Information and Communication Order (NWICO) is an example of a group of countries making “unreasonable demands” to redress an unacceptable level of information poverty.
The new world information and communication order

In the 1970s and 1980s, a number of nations used a UN education and cultural forum, UNESCO, to demand greater global equity in terms of access to, and distribution of, information and communication resources. At that time, they were particularly concerned about access to satellite technologies and claiming space in geostationary orbit above their own countries. Their actions resulted in the USA and the UK deserting UNESCO and depriving it of funding on the grounds that it had been “politicised” (Savage, 1989).

Information poverty, as the NWICO countries argued, is a two-edged sword. Not only is there a lack of access for the poor as consumers of information and communication products, but there is a corresponding lack of access for the poor as producers of such products – and no realistic editorial control over the content produced by the information-powerful others. The information-rich countries control the representations of the information poor and select images congruent with preexisting perceptions and prejudices. A similar dynamic can be seen to operate when considering the situation of the relatively information-poor population groups and societies in any country: they control neither the agenda nor the content of public debates. In Laos, for example, government agencies in the provinces have had to use floppy disks to send information collected in the regions to the capital for processing, while telephone density in Myanmar has been estimated at less than 1 percent. This digital divide, both inside the country and between poor and rich countries, has obvious implications for the future development of ICT, particularly if a government does not commit itself to providing universal communication access (as a right, regardless of commercial viability). This situation contrasts almost obscenely with Australia, where so much emphasis is put on the web delivery of government services that those without access queue for long periods, or make long telephone calls, to gain equivalent information.

The information rich – at the level of the household and of the nation – are wealthy according to a range of indicators, and they are likely to be perceived as rich as well as information rich. It may not be technology access that makes them rich; instead, their technology access may be only one of a number of traits, a privilege that reveals wealth rather than confers it. Arguably, most of the information rich in consumer societies are ignorant of the lives and aspirations of people they class as information poor, and the information poor have few opportunities to communicate back to them as equals in discussions about rights and responsibilities. In some nations, such as Timor-Leste, the comparative lack of Internet-connected computers is only one of numerous challenges facing the country.

Poor communication impovershishes us all

Arguing that communication is linked to the development of understanding and collaboration, this chapter suggests that the world is paying a high price for policies that perpetuate and deepen the communication gulf between rich and poor nations. Even the most powerful nations on the globe live in fear when they choose not to listen to, or understand, what other countries and cultures try to tell them. We all suffer from communication imbalance.

The UN and other global organisations (including the global religious, environmental, and peace and justice movements) have worked to create the forums and the contexts in which authentic two-way communication can occur. Different countries are also addressing the challenge of communication within and between diverse groups. One way of doing this is to harness new tools of e-governance to help create a coherent view of what it is that the nation cares about most strongly: where its priorities lie between a range of agendas, including healthcare, education, economic growth and human rights. Hong Kong offers good examples of such e-discussions. We should not wait for communication within countries to become perfect before we work on improving communication between countries, cultures and societies. These two endeavours can progress hand in hand.

From e-government to e-governance

It has been suggested that if 1993 to 1996 were the exploratory years for the popular Internet and 1997 to 1999 were the days of e-commerce and e-business, from 2000 onwards we would see the rise of e-government (Yong, 2003). (This is despite the fact that business-based websites in many countries continue to comprise over half the nation’s language-based presence on the Web.)

The 2003 UN Global E-Government Survey (United Nations, 2003a) provides proof of the rapid spread of e-government, with countries worldwide embracing ICTs for e-government. When the survey was first conducted in 2001, only 143 member states were using the Internet in some capacity; but by 2003, 173 of the 191 (or 91 percent) UN member countries assessed had a web presence. Examples of e-government might include Nepal’s visionary Bharatpur Municipality, which introduced e-governance to 14 local wards, providing such functions as service delivery, requests for information and filing of complaints. Similarly, the Information and Communication Technology Agency of Sri Lanka (http://www.icta.lk), supported by World Bank funding, is reengineering the government – not simply to automate government services but to use ICT to create better (more responsive, more inclusive) governance.

But what exactly is e-government? Is it different from e-governance? What are the domains of both? These are non-trivial questions, as our understanding of e-government or e-governance determines the kind of e-government or
e-government projects that will be implemented. What is at stake is the scope of ICT deployment in the most significant policy-making and consensus-building processes.

Back to basics

Governments and governance are the stuff of political science. Government refers to “the formal institutional structure and location of authoritative decision-making in the modern state” (Leftwich, 2000, p. 118). On the other hand, governance refers to “the process whereby elements in society wield power and authority, and influence and enact policies and decisions concerning public life, and economic and social development” (International Institute of Administrative Sciences, 1996). The former refers to a formal institution; the latter is a process. Governance is a broader concept than government. In fact, one can have governance without government. Anarchists were among the first to profess this idea. It is also implicit in Marx’s concept of communism as a stateless society. Governance without government is also a well-accepted concept in international relations, where governance extends across and between nations in a manner which demonstrates that the whole (governance) is greater than the sum of its parts (governments).

In their book Democratic Governance, James March and Johan Olsen (1995) advise that there are three domains of governance (pp. 122–3):

- **Administration**: a domain of expertise and problem-solving in which there are problems of incomplete information but not of conflict of interest
- **Politics**: a domain of constitutional procedures by which diverse interests and beliefs are translated into rules, principles and policies that are binding within the state
- **International relations**: a domain which involves dealings between sovereign states

March and Olsen make the important point that governance is not simply about more efficient delivery of public services but also about “who gets what, when and how”. However, they tend to tie the domain of administration and the domain of politics too much to the nation-state. Surely, there are also issues of administration and politics in international relations: in the global alliances and transnational forums beyond “government”? The concept of governance introduces matters of ethics and philosophy in place of (or as well as) efficiency and service delivery.

David Held (1995) provides us with another perspective on governance. He posits four levels of governance (p. 235):

- **Local-level governance**: covering issues and policy questions which involve people in the direct determination of the conditions of their own association, from policing to playgrounds, that primarily affect them. This is the level addressed by, for example, Nepal’s municipal associations (http://www.muannepal.org).
- **National-level governance**: over issues, collective problems and policy questions that significantly affect the people in delimited territories within the frontiers of the territory. One instance of this might be the provision of online public services in the Philippines, such as application for passports or for copies of birth, marriage or death certificates.
- **Regional-level governance**: encompassing issues which require transnational mediation because of the interconnectedness of national decisions and outcomes and because nations in these circumstances often find themselves unable to achieve their objectives without transborder collaboration among neighbouring states. The e-ASEAN Framework Agreement might be indicated here.
- **Global-level governance**: of issues involving levels of interconnectedness and interdependence which are irresolvable by local, national or regional authorities acting alone. The two-phase World Summit on the Information Society (WSIS Geneva 2003 and Tunis 2005) points up the potential for this level of governance.

While interesting and important, it must be noted that Held’s typology is simply based on the locus of decision-making.

From March and Olsen’s three domains of governance and Held’s four levels of governance, we can generate a broader, if not more comprehensive, perspective on the breadth and depth of governance. In this perspective, governance involves both the domain of administration and the domain of politics, and there are governance issues at the local, national, regional and global levels in each domain. There is no separate domain of international relations because it is covered in the regional and global levels of administration and politics. Furthermore, governance is not only about public life but also about social and economic issues.

E-government and e-governance

While definitions of e-government abound, they all have a common thread: it is the use of ICT to improve public services. The World Bank (n.d.) defines e-government as “the use by government agencies of information technologies ... that have the ability to transform relations with citizens, businesses, and other arms of government” (italics added).

Richard Heeks (2004) elaborates on the dominant definition of e-government by proposing three main domains of e-government:

- **E-administration**: which deals particularly with improving the internal workings of the public sector
- **E-citizens and e-services**: which deal particularly with enhancing the relationship between the government and
citizens – either as voters/stakeholders from whom the public sector should derive its legitimacy or as customers who consume public services

- E-society: which deals with enhancing the relationship between public agencies and other institutions, including improving the interaction between the government and businesses, building the social and economic capacities and capital of local communities, and creating organisational groupings to achieve economic and social objectives

In Singapore, over a third of all Singaporeans deal with their government via the Internet using e-government tools.

E-governance, on the other hand, is defined as “the transformation of [governance] processes [resulting from] the continual and exponential introduction into society of more advanced digital technologies.” 5 This definition underscores the capacity of ICT to strengthen the “public’s voice as a force to reshape the democratic processes, and refocus the management, structure, and oversight of government to better serve the public interest”. The Inter-American Development Bank says the same thing: “e-Governance allows direct participation of constituents in government activities.”6

From the definitions above, it is apparent that in the dominant view there is really no difference between e-government and e-governance. Furthermore, e-governance is construed narrowly: the definitions focus on public life and do not include decision-making in economic and social processes. Finally, the regional and international dimensions of governance are absent in the definitions.

In practice, we see a further narrowing of e-government to enhancing the efficiency and effectiveness of national government agencies, or e-administration. As asserted by Accenture (2004), a consulting firm which undertakes e-government surveys:

The goal for e-government now is to tailor service delivery to meet citizens’ needs, as opposed to approaching it from the government side. As a result, leading governments are becoming more critical in determining which services should be online. They are focused now on providing those online services that provide a real return on investment, either through increased service effectiveness or efficiency.

This claim is backed up by the findings of the 2003 UN Global E-Government Survey. Among this survey’s main findings was that only a handful of governments used e-government initiatives to support genuine participation of citizens in politics (United Nations, 2003b). E-governance initiatives at the regional and global levels were even rarer.

Regional e-governance in the domain of administration would include the use of ICT to enhance the effectiveness and efficiency of the ASEAN Secretariat (http://www.aseansec.org). It would also include the greater use of the Internet by various ASEAN bodies (e.g. ASEAN Ministerial Meeting, ASEAN Regional Forum) to facilitate discussions and consensus. A specific project that would fall under this domain would be a Pan-ASEAN ICT-enabled customs procedure.

Regional e-governance initiatives in the domain of politics, outside the Asia-Pacific region, would include initiatives to use ICT to increase the voice of citizens of European Union (EU) member countries in the European Parliament or in the EU’s discussion of a new constitution for Europe.

Global e-governance would include enhanced use of ICT in the UN General Assembly and the UN Security Council or at world summits.

The world summit, Hans Klein (2003) suggests, emerged as a new global policy institution at the end of the cold war and provides an interesting model for global governance. Klein asserts that a distinct world summit model has emerged from the series of UN summits beginning with the Earth Summit in 1992 and extending forward to the 2003/2005 WSIS. The world summit model consists of a set of preparatory activities, enlarged global participation, and the summit products. But what is truly unique about this model is the participation of governments, industry and civil society. With the world summit model, global policy-making is no longer the monopoly of governments.

WSIS provides a clue to how the world summit model of global governance could be transformed into a model for global e-governance. It is not so much the focus of WSIS that is important, but the use of ICT in the preparatory phase, during and after the summit meeting, and between the two phases of the summit. The Internet and other ICTs were widely used to update participants and other interested parties on the developments during the preparatory sessions for each of the phases. During the Geneva meeting itself, some civil society organisations raised privacy concerns with regard to the use of radio frequency identification cards at the summit (in principle, the technology allowed the tracking of participants while they were at the summit site). It would be difficult to imagine how the WSIS call “to set up a working group on Internet governance, in an open and inclusive process that ensures a mechanism for the full and active participation of governments, the private sector and civil society from both developing and developed countries” could be fulfilled without the extensive use of ICT.

At present, “virtual” world summits with “real” effects are infeasible – thus physical travel remains a necessity – but without ICT it would be far more expensive to participate in world summits, the quality of discussions would be lower, and the summits would be less effective as instruments of global governance.

The future of governance

Given the foregoing, and the potential of e-governance to revolutionise popular participation in civil society, why is e-government synonymous with e-administration at the
national level? We believe that any comprehensive explanation would include the following particulars: (1) the consequences of funding, (2) the hegemony of the limited view of governance as administrative and managerial competence, and (3) the well-entrenched distinction between national and international.

As most e-government projects are funded through public monies or official development assistance, government officials and bureaucrats determine the scope and scale of the projects. It is not surprising that they would prioritise making their job easier over enhancing public participation in decision-making. It is not in many officials’ or bureaucrats’ interest to share power or undermine their own. And even if their intentions were good, there may be “unintended consequences” of their acts.

Furthermore, no discussion of e-government occurs in a vacuum. It is influenced by the dominant ideas of the times. Adrian Leftwich (2000) argues that in the 1990s “good governance” emerged as one of the principal aims of Western aid and development policy, but it is defined from a narrow, managerial perspective and has come to mean “an efficient, independent, accountable and open public service, stripped of corruption and dedicated to the public good” (p. 120). This definition of good governance has become widely accepted in policy-making circles all over the world. But the inclusion of emancipatory and participatory ideals which involve relevant segments of the public as part of good governance has been ignored.

Finally, as Martin Shaw (2000) argues, the “institutionally defined order of national–international relations has been a principal context in which all the other main forms of social division have been entrenched” (p. 27). Hence, it has become “normal” for us to accept that national politics is somehow different from international politics. That while popular participation may be integral in national politics, international politics is a monopoly of governments. This need not be the case, and ICT has an important role to play in any potential democratisation of international politics.

In an era where the power of national governments is seen to be on the wane, there are drawbacks to the dominance of the definition at a national level of e-government as e-administration. At best, ICT is being used to strengthen a fast-weakening entity. At worst, ICT is not being mobilised to amplify the popular voice in the previously restricted arena of international diplomacy.

The dangers of not moving with the times are amply illustrated in the fortunes of WTO. The rise (violent) opposition to WTO may be partly attributable to its own practices. While WTO professes to have an open and consensus-driven decision-making process, in practice decisions can be made based on informal consultations among small groups of countries that exclude developing states (Steinberg & Mazarr, 2002). There is also the issue that some developing states only articulate the interests of a particular sector of their society (their elite).

Global e-governance can help international policy-making institutions produce good policies that will be acceptable to the global community by broadening the base from which they solicit information and perspectives. The first step in this direction is recognising the limitations of a dominant view that equates e-governance with e-government and defines e-government as e-administration at the national level.

**ICT and the potential for advancing democratic processes**

The digital media may be “new”, but it is obvious that many of the key issues surrounding the adoption of “new media” or ICTs are issues inherited from the “old”, “traditional” media. One of the more crucial sociopolitical issues is that of representation: *who* do the new media represent and *how* are they represented? This, in turn, is related to the wider issue of relationships between and within states, the market and societies.

Such debates in terms of technology and access mirror ongoing debates about literacy and power: speaking for people who would otherwise be able to speak for themselves. Unlike conventional media (except for talkback radio and “Letters to the editor”), the Internet can allow smaller groups to have a public voice. Once again, however, issues of access and language arise. The history of the Internet in Thailand – to take one example – provides evidence that rural citizens are not motivated to use ICT until they know that they can access content relevant to them that is in their own language. At the same time, the relative inaccessibility to ICT outside Thai cities compounds the problem, since the presence of peers using and benefiting from the Internet is an effective driver of technology adoption. In Vietnam, the lack of useful websites in the Vietnamese language has also been blamed for the slow increase in Internet subscribers. By contrast, in China, there has recently been a huge proliferation of relevant Chinese-language websites and a significant growth in the number of Internet users (although 60 percent of them are male, indicating a gendered digital divide).

In terms of advancing democratic processes in Asia Pacific, it is important that civil society and independent media groups utilise ICT to provide alternative sources of information that do not uncritically adopt official discourses. Maori forums in New Zealand are one example of such sources. This issue is of crucial importance in the Asia-Pacific region (and regions beyond, generally) given the different kinds and degrees of regime control of communication institutions – matched equally by the creative strategies adopted by civil society to limit, counter and possibly overcome these controls.

Prior to the arrival of the Internet in Asia Pacific in the early 1990s, a consistent feature of the media structures in many, though not all, of the countries in the region was that of strict regulation by the political regime. And when state regulation was not the case, market forces determined much
of the media output. In both cases, the obvious outcome was that access to the media was restricted, ownership was concentrated in the hands of a few (often those close to the political elite), and content was censored by both the government and the media themselves.\(^8\)

Such centralised control was – and still is – a legacy of the ideology of “development communication”, made popular in developing countries in the 1960s. The belief was that the media, particularly radio and television, played pivotal roles in “modernising” poor societies. Given this central role of the media, it was thus crucial that control of the media should be in the hands of the government. However, with very few governments being benign – or anywhere near democratic – such centralised control resulted in the media becoming nothing more than the propaganda machinery of the state.

The arrival of the Internet promised to change all that. State control and concentration of media ownership, it was argued, would not be the norm with the new media. Such optimism went further, with arguments being made for the “levelling” nature of the new media, that they would indeed pose a real challenge to the domination of the old media of television and the press. As recently put by Gomez and Gan (2004, p. xiv):

> Since, technically, individuals could communicate with each other across geographical and political boundaries without restriction and once a text is posted on the Internet the ability to control its movement is minimal, the notion of censorship that was so strongly present in traditional media was viewed to have an uncertain future on the Internet. Many were confident that any attempt by authorities to protect data or censor information would be circumvented by choosing to re-route or taking avoidance measures. In this regard, there were expectations that freedom of expression would increase and help further democratic development in the region.

But, of course, it has not been as smooth sailing as proposed. True, there continue to be anecdotal accounts and even studies of “success” stories. Accounts, for example, of how the Internet has been utilised successfully to provide alternative news in the region, such as in the case of Malaysiakini in Malaysia, Think Centre in Singapore, and Tehelka.com in India. However, these accounts often belie the fact that wider political, economic and social factors impinge on the short-term – let alone long-term – true success of these outfits.

Take Malaysiakini as an example. Malaysiakini was set up as an Internet daily newspaper in late 1999 with a grant from the Southeast Asian Press Alliance comprising most of its initial funding. It describes itself as “an Internet media project featuring independent news coverage, investigative journalism and in-depth news analysis . . . conceived by journalists unhappy with the sorry state of our mass media”.\(^9\)

By the end of 2000, Malaysiakini received rave write-ups in international newspapers and magazines such as the Far Eastern Economic Review, the Wall Street Journal and The Australian. It also won numerous international awards, including the International Press Freedom Award, through which editor Steven Gan was recognised. Often enough, Malaysiakini has been presented as a classic case of the Internet being utilised successfully to provide independent alternative news within a country controlled by an authoritarian regime.\(^10\)

Indeed, Malaysiakini’s continued survival since 1999 has reinforced the myth of its success and, by extension, the success of new media. But the reality provides some sobering lessons for those wishing to use the new media to take on an authoritarian state and an unforgiving market in order to expand the boundaries of free expression.

First, Malaysiakini has certainly not been an economic success. It has had to turn to subscriptions in order to meet operating costs. And more than a year after doing so, in 2002, Malaysiakini still did not have a big enough subscriber base to enable it to make a profit. In this regard, it is obvious that dependence on the market brings with it its own set of problems.

Second, despite governments sticking to promises of not censoring the Internet, the availability of a slew of long-established laws to curb freedom of expression is sufficient to muzzle dissent or alternative discourses. This has been the case with the harassment Malaysiakini has experienced. And the scenario is the same for other countries with similar legislation in place. Hence, the media and/or instrumentation may be new, but the wider controls already in place are sufficient, in the final analysis, to make the “new” conform to the “old” (Liberty, 1999).

Third, while Internet access in certain countries in the region is indeed wide-ranging, it is still true for many other countries that accessibility is restricted, principally due to limited incomes and often, additionally, due to the lack of familiarity with the major languages used on the Internet. Many governments are only too aware of the lack of access to the new media and hence are willing to treat it more liberally.

Fourth, it would be technologically deterministic to assert that, all these other factors notwithstanding, the availability of the technology will somehow, magically, make the citizens of a country more aware of their rights and, more importantly, begin making demands for, say, greater transparency, democratic space and accountability. In many circumstances, the citizens have been put through years of socialisation that invariably limit their ability to be critical of those in power. Hegemony has been won and maintained in these instances through the propagation of materialistic ideologies by the regimes concerned. These political perspectives privilege economic gains over individual and collective rights, including the right to openly question and criticise. As has been argued, “The relative immaturity of Asian democracies
themselfs constitute[s] an important impediment to greater public and political debate, participation and the promotion of civil and political liberties” (Banerjee, 2004, p. 61).

What of the future then, given the experiences of these initiatives at advancing democratic processes using the new media? At least three observations can be made in this regard. In the first place, and to look at it optimistically, the entire ongoing process of globalisation and the opening up of the world by the new media has provided – and continues to provide – those who have access to the technology with the opportunity to widen their understanding of issues and to be more questioning and critical. Thus far, the numbers are small, given limited access to the new media – especially in non-urban settings. In this situation, it could be argued that there is greater room for alternative media to manoeuvre, allowing for greater plurality, even given the occasional harassment by the authorities. In a limited sense, therefore, yes, it could be accepted that there are opportunities for creating counter-hegemonic discourses. But the important question that begs to be asked is: For how long?

Secondly, and following from the above, the two-pronged pressures of a repressive state and an unforgiving market will in all likelihood determine the long-term existence of any alternative media, either utilising new media technologies or old ones. Many of these well-meaning but, unfortunately, economically naive ventures need to understand that there is a limit to volunteerism. And, political harassment and repression notwithstanding, there is certainly a need to engage with the market, to sell what is being produced to audiences beyond the converted. Indeed, as Landry et al. (1985, p. 99) point out in their classic analysis of the failure of the radical press in Britain, receiving grants is fine, “but for many projects, there won’t be any form of life at all after the age of grant applications” (emphasis in original).

Thirdly, there is clearly a need for a government that wishes to utilise the new media to benefit its development strategies and, by extension, its citizens to understand the constituents of the knowledge economy that ICT is supposed to help realise. As argued by one of the main proponents of the knowledge economy, the renowned economist Joseph Stiglitz (1999, p. 20):

[...]institutions are best structured with openness and competition to be robust under the assumption that knowledge and virtue are rather less than perfect. That robustness strategy . . . leads to the institutions of an open society such as a free press, transparent government, pluralism, checks and balances, toleration, freedom of thought, and open public debate . . . This political openness is essential for the success of the transformation towards a knowledge economy.

(Emphasis added)

Free press, transparent government, pluralism, checks and balances, toleration, freedom of thought, open public debate – they are all very nice notions. If the potential of ICT for advancing democratic processes is to be realised, however, everyone – especially governments – concerned about democratic governance, genuine participation and a knowledge economy would need to come to terms with what these notions mean and begin wholeheartedly applying them.

Activism and the transnational collection of individual voices

Sometimes individuals find that they hold views at odds with those around them. This can happen in both pro-social and anti-social contexts. These people can use ICT to communicate with others who share their views or beliefs. The Internet can provide a gathering place for people who seek to combine their energies to create a force for peace, environmental protection or social responsibility. On the other side of the coin, people who hold extremely prejudiced views about other nationalities or other religions can share their views through racist or hate sites. Similarly, the Internet has made visible a number of underground paedophile rings whose members carry on their illegal activities beyond the view of their families, friends and neighbours.

Given that it is more difficult for the state to regulate and control the Internet than to regulate the mass media, the Internet can be an effective forum for radical and liberationist debate, sometimes leading to actions supporting particular perspectives. Such actions started to emerge in the late 1990s – one of which was the disruption of the WTO summit in Seattle in November–December 1999 – founded on the slogan “May our resistance be as international as capital”. Protesters seeking a fairer distribution of the world’s wealth, and greater prominence in international debates on issues of poverty and global exploitation, effectively brought the WTO summit to a standstill. This sort of movement has earlier been discussed in terms of its providing evidence that there has been a failure to engage the global public in an open, transparent and consensus-driven decision-making process.

Where a public sphere is regulated, as with the mass media, it reflects what that nation’s political elite see as culturally unacceptable. Internet communication, on the other hand, may be construed as essentially a niche medium, potentially connecting like minds across international boundaries. People use the Internet to access material that is important to them, and nation-states have limited powers to prevent cross-border information flows. (However, they can and do punish what they perceive to be inappropriate or illegal access to banned material or the circulation of subversive views and information. The definition of “subversive” is highly subjective, though.)

The concept of free speech within the national context varies over time and reflects the concerns of the day. The McCarthy era in the USA, for example, coincided with the commencement of the cold war with the Soviet Union and saw the oppression of left-wing views and left-wing people.
More recently, it seems to have been “un-American” to speak out against the US-led war on terror or to criticise the US infringement of human rights and civil liberties as revealed in the detention of many citizens of other countries (and a few from the USA) in Guantanamo Bay, Afghanistan and Iraq. Nation-states also have marked differences in their conceptions of free speech and of the relationship of free speech to their public spheres. Singapore, for example, celebrates being an information society but conceives the public sphere in a way that differs generally from the West’s. In many respects, Singapore sees free speech as less important than community harmony and the avoidance of express dissent, and hence it does not permit the media to broadcast stories that are deemed likely to lead to civil unrest. Arguably, the public sphere promoted and embraced by a nation partly creates that nation’s “imagined community” (Anderson, 1983) and expresses elements of its national identity.

What happens, however, when citizens and their governments differ in terms of their understandings of appropriate ways in which to use the Internet? Can the freedoms of the individual be balanced against the responsibilities of the government to manage society in a harmonious and collaborative way? The answer to this question tends to reflect the relative importance placed by each government upon the balance between the rights of the individual to freely express non-violent dissident views opposing government decisions and the rights of the government to operate within a framework of broad consensus, even at the expense of denying citizens access to communication avenues through which to express their opposition to government actions and policies.

New communication technologies have traditionally challenged governments that see individual rights as less important than the right to govern without open opposition. Even before the Internet really took off, Australian journalist and educator Julianne Schultz commented (1994, p. 111):

The former communist regimes of eastern Europe found blocking media from the west increasingly difficult, and the application of even limited electronic technologies made the production of samizdat publications of the Opposition much easier. In Panama, as President Noriega struggled to maintain power, he shut down the country’s independent media. A Panamanian exile managed to produce an alternative newsletter and sent it to facsimile receivers in banks, law offices and travel agencies throughout the country. Within hours up to 30,000 photocopies of the paper were on Panama’s streets.

In one Asia-Pacific nation, citizens need a licence to own a fax machine; in other countries, there is routine surveillance of private email. In Australia, the independent media complain that the government-funded media (ABC) and commercial media create a distorted coverage that supports capitalism and big business and does not offer a range of alternative, critical and independent viewpoints. They also complain that Australian citizens are kept ignorant of the true facts of their government’s oppression of human rights, particularly in the treatment of boat people and asylum seekers. John Howard’s government has been rebuked by many international organisations for its policy of compulsory detention of asylum seekers and, particularly, for the incarceration of children. The Howard government’s so-called Pacific solution – whereby refugee claims that should be processed in Australia are “outsourced” for processing by international bodies in sovereign nations such as Nauru – has also attracted worldwide derision. Nonetheless, an Australian, Mike Smith, has recently assumed the role of UN Commissioner for Human Rights, creating some strident comments from around the globe.12

Elsewhere in Asia Pacific, Vietnam and China have been singled out by Amnesty International (http://www.amnesty.org.au) for their treatment of non-violent dissidents who have used the Internet to express views in opposition to their governments. Amnesty International also criticises the US detentions at Guantanamo Bay and Australia’s treatment of Aboriginal people and of refugees. Human rights defenders have hoped for a long time that better communication will mean that respect for human rights across the world will increase. For example, science fiction writer Arthur C. Clarke is recorded as saying (Shawcross, 1992, p. 242):

The very existence of new information channels, operating in real time and across all frontiers, will be a powerful influence for civilised behaviour. If you are arranging a massacre it will be useless to shoot the cameraman who has so inconveniently appeared on the scene. His picture will already be safe in the studio five thousand miles away and his final image may hang you.

However valid this perception may be, the death toll continues to rise for prisoners of conscience, human rights activists and journalists who report human rights violations. The International Federation of Journalists produces an annual report of journalists and media staff killed in the line of duty.13 The report makes uncomfortable reading.

Indigenous peoples collaborate for global justice

Many indigenous peoples share problems arising from their experiences of colonisation and dispossession. These problems tend to include high mortality rates, poor health profiles and a range of serious social issues such as substance abuse and other addictions. Since the 1990s or so, indigenous peoples have begun to share their stories with each other. Unfortunately, it is hard to imagine ways in which the loss of their lands and self-determination can best be addressed
Does technology change society?

If people believe that a technology can change society, they are said to believe in “technological determinism”. Essentially, this perspective argues that technology is stronger than society and we cannot help the ways in which we use technology. In this situation, according to technological determinists, we have no choice. The features of the technology determine its use, and the role of a progressive society is to adapt to (and benefit from) technological change.

The opposite way of looking at technology is called “social determinism”. This suggests that the society concerned is responsible for the development and deployment of technology. The way that a technology is used in any given social or cultural context, argue social determinists, is a reflection of that society or culture. Thus, if the use of a technology is distorted because it is in the hands of corporations that want only to make a profit, then that aim is evident in the costs and patterns of use. Take Microsoft software as an example. Indonesian computer users, feeling ripped off by Microsoft and yet uncomfortable using pirated software, became extensive adopters of Linux open source software. In this case, Microsoft software might be construed as socially determined to communicate the priorities of global capital and international shareholders, while open source Linux, instead, embodies community access and national-level accountability.

For some people, their access to, and experience of, technology can change their perceptions of society – hopefully increasing their sense of community and inclusion. For example, ICT has empowered people living with a disability, such as immobility, vision impairment, hearing loss and other challenges. It has been estimated that up to a third of us will face a life-affecting disability at some stage in our lives. Therefore, including people living with a disability in our consideration of ICT access is a matter of relevance to us all.

So do we accept technological determinism or social determinism? Technology cannot change society by itself; it only makes sense in terms of human knowledge and activity; and once these are brought into the equation, then the issue is certainly not technological. For example, historically, men have been far more likely than women to have access to ICT: this is a social process. Archaeologists in ten million years’ time might have no understanding about how the gun they have just dug up was used in the 21st century. They might think of it as a sculpture or an ornament. But once there is an appreciation of what a technology is, who uses it and how it is used, then the social knowledge about the technology determines the overall perception of the object. Arguably, technology is socially determined, rather than society being technologically determined. This means that society can choose how to use the technologies available – including ICT.

Is technology good or bad?

It is tempting to answer this query with a statement along the lines of “technology is neutral, it’s the users who are either good or bad”. Nonetheless, if we argue that technology is neutral, we also argue somehow that it is outside the value patterns of the people who create, develop and market it. This might suggest that a nuclear bomb is a “neutral” technology and it is the people using it who are good or evil. Others would argue that the development and use of the nuclear bomb communicates fundamental truths about power, instability and fear that are not morally neutral and that are in some ways independent of the people who decide whether or not to use nuclear weapons. The visions of technological advance that tend to attract funding, anticipation and active commitment from the elites who hold power in societies and cultures are those visions that offer these elites the greatest benefits. Technologies are developed as a result of specific choices made by influential power brokers representing a limited range of social elites.

The groups that mainly sponsor technological development and adoption can be summed up as the A, B and C of political power: A = armed forces, B = bureaucracy, and C = corporate power. Even where there are other elements (such as academia) which may appear to be “hothousing” technological change, the funding which supports those institutions tends to be attributable to one or more of the A, B and C power blocs. Thus, technology as it develops represents the priorities of the elites in the society.
that sponsors it, rather than representing the society as a whole.

The Internet has been heralded as a potentially liberating and democratic technology, but such benefits can only be realised when the people have access to the technology as well as the skills and resources to use it. Nonetheless, optimists among us might like to add a D to the A, B and C of political power. This might be D = distributed power, which may arise through e-democracy or open source development.

We can judge the priorities of a society’s social elites from the technologies they develop and adopt. Affordable, renewable energy and an efficient public transport system say different things about a society than do power stations (conventional or nuclear) and high prestige-car ownership. The empowerment of A, B and C elites through technological change is not a necessary situation, however, as we have seen from earlier examples of e-governance and from the participatory cooperation of software developers using open source protocols. It is possible to democratise technology development and choice. It is also possible to make a technology reflect the lives and the priorities of the users, and of their culture. From the screen saver that comes up when the computer is switched on to the URLs stored in the computer’s memory, each individual machine can be customised to reflect the interests and priorities of the individual or household that uses it. If the individual or household is confident that their own choices are good, then they can be confident that the technology they use will reflect this.

Even so, there are particular aspects to the nature of information – and the information society – that make the handling of information fundamentally different from the production and consumption of material goods. It is this conundrum – the implications of the difference between material and non-material goods – to which we now turn.

What makes information so different from material goods?

One of the major drivers of ICT expansion is the power of the computer as a processor of information. As Japanese futurist Yoneji Masuda, credited with being “an architect of the information society”, points out,15 the growth in the quantity of information is a result of four properties not found in industrial goods. Information is:

• **Inconsumable**: Information is not consumed through use; it remains available to be used again, however much it has been used.
• **Untransferable**: Information is not transferred. Once information has been received and internalised, it can be passed on without being lost to the original recipient.
• **Indivisible**: Information may be partially transferred, but for something to make sense as information it has to be transferred as an entity. Transferring every fourth data element does not transfer one-quarter of the meaning of the whole.
• **Accumulative**: The addition of new information means more than simply the sum of the parts: it can create new knowledge as well as greater amounts of information. Further, because information is inconsumable and untransferable, it accumulates even while being used. (This is the opposite of material goods, the consumption of which equates with destruction.)

Thus, information is fundamentally different from the material and consumer goods that make up the majority of household (and often national) wealth. Furthermore, greater amounts of information are not necessarily better for a user, but often worse. Information has to be relevant and clear for it to be useful. Adding value to “data” to make it more readily relevant to decision-making has become a major industry in the information economy and is one response to the worldwide phenomenon of information overload.

The classic “information theory” definition of information is used by Stonier (1990) when he claims: “Information exists. It does not need to be perceived to exist. It requires no intelligence to interpret it. It does not have to have meaning to exist. It exists” (p. 21). For those who prefer a semantic approach based upon information being meaningful, this classical definition does not describe information, but data. Both perspectives can be represented on a chaos–wisdom continuum:

Chaos ➔ Data ➔ Information ➔ Knowledge ➔ Wisdom

The progression on this continuum starts in chaos, where there is no discernible pattern or organisation and where bits of information are fragmented, unable to be readily processed by human or machine. Data occurs where the symbols have been processed in such a way that they conform to the requirements of a transmission channel, such as a modem. Data is a quantity rather than a quality. Information, on the other hand, refers to data organised into meaningful chunks – specifically, chunks that have meaning to humans rather than machine applications. Information becomes knowledge when it has been successfully communicated to and understood by the now more knowledgeable recipient. Knowledge is the product of information plus thought and ideas. It implies a value judgement because knowledge marks the processing by a human of useful and relevant information. Wisdom is the final stage on the continuum. Here there are two sets of value judgements: the first in terms of the transition from information to knowledge, the second in terms of knowledge being used in the making of sound judgements.

The “information revolution” can be seen as an explosion of information at the lower levels of the chaos–wisdom
progression. The kind of information involved in social and political communication depends upon sense-making and meaning and relates to the upper levels of the continuum. Such information can be gathered from the corners of the world and delivered to where it is most needed (assuming technology and access). Such is the case with the Institute for Afghan Studies (http://www.institute-for-afghan-studies.org), whose website links Afghans around the globe to the rebuilding programme in their cultural home.

Is technology a threat to culture?

Iran has as one of its reasons for supporting ICT the development and empowerment of the national and Islamic culture and the Persian language in the digital arena. Arguably, initiatives such as the Institute for Afghan Studies, noted above, also show the positive contribution that technology can make to the sustenance and development of culture. Human culture is an endlessly dynamic social and cooperative process that reflects, and is reflected in, human relationships and shared society. Culture includes gender and generational relationships, caste, class (and other relations of power), religion, customs, norms, practices, beliefs, taboos, language, food and so on. ICT allows these expressions of culture to be shared and to claim space in the public sphere, creating a discussion between all those with an interest and a stake in the healthy expression of a culture and in the well-being of the people who constitute that cultural group. Every vibrant culture is characterised by diversity and contested priorities, by fluidity and change. It is said that death is the only way for humans to avoid change; and the same is true of culture: living cultures react to changes in the world around them, and these changes include ICT and other new technologies, such as medicines.

Electronic communication across frontiers becomes both easy and necessary when cultural groups communicate with each other in the global environment. For those with technological competence and technology access, political borders can become essentially irrelevant to information flow (provided that rights-threatening data surveillance and censorship is not practised by governments). Free communication can be culture-enhancing. It can also help to educate the world about the culture of a specific people, nation or place. Fonts are developed through which a people’s language, culture and literature can be expressed, strengthening their culture in the face of a mass media that often has an American accent and allowing new generations of non-English-speaking Asia-Pacific citizens to see and use their language in an everyday technological context. In this way, the Internet can be a small part of a “socialisation process” for communities of users. A culture can be celebrated and advanced as a nation’s holy sites, great buildings and public monuments claim a digital presence in cyberspace. Through the Internet, people can speak regionally and globally of the things that matter most in a time and place. In this way, technology can invigorate and sustain a culture, supporting rather than threatening it.

“Future-proofing” digital economies in the Asia-Pacific region

It is tempting to believe – but false – that the ability of a government to protect its country’s digital economy against becoming outdated lies entirely upon technological infrastructure building, committed investment and an active R&D programme. These matters are clearly relevant for a future-proof approach and are closely related to the political realm. However, social and cultural factors are also crucial. For the present to be inoculated against the future, that future must be constructed as a place of exciting possibilities rather than a fate to be feared, and change must be embraced as positive.

For an economy to be future-proofed, it must vibrantly and enthusiastically enjoy the digital present and look forward with keen anticipation to the digital future. Further, the productive and creative use of ICT requires critical thinking skills. This is much easier to achieve in societies with a high-income, well-educated population who see their own future – and their children’s – as being dependent upon keeping up with emerging ICT trends. Such people are motivated to try out the new technologies as they emerge, and the costs of technology failure are more easily absorbed when the investment is not seen as a major expenditure.

In less affluent societies, however, where individual disposable wealth might preclude majority ownership of advanced ICT, positive attitudes can be nurtured by government campaigns. Such initiatives may themselves be linked to an economic transformation in the society. Singapore’s Intelligent Island programme, Malaysia’s Vision 2020 and Taiwan’s Green Silicon Island, for example, have all helped to drive prosperity in those nations, while South Korea’s achievements with the rollout of broadband services after the 1997 economic crisis are globally famous. Notably, these government policies are particularly inclusive, since even citizens with low literacy can benefit from audiovisual information provided through broadband connections.

Government messages about the desirability of a digital future benefit from clarity and consistency. Otherwise, governments might think that they are promoting a digital future, but instead they find other messages being communicated. For example, when the authorities, feeling threatened by the intentions or actions of some Internet users, move to clamp down on cyber cafes and Internet access points, they cannot be surprised when parents ban their children from visiting those places. When Internet dissidents are put on trial and imprisoned, the effect is to send dissent underground and to dissuade educated and involved people from developing culturally appropriate uses of the Internet. Where ICT use is seen as carrying the risk of repercussions, the wholehearted adoption of these technologies by the broader
population is inhibited, resulting in only moderate, mainstream and pro-government views being expressed that are less well-represented than would be the case if the Internet were used freely by all members of society – both in favour of and critical of government actions. To encourage the digital future-proofing of their citizenry, therefore, governments would be wise to allow the Internet to be used freely to express non-violent views consistent with free speech and democratic processes. Although some people do use the Internet for illegal activities, law enforcement agencies should clearly communicate that it is the activity that is illegal, not the use of the Internet as such.

Another barrier that some governments set up is to block access to websites and servers that they perceive as jeopardising their interests. The message these governments are sending to their people is that the people cannot be trusted to make their own decisions about what they access. If a government compromises the potential of the Internet by delivering only part of the network to its citizens, then the development of the sector will be held back. If the technology is to deliver maximum benefit, then all the potential of the Internet needs to be accessible so as to fuel the imagination and to fire commitment to the future.

**Community and family life in the digital age**

In the developing world, ICT has begun to move into community life. In Pakistan the Virtual University’s first degree offering was a computer science course, in Vietnam over 70 percent of the universities are connected to the Internet, and in Macau almost all educational institutions enjoy subsidised Internet access. Telehealth is an area of emerging importance, and Fiji’s School of Medicine is coordinating a pilot project offering remote medical specialist support to medical facilities on other Pacific islands. In Pondicherry, south India, the M.S. Swaminathan Research Foundation uses information from a US Navy website to produce loudspeaker broadcasts for local fishing communities advising them of weather conditions. We can only imagine the lives that could have been saved if similar information from earthquake-monitoring agencies had formed part of an early warning system around the Indian Ocean.

Turning from the national and regional to the local, and to the home, there are few families and communities that take lightly the decision to invest in digital equipment. Computers are expensive items, and they require skills to operate them. ICT constitutes a social statement about a family’s or a community’s priorities.

In communities with generally limited access, the computer has shown the potential to act as a magnet for people outside the immediate family. A household that has a functioning computer becomes an information node for a wide circle of family, friends and neighbours. To some extent, this may be one of the motivations for investing in a computer: it can build the status of the owners besides benefiting their entire social network.

In communities that are new to ICT, every computer that functions in the way people expect it to becomes an advertisement for ICT and IT skills. As people approach friends who have access to the computer to help type a letter or a job application, they see the advantages of computer ownership. As children come home with tales of the benefits enjoyed by classmates who have a computer at home, parents become concerned that a lack of computer access may translate into a comparative disadvantage. Further, people become more confident about using a computer when they see their neighbours using it.

**The domestication of ICT**

When we talk about the domestication of a technology, we consider the ways in which families and households take a technology into the home. Domestication assumes that there is an environment that supports the technology’s use: an adequate power supply, a reasonably dust-free atmosphere, dry conditions and so on. It also recognises that a family who adopts a technology such as the Internet has to make space for the technology both in their physical environment and in their social and emotional environments.

The incorporation of the technology occurs when the family integrates the use of that technology into their rhythms of daily life. A habit of morning or afternoon technology use would indicate incorporation. Finally, the family converts the technology into a social currency when they talk about it with people outside the household or offer outsiders a chance to use the technology (Silverstone et al., 1992).

**The computer as a doorway to the information economy – and a source of family tension**

For some families, the computer is a doorway to the information economy, and an opportunity to future-proof their children through preparing them for the modern work life. However, while the parents invest in a computer to help their children in their education and their future employment prospects, children may distress their parents by choosing to use the computer for other purposes as well as (or instead of) the intended activities. The computer can become an object of contest between the parents, whose resources may have funded the purchase for educational purposes, and the child/adolescent, who sees it as a games machine (Marshall, 1997).

Whereas families are often gathered together around a television set in shared family space, introducing a computer to the household may mean finding a space separate from the domestic buzz where the computer can be used for education and work. This can introduce tension since the computer user is temporarily removed from the hub of the
family circle and because a number of family members might wish to use the computer: for work, schoolwork, entertainment and other purposes. Thus, the benefits of computers may be compromised by the potential of introducing conflict into family life and also interrupting the pattern of the family getting together at certain times in the day.

All these different tensions are intensified when a computer is connected to the Internet. For a start, cost rises. Whereas a computer is a capital expense, requiring only periodic expense thereafter (on software, electricity, technical support, etc.), an Internet service involves a recurring expense. Along with the concerns about what adolescents might be doing when they should be doing their schoolwork come concerns about the cost of music downloads, videos and other items. This usage can also exceed the contracted download capacity, with cost implications (or with the result that it prevents or slows down Internet use by other members of the family).

Dial-up Internet connections frequently mean that the family telephone cannot be used. In countries where there is widespread use of mobile phones, this may not be a big problem. However, land-line telephones tend to be the only numbers available to strangers, because they are listed in telephone directories, and they tend to be cheaper than mobile phones. Thus, the introduction of the Internet can have the paradoxical effect of making the household as a whole less accessible while making the person online better connected. In comparing and contrasting the television in family life with the online computer, David Holmes (1997) sees broadcasting as representing a community of consumption and the Internet as representing a community of interactivity – interactivity that is with other people, not with the family.

Interactivity means that ever more important jobs can be carried out at home on the computer. Parents can use the computer for teleworking, accessing government services, carrying out banking, and other purposes, while children can research their assignments online and all family members can use email. The result is increased demand and also increased tension. When equally important jobs to be done on the computer are prioritised – paid work over a study assignment, for example – tempers can fray and family members begin staying up late at night, or working much earlier in the morning, to gain access to the Internet. In these circumstances, the family privilege given to, say, male work over female work, or adult priorities over children’s priorities, may become more visible and can lead to conflict.

Illegitimate uses of the computer may cause even greater worry when online access is added to the equation. Of great concern is the possibility that family members are hacking into networks, accessing pornography and cybersex, gambling online, engaging in day trading of shares or home equity, revealing personal information to child predators, breaking laws, or visiting hate sites that expose them to extreme political or revolutionary views. Further, a small number of people can find the Internet addictive. They can become compulsive about playing web-based chess, for example. Online multi-player games, chatrooms, fanfiction and weblogging can all exercise an addictive pull on some people at some times, causing stress for them and their families. Kimberley Young (1998) approached Internet addiction as if it shared addictive characteristics with gambling, studying users who felt in control of their Internet habits and those who did not. This kind of research has spurred the development of a number of online self-help and other-help resources such as the Center for Online Addiction (http://www.netaddiction.com).

For wealthy families in countries where there is ready and affordable broadband access, one solution to the problem of competition within the family for Internet connectivity is to install a wireless broadband system. Assuming that all family members have the use of their own computers, this means that the entire family can be online at the same time. While the supervision problem is more difficult to resolve in this scenario, the stress of establishing which user has priority is removed. At the same time, (typically) the household land-line telephone is freed up once more and the potential exists for the family to gather again around the kitchen table or in the family room (even if they are all glued to their computer screens). Some countries, such as Bangladesh, are experimenting with community-level wireless points, which would allow families within range of those nodes to experiment with interactive, but untethered, Internet services. This strategy has obvious advantages for communities that have not yet been cabled.

Perceptions of the household’s private sphere

The distinction between “approved” and “subversive” uses of the Internet plays out in different ways in different communities. In Singapore, for example, there is an acknowledged hierarchy of heavier versus weaker regulation in different social spheres. According to Ang and Yeo (1998), these heavier/weaker dyads operate in home/business, children/adults and public/private. Heavier regulation in the home, rather than in business, differs from the expected priority of many Western countries. This ordering of heavier/weaker regulation for home/business takes into account Singapore’s emphasis upon its export economy and recognises that a competitive business strategy might involve businesses operating under a more lenient regulatory regime (for the export market) than is applied to domestic consumption. “Information for the home is considered less critical so censorship of such information is deemed to have less deleterious effect,” Ang and Yeo explain.

This contrasts with the situation in many states in Australia, for example, where it may be legal to watch some classes of pornography in the home, even though it would be illegal to have the same movies for hire or sale in shops. The view is that it is inappropriate to have such material on display or available in public places (shops, video libraries,
etc.) where teenagers could access it, but that adults are able to make their own decisions about what to watch in their own homes. The effect of this approach is to create a demand for mail-order X-rated pornographic videos.

Online material deemed inappropriate or offensive that is held on Australian servers can be reported to the Australian Broadcasting Authority (ABA), which may require the material to be removed. Reports on the ABA website, however, make it clear that the problem material that it has investigated is only occasionally located on servers in Australia. No country has jurisdiction over the Internet servers operating in another country’s territory. In some ways, each country operates in the global environment a little like the household does in the social environment. While it is possible to have some say over what the Internet is used for within their own borders, in each case the issue of appropriate/inappropriate content moves beyond the control of the household/country once the boundary is crossed.

The digital divide

Lack of access to the online digital world is not just about the unavailability of the right technology. Fear of the computer crashing, of viruses, of drafts being sent as finished copy, of privacy violation, of undemocratic law enforcement, of unwanted downloads and of unexpected expenses – all these elements have an impact on whether the user feels “at home” online. Confidence, competence and strong motivation are often required to overcome barriers to Internet usage. These traits are usually linked to the educational level, occupation, socioeconomic status, main language spoken at home and other factors. The effect of differential access therefore makes worse the circumstances of people who may already be disadvantaged.

The telecentre, cyber café, online library and other public access facilities set out to offer ways to bridge this divide between the computer haves and have-nots. In addition to the technology, such facilities may also provide education and support for Internet newcomers. Sometimes new users can gain digital confidence through friends and family, and this is an important role played by people who are “early adopters” of computers in social groups where there is little access or exposure to ICT. Trevor Barr (2000, p. 233) links the future success of new ICT to “how the organisations that offer those services understand the behavioural practices and needs of consumers and citizens. The real question for our communication future is not what the technologies are going to be like, but what we are going to be like” (italics in original). That includes whether we will be sharing technology more fairly.

However, not all people want to become computer-savvy. Some do not value Internet technology, for example, because it holds no perceived relevance or interest for them. The consumer behaviour theory of value and lifestyle segmentation suggests that these people may be fulfilled, or “content”, rather than inadequate consumers. “Consumers and citizens do not walk around with holes in their lives waiting for broadband services to arrive,” argued David Sless (1994, p. 6) a decade ago, going on to point out that “many today work far more hours than their parents did and develop ways of avoiding extra information services, not acquiring new ones”.

For those who do want better access to ICT, improved communication for some goes hand in hand with an increase in communication barriers for others, since communication brings together some people at the expense of separating those who are not connected. As the prosperous world becomes more intensively networked, so the divide between the information rich and information poor becomes deeper (Green, 2002). As people become more used to sending email, they may forget to contact the people who can only be reached by post. In Brunei, for example, the weight of postal mail dropped by 39 percent between 1993 and 2001 as a result of the rise of email.

Gender and generation

In the early to mid-1990s, there was considerable concern that cyberspace was becoming a male-dominated environment, and one that was specifically hostile to women. This hostility was evident in various ways, and it can still be experienced on occasions (such as the potentially distressing and threatening spamming which pushes pornographic products). In the early stages of the Internet’s development, men were found to greatly outnumber women in the online population. The imbalance reflected differences in both access and motivation. In the Western world, this disparity began to narrow towards the end of the 1990s, when the Internet emerged as a mass medium, and at around 1999 the number of male and female English-language users of the Internet came into equilibrium. However, this has happened more slowly elsewhere with an apparent gender imbalance in Internet use persisting in some countries (such as Japan) well past the turn of the millennium. Moreover, equal proportions of users do not mean that women and men use the Internet for the same purposes, or in the same ways.

While it is difficult to be dogmatic about gendered differences, some generalities are emerging from research and the literature. Socially approved uses of the Internet – work, education, research, maintaining and building family networks – are all claimed by both genders with men more likely to claim work as a reason for investing in digital technology and women more likely to see family and friendship networks as critical. However, when we look at “problem” Internet use, we see a starker gender divide. Here we are not commenting upon where the differences between the genders arise – whether they are genetic, social or cultural – but that there is a tendency for men to use the Internet in some ways and for women in other ways.
When we talk about Internet use that may cause problems for individuals, their families or their communities, we tend to see men accessing the Internet for gambling, pornography, violent content and/or compulsive games. In contrast, women are more likely to find their Internet compulsions played out in online chat, cyber romance and fanfiction. These addictions can cause problems with sharing the Internet with other household members, with the cost of Internet connections, and with bills – especially for extensive time online or for expensive activities such as gambling or porn. However, many of these problems are often short term, and most people return to their usual daily life after a few weeks or months when the Internet craze subsides.

We discussed earlier how households can see their priorities clarified when they examine competing claims for access to a scarce resource, such as the computer or the Internet. If the father’s needs always win (above, say, the mother’s need to complete a research assignment or children’s need to do their homework), then we can see the household value system in operation. This is particularly the case if the father’s use is linked to leisure and the mother’s or children’s use is linked to education or work, since this clearly establishes that the priority is given to the father because he is viewed as the head of the household, rather than because the work he is to do is the most important. It is still the case, however, in most societies that the adult male is the major breadwinner and has the final say in the purchase and use of a technology such as the Internet. This sense of ownership also confuses the picture.

Women have traditionally been more likely to volunteer for unpaid work and provide support networks that sustain their communities. It has been suggested that these roles fit in well with the rearing of young children and this is why women are more likely than men to spend their time in local grassroots community activities. The Internet offers new tools for community maintenance and building, but these tools can only be used to support the disadvantaged if the women themselves are allowed access to the technology and are given the opportunities to develop the skills and confidence to use these resources.

Conclusion

As the Internet continues to offer new ways for us to speak of ourselves to each other, we hope that the improved communicative exchange will help us to build understanding and break down barriers of prejudice and fear. With good fortune and commitment, the technology of communication will ultimately become transparent and we will truly be able to talk “heart to heart”. This in itself is a reason to work for the spread of digital communications throughout Asia Pacific and beyond.

Notes

1. The authors are grateful to the contributors of Digital Review of Asia Pacific 2003/2004 for many of the specific country examples, especially from the chapter “Asia-Pacific ICTs: An Overview of Diversity”.
3. See, for instance, Young (1999).
7. See http://www.aocafe.com/forums.
8. See, for example, Williams and Rich (2000) and Heng (2002) for empirical accounts of such state–market controls.
11. For example, Indymedia (http://sydney.indymedia.org, http://melbourne.indymedia.org, etc.).
16. See, for example, Green et al. (2004).
17. ABA is being incorporated into the Australian Communications and Media Authority in 2005.

References


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Appropriate ICT for Asia Pacific: Opting for open source, localisation, internationalisation and free access

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Asia Pacific is a profound paradox: it encompasses the most technologically advanced societies as well as the least connected communities in the world. But the region is often better known internationally as a powerhouse in computer hardware manufacturing, and a low-cost base for outsourced IT services, than for the challenges that it has to struggle with to make ICT work for its people. This chapter will focus on these challenges rather than its better-known successes. Much of the widely publicised successes are confined to a relatively small number of developed or nearly developed countries. The other nations are in various stages of economic development and must deal with all the daunting access and technological issues the rest of the developing world faces. Additionally, the majority of the people in Asia Pacific, rich and poor, at present have to navigate the Internet in a script and language that is largely foreign to them. This is a major impediment considering that the region is home to the largest number of cultural and linguistic groups in the world and the majority of their languages are not supported by existing technological systems. Compounding this challenge is the low literacy rate found in many Asian countries.

In this chapter, we will look at work being done on the disconnected side of the digital divide in Asia Pacific to enable communities to go online in a meaningful way. We will discuss appropriate ICTs, open source software, adaptation or “localisation” of ICT to meet Asian-language requirements, and internationalisation of the Internet to better serve the needs of users in the region. We will do this by reviewing experiments being conducted in selected countries in South and Southeast Asia to support development efforts there.

Internationalisation

Localising content

Governments and civil society in the region now emphasize the provision of connections and technology infrastructure as the main strategy for enabling communities to go online. National ICT strategies rarely consider what users will do once they get connected, what content they may consume, and what services they will engage with. This is a major strategic flaw.

Global Reach (2004), which has been tracking non-English online populations since 1995, estimates that 68.4 percent of all web content is presented in English. Ranking a distant second on the list of the top ten languages on the Web is Japanese at 5.9 percent, Chinese is fourth at 3.9 percent, and Korean is at tenth place with only 1.3 percent. Since only one-fifth of the region’s population has a working knowledge of English, we can infer that the vast majority of the people cannot effectively utilise the bulk of the information available online, even if the required infrastructure is available.

It is a myth that English has become the lingua franca of the world and that everyone should learn the language to take advantage of the possibilities offered by ICT. In fact, only 10 percent of the world’s population uses English as the first language, and this number is expected to decrease (National Geographic, 2004). The reality is that the majority of people do not use English for either personal or professional purposes and the need for localisation will always be there.

Internationalising navigation

Just as serious an impediment is the dominant use of the Latin script in navigating the Internet. Most of the people who visit websites published in Japanese, Chinese, Korean, Hindi, Urdu, Farsi, Thai or Tamil scripts still need to enter their URLs using the Latin script in order to get to these websites. This situation can be likened to the world’s population having to navigate the Internet using the Sinhala script if the Internet had been invented in Sri Lanka and the inventors had decided to use their national script as the primary means of navigation around the Web.

This is an especially frustrating obstacle since the technology already exists for Internet navigation using different scripts. The internationalisation of the Internet’s navigation system is now less of a technical problem but more of a political challenge. Countries, governments and
communities that use the same script need to master the political will to build consensus on the many linguistic, cultural, political and technical issues concerning internationalising Internet navigation.

Localising software and hardware

Localisation is the “process of creating or adapting an information product for use in a specific target country or specific target market” (Hoft, 1995). A language-specific character code set and font are among the key components of localisation. At the very basic level, the localised system must support the character set of the local language in a format common to that region. This character code set has to be registered with the International Organization for Standardization. Technical issues that have to be considered include the input method, application software, operating system, rendering technology and mark-up technology. In addition, there are non-technical issues that are often more challenging than the technical issues. For example, there is variety in the writing systems of languages. Some of these systems are based on characters, others on syllables, and yet others on pictograms.

There are also variations in the writing direction, including from left to right, right to left, and top to bottom. Some scripts seem to resemble each other very closely and yet contain enough subtle differences to make them different scripts altogether. The character structures of the Latin alphabet, the Cyrillic alphabet, and the Chinese, Japanese and Korean characters look relatively simple when compared to complex Asian scripts such as Khmer, Thai and Sinhala. In many cases, application software fails to accommodate characters with complex structures. Such complex scripts cannot be localised simply by replacing the character code and font in software. Out of the 6,809 active languages listed by Ethnologue (http://www.ethnologue.org), only 100 are enabled by ICT.

The intended users of localised technologies need to take the initiative to launch and drive the localisation process for it to be successful. Furthermore, development work is best carried out with the aim of producing free open source software, as solutions may not be developed in as timely a manner as is desired if users were to rely solely on centrally produced commercial proprietary products. The PAN Localization project is a good example of how local initiatives can drive regional efforts in localisation. Adopting open source software often leads to other benefits, such as helping to trigger local capacity development, strengthening the local software industry, expanding adaptation and local-language support, and reinforcing local autonomy in technological matters.

Protecting minority languages

A strong need exists for protecting the heritage of minority languages, languages that are used by very small communities of people. This need is felt most urgently when we attempt to disseminate and share large, irreplaceable bodies of indigenous knowledge only to find a lack of content creation tools and fonts for documenting such knowledge. This puts at risk the heritage of the people who communicate and sustain their ways of life using these minority languages.

Globalising localisation

Globalisation in the IT sector refers to the “process of creating a product that can be used successfully in many cultural contexts without modification” (Hoft, 1995). In other words, write once and use everywhere. The need for globalisation of ICT and related products may seem obvious, but it is often not done in the Asia-Pacific region. Japanese software serves as an example of the ignorance about globalisation. Japanese ICT users are the pioneers of localisation in the region. They have made significant investment in localising technology and content to meet the needs of the Japanese environment. In this sense, the Japanese people recognise the necessity and importance of localisation. However, only a small proportion of the software and content developed in Japan are exported or are developed for export. The awareness in the country of globalisation has been very weak.

Localisation and globalisation must proceed hand in hand to derive the full potential from ICT. People across the region who are engaged with localisation issues should work together to bring about equitable access to information in this digitally divided region as well as in other parts of the world. We must keep in mind that localisation and globalisation go well beyond substituting character codes and fonts. Rather, these processes are about the reengineering of information products so that they can be easily localised for use in any country in the world. It is really about making the language of a software product neutral.

Appropriate ICTs

The digital divide is the result of inequities that exceed technical matters and digital technologies. These important non-technical factors are addressed in other chapters in this volume. In this section, we will focus on technical issues relating to the divide, particularly regarding computer equipment and connectivity. The lack of these elements in developing communities has given rise to some of the most apparent disparities of the digital divide. This discussion of “appropriate” ICTs will look at three groups of digital technologies that offer promising solutions to some of these technical issues. They are wireless technologies, VoIP and low-cost devices.
Wireless technologies

For a long time, telecommunications services were delivered solely via copper wires to the offices and homes of subscribers. Stringing the wires was expensive and time-consuming. In the case of many isolated communities, the high installation costs could not be justified against the low revenue generated from the small number of subscribers at the end of the line. The economic arguments against running wires to communities living in difficult swampy or mountainous terrain were the strongest, since not only was installation expensive it was also very difficult. And as the people living in these isolated communities also tended to have the least financial resources, it was unlikely they could afford the services even if the wires reached them. This combination of daunting factors kept telephony out of reach of many rural communities for the past decades. So the people who needed the telephone the most because they were isolated never got connected.

The advent of wireless technologies is presenting these isolated communities with alternative means of access that may finally see telecommunications services overcoming terrestrial obstacles and severing their copper-bound tethers. These technologies are also a boon to urban residents. In monopolistic markets, where telecommunications companies once had a stranglehold on access because they owned the land lines, their stifling grip has been broken by wireless connections. Wireless technologies have also met the needs of the new generation of users, who are constantly on the move and do not always have ready access to fixed-line services. The meteoric rise of wireless technologies is now evident in the presence of cellular phones almost everywhere in Asia Pacific. The wireless revolution of the cellular phone was made possible by the advent of three wireless standards: GSM, CDMA and TDMA.

Mobile telephony

The advent of the cellular phone has made telephony accessible to hundreds of millions of people in the region who had previously waited, sometimes up to decades, for fixed lines. The competition which in most of the markets in Asia Pacific accompanied the launch of mobile phones has made services affordable to more users while at the same time delivering a level of service that often exceeds that of fixed lines. Mobile phones also provide the perfect match to the lifestyles of many: from slum dwellers without a permanent or legal address to vendors and migrant workers who are always on the move.

SMS (short message service) is a service available on most digital mobile phones that enables users to send short text messages to other mobile phones, handheld devices and computers connected to the Internet. SMS was designed as part of the GSM standard, the most popular standard for mobile phones in the world. It has become one of the most used ICT services in the region after voice telephony. It has completely replaced paging services, which were once ubiquitous in many Asian cities. In the Philippines, the “texting capital” of the world, 14–16 million of its citizens own mobile phones generating 150–200 million text messages a day. Filipinos use SMS for a wide variety of purposes: from sending love messages to tipping off the Civil Service Commission about instances of corruption and poor service by bureaucrats, and from downloading passages from the Bible to mobilising protesters onto the streets in 2001 to press for the removal of the then president Joseph Estrada. The popularity of SMS services in the Philippines is often attributed to their low price. A number of “free” messages are usually included in prepaid telephone cards and extra messages cost about 1 Php (about US$0.02) per message (Conde, 2003).

Educational and development organisations in the Philippines are now exploring ways of using mobile phones and SMS services to support development efforts. The University of the Philippines Open University has developed an mLearning programme for “learners on the go”, or mobile learners who wish to use idle time to improve their knowledge on topics as diverse as spelling, mathematics, dieting, smoking and physical exercises. The programme is free; learners need only purchase thin pocket-sized booklets as learning guides. Learners receive tests on lessons via SMS. They may also apply to sit for a certification examination by texting a special number of the university. Meanwhile, Filipino researchers have embarked on a joint project with researchers in Mongolia to test the feasibility and acceptability of SMS for delivering non-formal distance education modules to different socioeconomic, cultural and gender groups, as well as to determine the motivation of learners for enrolling on such modules.

The Philippines Rice Research Institute, with support from a Pan Asia ICT R&D grant, is developing an SMS database system to enable rice seed growers and seed centres in the country to access a national seed stock inventory in real time. The system will process data contributed by growers and the staff of seed centres and will answer queries sent in by them, all via SMS. Farmers will also eventually be able to place orders for rice seeds via SMS.

B2bpricenow.com is an award-winning e-marketplace for agricultural products that enables Filipino farmers, members of cooperatives and small entrepreneurs to do online trading via their mobile phones. It allows both buyers and sellers to access information and perform transactions via SMS. Through the Internet or mobile phone, farmers can upload information regarding their products and buyers can post notices about the items they are sourcing online. Farmers registered with this service can monitor the prices of produce such as rice in the market without travelling to the nearest trading centre.

The 26 December 2004 tsunami that devastated various places around the Indian Ocean moved mobile phone companies throughout Asia to launch services that allowed...
Mobile phones are also being used to bring telemedicine services to rural areas in Haryana, India, via a technology called TeleDoc (http://www.jiva.org/health/teledoc.asp). Field workers conducting medical examinations use mobile phones equipped with structured data entry software to guide them through the consultation procedure. Information from each examination is forwarded via the same phone to doctors in a central clinic, who then make the diagnosis and prescribe medicines. Patient information is stored in a database for future reference and for demographic purposes.

WiFi
A set of IEEE technical standards promises to do for Internet access what cellular phones did for voice telephony. This group of standards is popularly known in the industry as WiFi (wireless fidelity), a trade name of the WiFi Alliance (formerly the Wireless Ethernet Compatibility Alliance or W ECA). There are currently three variations of the WiFi standard: IEEE 802.11a, 802.11b and 802.11g. The most popularly used at present is 802.11b, which operates at 11 Mbps; 802.11a and 802.11g, which allow faster data transfer by operating at 54 Mbps, are still not as widely deployed. IEEE 802.11g is preferred to 802.11a because it is compatible with 802.11b. WiFi networks operate in the 2.4- and 5-GHz radio bands. Computers fitted with WiFi-enabled networking equipment can connect to the Internet when they are within the areas covered by WiFi signals without having to plug into any copper wire. Areas covered by WiFi signals are commonly called hotspots. The range of coverage of most hotspots is rather limited, usually extending a radius of about 150 metres from the antennae. As described below in the case of Indonesia, this limited range can be extended with clever tweaking of hardware and by mounting antennae on high towers. IEEE has now released a new standard, 802.16, that extends the range of such wireless networks up to a radius of 25 km. This new standard is popularly referred to as WiMAX. It will take a while for equipment manufacturers to sort out the compatibility issues before they can supply hardware for its deployment, but its potential for connecting the disconnected looks very promising.

Indonesia offers an interesting case of how civil society has utilised WiFi to make broadband Internet access more affordable and accessible. As described in a sidebar in the chapter on Indonesia, one such solution is to take off-the-shelf WiFi hardware and adapt it to increase its range from 100–200 metres to 1–8 km using home-made antennae, high-gain flat panels or parabolic antennae. The equipment is mounted on a tall tower to reduce signal loss. A LAN cable is then extended from the back of the WiFi equipment on the tower to the neighbourhood network.

Using this method, and with an initial US$100–$300 investment, users are able to obtain broadband connections with ISPs within a range of 5–10 km. Moreover, a cluster of users in a neighbourhood is able to share 24-hour access to the Internet at 11 Mbps at an average cost of about US$15–$30 per month. Such low-cost access would not be possible without the existence of neighbourhood networks. Schools, offices and other clusters of users have set up their own neighbourhood networks. More than 5,000 outdoor WiFi nodes of this type have been installed in Indonesia, and 200–300 new nodes are added each month.

Unlike community telecentres and cyber cafés, which connect several computers within a room or a house, neighbourhood networks extend LAN cables to adjacent houses and buildings. Indonesian neighbourhood networks basically deploy WANs based on Ethernet LAN. As more houses in the neighbourhood are connected to the network, the installation cost can drop to around US$50–$80 per house.

Although WiFi hardware and expertise are now readily available in Indonesia, until early 2005 large-scale WiFi deployment was banned because the 2.4- and 5-GHz radio bands on which the technology operates had not been unlicensed by the government. It was therefore previously illegal to operate WiFi equipment in the country without a licence. The Philippines, however, continues to enforce restrictions on the use of the 2.4-GHz band. The WiFi Community Base Network in the Philippines reported that the threat by the authorities to confiscate unlicensed WiFi equipment had reduced its membership from 50 to 2 within a year. The restrictions run counter to the trend to unlicense the 2.4- and 5-GHz radio bands.

Over in Thailand, in 2003 the National Electronics and Computer Technology Centre (NECTEC) initiated the Rural Wireless Broadband Access (RWBA) project, which aims to use wireless technology to overcome the lack of telecommunications and Internet access in rural areas (Koanantakool et al., 2004). As part of the project, a low-cost wireless access architecture will be designed and developed to provide digital voice and high-speed Internet access services in rural areas. A pilot programme will be conducted to identify key success factors for sustainable services, and an optimum solution for fulfilling universal service obligation in rural areas will be identified and established.

RWBA is designed for a wide range of users. The service scenarios adopted by the project helped the project team to define the basic engineering requirements and necessary protocol capabilities of the system units to be deployed. The scenarios are grouped into five categories: basic voice services, optional voice services, basic Internet access and data services, optional Internet access and data services, and other supplemental services.

The system architecture consists of a central facility (router to the Internet, media gateway to the PSTN, firewall,
layer-3 switch, and a cluster of web, email, virus filtering, proxy cache, and voicemail servers), a community-level facility (antenna tower, community router and community broadcast unit) for each community or village, and customer access devices (fixed-terminal adapter, multi-terminal adapter, PC and handset).

A field trial was set up at NECTEC in the Thailand Science Park, Pathumthani, to test the performance of equipment prototypes. The base station equipment was located on the roof of the NECTEC head office. Multiple point-to-multipoint fixed terminal units were installed within a 5-km radius of the building. Another single point-to-point fixed terminal unit was installed 20 km away from the building. The trial showed that it is possible to provide broadband access for telephony and Internet services at low costs for a small number of access points using existing WiFi equipment. Emerging technologies such as WiMAX and Smart Antenna can expand the capacity of RWBA. However, in its present form, RWBA is a promising solution that can speed up the process of bridging the digital divide.

Thai researchers have recommended that a portion of the unused 700-MHz UHF television channels be allocated for rural wireless broadband applications. However, in order to obtain a broader coverage range from these frequencies, sufficient spectrum bandwidth must be allocated. Cells deployed in rural areas should take full advantage of the longer reach offered by the 700-MHz spectrum. The exact amount of spectrum needed to satisfy this requirement depends on the distribution and usage of subscribers and will be specific to each service area. The researchers have also suggested that at least 25 MHz of spectrum should be allocated for rural deployment and 50–75 MHz for implementation covering the whole country.

The wireless LAN solutions based on early standards such as 802.11a and 802.11b were not originally designed for use as the infrastructure for rural telephone networks. However, the technology can be adapted for use in sparsely populated areas for both Internet access and VoIP. There has not been any large-scale deployment of the technology for public broadband access, except for hotspot services in cities where the operating range and power are limited to make sure that interference is kept to a minimum.

One of the problems encountered in Thailand is the lack of frequency spectrum for wireless LAN, as parts of the radio spectrum in the 2.4- and 5-GHz ranges have been licensed for other uses. Thus, wireless LAN devices must operate with limited bandwidth. There are a number of other challenges for rural application. These include the lack of reliable power supply, VoIP licensing issues, and the charging of interconnection fees by incumbent gateways for connections to foreign telephone operators and ISPs.

WLL
WLL (wireless local loop) is a system that connects subscribers to the PSTN using radio signals to replace copper wire as the last-mile connection. It makes use of wireless technology and circuitry that are generally cheaper and faster to install than stringing copper wire to rural areas. However, nationwide experiments with WLL in Thailand showed that it provided satisfactory voice communication but not Internet connectivity (Pipattanasomporn & Lueprasert, 2004). It was found that WLL equipment provided Internet access at a modem speed of only 16.8 Kbps, and the connections were unreliable and often disrupted. Moreover, each dial-up Internet connection via TDMA and WLL occupied a telephone channel for a long period of time. Using TDMA systems for Internet access thus increased the possibility of the telephone network collapsing, since in the experiment there were only 60 channels per base station. Increasing the number of base stations could have solved the problem but would also have increased costs.

In India, researchers from the Telecommunications and Computer Networks Group of the Indian Institute of Technology developed the widely adopted corDECT WLL system that provides 35/70 Kbps of Internet access and simultaneous voice communication to subscribers. It costs Rs 13,000–17,000 (US$295–$386) per installation. The system is usually set up to cover a small radius in urban areas to maximise frequency resources. However, in rural areas it has a range of about 10 km. The range can be extended to 25 km through the use of relay base stations. The system has been installed in the Kuppam area of the state of Andhra Pradesh providing connections to about 65 villages. The Department of Telecommunications has approved deployment of the system in the cities Bhopal, Panipat, Rajkot and Mumbai. Basic services operators and several ISPs are installing the system in many areas. The system has also been adopted in other developing countries, including Argentina, Brazil, Madagascar, Kenya, Nigeria, Angola, Tunisia, Yemen, Fiji and Iran (Jhunjhunwala & Ramamurthi, n.d.).

VSAT
VSAT (very small aperture terminal) technology is a wireless solution that has helped to bring access to isolated communities. However, it is meant for deployment by local ISPs and telecommunications companies rather than individual users. VSAT has led to impressive cost savings for ISPs in Nepal, with bandwidth costing 20 times less than before VSAT links were approved. As a result, the cost of Internet access to users tumbled 30–40 times (Chin, 2002). This remarkable achievement was made possible by the opening up of the VSAT sector to private sector ISPs.

Hybrid solutions
Independent researchers in Asia Pacific frustrated with the lack of resources to extend telecommunications services to the masses have been working on developing low-cost technologies that use hybrid media. Some of these efforts have been successful. The goal is to develop new, next-
generation technologies that combine the usage of radio, copper and fibre optic transmission media for deployment with new software and hardware applications to produce low-cost ICTs that can deliver multiple telecommunications services over large areas to a sizeable number of users in ways that make them superior to existing telecommunications networks.

Researchers of the Telecommunications and Computer Networks Group (http://www.tenet.res.in) of the Indian Institute of Technology, Chennai, are among those working on this front. The group is well known for their contribution to corDECT WLL technology as well as switching and transmission technologies. Researchers at its sister organisation, the Indian Institute of Technology, Kanpur, have established a lead in deploying low-cost Internet connections for rural areas using commercial wireless LAN technology in the Digital Gangetic Plains project undertaken as part of their Media Lab Asia initiative (http://www.iitk.ac.in/mladgp). The technology deployed is similar to the core technology adopted by the Jhai Foundation’s (http://www.jhai.org) wireless network project in remote areas of Laos (Liddell, 2002) but on a much larger scale.

A researcher in Bangladesh has developed the Broadband Multi-service Switching Transmission and Distribution Architecture (BMSTDA) for deployment in projects where wireless, satellite, fibre optic and copper networks need to be integrated to make a fault-tolerant and cheap-to-deploy multi-service telecommunications backbone. Designed for developing countries, it uses common PC components to deliver, in a unique way, all the layers of networking needed for PSTNs and Internet data networks. The network architecture has matured to a point where the same hardware can be reused as a mast-mounted router unit, a network switch, a telecommunications switch, an FM radio station, a television station, an audioconferencing system, or a multimedia terminal, in addition to its basic role as a local computer terminal. BMSTDA has been in development since 1998 and is in commercial use in the networks of PraDeshta and other Internet and Internet telephony service providers in Bangladesh. Software suitable for use as controllers for BMSTDA nodes may be sourced from http://www.mikrotik.com.

The current generation of products in use that are based on these new networking concepts build upon old ideas to deliver better results through the deployment of innovative new software applications running on old hardware. This is obvious in the new generation of telephone and telecommunications switches that can be built out of standard computer technology using low-cost telecommunications interface hardware running the open source Asterisk PBX software (http://www.asterisk.org). These switches can also operate via open source operating systems such as BSD and Linux. Using this solution, an operator can set up 120 analogue telephone lines with Internet connectivity in a remote village with an investment of about US$17,000, a fraction of the US$120,000 required for installing the same number of lines in the traditional way. The cost of building these new networks is expected to drop even further as the price of hardware such as servers, interfaces, channel banks, transceivers and routers is lowered through mass production and further refinement.

Internet telephony

VoIP (voice over Internet protocol) allows telephone calls to be made using the same data transmission technologies that run the Internet. When a call is made, voice signals are digitised and sent across the Internet as packets of data and then converted back into voice messages at the other end of the line. Long-distance VoIP calls are significantly cheaper than normal telephone calls because they are not priced according to the higher tariff scales of telephone companies. The calls are “free” in many instances, as users do not need to pay any charges other than the cost of Internet access.

VoIP is the most appropriate technology for the millions of illiterate people in the region who have so far not benefited from the advent of the Internet. The voice-based technology offers a good match with communities that rely mainly on oral communication. It is particularly appropriate for keeping the vast numbers of migrant workers in the region in touch with their families. It also offers the promise of enabling illiterate people to access online information that is in the form of audio files.

Indonesia has one of the most complex countrywide Internet telephony infrastructures ever established. It is operated largely free of charge. The VoIP Maverick Network is a community-based network operating on the Indonesian Internet infrastructure. Its architecture is described in the chapter on Indonesia. This free VoIP network is made possible by 24-hour Internet connections to numerous networks belonging to communities, neighbourhoods, offices and schools. WiFi (IEEE 802.11b) technology is the preferred method for establishing these Internet connections.

VoIP technology may not be legally deployed across half of the region. Telecommunications companies operating in the countries where the technology is banned have lobbied strenuously to preserve their proprietary rights to provide long-distance calls. Cambodia is one of these countries, where a sudden and harsh crackdown on Internet cafés providing VoIP services resulted in the closure of some of them. These cafés had been providing international telephone calls at US$0.05–$0.08 per minute for some years. The government has since licensed a company to run an exclusive VoIP gateway. The company has announced that its new service will cost 25 percent less than normal telephone calls to Europe and the USA, which cost about US$1 per minute. That means its rates will be many times higher than what the Internet cafés were previously charging.

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Low-cost devices

Affordable Internet access is just a part of the challenge of providing appropriate ICT to developing communities in the region. The other part lies in affordable hardware. Closely related to this challenge is finding equipment that can operate using power supply available locally to users. Electricity supply is often just as absent in isolated communities as are telephone services.

Budget PC

PCs costing about US$250 have been on sale in Thailand since 2002. The price includes the cost of a regular monitor and tax. The PCs are intended for general use in offices, homes and schools. This low-cost PC is the result of an initiative led by the private sector to manufacture computers for the masses. The initiative started with a cluster of PC manufacturers formed by NECTEC in 2001, as part of its Quality PC Certification programme, to produce a computer that could be sold at less than US$500. This target price was reduced by half a year later. The low pricing was made possible by the availability of the Thai versions of the Linux operating system (Linux TLE) and the OpenOffice suite (OpenOffice TLE), which were released free of charge. More than 160,000 budget PCs have been sold in Thailand since the beginning of the project.

Simputer

India’s Simputer (http://www.simputer.org) is probably the best-known appropriate ICT developed. Its concept is similar to that of the globally popular PDA. It connects to the Internet using an optional external dial-up modem and a regular telephone line or a CDMA cellular phone. It provides a web browser and email software for sending handwritten text and graphics. It also comes with a built-in voice recorder as well as facilities to play back CD-quality music and to store photographs transferred from digital cameras and data from computers. The device has 18 features altogether, including a calendar, an address book, a movie player, and games.

It also has what the manufacturer calls a “flip-flop motion sensor” that allows the pages of an ebook to be turned with a flick of the user’s wrist and photographs to be rotated following the rotation of the device. The Simputer is built with 64 Mb of RAM and a 206-MHz processor and runs on four 2-volt lithium-ion batteries that last for about eight hours of usage. The batteries are recharged using a built-in charger. The operating system is Linux Kernel 2.4.18. Although designed and manufactured expressly for users in developing countries, the Simputer costs far too much for its intended market. The three models were priced at US$240, $300 and $480 in 2004. The cost of shipping is extra. Another limitation may be the recharging of the batteries, as rural communities will probably not have ready access to a power source suitable for this purpose.

Village PDA

This lesser-known portable device was designed to very attractive specifications but never reached the marketplace. The company that was going to manufacture it went bankrupt in 2003. Its legacy may be its specifications, which hopefully will be realised one day. The village PDA was designed to provide real-time access to email, contacts, calendar and messaging functions at a fraction of the cost of a PC, using only one-twentieth of the bandwidth that a PC needs for Internet access. It was to be built with Bluetooth wireless technology, and seven village PDAs would share a single telephone line using this technology. The device was going to retail for US$25–$50 each. Prototypes of the PDA were to be tested in selected villages in the North-Western Province of Sri Lanka and in Kenya. They never were.

VoIP box and handset

Devices that allow users to make VoIP calls without a computer are now available in stores. The Malaysian company MoBif (http://www.mobif.com.my) had already shipped 10,000 units of its VoIP box in the last quarter of 2004. They were sold at US$75 each. The company is now developing a WiFi VoIP phone that will converge the benefits of WiFi and VoIP technologies. This sector is quickly evolving. Hopefully, it will meet some of the needs of developing communities. It will be particularly useful to illiterate Internet users.

Open source software

Free/libre and open source software (FLOSS) has become the preferred choice of many governments and companies in Asia Pacific. It is often referred to by the shorter term open source software or OSS. Countries in the region, from Sri Lanka, India and Pakistan to China, Vietnam and Malaysia, have all announced national policies that emphasize FLOSS as a strategic component of their national ICT plan. FLOSS is not new ICT. Organisations running the Internet infrastructure have relied on FLOSS to operate their servers and other equipment from the beginning.

The term open source refers to software in which the source code is freely available for others to view, amend and adapt. The basic idea behind open source is very simple: When programmers can read, redistribute and modify the source code for a program, the software evolves. People can also improve and adapt it.

FLOSS is considered more secure than commercial software partly because a large number of users are constantly upgrading it and partly because hackers target FLOSS far less than commercial products in their attacks. FLOSS is also significantly cheaper to obtain.

The “real” cost of commercial software to users is vividly illustrated when comparing the price of the Microsoft Windows XP operating system against the income levels of developed and developing countries. Ghosh (2004) carried
Many FLOSS user groups have been set up in recent years. The intention to adapt software to operate in the local desktop products and local-language integration.

The combination of low costs and superior security is strong enough reason for countries in the region to begin to seriously consider adopting FLOSS. But there is an additional reason that resonates with users in Asia Pacific. FLOSS offers users the opportunity and freedom to adapt and localise software to meet their specific language and operating requirements. This feature is one of the most valuable for many countries whose people are mostly unable to use English and the Latin font in operating computers.

The state of FLOSS deployment in Asia Pacific

FLOSS, such as Apache, is the most widely deployed type of software in networked servers and as applications for the Internet infrastructure. Feedback from countries in the region indicates that many ISPs use Apache to manage content mounted on the Web. These ISPs also use Linux distributions as their server operating system. Linux, apart from being almost free in terms of price, supports a wide range of hardware including obsolete servers and computers. There are many cases of Linux being used to operate equipment running on old Intel 486 chips that is deployed as servers for email, proxy, virus blocking and spam filtering. This is an important consideration for users who cannot afford new equipment. ISPs are also using MySQL, an open source database software that is usually applied together with PHP, a scripting language used to create dynamic web pages. PHP evolved from another open source programming language, PERL, which is now used for “writing” a range of functions that allow Internet users to customise the appearance of websites in their browsers, create photo albums for the Web, and manage searchable databases.

The popularity of these open source solutions in the region is in keeping with the global trend to deploy FLOSS to run ISP functions. This attractive blend of open source solutions across the Asia-Pacific Internet infrastructure has contributed to significant reduction in the set-up and operating costs of ISPs. The deployment of FLOSS is now spreading beyond ISPs to the general population of computer users, who are showing increasing interest in open source desktop products and local-language integration.

The interest in using FLOSS is often accompanied by the intention to adapt software to operate in the local languages of the users and to meet their particular needs. Many FLOSS user groups have been set up in recent years. Three such groups will be presented to illustrate some of the national and regional efforts to promote and support the deployment of FLOSS in tandem with initiatives to localise the software deployed.

Bangla Innovation through Open Source

This group (http://whybios.blogspot.com) was formed as a non-profit trust in August 2002 to address the twin issues of accessibility and affordability of ICT. It comprises Bangladeshi ICT experts, graphic designers, economists, education researchers, and teachers inside and outside Bangladesh who volunteer their time, resources, experience and knowledge to build a platform where interested ICT professionals and students can work together in building open source technology to bridge the digital divide, besides advocating the use of open source technology in Bangladesh.

Free Software Foundation of India

The foundation (http://fsf.org.in/philosophy/purpose.html) adopts a political interpretation for the word free in the term FLOSS: “Free software is a matter of freedom, not cost. It is a matter of liberty, not price. The word ‘free’ in free software has a similar meaning as in free speech, free people and free country and should not be confused with its other meaning associated with zero-cost. Think of free software as software which is free of encumbrances, not necessarily free of cost.”

The non-profit foundation was established to promote and propagate the use and development of FLOSS in India. Its work includes educating people about “software freedom”. It regards “non-free software as a problem to be solved, not as a solution to any problem”. The foundation also undertakes R&D in FLOSS. Additionally, it helps local policy makers to establish and maintain FLOSS standards and to develop quality assurance mechanisms for free software.

PAN Localization

The PAN Localization research project (http://www.pan10n.net/english/about-pan.htm) has four broad objectives:

- To develop sustainable human resource capacity in the Asian region for R&D in local-language technology.
- To build the capacity of developing Asian countries in strengthening existing technology to support their languages.
- To raise current levels of technological support for Asian languages.
- To advance the policy of local-language content creation and access in support of development.

The scope of the project includes the development of character code sets, collation and other language standards, fonts, lexicons, spelling and grammar checkers, search-and-
replace utilities, speech recognition systems, text-to-speech synthesis, and machine translation. The project will assess both Linux and Microsoft platforms for these specific applications. Different aspects of technology localisation will be addressed, including linguistic standardisation, computing applications, development platforms, content publishing and access, and the effective marketing and dissemination as well as strategies for protecting the intellectual property rights of the products developed. The project will also research into problems and solutions for local-language computing across Asia and will attempt to build an Asian network of researchers to share their experiences with FLOSS.

The countries (and languages) included in the project are Afghanistan (Pashto, Dari) Bangladesh (Bangla), Bhutan (Dzongkha), Cambodia (Khmer), Laos (Lao), Nepal (Nepali) and Sri Lanka (Sinhala, Tamil). The implementers of the project comprise ICT researchers, practitioners, linguists and policy makers from government agencies, universities and the private sector. Various institutions are participating in the project: BRAC University in Bangladesh; the Department of Information Technology of the Ministry of Information and Communications, the Dzongkha Development Authority of the Ministry of Education, and Sherubtse College in Bhutan; the National Committee for Standardisation of Khmer Script in Computers and the National Information Communications Technology Development Authority in Cambodia; the Science, Technology and Environment Agency and the National University of Lao PDR in Laos; Madan Puraskar Pustakalaya, the University of Kathmandu, and Tribhuvan University in Nepal; and the University of Colombo School of Computing in Sri Lanka. The project is coordinated by the Centre for Research in Urdu Language Processing at the National University of Computer and Emerging Sciences in Pakistan and supported by the Pan Asia Networking (PAN) Programme of IDRC of Canada.

Illustrative cases

We begin this brief review by looking at the efforts of three members of ASEAN to appreciate the different approaches they have adopted for promoting FLOSS in their countries. In the case of Vietnam and Thailand, we see two national projects initiated by their governments to trigger the countrywide adoption of FLOSS. Indonesia is an interesting case where users, rather than the government, are taking the lead in mainstreaming FLOSS across this vast archipelago.

Vietnam

The Viet government approved in March 2004 the master plan for applying and developing OSS for the period 2004–2008. The plan was drawn up in response to the concern that the high cost of commercial software is hindering the use of ICT to propel national development. Aside from its low cost, vendor independence, suitability for a wide range of low-cost computers, security and reliability compared to commercial software, FLOSS offers the flexibility for localisation and customisation to meet local needs. Moreover, as Vietnam prepares to join WTO and to fully implement its bilateral trade agreement with the USA, FLOSS has emerged as an important instrument to help it comply with the terms of the trade agreements requiring it to eradicate software piracy. In preparing the master plan, the Viet government was able to tap the experiences of China, Taiwan, South Korea and Malaysia.

The objectives of the master plan are to speed up the development and use of FLOSS, to train technicians who can deploy FLOSS creatively, to produce FLOSS that is localised to meet domestic conditions and requirements, and to promote the development of the country’s software industry.

Vietnam will experience immense difficulties and challenges in its efforts to promote and deploy FLOSS across the country because of various factors. Firstly, there is little copyright awareness and the use of illegal software remains the norm, resulting in a lack of motivation to switch to FLOSS. At the same time, the spending of ICT projects has not been closely monitored and any cost savings that could have been made from the use of FLOSS have not been maximised. Secondly, specialists who can install, operate, troubleshoot and develop FLOSS are lacking. Uncoordinated R&D efforts in OSS have failed to build up expertise in this area. Thirdly, the country is overdependent on the Microsoft platform. This undesirable dependency has been difficult to address because of the lack of expertise to develop suitable FLOSS and to help users migrate to open source platforms. Lastly, there is a shortage of FLOSS applications that have been localised and rendered suitable for mass deployment.

Among the organisations in Vietnam with expertise in FLOSS are two companies that supply operating systems and office applications. One of them is the CMC Company, which develops Linux and applications based on localised Red Hat and OpenOffice. CMC was awarded a contract by the Ministry of Education and Training to supply 5,000 PCs installed with their open source operating system and office applications for more than 100 schools across the country.

The other company is the VietKey Group, which has developed fully localised Linux and OpenOffice under the brand Vietkey Linux. The group has signed agreements with Vietnamese PC makers such as Vietnam Electronic Informatics Corporation, Green Mekong, SingPC and Elead-FPT to install Vietkey Linux in their products. There were an estimated 100,000 PCs installed with Linux in 2003 across Vietnam.
Besides these two companies, there are several others dealing with FLOSS products and services. Nhat Vinh Company is one of them. It develops web and e-commerce applications. Another company, CDIT Centre, develops Internet applications. The Vietsoftware Company recently won a major contract to work on the Hanoi portal initiative. In the meanwhile, the Hanoi University of Technology, Cadpro Company, the Institute of Mathematics and the Institute of Mechanics are all developing high-performance computing applications.

Some organisations have begun to use FLOSS throughout their operations. They include the Informatic Francophonie Institute, the Mathematics Faculty of Ho Chi Minh National University, and the Management Board of ICT Projects of Ho Chi Minh City. The Ministry of Defence and the Ministry of Police are also running FLOSS. Most servers in the country operate on FLOSS.

Thailand
The Thai government has also been working to eliminate software piracy by encouraging the use of legal software while enforcing its Copyright Law. Although most large businesses in Thailand use licensed software, a large percentage of educational and home users cannot afford the high licensing fees. These users are therefore potential adopters of FLOSS.

NECTEC initiated a research project in 1995 to develop a Thai-language operating system and office suite based on open source technology. In addition, it set out to create awareness among users about software copyright and to build local expertise and businesses to support the development and adoption of FLOSS.

As part of this initiative, NECTEC developed FLOSS for schools participating in SchoolNet. The collection of Thai-language software that was eventually distributed for this purpose included the Linux SIS (School Internet Server) operating system for the main Internet servers in schools and Linux TLE (Thai Language Extension) and OpenOffice TLE for desktop PCs. This bundle of software is easy to use, and its quality is comparable to that of the more expensive commercial products. More than 100,000 sets of the software package have been distributed.

Indonesia
The open source movement in Indonesia is driven entirely by the user community. Tens of thousands of Indonesian Linux users keep in touch with the movement via mailing lists and websites. The most active Linux mailing lists include linux.or.id, tanya-jawab@linux.or.id, majalahneotek@yahoogroups.com and linux-heboh@yahoogroups.com. Three Indonesian versions of Linux have been developed and distributed: Trustix Merdeka (http://www.trustix.web.id); Bijax, developed by Universiti Bina Nusantara students (http://www.binus.ac.id); and WinBI, adapted from Trustix Merdeka and supported by the Ministry of Research and Technology. The open source package Linux Terminal Server Project (http://www.ltsp.org) is widely used across Indonesia as a low-cost solution by Internet cafés and school networks.

Indonesian websites run by Linux magazines such as InfoLinux (http://www.infolinux.web.id and http://www.infolinux.co.id) and Neotek (http://www.neotek.co.id) are popular sources on Linux. Hundreds of books on Linux, the Internet and ICT have been written by Indonesian authors.

User polls conducted by websites (http://www.linux.web.id, http://www.infolinux.co.id and http://jakarta.linux.or.id) show that Red Hat, Mandrake, Slackware and SuSE are favourite Linux distributions in Indonesia. MySQL is the favourite database software among Indonesian Linux users, while their most popular user interface or window manager is KDE.

The open source movement has led to other collective efforts. In October 2003, a group of users got together and launched Groups.or.id, a free mailing-list discussion platform. It has grown rapidly since then. The first mailing-list server was a computer with a 600-MHz Pentium III processor bought with funds contributed by many people; no one owns the initiative – it truly belongs to the Indonesian people. Other servers are being set up for the open source community, including a free webmail/popmail server and a development server. Three additional servers have been installed since the first mailing-list server was commissioned.

Goa School Computer Project
There are many interesting cases from South Asia of the use of affordable localised open source applications bundled with low-cost hardware to support educational programmes and to enable access to ICT in rural areas. Such efforts by committed individuals in Goa, India, is a useful case to review. These individuals created the School Computer Project, which began as an informal effort by Goans and other Indians living in the USA to help facilitate access to computers by students and other people living in the vicinity of rural schools. They collected used PCs and shipped them to Goa, where the computers were refurbished, loaded with FLOSS and distributed to schools. Teachers at these schools were provided with training on Linux. A local Linux user group was formed to support the initiative. The project proves that affordable computer labs can be established in rural schools using old PCs and FLOSS. Many of the computer labs are open to villagers after school hours for sending email and downloading information from the Web.

The process of setting up such labs usually involves first creating a local organisation to undertake the task. The extent of ICT penetration in the schools in the target area is then assessed. Arrangement has to be made with the local education department to ensure customs duty on hardware is waived. Schools that should be included in the programme are identified. Following that, help in building the infrastructure is given, and teacher training and curriculum development are arranged. Used computers are then sourced
and shipped, and provision is made for maintenance of equipment. Finally, the facility is also opened to the villagers after school hours, providing them with useful applications (Indian Express, 2002).

**SchoolNet Thailand**

SchoolNet was a pilot infrastructure project to link 5,000 schools in Thailand to the Internet. The aims are to use ICTs, particularly the Internet, to improve the quality of education for the youth, to reduce the gap in the availability of quality education between urban and rural areas, and to promote educational activities on the Internet. The network also serves as a communication tool to facilitate the exchange of information between teachers in the participating schools, between teachers and students, and among the students themselves. It is also designed to encourage youths to search for information, including employment opportunities, on their own using ICT.

SchoolNet was launched in 1995 by NECTEC as a component of the national ICT policy IT 2000. Its development was undertaken in four stages:

- **Evolution stage (1995–1997):** SchoolNet was set up with the target of connecting 50 schools. The biggest obstacle during this stage was the disparity in Internet access charges for the schools between urban and rural areas, besides the lack of useful local content in Thai on the Web.

- **Development stage (1998–2000):** The network was granted permission to use the Kanchanapisek network, which has service centres nationwide supported by the Telephone Organisation of Thailand and the Communications Authority of Thailand. This led to the expansion of the network to cover 1,500 secondary schools to connect to the network at a fixed rate of 3 baht (US$0.08) per call. A parallel programme to encourage the development of Thai online content was also initiated.

- **Expansion stage (2001–2002):** The government approved the expansion of the network to cover 5,000 primary, secondary and vocational schools.

- **Upscaling stage (2003 onwards):** The project has accomplished its objectives and is being readied for handover to the Ministry of Education to manage and scale up to cover all the approximately 34,000 schools in Thailand.

Most of the schools continue to depend on the 1509 dial-up service for access. A small number of leading schools are connected through leased lines. All the schools use the Thai version of Linux SIS to run web, mail proxy, cache and domain name system servers. A Thai-language web administration tool is available for maintaining the server without advanced knowledge of Linux. NECTEC also provides schools with a digital library that can serve as a model for developing school libraries. The digital library is an interactive learning medium for teachers and students nationwide, and it encourages schools to link their websites with other schools’ in the country through SchoolNet.

**Business models**

The concept of using business models in development projects became popular with the adoption of digital technologies in the sector. The euphoria of the dotcom boom saw some of the thinking and language of entrepreneurs rub off on development practitioners. Along with the concept came the imperative that development projects must be self-sustaining. Donors concerned about the future of the expensive computer systems installed in villages and slums insisted that NGOs and communities run the equipment as businesses to generate income to pay for connection fees and operating expenses as well as maintain a surplus fund for replacing hardware.

In instances where the push to set up self-sustaining businesses became the primary objective, important development considerations took second place. Some of the business models were so ambitious that they would not have worked even if applied in developed country settings. Development practitioners whose strength lay in altruistic processes became so occupied with trying to be entrepreneurs that they did not have the time to do what they were good at. Instead, they struggled to replicate dotcom business models that they did not empathise with. And the users who should have benefited the most from the new technologies could not use ICT to the full because they could not afford to pay the prices the business models required. This swing towards profitability shows the weaknesses of being driven by hard-nosed business priorities in initiatives that have overarching development goals. It also shows how expensive computers and Internet access can be in terms of the incomes of the intended developing country users.

The search continues for an appropriate business model. It may be the most difficult piece of “technology” to invent in the whole suite of ICT for development. In its absence, the valid fears of the donors will come true: equipment will eventually fail and telephone bills will pile up and lines get disconnected because there is no money to buy replacement hardware and to pay for connection fees. We review briefly three well-known business models that have worked effectively in the right conditions. They are the telecentre, the village phone of Grameen Bank, and public funding.

**Telecentres**

Telecentres are a logical extension of the public call office that brought telecommunications services to millions of villages across India and other parts of South Asia. In the case of the public call office, villagers at first set up business with just a telephone line and handset and charged users a
fee for making calls from the telephone. The business usually comprised no more than a telephone, a table and a couple of chairs. A fax machine was added later when fax became ubiquitous. Telecentres added several Internet-enabled computers to this milieu, as well as a faster telecommunications line where it was available and affordable. The business model remained very similar to the pay-as-you-use formula of public call offices.

Telecentres operated by development projects have found their overheads high, and they commonly run short computer training courses and provide website design and other desktop publishing services to earn extra income. The training element is at the same time meeting the goal of most development projects of building local capacity in using software applications. Commercially run cyber cafés, on the other hand, have discovered online gaming the most profitable part of their business.

The track record of telecentres has been mixed. Like cyber cafés, they tend to do well in more urbanised areas with users who can afford the price and have a reason to go online. Telecentres in rural areas have been challenged by users who are interested in using their services but are unable to pay for them. They also have to contend with frequent disruptions in both power supply and telephone connection. The search continues for a business model to serve poor users. The search is perhaps in vain as business models inherently exclude people without the money to pay for services.

Village phones

The Village Phone Programme of GrameenPhone – a company of Grameen Bank, famous for its micro-credit financing schemes – has expanded rapidly across Bangladesh. The programme is designed for women who have participated in Grameen Bank’s loan schemes. Selected women are provided with a loan to buy a GSM mobile phone and trained to use the phone to run a public call-office service in their neighbourhood. The loan is for an average of BDT 12,000 (US$208) to pay for a handset, the telephone subscription fee and incidental expenses.

The programme was launched in 1997. There were 45,421 village phones subscribed by the end of 2003 and 58,000 phones as of April 2004. The average revenue for each village phone subscriber is double the telephone charges of the average business user. The revenue from village phones for GrameenPhone itself has been growing significantly over the years, starting with BDT 530,000 (US$9,200) in 1997 increasing over the years to BDT 2,070 million (US$36 million) at the end of 2003. The village phones in operation now provide telephone services to more than 60 million people living in the rural areas of Bangladesh. More than 68,000 villages in 61 districts have been covered under this programme. A case study posted at the GrameenPhone website (2004) reported that one of the earlier subscribers to the programme was able to earn BDT 3,000 (US$52) a month after deducting all her costs.

An analysis of the programme found that village phone subscribers were provided with 50 percent rebates on the cost of calls made from their mobile phones (Digital Opportunity Initiative, 2001). This allowed the women operating the public call offices a reasonable income from their investment. GrameenPhone was effectively subsidising village phone subscribers with revenue generated from their urban subscribers. The analysis also found that two groups of people made the most use of the village phone. The first group comprised farmers checking on prices for their produce and making arrangements to ship their produce in a timely manner so as to minimise spoilage. The second group was made up of people using the mobile phone to arrange for remittances from relatives who were working abroad.

Public funding

Public funding used to be a familiar “business” model. It had gone out of fashion in recent years but made a surprising comeback in 2004 among some of the richest communities of ICT users. Cities in Silicon Valley of California, stretching from San Jose to San Francisco, as well as many other cities in the USA, have begun providing broadband access to all their residents. WiFi antennae are set up on lampposts and other vantage points to create hotspots in central parts of the cities. The long-term plan of many of the cities is to provide WiFi coverage across entire cities.

Public funding continues to be the dominant model for educational and development broadcasting. Many governments recognise the importance of dedicating parts of the airwaves to carrying information and content vital for the progress of the population. Some governments have at the same time privatised some television and radio stations. Experience has shown that privatisation tends to lead to the conversion of previously development-supporting channels into stations that are focused on entertainment so as to maximise revenue from advertising inserted between such programmes.

Asia-Pacific countries that have progressed the fastest with the deployment of ICT are also those that have made the most significant public investment into infrastructure, services and R&D. South Korea and Singapore are among the richer Asia-Pacific countries that have pumped billions of dollars into the ICT sector in the form of infrastructure, R&D grants, and incentives to businesses. Public funding has a definite role to play in closing the digital divide, especially in poorer communities, which are becoming increasingly isolated by the liberalisation of the telecommunications sector.

Funds from governments and donors should also be invested in developing low-cost hardware suitable for both illiterate and literate ICT users. Computers will remain beyond the reach of many hundreds of millions of potential
ICT users in Asia Pacific for decades to come, just as the simple telephone has eluded many millions of people before that. Appropriate low-cost hardware may range from better and cheaper radio receivers to WiFi VoIP handsets. It is time to progress beyond PCs and keyboards.

The efficacy of “public” funding, in the true sense, can be seen in the case of the Indonesian VoIP service described earlier. Members of the public have self-financed the establishment of WiFi networks, servers and other supporting infrastructure to make the country’s VoIP network one of the most vibrant in the region without any form of support from the government. Admittedly, this has been achieved mainly among Indonesians with a reasonable income rather than the poorer communities.

**Appropriate solutions**

Asia Pacific has the exciting prospect of using expertise and experiences residing within the region to develop appropriate solutions to the technical challenges posed by the digital divide. The region would find it very worthwhile to localise and globalise R&D in FLOSS as well as low-cost text- and voice-based devices to meet the needs of the hundreds of millions of disconnected people.

Governments can at the same time wield their policy-making instruments astutely to provide connectivity to their citizens by liberalising the telecommunications and ICT industries so that profitable urban segments of users can obtain more efficient services at a cheaper price. They should also unlicense the 2.4- and 5-GHz radio bands required for WiFi services to prosper. Keeping these two radio bands the exclusive domain of telecommunications companies and the government is a short-sighted policy that will eventually delay the growth of information societies and stymie the expansion of national economies.

Governments also need to ensure the provision of ICT services to isolated rural areas, which will inevitably suffer in liberalisation regimes that aim to maximise profits in commercially viable parts of the country. The risk of entrenching the digital divide through liberalisation is a very real risk in most countries in the region.

**References**


Afghanistan is returning to normalcy, and 2003 stood out as its most successful year in the past decade. During that year, the government was able to study the condition of the country to determine weaknesses, appreciate strengths and plan strategies for implementing action plans and projects for the reconstruction and development of the various sectors.

The ICT sector in the country is very new and weak, and thus it is receiving special attention from the government. After transportation, this is the next most important sector that directly affects the economy and the quality of life in the country. The Ministry of Communications (MoC), as the core body handling ICT issues, has achieved a number of milestones that will change the telecommunications and ICT sectors in 2004–2006.

Enabling policies

ICT offers an enormous range of practical benefits that will support the reconstruction of Afghanistan in all areas. Telecommunications links, for example, will allow families who have been separated to reconnect. Telecommunications facilities will provide vital support to reconstruction efforts, particularly outside of Kabul, both in the early phase during policy implementation and in the longer term when the private sector begins to develop and expand. ICT is also critical to the development and enhancement of national security by creating capacity for greater linkage among the Afghan people as well as between them and the outside world. New telecommunications and ICT policies have been formulated to support the growth and development of the ICT sector in order to meet these needs in the short and long term. MoC has established, or is planning to establish, authorities that will implement action plans and strategies specified in policy documents.

Telecommunications and Internet policy

MoC’s new Telecommunications and Internet Policy outlines an overall framework that is intended to get investments flowing. It encourages private investment through the introduction of measured competition, establishes Afghan Telecom as a state-owned corporation with the authority to accept private investments, and supports rapid expansion of telecommunications and Internet services at the local level. The policy encompasses four broad goals:

- To facilitate social and political integration nationwide.
- To enhance national and civil security.
- To provide macroeconomic stimulation.
- To adopt international best practices.

Following the recommendations of the policy, the functions of the Telecommunications Department of MoC will be transferred to Afghan Telecom. At the time of establishment, Afghan Telecom will be a public corporation owned by the government and administered by MoC. However, it is encouraged to engage operation and investment partners to become a market-oriented commercial enterprise.

ICT policy

MoC recognises the critical importance of ICT and has formulated a policy to pave the way for the rapid development of ICT, which in turn will act as a key driver of the socioeconomic development of the nation. The following three objectives are central to the vision of the national ICT policy:

- Universal access to networks
- Universal access to information and knowledge
- Government use of ICT

Indicators 2003

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* For year 2001

Source: Monitoring the Digital Divide. © Orbicom 2004
Regulatory environment

A new comprehensive Telecom Law has been passed following a consultation process, and a Telecom Regulatory Board has been established for the regulation of the sector in accordance with the provisions of the Telecom Law.

The Telecommunications and Internet Policy includes plans to establish an independent Telecommunications Regulatory Authority of Afghanistan (TRAA) by the end of 2005 to ensure regulatory transparency and fairness for all market participants. TRAA is expected to evolve out of the existing Telecom Regulatory Board. Reporting to MoC, TRAA’s responsibilities will include implementation of a national policy of competition and market liberalisation and issuance of licences for the provision of mobile, fixed-line, Internet and other network services.

With the help of ITU, MoC has established and equipped a frequency management unit within the ministry and also prepared a table of frequency allocations. The unit will update the national spectrum regulation, assess present and future spectrum requirements, work out a countrywide coverage map for radio and television broadcasting, prepare a guide for spectrum monitoring and station inspection, and establish a computerised frequency management system. No entity will be permitted to utilise the licensed radio spectrum without first obtaining a spectrum licence from the Spectrum Management Office.

In addition, a decree has been drafted for consideration by the new Cabinet for the establishment of the National Information and Communications Technology Council of Afghanistan. The council is expected to be formally established by mid-2005 with the mandate to provide advisory services to the government in all matters related to ICT and to act as a coordinating focal point. It will be an independent body reporting directly to the President. MoC will act as its secretariat. The first task of the council will be to formulate a national ICT agenda to chart the path for the development of the ICT sector.

Key national initiatives

Telecommunications sector

The ability to provide comprehensive connectivity and universal access to internal and external information and communication networks is enhanced by the availability of a variety of technologies. Apart from the options provided by the traditional telephone network, there are also those offered by wireless technology (mobile cellular, fixed wireless, satellite), fibre optic networks, and enhanced services over copper cable (e.g. DSL and ISDN). MoC has selected technologies that are relevant, advanced, sustainable, cost-effective and quick to deploy to meet the requirements of the people and the market.

MoC contracted out in August 2003 the installation of 87,000 new digital telephone lines in Kabul and 11 other cities: Mazar-e-Sharif, Kandahar, Jalalabad, Khost, Kunduz, Pulekhomri, Sheberghan, Ghazni, Faizabad, Lashkergha and Taloqan. The subscriber terminals for these new lines will meet the CDMA 2000 standard. The project was completed at the end of 2004. An additional 30,000 new lines for another 11 provincial capitals are being built at about the same time. With the implementation of these projects, the telephone penetration rate has increased to 0.5 percent. It has been forecasted that by the end of the decade 4 out of 100 Afghans will have a telephone.

In addition, MoC contracted with Globecomm Systems Inc., USA, to install a complete nationwide satellite network interconnecting 32 ministries, 32 provincial capitals and all 355 district capitals. The network will provide voice, data and videoconferencing services. All the provincial capitals and 20 percent of the district capitals will be connected by mid-2005.

MoC completed in December 2003 a study, funded by the US Trade and Development Agency, on a proposed 3,300-km telecommunications fibre backbone to assess the technical and financial feasibility of the project and recommend options for its implementation. MoC is expected to invite bidding for the project in 2005. The proposed fibre optic network will trace the country’s ring road network and connect to the Trans-Asia-Europe fibre optic network in the north and the submarine cable in the south. It will be installed along major national highways. Other international links, to be negotiated as bilateral agreements with Afghanistan’s neighbouring countries, are planned. The network will provide alternative routing as traffic increases in the future. It will also reduce the demand for satellite communications.

A network of Codan radio systems was installed in early 2003 covering 36 locations throughout the country, including the 32 provincial capitals. The high-frequency system is capable of sending and receiving voice and data.

MoC has issued two nationwide cellular telephony licences and several Internet licences. The two GSM licensees have so far invested more than US$90 million in Afghanistan to provide mobile phone services to six major cities in the country. They plan to invest another US$100 million to expand services to at least 20 more cities during 2004. The two operators had a total of 120,000 subscribers in the first half of 2004.

The demand for telecommunications services is very high and is not being met by the current service providers. This justifies the issuance of new licences to increase competition. However, the two cellular operators were given the commitment that no additional GSM licences would be issued until 10 January 2006. With this time limit in mind, invitation for bids for a new GSM 900 licence was started in the first quarter of 2005 to ensure that the successful bidder will be ready to launch its services by 10 January 2006.

In order to increase the penetration rate of telephones, MoC will also issue two new national licences for fixed
service providers through a competitive selection procedure. These providers will be free to carry their own long-distance traffic.

However, as most parts of Afghanistan currently do not have access to telecommunications services, it will take a long time for national service providers to extend their services to rural areas. At present, rural residents are using Thuraya satellite mobile phones, which are very costly. To serve the needs of all local communities in the near term, MoC is considering licensing local operations for small cities, towns and rural communities. The private sector will be encouraged to invest in the building of cooperative communications infrastructure to meet local market needs. Operators will be issued fixed service provider licences for local operations that must comply with national technology, spectrum and competition requirements. The licences will be granted for several locations at the same time so that services are rolled out to rural areas rapidly.

To raise efficiency, the US Agency for International Development provided MoC with a computerised accounting and billing system for digital phones along with computer equipment and training for the people operating the system. MoC has contracted out the implementation of the system in all provinces to the Operational Research Group from India. The system is expected to be fully implemented by mid-2005.

ICT sector

The ICT policy has been finalised and approved by the Cabinet; it is now awaiting implementation. Another development was the establishment on 17 March 2003 of the Afghanistan Network Information Centre (AFGNIC), which operates and administers the “.af” domains.

Internet penetration in the country is growing. In 2003, there were only two ISPs in Kabul; a year later, there were six operating throughout the country and covering all the major cities. The number of Internet cafés in the country also jumped from 2 to 150. The demand for Internet-related services continues to grow. To help the development while coping with the growth of the ICT sector, a number of development and training projects have been planned or implemented.

MoC in collaboration with UNDP has established in Kabul nine telekiosks offering Internet access to the public. It is planning to expand the project to other cities.

A project to set up ICT and Cisco training centres was started in 2002 to provide basic computer training to government employees and the public. There are now ten training centres in five provinces, and more are planned. A second Cisco training centre has been established at the ITU-funded Telecommunications Training Centre. In the meantime, MoC is reestablishing the Telecommunications Training Centre as the ICT Institute. The institute will offer bachelor degrees in telecommunications engineering and computer sciences, with the aim of meeting the lack of human resources in both fields.

In preparation for e-government, analysis of the day-to-day work processes of government organisations is underway. Besides implementing e-government and setting up a government portal, e-commerce legislation and a Digital Signature Act are being studied. In addition, the Civil Service Commission will be implementing the e-administration system in government offices and civil servants will be trained to use it. The system will eventually be expanded to the district level.

A national data and IT centre will be established to house the government’s critical equipment and applications, such as national databases. The centre will also serve the IT needs of government offices. In addition, a software house will be set up to address all software-related issues of government organisations. These issues include the development of databases, software applications, security software and web applications.

An IT park will be built that will not only be a centre for supplying hardware and software products and after-sales service, but it will also provide a suitable environment for developing and manufacturing these products.

All these projects will help MoC move towards its ten-year target for achieving the following goals:

- To extend Internet access until the village level for communities with a population of more than 2,000 people.
- To establish at least one ICT training centre, which will provide both hardware and software training, and at least one community technology centre with Internet access facilities for each of these villages.
- To establish at least two software development centres at each provincial capital and one per district with the objective of developing software exports worth US$5 million from government-owned software houses and US$20 million from private sector software houses.
- To establish at least four hardware maintenance centres for each provincial capital and two for each district.
- To establish at least one manufacturing facility for computer devices and components in each provincial capital with the objective of generating hardware exports worth US$3 million from government-owned facilities and US$12 million from private sector facilities.
- To proliferate the utilisation of appropriate software to eventually create almost paperless government offices up to the district level, as well as to develop management and financial management information systems for all government offices throughout Afghanistan.
- To host online facilities for e-education, e-health, e-commerce and other e-services.
- To develop the necessary human resources for the ICT hardware and software industries in the country.
To prepare the ground for the creation of local content, MoC, together with UNDP, is developing fonts for the Pashto and Dari languages. It is also collaborating with the Afghan Computer Science Association (ACSA), a group of linguists and Microsoft on the language interface pack for Microsoft Windows and Office. The team will then work on computing and ICT terminology as part of IDRC’s PAN Localization project to facilitate the development of local content.

ACSA has embarked on a nationwide ICT awareness and acceptance campaign in the first quarter of 2005. During the first phase of the project, which will last for two years, teams will be dispatched to different areas of the country to conduct e-readiness assessment. After completing the study, ACSA, in partnership with MoC, will take the next step of establishing training centres and conducting awareness seminars and workshops in rural areas. The aim is not only to raise ICT awareness but also to help people understand the importance of adopting the new technologies and how ICT will contribute to the development of the country.

ACSA is collaborating with Internews Europe on another key project, Promoting Internet Policy and Regulatory Reform in Afghanistan, which will address policy and regulatory issues in the ICT sector.

**Industries**

**Media**

Cable television arrived in Afghanistan in 2003. As of June 2004, there were about 7,000 cable subscribers in Kabul, mainly from the middle class. Cable companies are required to obtain approval from the Ministry of Information and Culture, which is responsible for regulating the provision of media services, the channels to be used and the content to be distributed. Additionally, any cable company seeking to provide two-way or interactive telecommunications or Internet services must apply for the appropriate licences from TRAA.

The Ministry of Information and Culture has issued three private television licences to Aiena, Afghan Television and Tolo Television to broadcast in three provinces in the north and in the capital city.

Various schemes are underway to modernise the media industry. One of them is by Internews Afghanistan, which operates a computer training centre in Kabul to provide journalists with basic training in Microsoft Windows and Office.

UNESCO will help to computerise the operations of the Afghan Bakhtar Information Agency in Kabul, provide it with Internet access and train its staff in the use of the new equipment. It will also help to modernise the agency’s news archive by providing equipment and training in digitising its collection of newspapers going back to the 1950s.

The AÎNA Media and Culture Centre, which houses an informal meeting place, a library, an Internet space, a computer room and administrative offices, has been equipped by UNESCO with ten computers connected to the Internet via satellite. The centre is open to both Afghan and foreign journalists as well as organisations which the centre has decided to host.

**ICT**

Only a small computer hardware market was present in Afghanistan back in 2002. It comprised a few computer shops in Kabul, Herat, Kandahar and Mazar-e-Sharif. Since then, the IT market has grown and a number of local IT companies have started business. The following are some of them.

Afghan Tech specialises in Pashto keyboard support and Pashto fonts. It also provides web design and development services for English, Pashto and Dari websites. Enabling Technologies, which came into existence in June 2003, specialises in data networks as well as Internet and software solutions. Bittss (Bakhtar IT and Technical Services and Solutions), which was established in May 2003 in Kabul, offers services in webpage design, domain name registration and web hosting as well as database and software design and development. Khpala Pashto develops software in the Pashto language. It also offers web design services. Mashriqsoft is another company which localises software in the Pashto language. Sepia Solutions is a new Afghan company providing web hosting and web development services.

**Looking ahead**

The momentum generated in returning the country to normalcy is expected to be maintained following the successful conclusion of the national elections in 2004. The continuation of this trend is important to Afghanistan on all fronts. The achievements of recent years are encouraging signs that painstaking efforts to rebuild the country are working. The digital divide separating the country from the other economies in the region will hopefully begin to close soon. Although the future looks hopeful, much hard work remains to be done to build the information society in Afghanistan.
Overview

Australia has continued to prosper over the past years, but changes may lie ahead. With interest rates on the rise and the Australian dollar gaining against the American greenback, most imports are cheaper while exports are dearer. When Prime Minister John Howard first came to office, the Internet had barely begun to make its presence felt. Now the digital dimension is central to policy-making in areas as diverse as government service provision and primary school education.

While Australia as a whole is a wealthy country, large areas of the continent are sparsely populated and the vast distances make it difficult to connect telecommunications users by fibre, cable or wireless means. There are huge disparities between the services available in towns and cities and those in remote, rural and regional areas. In November 1997, the Howard government sold one-third of Telstra, the publicly owned Australian telecommunications giant, and the money raised (as well as the funds acquired from the sale of a further 16.6 percent in October 1999) was partly committed to improving telecommunications services in non-metropolitan areas under a major scheme called Networking the Nation (NTN).

Although NTN had some success, sophisticated digital services remain comparatively inaccessible and/or unaffordable for domestic consumers in large areas of the outback. The government promised not to sell any of its remaining 50.1 percent holding of Telstra shares until the communications problems in the bush had been fixed. In September 2000, the report of the first independent Telecommunications Services Inquiry, Connecting Australia (or the Besley inquiry), was made public and it documented a range of continuing problems. In November 2002, the report of the Regional Telecommunications Inquiry, Connecting Australia (also known as the Estens inquiry), which evaluated the relative success of the strategies formulated to address the problems catalogued by Besley, was delivered and it made 39 recommendations. In June 2003, the government announced its response to the Estens inquiry, accepting all recommendations and declaring that its promise to address the problems faced by remote telecommunications users had been kept. In its view, it has now become permissible to sell off the remainder of Telstra once the stock market is strong enough to ensure a good price. (This has yet to happen.)

As this brief introduction indicates, the government has primarily invested resources in efforts to equalise services between urban and country areas rather than concentrating on other disparities such as between rich and poor, English-speaking and non-English-speaking, young and old, and people with disabilities and those without. However, many residents in remote Australia remain at a significant communications disadvantage. A June 2004 review of the Universal Service Obligation and the Customer Service Guarantee identified problems with the way in which some services are subsidised in order to make them universally available.

Given that broadband services are theoretically accessible (via satellite) throughout country areas, the cost of this service and the options available do not equate to the digital infrastructure of the cities. Further, a major concern of country residents is what they call "future-proofing". They fear that the government’s commitment to continually upgrading country services will cease to be a priority once Telstra has been sold off. Decision makers in regional and rural areas sought a future-proof guarantee that their communities would not find telecommunications services declining relative to cities in the years to come. The government responded with a commitment to continue a programme of regular inquiries into any differences in service provision between metropolitan and non-metropolitan areas. It also promised to develop a National Broadband Strategy.

In the cities, the more affluent sections of the workforce and population are combining increasingly affordable broadband connections with wireless connectivity. This allows a number of (mainly) laptop users with wireless cards to access the Internet simultaneously, ending arguments in...
families about who has first turn on the Internet-connected computer at home. Edith Cowan University in Perth recently announced a ten-year strategic educational alliance with IBM to develop teaching and learning strategies for university students using wireless technology. If small-scale trials deliver the anticipated benefits, the future vision includes wireless networking of laptops for all students.

Australian higher education is facing significant uncertainty in the short term, mainly to do with funding and the re-regulation of student fees. Some sources estimate that Australian students will be paying A$662 million more for their tertiary education over the 2005–2009 period under a government plan that allows universities to increase their tuition fees by up to 25 percent for undergraduate students entering university from 2005. This is likely to impact upon enrolments for science and IT degrees, which are already more expensive than arts and humanities courses. The majority of universities have decided to implement this rise and the rest are likely to follow. The opposition Labor party has decried the policy of fee increases saying it will put poorer students off going to university.

There is also continuing concern about the lack of female students enrolling in IT and related subjects. In 1990, the Department of Employment, Education and Training set Australian universities the target of increasing the proportion of women graduating with a professional computing qualification to 40 percent of their year cohort by 1995. Nonetheless, women’s participation rates have failed to respond, with most courses historically enrolling 20 percent women and many failing to achieve that level. Anecdotal accounts place the proportion of female students as low as 10 percent in some courses, and women’s participation rates in the professional IT workforce reflect this differential education dynamic. Although this is a problem in many countries across the globe, it represents a lost opportunity in terms of realising the potential contribution of women to IT and other digital industries.

The Australian–US Free Trade Agreement (AUSFTA), which came into force on 1 January 2005, raises a number of issues for the coming years. The extension of copyright to 70 years after the author’s death (see sidebar) is not the only aspect of the revised intellectual property rights regime included in AUSFTA with implications for the digital realm. Some provisions deal with new liabilities for ISPs that hold allegedly infringing material on their networks and servers. Others require the banning of devices for circumventing the operation of technical protection measures (TPMs), which may have implications for the development of open source software.

Under AUSFTA, it has become a criminal offence to manufacture and sell equipment to counter TPMs. Even though a 2004 report to the Attorney-General’s Department argued that TPMs should be defined as measures limiting (or preventing) the infringement of copyright, AUSFTA implies much more than this. TPMs may include, for example, the chips required to modify computers or games consoles to read a range of disks. At the current time, the Australian courts have been asked to determine whether regional coding is effectively a TPM. Given that the Australian Competition and Consumer Commission opposes regional coding of DVDs and other digital formats, and has lifted restrictions on parallel importing over the past few years, if regional coding is deemed to be a TPM one effect of AUSFTA may be to reintroduce these restrictions in the name of free trade.

Until recently, more positive developments had been occurring in the sphere of digital arts. The Australian Network for Art and Technology developed a digital database Synapse (http://www.synapse.net.au) as a resource to encourage creativity, collaboration and new connections between all interested parties – from artists through to science organisations. The database was a significant outcome of the Australia Council’s New Media Arts Board, with the collaboration of the Commonwealth Scientific and Industrial Research Organisation, the Australia Council for the Arts, and the Australian Research Council. Among world-renowned arts–science projects were “Auto Nomad: A Location-based Handheld Audio Device for Sound-art Applications” and “Fish-Bird: Autonomous Interaction in a Contemporary Arts Setting”. According to a 2003 press release issued jointly by the Minister for Education, Science and Training and the Minister for the Arts and Sport, “In Australia, the creative industries have been valued at A$25 billion a year – as much as the residential construction industry – or 3.3 percent of GDP.” It adds, “Creative industries employ 350,000 people and, at 2.7 percent per annum, growth in employment in creative industries outstrips the national average of 2.0 percent.” The imaginative fusion of arts, science and technology – and the leveraging of technical innovation through the creative industries – was seen to offer the wider society a range of benefits from social through to industrial. Sadly, however, these developments suffered a body blow in December 2004 when the Australia Council announced that the New Media Arts Board was to be dissolved.

Local online content

Local online content in the Australian context is plentiful. Critical enablers appear to be located in the education sector, where many courses on website construction are integrated with other study areas. College students are often required to access websites to find out about assignments, course requirements and other information. They may also be required to post information on websites, or develop websites, as part of their assessment protocols. Additionally, face-to-face teaching may be supplemented by online education mediated through Blackboard or other teaching interfaces. One consequence of this new teaching method is that courses without a central connection to ICT still teach...
The extension of copyright in Australia

The recently negotiated Australian–US Free Trade Agreement (AUSFTA) has extended copyright from 50 years to 70 years after the original author’s death. This is an initiative mainly championed by Hollywood interests (e.g. the Motion Picture Association of America) facing the passing of icons such as Mickey Mouse into the public domain. By definition, this copyright extension did nothing for the originator of the work (who died 50 years earlier), while their children’s interests were already largely protected by the half-century extension beyond the life of the creator. The major beneficiaries of copyright extension are the subsequent heirs of the originator’s children and corporations which have acquired copyrights (such as Disney, which has bought the rights to Winnie the Pooh, originally due to lapse in Australia in 2006).

The Australian Senate committee assessing the extension proposals remarked with some irony upon “whether it is appropriate to include IP [intellectual property] in an agreement that has the aim of advancing free trade. IP rights are generally seen as a restraint on commerce since they can be used to preserve monopoly power and to inhibit technological developments.”a The committee also commented upon the precedent of adopting an international agreement that overrode Australia’s domestic law reform processes.

In 2000, Australia’s Intellectual Property and Competition Review decided against extending the term of copyright beyond the existing 50 years. It was that committee’s belief, following submissions by bodies such as the Australian Digital Alliance, that it was in the public interest to have copyrighted materials continue to enter the public domain after half a century. The review could identify no benefit that would outweigh the social costs of further restraint upon the circulation of ideas, published works and artistic creations. Its recommendation, accepted by the commonwealth government in 2001, was that the term of copyright not be extended at that time and that it should never be extended without a thoroughgoing examination that weighed all costs and benefits. Arguably, in the rush to ratify AUSFTA, such an investigation was precluded.

As any author citing copyrighted works published in the past 50 years will attest, the time and cost of obtaining permissions for images, artworks and extracts of published writings can prove prohibitive. The costs are both in research hours and in fees. Such considerations may alter the content of a book to exclude certain copyrighted items on the grounds of cost or convenience. Further, some estates, agencies and copyright holders choose to control the artistic expression of the creative idea. Copyright holders may ask to see the context within which the quote will be used – effectively censoring “dissenting” and “dissident” usage, and only giving permission if the context is approved. These problems have already affected Australian productions of works created by overseas playwrights and composers. This has obvious implications for free expression and creative reinterpretations. What if Shakespeare’s works were still copyrighted and his estate had not liked what Baz Luhrmann proposed to do to Romeo and Juliet in his 1995 film?

Academic lawyer Dr Matthew Rimmer argued that “the legislation will have a severe impact upon cultural institutions – such as libraries, galleries, orchestras. It will interfere with the activities of electronic publishers of public domain works – such as Eric Eldred’s Eldritch Press, The Internet Archive and Project Gutenberg.”b Other commentators noted the irony that it will be easier for tomorrow’s generation to research the 19th century than the 20th, since resources from the 19th century will be readily available online while those from the 20th may have copyright successively extended. (Australia is already on notice that 70 years is an interim goal for the USA, which would prefer 95 years’ copyright after an author’s death.)

Additionally, the government has provided grants to help communities develop online material. The NTN initiative, for example, allowed communities to apply for funding for specific projects. One project may serve as an example of many. The Southern Yorke Peninsula Community Telecentre in South Australia worked with other organisations and agencies to raise funds to create a local portal (http://www.yorkeregion.on.net). An NTN report commented: “The centre has recorded some 5,000 users, collaborated with Seniors On Line, written training material, negotiated an agency contract with the Australian Taxation Office, become the Centrelink agency for the area, is working with the regional Technical and Further Education (TAFE) College and developed the regional portal website.”10 In this way, content is created while local skills and creative, educational and supportive networks are developed.

The World Wide Web is also a major site of Australian popular culture, linked into and promoting movies, magazines, books, radio and television. Most television programmes have an official website, and the new breed of reality programmes – pioneered in Australia in 2001 by the Dutch-developed “Big Brother” show – includes interactivity via SMS texting and a dedicated website with 24-hour live coverage of “the house”. This show, along with other franchised spin-offs of global rating-busters (like “Australian Idol”), both develops and reflects the increasingly interactive nature of youth culture. The commercial nature of much of this television – the sponsors, the giveaways, the reliance upon fee-per-call high-tech communication – drives further local content creation specifically targeted at the Australian marketplace.

Website creators classify the content of their sites according to a code of conduct11 drawn up by the industry and registered by a watchdog body – the Australian Broadcasting Authority (ABA) – which is also responsible for implementation. If consumers have reason to complain about content, then that complaint is investigated and a remedy upheld if it is found to be justified. ABA reports the outcomes of all Internet-related complaints on a monthly basis.12 ABA is due to be merged with the Australian Communications Authority (ACA) to form a new body, the Australian Communications and Media Authority (ACMA), before July 2005 (see also “Regulatory environment” below).

**Online services**

As implied above, there has been extensive creation of online content in Australia, and this has often been related to the provision of online services. The business, education and government sectors are all keen to provide services online, seeing this medium as a cheap and effective delivery mechanism. Almost any information and communication service available in Australia may be researched, booked and paid for online. Three issues arise from this development.

As online services become better and more plentiful, those without online access experience greater comparative disadvantage. Australian telephone banking, for example, tends to be more costly for consumers than Internet banking, while face-to-face services may be charged even higher than either of the remote options. Contacting a government agency by telephone can involve “holding” on the line for many, many minutes during which time the website is often extensively advertised.

Another point that arises is that many people with great need to access government services may not be literate, or may not speak English. While the Council for Multicultural Australia (http://www.immi.gov.au/multicultural/cma) tries hard to ensure that vital online services are available in the range of languages spoken as mother tongue by all Australians, and the government makes many of its websites available in a number of different languages, English remains the dominant language for website creation.

Finally, services tend to be developed to work best on top-of-the-range equipment, with the best possible network infrastructure, but comparatively few people have access to these technologies. One key promise following the Estens inquiry is that broadband services will be made more available to country areas (the National Broadband Strategy): “We are working hard to make ADSL available in as many regional areas as possible,” says Telstra’s Countrywide Managing Director, Doug Campbell. “We are also looking at wireless technologies to extend access to broadband where that might be appropriate.”13 Until then, people in remote areas will find accessing some online services much more difficult than would be the case if they had a broadband service.

**Key national initiatives**

The critical importance of the Telecommunications Services Inquiry and the Regional Telecommunications Inquiry in building awareness of ICT policy issues and proposing strategies to address regional inequities was discussed earlier. Inequality in service provision is seen throughout Australia, even though the interventions were targeted at remote, regional and rural areas.

The government is the primary driver of national initiatives. For example, when it makes funds available to organisations, it frequently requires reports on the progress of those initiatives to be posted on the Web. Commonwealth government department grants (such as discretionary grants from the Department of Education, Science and Training) are an example of funding that comes with that requirement.

In April 2004, the government disbanded the National Office for the Information Economy (NOIE) and split its functions between two bodies. The Australian Government Information Management Office (AGIMO) was assigned all of NOIE’s government responsibilities, including six areas
in which ICT use is seen as making these areas “better”: government, information, services, business, infrastructure and practice (all headlined on the AGIMO homepage http://www.agimo.gov.au). More general functions and resources were allocated to a downgraded Office for the Information Economy (OIE), located in the Department of Communications, Information Technology and the Arts. OIE has a policy-development and advisory role and

The Western Australian Telecentre Network

With the mission of servicing regional communities through technology, Western Australia’s network of telecentres is an international success story. From the opening of the first telecentres in 1991, the network has grown to over 100 centres, each reflecting the needs and demands of the community it serves. The number of telecentres – as well as their geographical spread – makes this the largest coordinated network in the world. Nonetheless, the network is currently being evaluated against possible future demands.1

Although it is hard to generalise their roles, these telecentres are used to support further education, professional development, job seeking, teleconferencing, community publishing, small business start-up, liaison with government departments, online banking and email. The Western Australian Department of Local Government and Regional Development has oversight of the telecentre network. At the same time, government, educational and business partners are often enlisted by local communities to help support a telecentre application.

Learning from the early experience of supporting the first telecentres, the Western Australian government established the Telecentre Support Branch (TSB). This agency helps to ensure existing telecentres receive the guidance and services they require and that prospective telecentres have the community backing needed to ensure their success. TSB has developed a memorandum of understanding outlining key principles to be accepted before a telecentre proposal can be adopted as part of the network. The first requirement is a local champion for the scheme who has support from the community: “A community guarantor is required to show local commitment to the project, and community members must take responsibility for managing the Telecentre’s operations.” Telecentres are only established in response to community needs and demands, operating with the keen involvement of a body of volunteers willing to pass on their skills and expertise to develop the use of ICT in their community.

Each community enters into a resource and performance (R&P) agreement with TSB. This sets the strategic plan for the year and provides the basis upon which the telecentre is evaluated. Telecentres report back annually on their performance, although community usage rates are monitored six-monthly. Each performance objective is matched by an indicator which demonstrates in a measurable way whether that aim has been met, and the R&P document is an important component in attracting continuing government funding.

The website of the telecentre network notes that “a typical telecentre has computers, the Internet and email facilities, two-way 128kb videoconferencing, photocopiers, fax machines, printers, television and video machines, decoders, scanners and much more depending on the needs of the community” and also that telecentres are all different. Some include small-business support services (such as secretarial resources and agribusiness consultancy); others may be part of the local library or a craft shop. The important constant is that they are friendly, helpful and accessible. Where a community cannot support a full-service telecentre, telecentre access points allow shared Internet access.

There is no expectation that the telecentres should make a profit, but neither should they be an unsustainable drain on public funds. The local community owns the telecentre, which is set up as an independent incorporated body under the supervision of a management committee. Telecentre start-up funds are available from both the commonwealth and state governments and can be put towards the required purchases of technological equipment. Provided the periodic resource, performance and usage targets are met, there is also an annual grant towards the salary of a part-time coordinator. Any extra costs have to be met by a cost-recovery reimbursement schedule, by fund raising or by in-kind community donations through volunteer labour. Approximately 500,000 people access a service provided by a Western Australian telecentre each year.

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2 http://www.dcita.gov.au/Article/0,0_2-1_1-2_5-4_90269,00.html.
promotes the development and take-up of IT opportunities. Although it may seem to be a comparatively small change for a stand-alone national office to become incorporated into another department as just an office, some commentators see the repackaging of responsibilities as indicating that the information economy in Australia has come of age. Instead of being “a vision to be realised”, the information economy is now positioned as “part of everyday business”.

Enabling policies

Apart from the response in June 2003 to the Estens report, there have been few additional ICT initiatives based solely upon a government agenda. This is largely due to a philosophical perception that enabling policies are best driven by demand at the community level rather than imposed from the top down. Thus, the government (as with the NTN scheme) usually allocates funds in accordance with a competitive bidding regime, ensuring that the projects funded are carried out by a research/implementation team dedicated to a positive outcome.

In response to community-based proposals, the NTN initiative has funded planning studies; fixed communications links; websites and portals; software development; training; videoconferencing; internet service providers and points of presence; public internet access facilities (including computers and Internet access facilities in schools, libraries, councils, telecentres and community centres); support/helpline and technical assistance; awareness raising through demonstrations and visits to communities, businesses, educational institutions and individuals in remote locations; online services; and increased mobile phone coverage. The NTN programme’s focus is on “sustainable, needs driven projects that build demand within communities. Public internet access facilities funded under the NTN Program have been instrumental in building community awareness of the latest IT developments and providing a local venue for training and skills development and other support services.”

Regulatory environment

The government states its policy as promoting competition within a framework of consumer safeguards. The key problem with this approach, as identified by Barr and by Green, is that there is a range of consumers who do not constitute an attractive market for suppliers of goods and services. The poor, the remote residents, the elderly, the disabled – for example – are much less likely to find suppliers competing to fill their needs than is the case with well-paid professional workers. Nonetheless, the deregulation of the telecommunications industry has seen an increase in service choice and provision along with a decrease in costs. For instance, the number of licensed telephone companies grew from 3 in 1997 to 89 in mid-2003. Where the market operates well (e.g. in cities), the deregulation has delivered consumer benefits.

For those people who fail to attract marketers, consumer safeguards in the telecommunications sector are outlined as being “the Universal Service Obligation, the Customer Service Guarantee, the Network Reliability Framework, priority access for people with life-threatening illnesses, price controls on less competitive services and the Telecommunications Industry Ombudsman.” Even so, the Estens inquiry recommended a range of measures that should be implemented to further enhance these safeguards, and the government has committed itself to adopting these recommendations. ACA (http://www.aca.gov.au) will regulate Telstra’s performance against its commitments on service provision and delivery prior to the creation of ACMA.

Open source movement

The open source movement in Australia continues to gather momentum and has recently broken through from being a “techy” preoccupation to being something that has registered as an issue (and a possibility) in the public consciousness. One indicator of this progress is that it is now a subject of debate for media and communication studies students and academics. An online journal M/C: A Journal of Media and Culture dedicated its July 2004 issue (“Open”) to variations on this theme. As part of the rationale for this special issue, editors Felix Stalder and McKenzie Wark set themselves the questions: “What is the impulse behind this sudden explosion of ‘openness’? What makes a community ‘open’? Is open really always better or does openness imply its own set of dangers and its own particular forms of exploitation? What are the aesthetics of openness?” They give their motivation for publishing this special issue as attempting to assess the potential of the FOSS (free and open source software) movement “without being sucked into yet another cycle of hype and disappointment”.

Research and development

Although the government identifies national research priorities for funding, many of the funding schemes require researchers to develop possible projects which are then evaluated in a competitive funding round before the decision is taken as to which projects will be funded. This means that the government will identify digitally driven themes but allow the innovativeness of researchers to determine the topics that they feel to be most cutting-edge. The Department of Education, Science and Training released in 2003 a report “Mapping Australian Science and Innovation” that places the various components driving Australian R&D into a comparative framework. One of the players most closely driven by government policy on research (although overseen by an independent board) is the Australian Research Council (ARC).
ARC is the government body for funding non-medical research in Australia. It has a range of strategies to promote ICT development arising out of the government’s Knowledge and Innovation Strategy (1999), which looked at structural issues, and Backing Australia’s Ability plan (2001), which addressed resource allocation with an increased financial commitment. In 2003, the Allen Consulting Group independently evaluated the effectiveness of these approaches in driving the research agenda. It has also separately evaluated the return on investment delivered by projects funded by ARC.

Trends

The government is likely to continue on its path of identifying national priorities for funding and then requiring that researchers, community groups and non-profit organisations apply for funding through competitive regimes. Competition for funding between communities, researchers and organisations helps to ensure that successful projects are carried out by responsible entities and have relevance for the people. Similarly, by requiring a web presence to establish the credibility of the organisation or group receiving grants, and by requiring the web publication of results, the government will continue to drive online content creation and online service provision across a range of industries in addition to those related to ICT.

In e-commerce, supply issues and inventory management are becoming a focus of differentiation between 21st century businesses and last-century outlooks. Digital management of all aspects of business operation is likely to prove an effective driver of competitive advantage and share-price appreciation, persuading boards of directors to continue exploring new ways to use online and Internet communications to drive business development.

The “soft” regulatory environment adopted by Australia means in essence that the government gets the public to carry out the final evaluation of digital products. Having used industry bodies to set up guidelines as to what is (and is not) acceptable practice, the government delegates to the industries concerned the responsibility to self-regulate according to these guidelines. The public alert the appropriate government-appointed watchdog agency (such as ABA/ACMA for Internet content) when they come across material that they believe breaches the guidelines.

In theory, public interest and feedback close the loop in the system and provide the checks and balances for the scheme: a watchdog regulator consults and the industry body sets up guidelines; industry applies the guidelines; the public assess if the guidelines have been applied correctly and report any concerns; and watchdog regulator evaluates and adjudicates on the matter. Consumer rights advocates, however, argue that this dynamic has reversed many years of progress in consumer protection and changed the balance of power to strongly favour small businesses, the corporations and direct marketers. Furthermore, they claim that this erosion of privacy and consumer protection in Australian society goes hand in hand with gross intrusion into civil and political rights resulting from the heightened security regime triggered by the September 11, 2001, attacks upon America.

By using what is presented as a “grassroots” approach to programme development and regulation, however, the government helps to ensure a dynamic environment for policy development and application. Cynics say that funding goes to people who are good at proposal writing and who have appropriate insights into government policies and priorities. Nevertheless, many of these successful bidders do have a clear vision of their desired outcome – and the skills, networks and resources to make this happen. The theory is that minimum regulation is in place so that innovation can be driven by a perceived market demand without requiring innovators to negotiate a time-consuming and complex approval process. (Unfortunately, in practice, this does not always work in the consumer’s interests.)

Notes

15. See note 10.
L. Green, Technoculture: From Alphabet to Cybersex. (Sydney: Allen & Unwin, 2002)
17. See note 3.
22. Such as Roger Clarke, Xamax Consultancy, and Canberra.
The year 2003 proved to be difficult; and stakeholders of the ICT industry, as they geared up to provide viable services to content producers, ISPs and consumers, had to accept the cold fact that Bangladesh has a long way to go in developing the necessary policy and legal framework to properly administer the country’s public communications infrastructure. Although sales of consumer products such as mobile phones, desktop computers, printers, modems and networking equipment were observed to be increasing every month, the use of ICT remained confined to entertainment, voice communication, and basic Internet access for browsing and email. This was a period during which a number of positive steps were taken by developers, service providers and users to apply the new technologies in ways that would benefit the country. However, overall growth of the ICT industry was hampered during 2003 and 2004 by loose coordination and cooperation between private and public sector agencies, as well as a widely perceived lack of long-term vision at top-level policy-making bodies, despite ICT being declared a “thrust sector” in many forums.1

Industries

Internet and telecommunications services

The Bangladesh Telecommunications Regulatory Commission (BTRC) reported that there were 150 registered ISP licence holders (“licensed” often does not mean operational) at the end of 2003. Among these licensees, 14 were registered as “nationwide service providers”. Regular ISPs and nationwide ISPs are distinguished by the level of licence fees and their business plans. BTRC does not currently provide information on the service areas of the active licensees, but interviews with key informants show that there are 49 operational ISPs in Dhaka, 14 in Chittagong, 6 in Sylhet, and only a handful in all the other districts combined. Most of these ISPs are hybrid service providers supplying dial-up, wireless and DSL services.

Apart from the ISPs, four registered VSAT hub operators had unveiled plans to provide satellite terminal and gateway services in December 2003, but a year later only one of them was open for business in this area providing services to financial institutions. At the same time, more than 20 data communications service providers in the country had registered with BTRC to operate using either their own data communications networks or microwave or fibre circuits leased from established GSM and CDMA mobile network operators.

BTRC also reported 67 VSAT systems registered in the country belonging to ISPs, software developers, and companies using the stations for internal communication. Apart from these registered stations, there are a number of unauthorised VSAT systems in use that are well hidden to avoid detection. The unauthorised VSATs are almost all used to provide illegal call-termination (into Bangladesh) or calling-card services for international calls (from Bangladesh to the world). Information about these unauthorised services can be easily obtained on the Web or at local grocery shops and supermarkets. It is obvious that many of these services are backed by well-managed business organisations that seem to be immune to the law or are tolerated by the authorities as they operate within a “grey area” of the telecommunications policy.

With this number of satellite ground assets, one would expect a large amount of data communication taking place, but the concept of sharing, or parallel use, of common infrastructure has so far not taken hold. It seems that BTRC has chosen largely to omit to follow up on its mandate to conduct inspections and, where necessary, to regulate against illegal usage, or to gather all the stakeholders for a roundtable discussion on updating and modernising rules relating to public communications services. It has instead issued a large number of licences to applicants without consideration for earlier entrants in the same sector or geographical area. The confusion of the role of BTRC is, however, understandable and probably will take more than a few years to resolve.
Perhaps the commission requires more stakeholder participation and a policy-shaping exercise to build consensus on the unique requirements of the Bangladesh ICT market.

In the area of public fixed-line telecommunications services, 37 licences have been approved for 18 companies and an additional 192 applications have been received. The successful applicants have been granted licences to operate in the South-East, South-West, North-East and North-West zones of the country. The Central Zone has been claimed as a monopoly by a foreign company based on a controversial last-minute agreement with the previous administration before it was replaced. Legal clarification and arbitration on the licence for the Central Zone is continuing.

In contrast to the confused state of the private sector, the public sector, dominated by the Bangladesh Telegraph and Telephone Board (BTTB), is much more organised. It is financially healthy in spite of regular predictions of its impending doom and claims of mismanagement. BTTB presented its digital telecommunications network to the public for the first time at a technical conference held at the Bangladesh University of Engineering and Technology in December 2003, immediately before BTTB was awarded its own independent licence as a full telecommunications operator for fixed-line telephony. The presentation showed that major fibre optic cables were already in service linking some of the metropolitan cities at speeds ranging from 155 Mbps to 2.5 Gbps. Domestic connectivity nationwide was possible through the BTTB telecommunication carrier network at speeds as low as 9.6 to 64 Kbps, and beyond that in increments of 64 Kbps up to 2 Mbps. ISDN and leased-line services were also available in the cities of Dhaka, Chittagong and Khulna and were being offered on demand. The service areas for each fibre optic network are dispersed and isolated, and they rely upon microwave circuits for back-up facilities. There are, however, problems in accessing BTTB’s PSTN facility, as policies for general and commercial access are not defined at present, and more importantly there is almost no provision for third-party (customer) equipment to be installed at any BTTB network exchange facility while retaining ownership of the equipment. These issues need to be resolved before customers will feel confident about depending on BTTB facilities.

BTTB took a big step towards establishing a large-scale infrastructure for digital data and voice communication in December 2003 by commissioning a VoIP telephony service for all its subscribers on selected international routes. Although VoIP services had been rendered by unauthorised service providers via VSAT stations as far back as 1999, regulations prohibited BTTB from upgrading its infrastructure to provide such services until approval was given by the Cabinet. The charges for selected international calls fell from BDT 30–60 per minute to only BDT 7.50 (USD0.12) per minute when the Cabinet finally gave its consent at the end of 2003. A separate access number 012 has been commissioned so that subscribers can choose to dial through either regular voice circuits or cheaper VoIP circuits with inferior audio quality. This move caused some controversy, as the VoIP service was launched without public notice, and it was obvious that BTTB considered itself above and beyond the scope of BTRC, which had not approved any VoIP services. Another important point that is often overlooked is that with VoIP it is more expensive to place a call between Dhaka and Chittagong, two major cities in Bangladesh, than it is to call New York from Dhaka. This is an unfortunate situation that stems from restrictions imposed by the Ministry of Finance (which regulates the income and expenditure of BTTB) and the Ministry of Posts and Telecommunications (which regulates BTTB and BTRC).

Internet exchange

No progress has been made in the establishment of a domestic peering point or Internet exchange, in spite of efforts by a number of parties who have either registered their intent with BTRC or convened public forums to sign on stakeholders as candidate subscribers. Greater efforts need to be made among the large number of ISPs so as to develop a consensus on this matter. The much publicised and anticipated Internet exchange project of the Sustainable Development Networking Programme Bangladesh (SDNP), hosted by the Bangladesh Institute of Development Studies and UNDP, had not been commissioned as of mid-2004 in spite of a very impressive budget for human resources and technical development. Of particular note to the ISP industry is that SDNP has expressed repeatedly that it will not be in a position to connect all the licensed ISPs and will only be donating equipment of its choice to selected ISPs. In the opinion of this author, who has played a significant role to date of building the Internet in Bangladesh, this decision of SDNP will eventually create a very large gap between those who are connected to “the” exchange and those who will have to raise funds and obtain equipment on their own to make this connection. This initiative will probably turn out to be counter-productive. Perhaps SDNP needs to consider why it wants to get into the “business” of being a telecommunications service provider if this alienates hundreds of thousands of users.

Software

Commercial software developers in the country now seem ready to accept the fact that they need to first set up a viable domestic software development industry before they can aim for the international market. This was evident during the marketing mission they undertook to COMDEX 2003. The mission was co-sponsored by the Export Promotion Bureau and the Bangladesh Association of Software and Information Services. It confirmed the inadequacy of just providing ICT.
education to large numbers of students without generating jobs for them when they graduate, forcing them to seek employment in other countries.

Online content

There has been no significant increase in the online presence of Bangladeshi vendors, service providers and service organisations. The exception is in the number of mainstream English and Bengali-language newspapers\(^7\) which are now available over the Web via their online editions. The extended absence of a standard code for the Bengali font poses continuing challenges to content providers working in the national language. Software developers have opted to tackle this problem by creating more Windows-based font-input translation capabilities to complement the long-standing support for Bengali provided by Apple Macintosh computers for well over a decade now.

Another exception is the increase in the number of small and medium-sized companies registering their own domain names, initially for email and subsequently for establishing websites. It is difficult to determine the number of websites registered within Bangladesh owing to the absence of a consistent top-level domain-name scheme in the country and a common registrar. It is also virtually impossible to determine the number of websites published by Bangladeshi companies, organisations and individuals that are hosted overseas by international service providers. A simple registration service is being offered by BTTB for organisations choosing to adopt a “.bd” top-level domain, but there is controversy over the structure of second-level domains and it has been recently divulged that the infrastructure for the top-level domain name records maintained by BTTB is fragile and unsupported.\(^8\)

Disabling policies

Discouraging exports

It is puzzling that the issue of foreign currency revenue is rarely discussed by policy-making bodies, even though current regulations in this area discourage ICT exports from Bangladesh. Presently, Bangladesh Bank, the country’s central bank, routinely deducts 10 percent of foreign currency remittances that ICT companies receive from abroad as payment for their exports. The deduction is for “royalty” payment to the government and is on top of applicable income taxes payable by these companies. Additionally, Bangladesh Bank requires that the balance of the remittances be converted into the local currency and deposited in local banks. The National Board of Revenue does not allow local ICT companies to maintain foreign currency accounts, make use of foreign currency credit cards, or maintain international foreign currency bank accounts for depositing their export earnings. These antiquated and draconian regulations are discouraging and restricting the efforts of local exporters.

Bangladesh Bank allows the 10 percent royalty deduction to be waived for remittances received “for software export” and “for IT export”. However, companies must use these exact terms to very carefully describe their export earnings at the time their foreign remittances are received, otherwise the deduction is automatically made and will not be refunded. The use of other terms, such as “for software export services” or “for IT-enabled services”, is not accepted by the bank and will lead to the deduction being made.

Discouraging R&D and specialised engineering

Existing regulations for importation of components and equipment discourage ICT manufacturing and R&D efforts in the country. The National Board of Revenue, part of the Ministry of Finance, sets the customs tariffs and revenue targets and controls all imports into Bangladesh in collaboration with the Ministry of Industries, which defines the Import and Export Policy of Bangladesh. The policy was obviously put in place to protect local industries by selectively applying tariffs on various categories of components and equipment according to its Harmonised Standard Codes. It imposes additional fines and taxes of up to 41 percent for small shipments of goods. There are also fines for not purchasing through letters of credit and more fines for not using a pre-shipment inspection agency. It is obvious that in the implementation of the policy the government has never considered the plight of small, skills-based ICT R&D workgroups as well as developers who need just-in-time shipment of electronics and software components. What is also evident is that the government’s Import and Export Policy for 2004–2005 and 2005–2006 has discouraged R&D-oriented engineering firms from contributing to the development of the ICT sector in Bangladesh. This in turn has alienated ICT talent in the country, who are migrating in large numbers to any country that will employ them.

There is an obvious gap between the stated goals of the government to promote ICT as a thrust sector and the policies currently followed. Some time may have to pass before the goals and policies may converge.

Notes

3. According to the provisions of the Telecommunications Policy 2001, BTTB was to be provided with a “grandfather protection” clause for 12 months after the founding of BTRC, but the process was not completed owing to many factors, and the grace period expired on 31 January 2003.

4. Such claims of BTTB are often met with valid scepticism by commercial customers, who often comment that it may be more accurate to add “as long as ‘speed money’ is paid to local technicians and technical problems don’t happen on a Thursday, Friday or Saturday”. Typically, BTTB repair crews work government business days, which are Sunday to Thursday. Urgent repairs after normal work hours are not typically provided to subscribers.


Overview

The economy of Brunei, which is predominantly based on oil and gas exports, has done well given the high prices enjoyed by the two commodities during much of 2004. The country is expected to embark on a new round of investment-oriented development activities. A second wave of e-government spending is also expected to extend beyond the current Eighth National Development Plan ending in March 2006. Economic growth is expected to strengthen further in the years ahead due largely to increased government spending. GDP is projected to increase at 3–4 percent. The largest share of the country’s annual budget for 2004–2005, amounting to B$5,000 million (US$1 = B$1.7), was the B$604 million that went to the Ministry of Education.

A two-pronged investment strategy has been conceived by the Brunei Economic Development Board (BEDB) to accelerate economic diversification. Plans are underway to develop an international port and hub at a deserted island off the coast of Brunei Bay called Muara Besar. Another set of plans focuses on building a series of heavy industrial plants (aluminium refinery and tyre recycling plants) in Sungai Liang, a town close to the Brunei Liquefied Natural Gas Plant. The Eco-Cyber Park project runs parallel to these initiatives. It has been conceived to integrate ICT and ecology, principally in the form of eco-tourism and environmentally friendly approaches to industrial development within a specially gazetted zone. This project was the brainchild of the Ministry of Communications and is now managed by BEDB. It aims at jumpstarting foreign direct investment in ICT-related fields and incubating local entrepreneurs. However, the Eco-Cyber Park appears to have been overshadowed by the Sungai Liang Industrial Park project. The master-plan contract for the latter was awarded to the Halcrow Group in December 2004. The urgency of attracting downstream investors to the Sungai Liang Industrial Park will further retard the progress of the low-priority Eco-Cyber Park. The consultancy report from the Monitor Group, presumably a part of the feasibility study on the projects, was submitted to BEDB in mid-2003.

The newly appointed chairman of BEDB, Pehin Dato Hj Mohammad, is likely to maintain the momentum of securing international investors to develop downstream and manufacturing industries in Brunei. BEDB will play a more prominent role in the implementation of the Eco-Cyber Park project. A request for proposal was issued in early 2003. However, there is no indication as to when and how the project will be awarded. Ironically, high crude-oil prices do not favour diversification of the economy into the energy-intensive heavy industries. From a business perspective, it is rather fruitless to allow high profits from oil exports to be offset by heavy spending on downstream activities. The current trend in the oil industry appears to be to focus on lean and niche fields, cutting off subsidiaries or plants that are not making good profits. If it is difficult to create and maintain clusters of manufacturing plants in the country, then other options such as financial services, tourism, logistics and ICT are likely to become mainstream economic activities.

The government is actively pursuing the vision of establishing Brunei as a financial hub in the region, specifically for Islamic financing and trade-related financial products. The country has an edge in this field because of its friendly international policies and alliances. Brunei Darussalam is a Malay Islamic monarchy state, renowned for its peace and security. It also does not need to further burnish its reputation as a modern, progressive and global player. In this regard, the government is committed to improving and strengthening Brunei’s finance-related services.

The Treasury, Accounting and Finance Information System (TAFIS) project led the first wave of e-government initiatives in the country. The Brunei Accenture Group, a joint venture between Accenture and a government-owned enterprise, won the contract to implement the project, which is scheduled to be completed by the middle of 2005. TAFIS was followed by the PMOnet project of the Prime Minister’s Office. A message that comes across clearly from these two projects is that the government is pinning high hopes on the
outcomes of e-government. There are good reasons to be optimistic. The B$1 billion set aside for all the ministries to implement several e-government flagship projects should generate significant ICT-related economic activities and raise public awareness. E-government will also provide a backbone to support all the other initiatives aimed at attracting foreign direct investment for the diversification of the economy. An efficient, effective and transformed government should help to boost investor confidence. At the same time, human resource development associated with the initiatives will align Brunei’s workforce with the requirements of the knowledge-based digital economy.

On the user end, the target of providing last-mile Internet connectivity to all households in the country remains a far-fetched ambition. The 2003 census reported that about 46.6 percent of households own at least one PC and about 61.4 percent of these PCs are connected to the Internet. The majority of the connections are dial-up with a maximum speed of 56 Kbps. Although there are two ADSL services delivering a maximum speed of 256 Kbps available to domestic users, their popularity is limited. Perhaps the monthly cost of B$98 for a 128 Kbps ADSL line is too high for the budget of an average family.

There is wide disparity in Internet usage in the private sector. At the top end, companies such as the Brunei Shell Companies, HSBC Bank and Royal Brunei Airline are connected via secure leased lines and have nearly reached the maturity level of the Nolan stages of information system development (Nolan, 1984). The Nolan stage model consists of six stages:

**Stage 1 Initiation:** The computer system is used for low-level transaction processing. There is either no planning of information systems or little systematic methodology in systems analysis and design. Users are not aware of the technology.

**Stage 2 Contagion:** Users become more curious and demanding about the level of information systems and supporting applications. Technical problems with the development of programs are rampant as budgetary control over IT expenditure is misaligned. This is a period of unplanned growth.

**Stage 3 Control:** Users see little progress in the development of information systems while the IT department undergoes restructuring and develops a systematic approach to budgeting, planning and management.

**Stage 4 Integration:** The IT department becomes more oriented towards information provision. There is a significant growth in the demand for applications and a consequent increase in supply and financial resources to meet the demand.

**Stage 5 Data administration:** Progressing from stage 4, the support for and the quality of applications also are enhanced whereby the service level or redundancy of data increases. Users become more accountable for the integrity and correct use of information resource.

**Stage 6 Maturity:** This level is the ideal destination.

Within each stage of development, four major growth processes must be planned, managed and coordinated:
Application portfolio: This first element refers to the support for key applications within an information system organisation. Some examples are finance systems, accounting applications and call centres.

Data processing organisation: The second element focuses on the orientation of data processing, for example, as centralised and technology driven or as management of data as a resource.

Data processing planning and control: This refers to the degree of control, formalisation of the planning process, management of projects and extent of strategic planning.

User awareness: The last element deals with the level of expertise and human resource development within an organisation.

In contrast to large corporations, the average small and medium enterprises in Brunei are not taking e-commerce as seriously as their counterparts in other Asia-Pacific countries. Their ICT focus is on managing applications and operations. Their software applications are usually derived from customising off-the-shelf packages. As such, Linux and other open source software are not commonly found in these enterprises.

Putting all these into perspective, the future does look very bright for ICT development in the country. The fundamentals are strong with the economy being driven by a growing GDP, an educated population, political stability, supportive international alliances and a rich heritage. Some sceptics may point towards the country’s inability to move fast enough with the implementation of projects. Other analysts are doubtful if the small size of the economy will enable it to achieve a critical mass. Despite these unfounded worries and the many trade barriers emerging in the sector, there is very little doubt that the ICT landscape will grow and be significantly different in a couple of years.

Local online content

The government has begun to disseminate information online through a single website (http://www.gov.bn) as a part of its e-government initiative. In the past, most of the information was released through the Information Department of the Prime Minister’s Office in the form of printed documents. The various ministries also maintain their own websites, which tend to be limited to providing information about the missions and structure of the respective ministries. But this is now changing, and information about the latest activities of the ministries is also being posted. The way that the government disseminates its information will evolve further with the implementation of one of the six principles adopted recently by the e-Government Programme Executive Committee, which requires all information released by the government to be made available electronically. There will be a major overhaul of the government ICT infrastructure by the end of 2004 following the award of the contract for establishing PMOnet to a consortium comprising local system integrator Syabas Technologies and IBM Business Consulting Services.

Outside the government establishment, Radio Television Brunei has expanded its website to provide international news links and online news broadcasts. However, content creation among private sector organisations is regrettable slow and weak. Much of the existing content is focused on news, events and forums as exemplified by http://www.brudirect.com. Very little information about indigenous knowledge, such as local customs and practices, cooking, dressing, folklore and music, is available on the Web. The bulk of the existing local content in this area is related to tourism promotion. The two notable tourism sites are http://www.tourismbrunei.com and http://www.bruneibay.com. The University of Brunei Darussalam is attempting to fill the gap by building a site consolidating indigenous knowledge under the university library’s initiative Bruneiana (http://www.ubd.edu.bn/suppserv/library).

Online services

As in the content area, online services will be significantly different by the end of 2004 with the implementation of the e-government projects, which include the setting up of web portals. TAFIS, the first major e-government project, has successfully established linkages across several ministries and government departments via a secure infrastructure to deliver treasury and financial services online. Eventually, these online services will be extended to all government contractors and suppliers as well as authorised financial institutions in the country.

Moreover, the PMOnet project will establish a service delivery infrastructure to facilitate the effective dissemination of information and services electronically within the departments of the Prime Minister’s Office. These services include a collaborative e-office (CEO), an enterprise service portal (ESP) and customer relationship management (CRM), which are designed to help transform the Prime Minister’s Office into a customer-oriented organisation (Brudirect, 2003). The ESP will enable public access to information and services as well as host government websites, which are currently hosted by the Telecommunications Department (Jabatan Telekom Brunei, JTB). The CRM system will help the Prime Minister’s Office to identify and monitor all applications and grievances handled by the relevant agencies and the actions taken by them. The CEO will create an environment that enables collaboration and communication across agencies in delivering their services in a more efficient and productive manner through the use of email and an electronic document management system.

In the private sector, banks are taking the lead in enabling online services. HSBC Bank provides a range of online services including a secure Internet payment gateway that accepts Visa and MasterCard. However, the number of local
e-commerce sites is very small. Noting the low uptake of e-business activities, the ex-chair of the e-Business Programme Executive Committee (EBPEC) has reorganised the committee to focus on a unified approach to promoting e-commerce in the country. The current chair of EBPEC also chairs the BEDB.

**Industries**

BEDB ([http://www.bedb.com](http://www.bedb.com)) was set up to diversify the country’s oil- and gas-based economy and to attract foreign direct investment to new industries. In 2003, BEDB engaged the Monitor Group to identify and prioritise industry clusters for potential growth in the country. The study also considered action plans to access and attract foreign direct investment to develop these industry clusters. Despite strong competition from the established ICT sector of neighbouring countries, the study found the need for Brunei to focus on the ICT cluster.

Efforts to develop the ICT industry should show results shortly. The new industry will provide ICT services to the oil and gas sector, locally based international financial institutions and e-government initiatives. The success of ICT development within the Brunei Shell Petroleum Company, which has a strong local workforce, has provided an impetus to government agencies to draw on both local and international expertise. A robust ICT infrastructure and a vibrant industry cluster are perceived as indispensable to the operations of financial institutions and for attracting more offshore banking institutions to set up offices in the country.

There have not been significant changes in the telecommunications industry except for the steadily increasing number of mobile phone users and broadband subscribers. The much anticipated splitting of JTB, under the Ministry of Communications, into a regulatory arm called the Authority for Info-communication Technology Industry (AiTi) and a service-providing corporate arm to be called Telekom Brunei Bhd has not been fully implemented. There are two service providers in Brunei, and they are JTB and the private DST Communications. JTB is the fixed-line service provider, while DST provides GSM services.

**Enabling policies**

AiTi was established by the Authority for Info-communication Technology Industry Order 2001, also known as the AiTi Order. It was formed on 1 January 2003 with board members appointed from public and private sector organisations and is chaired by Pehin Dato Haji Abdullah, Permanent Secretary of the Ministry of Communications.

AiTi’s primary roles are to regulate and develop Brunei’s ICT industry. Its vision is to establish a dynamic, innovative and vibrant ICT industry that is anticipative of the needs of the nation and responsive to the challenges of the information era. AiTi has five missions:

- To ensure the supply of reliable, affordable and accessible ICT.
- To contribute towards the economic development of the country by being more competitive.
- To provide a regulatory framework that would enhance effectiveness, efficiency and accountability.
- To keep abreast of international changes and development.
- To create an environment conducive to the development of the ICT industry.

Running in parallel with the missions of the regulatory body are the following principles of e-government:

- **Electronic documentation:** All information released by the government should be made available electronically.
- **Customer-centric approach:** All projects must be designed on a customer-centric and not agency-centric basis.
- **Attaining category C (interact):** All government agencies must achieve at least category B (publish) capability for their projects. Only projects that do not involve transactions with the public are allowed to remain at this level of capability; others should aim to attain category C status.
- **Key in once and visit once:** If the physical presence of a person is required at a government agency, in spite of available online services, the person shall be required to make only one visit to the agency. If personal information is required by the agency, a citizen or a user of the system shall be required to key in or update the information in the system only once.
- **Exchange, collaborate and integrate:** All information systems in government agencies shall work towards the exchange of information, collaboration of services and integration of processes so as to deliver seamless and speedy services through single points of access.
- **Access for all:** Government agencies shall provide multi-level access and assistance to those who need help in obtaining the benefits of e-government services.

**Regulatory environment**

There were no major changes in the regulatory environment in the past year. However, representatives of the Attorney General’s Chamber are actively involved in the various e-government committees, notably the e-Government Programme Executive Committee (EGPEC), the e-Government Strategic, Planning and Evaluation and Coordination Committee (EGSPEC) and the Policy Taskforce (termed locally as KKT).

Among the new regulatory frameworks being drafted are those that deal with the setting up of the Data Protection and Privacy Guidelines, the Generally Accepted System Security Principles (GASSP) and the Computer Emergency
Structured adjusting for better results

One of the remarkable achievements in the e-government journey lies in the structural adjustments adopted for planning and implementation of projects. Although the work flows and processes may seem rather bureaucratic, they are carefully managed with clear understanding of the possible outcomes. The top-tier committee (EGPEC), chaired by the Permanent Secretary of the Prime Minister’s Office, consists of all ministerial permanent secretaries. Reporting to this committee is the active strategic policy and coordinating committee (EGSPEC), which consists of representatives from key stakeholders. Regional experiences and best practices are incorporated in the planning and project approval stages. A central consultant helps all the agencies in finalising their respective information system and IT plans, and in this way a sense of ownership is developed.

EGSPEC advises agencies on the models to adopt. For example, the recent award of a consultancy contract for the Government-Wide Human Resource Management System to Wescot Technologies and KPMG (Singapore) shows that the lead agency was willing to implement the system only after establishing a clear layout of requirements and purposes. Actively learning from the mistakes of other e-government journeys and avoiding the need to reinvent the wheels run deep into the system. It is a simple way of managing risks and delivering better results to the e-government projects.

Response Team (CERT). These frameworks will provide a solid foundation for building the ICT industry. The Data Protection and Privacy Guidelines will raise investor confidence and help to attract companies and financial institutions with international databases to locate their databases in Brunei. GASSP aims to strengthen the security of the national network, while CERT is focused on creating a regional cyber-crime unit to share information on hackers, worms and viruses among ASEAN member countries that have agreed to establish CERT by 2005.

Open source movement

The open source movement of Brunei is in its infancy. Only a small number of organisations have deployed open source applications, even though awareness is fairly high among practitioners in the ICT sector. The main obstacle is the lack of suppliers who can deliver open source products and services. Faculty members from the University of Brunei Darussalam are active participants in regional conferences on open source issues. A survey in the country indicated that open source applications for email and web servers as well as network monitoring are gaining popularity because of their lower cost of acquisition.

Research and development

Brunei’s R&D activities in ICT are concentrated within academic institutions such as the University of Brunei Darussalam and the Institute of Technology Brunei Darussalam. There are no R&D efforts to produce commercialised ICT products. However, the establishment of the Eco-Cyber Park is expected to give rise to commercially driven R&D.

Trends

Some interesting patterns in the consolidation of information systems are beginning to emerge among ICT-mature organisations such as Brunei Shell Petroleum and DST. These companies are in the process of implementing a SAP system that integrates most of their business applications. There was vigorous debate about alternative middleware application platforms for government agencies offered by .NET, J2EE, Oracle 9i and SAP. Microsoft and .NET developers and suppliers are more competitive and readily available, but the J2EE platform promises a more robust and advanced set of features. The award of the PMOnet project to Syabas and IBM means that the middleware application server in the Prime Minister’s Office will be IBM WebSphere. Two other interesting developments that are likely to dominate the industry are the adoption of the electronic document management system and the mushrooming of CRM and call-centre services across government agencies.

References


Overview

ICT has played an important role in speeding up socioeconomic development in Bhutan. Radio broadcasts on development issues reach 90 percent of Bhutanese homes today, providing information on the latest farming methods and treatments for cattle diseases. Almost one in five literate Bhutanese reads Kuensel, the weekly national newspaper. There are an average of about 3 telephones for every 100 people. Computers and the Internet are increasingly used in workplaces, bringing people closer to the World Wide Web of information. All this development would not have been possible without the timely establishment of the ICT infrastructure in the country. Bhutan now has access to good broadcasting, telecommunications, Internet and printing facilities; and every sector of the economy has started exploiting the benefits of computers and networks.

ICT is gradually helping to improve the quality of life. E-education, telemedicine, and agricultural information networks all hold much promise for the development of the country. E-government initiatives that are underway should bring about more efficient and transparent governance. At the same time, ICT is facilitating and strengthening recently introduced democratic processes in the country. The development of the Bhutanese font, Dzongkha, undertaken with the assistance of IDRC, will boost the use of ICT.

Unlike the public sector, awareness of the potential of ICT is low in the expanding private sector, which makes minimal use of the new technologies. But the situation is improving, and soon the private sector is expected to tap the full benefits of these technologies. The potential is immense: tourism can be promoted online, work productivity may be raised and, with appropriate training, the large numbers of unemployed youths have the option of going into innovative ICT businesses. Financial institutions need to urgently revamp their operations if they are to play an effective supportive role in growing the national e-economy and to catch up with the international financial sector. There is also an urgent need for policies that will facilitate ICT use by the private sector.

The most urgent and important concern today relates to the affordability and accessibility of ICT services. Bhutan’s Internet connection costs may not be the highest in the world, but the hourly rate for Internet access is currently almost double the hourly wage of most office workers. Surveys found that the private sector is keen to make use of the Internet but is deterred by the high access fees. High costs are also discouraging IT training and awareness-building programmes from making use of online resources. There is therefore a need for a policy supporting universal access to ICT services.

Local online content

The first Bhutanese website in Dzongkha, the national language, was launched on 9 January 2004 by the Centre for Bhutan Studies (http://www.bhutanstudies.org.bt/index-dz-a.htm). Although the site does not contain much local content now, it is expected to play a leading role in the continued development of websites in Dzongkha. The initiative is hampered by low technology and the lack of a standardised font in the national language. Visitors to the website will notice that the pages are made up of large image files imported into HTML tags. This is not an ideal way, but it seems to be the best available option for the moment.

A number of websites were launched in 2003 to cater to specific local information needs. Many are public sector websites that offer a substantial local focus and are designed to enhance the dissemination of information within the country. These websites include the official government website (http://www.bhutan.gov.bt) and those of the Ministry of Agriculture (http://www.moa.gov.bt), Planning Commission (http://www.pcs.gov.bt), Ministry of Trade and Industry (http://www.mti.gov.bt), Department of Education (http://www.education.gov.bt), National Environment Commission (http://www.nec.org.bt), Royal Audit Authority (http://www.raa.gov.bt), Royal Monetary Authority (http://www.rma.org.bt) and Bhutan Telecommunication Authority (http://www.bta.gov.bt).

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<td>Telephone main lines per 100 inhabitants</td>
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<td>PCs per 100 inhabitants</td>
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<td>Internet users per 1,000 inhabitants</td>
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* For year 2002

Source: Monitoring the Digital Divide. © Orbicom 2004
Online services

There are not many service-oriented websites in the country. Bhutan Telecom’s website provides only static information without any services. Even the website of Druknet, the only ISP in Bhutan and which is owned and operated by Bhutan Telecom, offers only a limited number of online functions. Bhutan Power, an important national corporation, still has no official website of its own.

A special e-citizen initiative of the Department of Information Technology, which manages the government’s official portal, aspires to provide online all basic public services required by Bhutanese. A large number of frequently used government forms have been posted online for downloading by the public, as well as all government circulars and transportation schedules. Links to other government agencies and organisations are provided too.

Use of ICT in the private sector

A World Bank survey\(^1\) found that there were adequate ICT facilities in private sector firms and establishments, but they were underutilised. It also found that 62 percent of all private sector firms made use of the Internet, email, fax and telephone. Major factors cited as constraining the growth of ICT in the private sector included the high cost of Internet access, lack of skilled employees, high cost of engaging external professionals and underdeveloped ICT regulations. It also found that computers were used mainly for simple applications such as word processing.

Small and medium enterprises, which form the bulk of the private sector, will make more productive use of their computers if the cost of Internet access is lowered. No major business establishments, including banks, make use of leased lines. This is indeed surprising considering the significant amount of data and information exchange that usually takes place between banks. The use of computers for production control and automated inventory management is also rare, with the exception of a small number of factories. The lack of ICT professionals is another major impediment to the widespread use of computers and the Internet.

Employment generation

Obtaining employment is a major concern of the youth. It is estimated that 50,000 people will be seeking jobs by 2007 and 100,000 by the end of 2010. At the same time, a disturbing trend of rural–urban migration has emerged among the workforce. There is an obvious need to create more jobs. The prospect of this happening is not encouraging given the current state of the private sector and the trend of employing fewer people in the public sector, which has always been the primary employer in Bhutan.

The National Employment Board and its implementing organisation, the Department of Employment and Labour (DEL), are entrusted with the oversight of the employment situation in the country. DEL’s primary role is in matching demand with supply in the job market. However, a severe mismatch seems to exist. Although employers have indicated that ICT professionals are lacking, ICT trainees from the 18 ICT training institutes remain unemployed because of the low-level and inappropriate training given. Most of the ICT job seekers have a class 10 or 12 qualification and a few months of training in basic computer applications, while employers are looking for software and system engineers. This demand is now being filled by software specialists from India and system engineers of the Japan Overseas Cooperation Volunteers. Graduates with a diploma in information management system from the Royal Institute of Management are very much in demand, but most of them are hired by public sector organisations. DEL has conducted a nationwide job market survey to identify the most pressing employment issues in the ICT sector.

ICT can play an important role in addressing the employment issues in Bhutan. IT professionals who once worked in the civil service now own most of the private ICT companies, giving a major boost to the development of the private sector. However, it has been at the expense of government organisations, which have lost most of their experienced ICT professionals.

Business and commerce

Bhutanese businesses do not make use of e-commerce in its true sense. The closest form of e-commerce is the use of email for business development and communication. Online advertising hardly receives any attention, as most local websites do not allow visitors to interact on a real-time basis. Banner ads are hosted at Druknet, which receives about 400 hits a day mostly from Bhutanese living abroad. Payment by credit cards is still not possible in Bhutan. There are two common methods of payment for foreign customers. The first is by depositing the payment into a common account operated by the Bhutan National Bank at Citibank, New York. The Bhutan National Bank will in turn bank the payment in the local currency into the account of the merchant in Bhutan. The other way is via Western Union’s money-transfer facility. Bhutan Post is the sole agent in Bhutan for Western Union.

There is much potential for e-commerce in the country, particularly in the sale of handicrafts and agricultural produce of villagers and in operating local tourism services. Women, who play a very important role in such enterprises, are potentially key operators of e-commerce activities. UNDP, in association with the Ministry of Trade and Industry and the National Women’s Association of Bhutan, is promoting e-business among women entrepreneurs and handicraft producers in Bhutan. It is one of the first e-commerce projects in the country. Also, Bhutan Post is embarking on an E-Post project, which will be extended beyond email services to

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cover a number of online services, such as bill payment, transport ticket reservation, banking and e-commerce.

Basic facilities necessary to enable e-commerce are absent in Bhutan. The foreign exchange policy of the Royal Monetary Authority does not allow citizens or commercial establishments to maintain foreign currency accounts. Only a few financial institutions, such as banks, and a small number of government agencies are permitted to maintain such accounts outside the country. There is an urgent need to formulate enabling policies and practical and realistic e-commerce guidelines for the country.

Banking and financial services

There are no e-banking services in the country. Although the computerisation of banking operations may have helped to streamline administrative processes within banks, the benefits of computerisation have yet to be shared with bank customers in the form of more efficient and convenient banking services. The Bhutan National Bank (BNB) and the Bank of Bhutan (BOB) are the only two commercial banks in the country, and neither have any e-banking facilities. The Druk Banking System of BOB was developed on the Microsoft Windows NT platform by an Indian consulting firm. It supports only counter services, data transfer, interest calculation and bookkeeping.

Being the main agent in Bhutan for Citibank, BNB uses Citibank’s Micro Banker system. Although transactions with Citibank are normally carried out using conventional communication channels, such as fax and telex, this system has been very useful in helping BNB to standardise its day-to-day banking operations. It is used for running counter services, monitoring foreign exchange, keeping stock and inventory, making clearinghouse transactions and managing customer information.

The Royal Insurance Corporation of Bhutan uses an online system, which connects its headquarters with the Phuentsholing branch office, mainly for keeping records of insurance policies, managing the company’s investments and preparing the payroll.

Key national initiatives

E-government

Bhutan’s Ninth Five-Year Plan (covering July 2002 to June 2007) includes a number of initiatives aimed at promoting e-governance. The launch of the official government portal on 20 May 2003 by the Ministry of Communications was one of these initiatives. The website is hosted and managed by the Department of Information Technology (DIT). Unlike most other government websites, it was planned and developed entirely by Bhutanese developers at DIT. A number of LAN and WAN systems will be installed at various government facilities along with the building of other portal sites. The Planning Commission operates a website that provides information on the country’s five-year plans. The commission is also establishing LAN systems in various district headquarters.

DIT will install an inter-ministerial fibre optic network in the capital, Thimphu. Additionally, all government offices in the capital and the districts are scheduled to be networked by mid-2005, at a cost of US$8.2 million, which will enable central and district government personnel to share information. DIT also plans to establish an intranet using a fibre optic backbone to connect ten ministries and government agencies. District administrations, and eventually local governments, will be connected to this intranet. Training will be given to local leaders, members of the private sector and other interested users. This project is expected to cost about US$3 million.

E-Post

Bhutan Post has begun an E-Post project in collaboration with Bhutan Telecom, ITU and the Universal Postal Union. E-Post will provide an infrastructure that can be used to run online services such as e-business, e-governance and even web hosting. Bhutan Post is optimistic that E-Post will help to link government outposts, enable farmers to access agricultural information and allow people virtual access to medical consultation.

The project began with the installation of telekiosks rendering email services at 17 post offices in 2004. It will expand over a number of phases. The pilot phase will eventually network 38 post offices, which represent about a third of the 110 post offices in Bhutan. The current challenge is to design software required by the project. E-Post will initially offer the service of scanning and transmitting by email letters written in local languages. Postmasters participating in the pilot project have been trained on using the Internet and on showing customers how to use the email services. This pilot project is estimated to cost about US$125,000.

E-health

The Health Department has installed computers in all 29 district hospitals. HMIS, a database application, is being used to manage information on the hospitals and their staff, their patients and the diseases treated. The hospitals in Mongar, Gelephu and Thimphu have started a telemedicine project for sending X-ray, ultrasound and ECG images by email to a focal point from where they are forwarded to specialists for their diagnosis. The specialists will then email their diagnoses and treatment recommendations back to the hospitals concerned. About four to five such consultations have been recorded each week since the project was launched.

The hospital in Thimphu is equipped with a LAN, a leased line and a number of computers. This facility allows
doctors to access medical literature and take part in forums held within Bhutan as well as overseas. The hospital has given high priority to the expansion of telemedicine, teleradiology and online health education.

A hospital management system is urgently needed at the Jigme Dorji Wangchuk National Referral Hospital for registering patients and scheduling appointments. The system may also be used for maintaining patient records. DIT has agreed to assist the hospital in designing and implementing the system.

E-education

The education sector does not have a policy framework on the use of ICT. However, a number of plans and activities have been implemented on a continuous basis to introduce computers to schools. The Department of Education has an ambitious plan to eventually equip all schools in Bhutan with computers. Although short of funds and resources, these plans do show an encouraging vision and enthusiasm for the adoption of the new technologies in schools.

In spite of the current situation, the education sector is the largest user of ICT in Bhutan. Educational establishments own more than 400 computers, exceeding all other sectors in the country. The use of computers is now concentrated in high schools. Each of the 35 high schools has on average four computers but without Internet access. Sherubtse College and the two national institutes of education at Paro and Samtse have more than 40 computers each. The government has committed an annual budget of Nu 5 million (US$1 = Nu 45) to a programme for providing at least one computer to each school in the country. Not all schools will be provided with Internet access owing to technical difficulties and limited resources.

Most high schools have started optional computer courses. Sherubtse College runs a regular degree programme in computer science. It has also introduced a postgraduate degree course in IT for teachers that is conducted during the winter vacation. More than 100 teachers have attended this course. The National Institute of Education is running a distance learning programme for teachers that is now conducted using conventional methods without the support of any online facilities. An IDRC-funded project is aiming to change that by building an e-education portal. Teachers should be able to carry out much of their studies online at this portal site. However, unless the government commits to subsidising the high costs of the leased line required by the portal, this facility may not be sustained in the long term.

The Ninth Five-Year Plan also includes the establishment of 30 resource centres where teachers can meet and discuss issues of common interest as well as access online information resources. The centres will be established in strategically located schools, with each centre serving a cluster of other schools in the vicinity. It will be useful to eventually network these centres so that teachers can communicate with their peers at other centres in the country.

The Department of Education website is a useful source of information, including school examination results. However, it suffers from low bandwidth and is thus rather slow. There are no official figures on the number of schools in Bhutan that publish their own websites. Private schools tend to make more active use of computers than government schools. The private Kelki High School in Thimphu has a fully equipped computer lab with more than 20 computers and a teacher of ICT.

Renewable natural resources

The Ministry of Agriculture has a 64-Kbps leased line and hosts its own website, which provides comprehensive information on renewable natural resources. Moreover, the four Renewable Natural Resource Research Centres of the ministry have been operating their own LANs since 1999 and have dial-up Internet access. Besides networking research centres, the ministry’s website also provides important information on agriculture and forestry.

Environmental protection is one of the priority development objectives of Bhutan. Legislation and guidelines on environmental protection may be found at the website of the National Environment Commission, which serves as an information and resource centre on the environment. The commission has established an award scheme to encourage local communities to protect the environment.

Regulatory environment

Government

The king is Bhutan’s head of state. The National Assembly, which was established in 1953, has 150 members, comprising 105 chimis (people’s representatives) elected directly by the public for a tenure of three years, 10 elected representatives of the clergy, and 35 representatives of the Royal Government, of whom 29 are nominated by the king and 6 are elected cabinet ministers. Each year, the position of prime minister is rotated among the ministers. There are now ten ministries in the government. The judiciary is an independent entity. The High Court is the highest court of justice, and the Throne is the ultimate institution of redress and clemency.

There were previously six ministries in the government: Health and Education, Agriculture, Home Affairs, Foreign Affairs, Trade and Industry, and Communications. Some of them were split up to create four new ministries: Information and Communications, Public Works and Human Settlement, Labour and Employment, and Industries. Each ministry comprises a number of departments and independent agencies. Many service-oriented departments have been reorganised as state-owned corporations.
There are 20 districts (dzongkhag) in Bhutan, each headed by a district administrator (dzongdag). Districts also have their own district courts. The Dzongkhag Yargay Tshogchung (district development committees), established in 1981, coordinate development activities in the districts, while the 201 Geog Yargay Tshogchung (block development committees) handle development programmes at the village-block level. The committees are the lowest-level political establishments in the country and are headed by gap (village heads). They have been provided with substantial financial and administrative authority after the implementation of the government’s decentralisation policy.

The district administrators supervise all their respective district sector heads and report to the Ministry of Home Affairs. The other ministries monitor activities in their respective sectors. In this way, district activities are conducted in an integrated and coordinated manner.

Regulatory institutions

All national acts and laws are debated and adopted by the National Assembly. The Constitution Committee is drafting Bhutan’s first written Constitution, which will be debated soon for adoption. The Judiciary Bill, the Election Commission Act and the People’s Representation Act will also be drafted. These democratic instruments will work within the structure of an established and historical hereditary monarchy.

The Bhutan Telecom Act and the Frequency Regulation were adopted in 1999. They were the first ICT-related policy documents ever produced. Under the new regulatory regime, the Bhutan Telecommunication Authority (BTA) will probably be reorganised as the Bhutan Communication Authority. It will oversee media and postal regulations in addition to telecommunications and radio regulations. Various acts and regulations are being enforced by the Ministry of Communications to control the ICT sector’s development. The random use of frequencies has been streamlined as a result of the Frequency Regulation. A regulatory and legislative framework for the print, broadcast, multimedia and audiovisual media is planned. An ICT policy and act will also be put in place soon to support the development and use of ICT in the public and private sectors. Other policy guidelines and regulations regarding online content, information management and e-commerce will be prepared too.

Regulatory and policy activities related to ICT are carried out by two organisations within the Ministry of Communications. BTA is the telecommunications and broadcasting regulator that oversees tariff and licensing policies, while DIT oversees capacity building and the promotion, certification and standardisation of ICT-related activities. This structure will be revamped with the recent establishment of regulatory divisions within the new Ministry of Information and Communications.

Open source movement

Open source systems have been introduced to Bhutan for a number of years, but they have not been seriously considered as alternatives until now. One of the reasons for this may be that most of the software procured in the country is either public funded or donor funded, so the cost factor has never been an issue. Private sector firms use bundled systems and applications that are preinstalled by hardware vendors, while the use of PCs at home is very rare.

But things are beginning to change. Druknet, the national ISP, for example, runs all its servers on open source platforms. Some other organisations are also beginning to use Linux-based web and mail servers in order to reduce costs and ensure flexibility. The latest device running on open source software is the Simputer imported from India. This PDA is gaining prominence in rural communities after being adopted for the E-Post project.

However, the open source movement has not captured the full attention of the Bhutanese ICT community. The Ministry of Information and Communications has yet to announce concrete initiatives on open source. The movement is now confined to a small number of organisations and ministries, such as the Ministry of Education and BTA, which have acquired computers preinstalled with open source software for distribution to schools and monasteries.

Trends

ICT has a very short history in Bhutan. The first telephone lines were installed in 1963, while the first computers were imported only in the 1980s. By 1985, there were approximately 530 km of overhead telephone wires carrying 12 pairs of copper cables. An analogue microwave system was established that year connecting Thimphu and Phuentsholing to some Indian border towns. The first digital switching exchange and an Intelsat satellite earth station were commissioned in 1990. International telephone calls were routed via Madlay’s station in the UK. The volume of international traffic remained low for the initial period, as the telecommunications network did not extend beyond Thimphu.

The state of telecommunications development, however, changed after the establishment of the domestic telecommunications network. According to Bhutan Telecom, there are now an estimated 21,500 telephone subscribers in the country with a total exchange capacity for 26,000 lines. This represents a phenomenal growth when compared with the 2,000 lines available in the mid-1990s. The area around Thimphu accounts for about half of all telephone subscribers. The Thimphu exchange was split into two main switches at Simtokha and Dechencholing using Pasolink. These two exchanges were operating at full capacity within two years. The demand at the Thimphu exchange is particularly high,
and its capacity will be increased with the installation of a new 5,000-line switching exchange.

Although traffic between exchanges at present requires minimal bandwidth, there is a plan to upgrade network capacity between some high-traffic segments in order to meet the projected growth in demand for voice and data services. The current capacity of three trunk circuits with 2 Mb bandwidth for each, or 90 voice circuits between Thimphu and Phuentsholing, will be increased when an additional fibre optic network is built. In fact, the initial phase has already been completed, which connects some major towns in the western region. It will be connected to the Indian fibre optic network that passes through Hashimara. This will represent a tremendous increase in capacity over the small narrowband analogue system operating in the early 1990s.

In tandem with infrastructure growth, tariffs for Internet access and telephone lines are being reduced continually. The PSTN tariff for data services, which are used mainly to access the Internet, has dropped by 25 percent recently. Bhutan Telecom has been lowering its telephone tariffs since its deregulation in 1999. Although the still high tariffs for ICT services are believed to be the major factor discouraging greater use of ICT, the trend of declining tariffs does give much room for optimism.

Bhutan Telecom commenced mobile phone services in November 2003 that include international calls, SMS and fax. The charges are very high, putting the services out of reach of most people. But the tariffs are expected to be reduced gradually in phases.

There are approximately 2,500 dial-up Internet account holders and more than 25 leased-line subscribers registered with Druknet. It is also estimated that as many as 1,050 computers are connected to the Internet through these leased lines. Druknet estimates that the actual number of Internet users is much higher than the number of subscribers, as many users go online from Internet cafés. With programmes to install computers and Internet connections in schools, the number of users is expected to grow. A new ISP has recently been granted a licence to provide Internet services via VSAT in urban as well as rural areas. With competition, Internet access will become more affordable to Bhutanese over time.

About 80 percent of Bhutanese live in rural areas spread over 201 village blocks (geog) of approximately 2,000 villages in the 20 districts. This rural majority has access to less than 10 percent of the telephone lines and accounts for less than 1 percent of Internet connectivity in the country. The teledensity is 2.86 percent nationally, but it is much lower in rural or semi-urban areas. If the three major towns of Thimphu, Phuentsholing and Paro were excluded, the teledensity would be only 1.39 percent. However, the situation is improving: 79 village blocks are now connected to the telephone network; and with a major rural telecommunications project underway, it will not be long before every village-block office will have a telephone and Internet connection.

Note

1. World Bank, Bhutan Private Sector Survey 2002 (Washington, DC, 2002). The survey was carried out by the World Bank, the Bhutan Chamber of Commerce and Industries and the Ministry of Trade and Industry.
The number of Chinese going online continues to increase. At the same time, R&D efforts in the country are beginning to yield a number of important ICT innovations that manufacturers have commercialised for the large domestic market. The government has maintained its support for ICT and is dedicating sustained efforts to developing industries related to the new technologies while promoting their use to the people.

**Local online content**

The number of Chinese domain names ballooned from 250,000 in June 2003 to 349,349 in March 2004. Likewise, local online content grew. Data from the China Internet Network Information Centre (CNNIC) show that in 2003 Chinese users spent 89.1 percent of their time online visiting Chinese websites, an increase of 9.6 percent over 2002.1 Online games have become very popular in China, particularly multi-user role-playing games such as Legend, Pick and Heaven from South Korea and Taiwan. According to market research firm IDC, the gaming industry in China will grow rapidly with the number of game players increasing from 13 million in 2003 to 41.8 million in 2007 and industry revenue growing from RMB 1.3 billion in 2003 to RMB 6.7 billion in 2007 (US$1 = RMB 8.27).2 About 68 percent of current game players access from Internet bars; as such, much of the competition in the industry will concentrate on these establishments.

The number of Chinese blogs grew rapidly in 2003. According to a blog census conducted by the National Institute for Technology and Liberal Education, USA, there were 3,543 simplified Chinese blog websites, ranking them 14th in the world, and 7,712 traditional Chinese blogs, putting them at 9th place.3 Blogs now cover almost every field, including novels, arts, and farming issues. However, some of the better-known sites are personal chronicles such as the controversial “Sex Diaries” of Mu Zimei.

The number of government websites also grew rapidly in 2003. A survey conducted by the State Council Informatisation Office shows that most of these websites, especially those of counties, continue to provide only basic information. Some progress has been made in making government information available to the public, but users remain dissatisfied with the lack of interactive services.4 The outbreak of SARS in 2003 raised the importance of the Internet as a communication medium in China. During the epidemic, the Chinese people received 10.5 percent of their information from the Internet, ranking it just after television and newspapers.5 Although 47 percent of the 8.3 million small and medium enterprises in the country are using the Internet, only 11.1 percent have engaged in e-commerce. Many companies have established only a website and email, and they do not update their information on a timely basis.

**Online services**

Certain online services expanded unexpectedly with the outbreak of SARS. Distance education, B2B e-commerce, telemedicine and videoconferencing were among them. Online services have become a huge market with revenue forecasted by CCID Consulting to climb from RMB 7.3 billion in 2003 to RMB 10.6 billion in 2004.6

**E-government**

The year 2003 was significant in the development of China’s e-government, and investments totalling about RMB 250 billion were made during the year. The central municipal government began to set up an e-government infrastructure that consists of a government portal, an intranet and an extranet, 4 databases (on China’s population, geology, natural resources, and macroeconomy) and 12 projects to develop application systems for public finance, auditing, customs, taxation, social security, agriculture, hydrology, etc.
Distance education and e-learning

The Xiao Xiao Tong (connecting schools) project has been launched to make the Internet available to all primary and middle schools in the eastern counties and western medium-sized cities. Simultaneously, it will strive to link the middle schools and central primary schools of counties in the western and other poor districts to the China Education Broadband Satellite Net.

The Internet proved valuable in another area during the SARS outbreak when students in Beijing attended classes from home through the Web. In another development, the Ministry of Labour and Social Security began training courses delivered through satellite broadcasts for the unemployed in eight western provinces.

A special certification training course on the standard for the national quality management system and the quality control of distance education was conducted to improve the quality of this sector. Also, the Ministry of Education has conducted research on the ISO 9000 standard with the aim of establishing a quality control system for e-education.7

E-commerce and e-business

E-commerce has started in some cities as well as at the regional level. For example, an information platform established in Wuxi, a city located in Jiangsu Province in the east, has attracted more than 1,000 small and medium enterprises after its launch in May 2003.

Eachnet, a Chinese C2C website which has attracted a large number of users, was purchased by eBay, the world’s largest C2C website, in June 2003. The takeover has triggered new interest in the Chinese C2C market, and some well-known Internet enterprises, such as Yahoo, are preparing to enter this market.

Telemedicine

Online consultation has evolved into online diagnosis and remote surgery with the advent of full-screen and interactive video facilities.8 Many of the suspected SARS cases were diagnosed using telemedicine technology. Efforts have now begun to build a national information network for the prevention of diseases. However, this sector continues to face a number of obstacles, including the lack of funds, technologies and, especially, bandwidth. The other difficulties faced include the shortage of medical experts at telemedicine facilities as well as the absence of laws and regulations guiding this new sector.9

E-conferencing

E-conferencing was a popular mode of communication for large and multinational companies during the SARS outbreak.10 Regrettably, the expansion of this market is retarded by a lack of equipment, trained personnel, and qualified suppliers.

E-forums

E-forums are quite popular in China. The views and opinions expressed at these forums can influence the decision-making process of the government, as the SARS epidemic has shown. E-forums can provide the government with a useful way of gauging public opinion.

E-communities

Compared with e-forums, e-communities are in their infancy. Their popularity varies greatly across the country, being established mainly in the larger cities. In Beijing, for example, an e-community network was built in 2003 that covers 14 areas of interest with a total of 180 themes ranging from housekeeping and service agencies to logistic services.11

Industries

The turnover of the computer industry rose by 15.4 percent in 2003 to RMB 332.7 billion, the highest in the electronics and information sector. Hardware sales reached RMB 238.3 billion, representing an increase of 10.2 percent over the previous year. Software sales grew by 15.8 percent to RMB 40.0 billion. Information services accounted for RMB 54.4 billion, having increased by 26.7 percent. IT services and network products contributed the most to the rapid expansion of the industry.12

The telecommunications industry’s revenue increased 14.4 percent in 2003 to RMB 421 billion. The number of mobile phone users totalled 263 million in the same year and for the first time exceeded the number of fixed-line users, which stood at 260 million. The turnover for mobile communications was RMB 197.8 billion, representing an 18 percent growth and accounted for almost half of the total turnover of the telecommunications industry. The SMS market expanded vigorously in 2003 with 200 billion messages sent, more than double the number in 2002. On average, SMS users each sent or received 10.9 messages per week, 46.5 percent of which were textual information from websites.13

China launched its first 3G mobile phone based on the TD-SCDMA standard in 2003. However, few people at present access the Internet via the mobile phone. The potential market size for 3G mobile phones is about 300 million people. It will take time for the technology to become widespread, as it is still considered expensive.

Over in the Internet market, the number of netizens in China grew to 79.5 million by the end of 2003. In April 2003, China Netcom together with the top telecommunications carriers of South Korea and three other countries formed the first marketing federation in the world for wireless LANs.14 China’s telecommunications carriers spared no effort in promoting their broadband services. By the end of 2003, the number of broadband users had exceeded ten
million. In the works is the construction of 5,000 hotspots throughout Beijing by 2008 for wireless broadband access. However, the development of Internet applications which exploit broadband technology remains limited.15

Key national initiatives and enabling policies

The government has been carrying out numerous projects to develop and promote the application of ICT. There have been many achievements so far, as shown by the development of new technologies and the rapid increase in users. However, problems remain, as seen in the uneven development between industries and between different regions. Despite these problems, informatisation will continue.

Development of the ICT infrastructure

The proposal to construct a national ICT infrastructure that includes broadband networks and high-speed Internet was an important component of the Tenth Five-Year Plan. Implementation of the plan has led to the rapid growth of broadband Internet and efforts to converge telecommunications networks, cable television networks and the Internet. These developments lay a good foundation for the deployment of the next-generation Internet.

The number of broadband users increased by 390 percent in the second half of 2003, and was projected to exceed the number of non-broadband users by the end of 2004. The development of broadband has benefited much from the adoption of enabling policies and the availability of relevant technologies. Competition in the telecommunications market has helped to lower the price of broadband services. At the same time, the open IP standard has driven innovation and advancement in ICT, which in turn has led to the old, closed network being replaced by an open digital broadband network. However, insufficient bandwidth and relatively high charges impede the widespread use of the new network.

The government is keen to converge broadcast, telecommunications and Internet services. A key aspect of this convergence plan is the launch of digital television. To facilitate convergence, the State Administration of Radio, Film and Television (SARFT) is implementing a three-step development strategy16 to digitise Chinese radio and television content, beginning with the digitisation of cable television in 2003. In the pilot phase, digital cable television networks were built in more than 46 cities in 26 provinces, and 34 subscription digital cable television channels were launched. Each of the subscription channels provides niche programming, such as Beijing opera, popular music, fishing, shopping, football, childcare and cars.

The strategy of upgrading the cable television infrastructure to digital standards for an entire community all at once helped to boost digital television subscription from 90,000 in 2002 to 276,000 in 2003. However, this number is still far short of the multimillion viewership target. Under this upgrading scheme, not only is the equipment at the cable television station serving a particular community replaced with new digital hardware, but members of the community subscribing to the digital service are also provided with help to purchase new digital television sets.

At the same time, most of China’s telecommunications services have been converted to operate on IP, resulting in...
95 percent of all telecommunications data being transmitted through the Internet today. Preparatory work has started to upgrade networks to IPv6 so as to meet the requirements of the converged infrastructure. CERNET2, the prototype next-generation backbone of the IPv6-based Internet, was commissioned in March 2004, marking the beginning of the next-generation Internet in China. It is expected to lead to the establishment of the world’s largest IPv6 network by 2005. If accomplished, the network is expected to bring immense benefit to China’s ICT industry. Moreover, the application of IPv6 will open up many opportunities for Chinese manufacturers and may even help to spawn new industries.

However, administrative inefficiency is impeding the convergence of telecommunications and cable television networks. The uncoordinated development efforts of the Ministry of Information Industry and SARFT have led to independent expansion of the networks. The disorganisation within SARFT and its lack of enthusiasm for collaboration and forming alliances with others have also become an obstacle. At the same time, resources allocated to the broadcasting sector are being dispersed among regional authorities. In spite of these deficiencies, the government has gained much useful experiences from the programme. It has begun to encourage all urban residents to adopt digital television in an effort to accelerate the expansion of this network.

Informatisation efforts

The government has implemented a development strategy of building an e-government and driving industrialisation with informatisation while at the same time accelerating informatisation with industrialisation. Three major projects have been launched as part of this strategy: the E-Government Project, the Enterprise Internet Project and the Family Internet Project. The basic infrastructures for the first two projects have been established, thereby allowing them to commence operations. The other project is still in the early phase of implementation.

There are many obstacles getting in the way of developing e-government, such as the uneven development between different regions of the country and between industries, as well as the restrictions imposed by old and existing systems.

Although most local governments have established intranets, the state of these networks varies according to the local economic conditions. The e-government facilities in the more prosperous eastern region are much better than those in the rest of the country.

Communication between the various government intranets has proven difficult because of the uncoordinated construction of infrastructure, differences in the level of authority of the different government departments and other reasons. There is also a lack of information on government activities and public services on government websites, even though the government manages 80 percent of all public information resources.

The 12 Golden Projects form an important component of the larger E-Government Project with the aim of developing key industries. E-government in the areas related to trade and economy, such as finance, customs and tax, has developed much quicker than in other areas, such as agriculture. The golden projects are expected to spawn a new market worth no less than RMB 50 billion for the ICT industry.

The Golden Card, Golden Tax and Golden Customs projects have achieved their primary objectives. The Golden Card Project has made an extraordinary impact, helping to stabilise China’s financial system during its ten years of operation. A nationwide bank-card information exchange network has been set up, which provides the foundation for e-business. At the same time, the project has stimulated the development of the local IT industry.

The Enterprise Internet Project has aggressively promoted the informatisation of local enterprises, which form the major group of Internet users in China. It is estimated that the Internet sector contributed more than 0.3 percent to national economic growth in 2003 due mainly to business use of the Internet.

Most of the large enterprises in China have set up their own intranets and extranets connected to the Internet. E-business has developed very quickly in the business community, especially in large enterprises such as Haier and Lenovo. However, problems associated with e-payment, security of online transactions, distribution channels for merchandise, and the absence of policies and laws have stymied the development of e-commerce.

The financial industry, which includes banks and stockbroking firms, is the leader in e-commerce. Online banking and stock trading are the most successful applications of the Enterprise Internet Project. Online banking services are growing rapidly. Services available include fund transfer and remittance as well as online payment for B2B and B2C transactions. This healthy growth is expected to persist with the completion of new service and security management systems and the widespread adoption of the China Financial Certification Authority’s certification system.

Stockbroking firms expanded their online services in 2000 after the China Securities Regulatory Commission issued temporary management measures for online stock trading commission, paving the way for online trading. By February 2003, 72 percent of all stockbroking firms were offering online services. This rapid growth was made possible by the availability of advanced ICT that is secure, reliable and efficient as well as the provision of advisory services to investors. However, obstacles remain to impede the further growth of online trading: the irrationality of existing policies and laws (e.g. investors cannot open online accounts in different parts of the country) and the general lack of security over the Internet.
The implementation of the Family Internet Project needs to be speeded up. Although the number of Internet users has increased significantly in recent years, only 6 percent of the population has access to the Internet. Growth is restrained by the lack of online content in Chinese, inadequate knowledge of Internet applications, and the high cost of hardware and services. The high cost of services is considered one of the main restrictive factors.

The Chinese Digital Life Promotion Year was launched by the Ministry of Information Industry in March 2003 to encourage the consumption of digital products and services. The campaign included activities such as events, forums and exhibitions on digital life, as well as educational programmes on digital technologies. To some extent, awareness of digital products and their applications has increased after this year-long campaign.

Internet security measures

The volume of spam China receives is among the highest in the world. The first to act on spam was an NGO, the Internet Society of China, which together with other NGOs formed an anti-junk email group in November 2002. The group regularly compiled and circulated a black list of IP addresses involved in spamming and also coordinated joint action on the offenders. In spite of these efforts, statistics from CNNIC show that the percentage of junk email received weekly by Chinese users increased from 51.8 percent in December 2002 to 57.7 percent a year later.

The government started taking action against spamming at the beginning of 2004. Various departments have been mobilised to investigate email service providers around the country and to supervise their activities. In the meanwhile, legislation against spamming has been initiated.

In addition, Internet emergency measures will also be enforced to ensure the security of the Internet. However, apart from adopting legislative and technical measures, the government should also strengthen international cooperation in securing the Internet.

Other initiatives

The software sector was the focal point of the ICT industry in 2003. Many policies adopted by the government are designed to promote local software development and use. For example, the Government Software Purchasing Regulation released by the Ministry of Information Industry and the State Department Purchasing Centre requires

### The Golden Card Project

The Golden Card Project was initiated in June 1993 to develop China’s e-money system using integrated-circuit (IC) card technologies. Initially, the system was deployed solely by the People’s Bank of China, but it was gradually adopted by many other commercial banks working together to make the transformation. The project is playing an increasingly important role in coordinating the secure and efficient use of bank cards, the supervision and management of financial transactions, and the application of IC card technologies.

The Golden Card Project has succeeded in increasing the number of financial organisations adopting IC cards from 5 to 91 by the end of June 2003. The total number of cards issued soared to 569 million compared with 4 million in 1993, and the savings attributed to the cards were valued at RMB 994 billion. The number of merchants accepting these cards, including stores, hotels and restaurants, rose from 20,000 in 1993 to 200,000. The number of ATMs reached 490,000 units compared with 4,700 units in June 1995. The volume of card-enabled trade grew from RMB 200 billion in 1995 to RMB 11,560 billion in 2002. This increased volume included interbank trade, which was never transacted before. The volume of trade in the first half of 2003 was RMB 75,700 billion, of which RMB 132 billion was in the form of retail sales. The bank-card system has evolved into a web of interbank and inter-district information exchange networks for customer service, financial administration, marketing, risk and fraud management, and other uses.

IC cards have also been adapted for application in the telecommunications, social security, tax, trade, transportation, customs, and construction sectors. These cards can store essential data, and they are secure, quick and easy to use. The number of cards in use reached 1.3 billion by the end of June 2003, with 70 million of them as telephone cards, 30 million as mobile phone SIM cards, and another 30 million as cards of societies and organisations, transport fare cards, fuel cards and others.

The Golden Card Project has also hastened the establishment of an integrated industrial base for the IC card industry: from chip design and production to the R&D of reading and writing implements used in the coding and application of these cards. It also includes the development of all kinds of applications and software as well as the integration of systems. About 80 percent of the materials and services used in the project are locally produced. These information products, which are the necessary accessories of the Golden Card Project, now make up a very promising new sector that contributes towards the growth of the national economy.
government ministries to use software produced in China. As such, Chinese software manufacturers will have the largest share of the market created by the 12 Golden Projects and the E-Government Project. In addition to the local software market, the sector has also started to target overseas markets. Five software export centres will be constructed in Shanghai, Dalian, Shenzhen, Tianjin and Xi’an.

Competition between telecommunications carriers has grown more intense since 2002. Conflict in interconnection and imbalance in competition plague the various networks. In order to maintain their smooth operation, the Ministry of Information Industry has speeded up development of the telecommunications network quality-monitoring system, investigation of network problems and drafting of the Telecommunications Law, which will regulate competition in the market. The draft law was submitted to the State Department in July 2004 and is expected to be approved sometime in 2005.

**Regulatory environment**

In spring 2003, some legislators proposed strengthening the legislative environment for the ICT sector. Among the proposals was Internet security legislation. However, laws enacted in 2003 were not related to Internet security. One of them was the regulation drafted by SARFT governing content distributed over the Internet and other information communication networks. It prescribes that network managers must apply for permission to distribute audio and visual content over the Internet. In addition, the Ministry of Culture drew up the Internet Culture Interim Regulation for controlling the production and distribution of cultural products over the Internet. The regulation also covers the provision of Internet cultural services. Any organisations proposing to set up such activities are required to obtain official permission.

The first legislative document dealing with the supervision and management of China’s telecommunications market was drawn up by the Ministry of Information Industry. It emphasizes that problems in the telecommunications market should be solved through legal, economic and technological measures.

The regulatory environment for the ICT sector is complicated by contradictory laws and regulations. For example, the Internet Culture Interim Regulation issued by the Ministry of Culture contradicts the Internet Publishing Interim Regulation issued by the National Copyright Administration and the Ministry of Information Industry. This contradiction in regulation has made it difficult for companies to obtain approval and copyright for their products.

As noted earlier, spam has become a huge headache. Among the useless content mass distributed is a fast-expanding population of computer viruses and worms, seriously threatening the security of networks. Network security was the focus of proposed legislation in 2004. A bill for speeding up legislation against spamming was introduced during the second meeting of the Tenth National Political Consultative Conference and discussed at a seminar in February 2004. Government officials, representatives of Internet associations and related enterprises, and legal experts attending the seminar unanimously supported the bill.

**Open source movement**

The government continues to promote the development and use of open source software and has agreed to cooperate with Japan and South Korea in this area. Although not yet standardised, Chinese Linux distributions such as Red Flag have been adopted by government departments. Meanwhile, Linux-based software has been developed that uses the scripts of some of the languages of minority groups in the country.

In October 2003, IBM and the Ministry of Education announced that they would adopt NetLog technology to promote their cooperation in education, scientific research and other areas at universities all over China. This is an excellent opportunity to diffuse Linux across China, and it may help to make the country the largest user of Linux systems in the world. However, before this can happen, hurdles associated with copyright, standards, access and content localisation need to be overcome.

**Research and development**

To raise the low research capacity in the country for core technologies, the government in 1986 launched Plan 863 to nurture the development and application of technologies and software. Significant breakthroughs have since been made in several areas, especially IPv6 and Linux. The National Development and Reform Commission has invested some RMB 400 million in the construction of the prototype next-generation Internet based on IPv6.

After more than a year of research, the final draft of the digital video standard was released on 25 November 2003 for public review. The first 3G cellular phone and its core chip were successfully developed in Chongqing and Shanghai towards the end of 2003. With these innovations, China joined the ranks of advanced developers of mobile telecommunications technology.17

Lenovo Company and Shuguang Information Co., Ltd successfully built the high-performance computers Shenteng 6800 and Shuguang 4000A, with computation speeds of 4.2 trillion times and 10 trillion times per second respectively.

**Trends**

The development of the Internet in China remains in its infancy, in spite of the encouraging progress made so far.
The range of web-based applications, multimedia content, and Internet services offered by local providers will expand with the increasing number of users who have broadband access. The outbreak of SARS has helped to stimulate the demand for Internet-based applications and services, which include online games, advertising, messaging, e-conferencing, e-commerce, telemedicine, distance education, e-banking, e-government and blogs.

China’s huge population makes it a massive Internet market. However, it is not yet a powerful Internet market, as its penetration rate has not reached half of that of developed and emerging economies. The digital divide is widening. Furthermore, the Internet sector has yet to be integrated with other sectors and industries. Relevant laws and regulations for the ICT sector have yet to be finalised, and network security remains weak. These challenges for new stand in the way of the Internet developing to its full potential.

A review of the informatisation efforts shows that the various initiatives have chalked up many achievements. However, the uneven development between industries and between regions, as well as the lack of coordination between the hardware and software sectors, indicates that much remains to be done. The three major informatisation projects also clearly illustrate that informatisation efforts are interrelated. For example, the uneven development within the E-Government Project has affected the Enterprise Internet Project. Furthermore, the lack of enabling policies and clear regulations, obsolete social systems, and other impediments have also adversely affected these projects.

Despite all the challenges, improvement in technologies and the increasingly sophisticated demands of users are expected to spur the growth of the Internet to its full potential in China. The government and research institutes are strengthening work in areas such as IPv6 and grid technology to cope with future needs. The Internet Society of China and other NGOs will play an increasingly important role in enhancing industrial autonomy and information security and in the drafting of Internet laws and regulations. China’s Internet of the future will ride on a second wave which will bring about a period of more rational and mature development.

In the meantime, the government should intensify its effort to promote the harmonious development of the different sectors and regions. This will include the coordination of hardware and software development and the facilitation of beneficial interaction between projects. Informatisation needs to be appreciated as one huge project that ultimately seeks to bring about social innovation. The active participation of the whole society, together with harmonious innovation within various fields, is necessary for this project to succeed. The sustained implementation of government projects with the active participation of NGOs and civil society will bring a bright future for the informatisation of China.

Notes

5. Results from a survey conducted by the Public Opinion Research Institute of the Chinese People’s University. Cited by the Chinese Internet Media (14 July 2003), Chinese Internet Media Report, http://netmedia.academe.com.cn/105/2003-7-14/50012@1593.htm.
16. The three-step strategy comprises: (1) the development of digital cable TV in 2003, (2) the launch of digital satellite live broadcasting, and (3) the promotion of land-based digital TV and high-definition TV.
**Overview**

The digital access index released by ITU in November 2003 ranked Hong Kong seventh overall among 178 economies, second in the Asia-Pacific region. Hong Kong fared particularly well in terms of Internet affordability: with its Internet cost being only 0.19 percent of per-capita income, it provides the most affordable Internet access in the world. Hong Kong has 14.6 broadband subscribers per 100 inhabitants, placing it second after South Korea among the 178 economies assessed. It was ranked fifth in the world in mobile penetration, with 91.6 subscribers per 100 inhabitants. The latest figure (September 2004) provided by the Office of Telecommunications Authority was 117 mobile subscribers per 100 inhabitants.

Being mainly a service-oriented economy, Hong Kong has a strong dependency on international trade and commerce. Connection to the global economy via the application of ICT is considered a way to sharpen Hong Kong’s competitive edge. The government in its Digital 21 policy paper describes ICT as a basic infrastructure of an information society. It believes that ICT should provide the foundation for creativity, e-government as well as economic expansion and transformation. To this end, the government’s efforts in harnessing the power of ICT were obvious in 2003–2004. All sectors of the telecommunications market were liberalised from 1 January 2003 to encourage competition and provision of services at affordable prices. Four 3G licences were issued in October 2001, and 3G services were rolled out in January 2004. Hong Kong was among the first group of economies in the world to open up the relevant frequency bands for wireless services based on the IEEE 802.11 standard. Amendments to the Electronic Transactions Ordinance were introduced in June 2003 to ensure an up-to-date legal framework for e-business. By end 2003, 90 percent of public services amenable to electronic delivery became available online, with some 180 public services from over 50 government departments and public agencies being offered via the Electronic Services Delivery Scheme. In addition, over 80 percent of government procurement tenders were conducted through electronic means. Moreover, the government rolled out a major IT project in June 2003 – the multi-application smart identity card for Hong Kong citizens. The card can store a digital certificate, serve as a public library card and be used for automated immigration clearance at border control points. It will also serve as a driving licence in 2006.

Since 2001, the government has been conducting annual thematic household surveys on the penetration and usage of IT. According to the 2004 survey, 71.1 percent of households had PCs compared to 67.5 percent the previous year, while 64.9 percent of households with PCs (excluding palmtops and PDAs) were connected to the Internet compared to 60.0 percent the year earlier. Out of the population aged 10 years and older, 61.3 percent had knowledge in using PCs and 59.5 percent reported that they had used a computer in the past 12 months. This population, totalling 3.67 million people, reported spending an average of 27.1 hours per week on the computer.

The take-up of e-commerce remained low. Only 14.4 percent of those aged above 15 years had made use of e-commerce for personal transactions in 2004, recording a slight increase from 13.1 percent in 2003. Likewise, the level of online purchasing activities remained low at 7.1 percent among those aged 15 years and older, achieving only a 0.1 percent increase from 2003. And for those transactions that actually took place, the median spending was HK$580 (US$1 = HK$7.8), 54.2 percent of the transactions being ticket reservations.

Despite government efforts in promoting e-government and e-services, only 28.5 percent of persons aged 15 and older had used online government services for personal transactions in 2004, compared to 24.3 percent in 2003. On the other hand, the promotion of digital certificates seems more effective, with the proportion of computer users aged 15 years and older who had digital certificates rising almost fourfold from 3.4 percent to 12.4 percent. Conceivably, the rise could be related to the offer of a one-year free digital...
certificate to citizens when they swap their old identity cards for smart cards. Out of those who had acquired a digital certificate, only 23.5 percent, or 98,000 people, reported that they had actually used it.

**Digital divide**

According to the 2004 household survey cited earlier, Hong Kong has made significant progress in computer and Internet penetration. The proportion of households with PCs had increased from 34.5 percent in 1981 to 60.6 percent in 2001 and 71.1 percent in 2004. Similarly, the proportion of households with Internet access had grown from 11.8 percent to 48.7 percent and 64.9 percent, respectively.

As we move towards an information society, and as computer literacy increases, those who have limited access to computer technology or who are slow in catching up with the trend will become even further marginalised. The magnitude of the digital divide in Hong Kong has partially been revealed in the same household survey report. Some 645,600 households did not have PCs at the time of enumeration, their main reason being “did not know how to use computer”, as cited by 58.6 percent of the households without PCs. This was followed by “no specific application” (46.1 percent). The digital divide exists between age groups, genders and income groups.

It is obvious from user data that computer penetration dips with increasing age. The 2004 household survey discloses that the proportions of computer users in the age groups 10–14, 15–24, 25–34, 35–44, 45–54 and 55–64 were, respectively, 98.1, 97.2, 87.5, 70.3, 42.6 and 23.3 percent. Those aged 65 years and over scored a mere 4.8 percent. The high computer penetration in the 10–14 age group could be due to the government policy of providing computer equipment to all primary and secondary schools. By 2002, the government had spent a total of around HK$2.2 billion in computerising schools.6

Even senior citizens are slowly catching on, with the computer penetration rate improving from 17.9 percent to 23.3 percent between 2003 and 2004 for the 55–64 age group and from 2.5 percent to 4.8 percent for those aged 65 and older.

The same survey indicates that gender disparity in the younger generations, especially in the first three age brackets, was not very wide. For those aged 15–24, there were even slightly more computer users among the females (97.8 percent) than among the males (96.6 percent). However, the gender disparity among those 65 years and older was marked (6.8 percent for males and 3.0 percent for females), which was probably related to the low literacy rate of elderly women.

There seems to be a strong association between income disparity and the digital divide. The percentage of households with Internet access had increased across all household income groups between 2003 and 2004. What had not changed, however, was the fact that households with monthly income below HK$10,000 were far less likely to have Internet access at home, with rates of 28.8 percent (2003) and 39.3 percent (2004), far below the overall rates of 60.0 percent and 64.9 percent, respectively.

According to World Bank data for 2004, Hong Kong is affected by very severe income inequality, with an income gap that is among the widest across developed countries. GDP per capita grew from HK$92,221 to HK$192,465 between 1981 and 2001, while the Gini coefficient, an indicator of income disparity, rose from 0.451 to 0.525. Over the same period, computer penetration increased from 34.5 percent to 60.6 percent. As the economy develops, and ICT take-up increases, the hope that IT could help to narrow the income gap has so far not been realised; instead the gap has widened.

As schools move towards online delivery of after-school education, which requires preparation and submission of homework online, kids in low-income families, which cannot afford computers and Internet access, are put at a disadvantage. Whether this handicap will raise the chances of inherited poverty and continuation of the digital divide to the next generation is still not known. Clearly, the severity and implications of this phenomenon have to be determined.

In fact, the full picture of the digital divide in Hong Kong is obscured. The extent to which disadvantaged groups in society are benefiting from ICT development remains unknown. The household survey reports, for instance, do not include specific data on people with disabilities, single parents (who are mostly homebound), children from low-income families, and new arrivals to Hong Kong. The government is commissioning a digital inclusion study in an attempt to fill this knowledge gap by measuring how specific groups in society have been “included” in this evolving information society. The research is expected to be completed by end 2005 or early 2006.

**Digital inclusion programmes**

By 2002, the government had spent a total of around HK$2.2 billion in bridging the digital divide. Building the ICT infrastructure for the general public accounted for HK$918 million, the highest among the various components, while that for specific disadvantaged groups amounted to HK$304 million. ICT-related training and education for the general public accounted for HK$727 million, while that for specific disadvantaged groups accounted for HK$226 million. Spending on promoting web accessibility was the lowest, accounting for HK$4.2 million only. In fact, the accumulated total of HK$2.2 billion amounted to less than 1 percent of total government expenditure (HK$238.6 billion) for year 2001/2002.

Clearly, the efforts had skewed towards the provision of infrastructure and training. Issues such as content development, promotion of usage and accessibility, and
capacity building for sustaining the use of ICT by disadvantaged groups have not received much attention. In 2003–2004, there were more attempts to fill those gaps, such as exploring the use of speech technology to increase website accessibility, establishing a general technical helpline for the general public, and providing recycled computers to the disadvantaged. NGOs and professional bodies in the IT sector have been experimenting with digital inclusion programmes since 1999. Most of them face financial difficulty in sustaining their activities. The following are some of the programmes.

Computer recycling

Caritas and the Salvation Army, the largest PC recyclers in the community, aim to recycle 3,000 PCs per year. The software licences for these PCs are donated via the coordination of the Hong Kong Council of Social Service (http://irc.hkcss.org.hk/services/other_project/CoLFO_e.asp). Recipients of these computers are low-income families, senior citizens, and other people with special needs.

Virtual community for senior citizens

The Hong Kong Cyber Senior Network Association (http://cybersenior.org.hk) was formed in 2001 and has since grown rapidly into a virtual place for senior computer users to congregate. It provides a free webmail service for members, hosts their personal websites, offers a discussion forum on various topics and is also a rich source of information on the aged.

Free technical helpline

IT Easy Link (http://www.iteasylink.org.hk/aboutus.htm) was established in 2002 as a community service of the Hong Kong Computer Society to encourage computer usage among the general public, especially the disadvantaged. Research indicates that one hurdle to, for instance, the elderly using computers is the lack of support when facing computer problems. The programme is fully funded by the government and provides a high level of professional service to the public. Funding, however, is going to cease sometime in 2005, thus the programme needs to transform itself into a more community-based activity in order to survive.

Promotion of accessibility

The Webcare programme (http://www.iproa.org/webcare) organised by the Internet Professional Association contains two parts: providing a unified Internet training programme for people with special needs and accrediting commercial websites for their accessibility.

In 2004, the government supported a community initiative to establish a Digital Solidarity Fund (http://www.hkcss.org.hk/dsf) to help finance digital inclusion programmes. The fund aims to promote tripartite cooperation between the commercial sector, the government and NGOs and to form a platform upon which longer-term strategies to tackle the digital divide could be discussed and implemented. Initial contributions from the government and the commercial sector have been received, and a multi-sectoral management committee has been formed to manage the use of the fund.

ICT and sociopolitical development

During the miserable mid-2003, Hong Kong was like a cursed city. The outbreak of SARS claimed a few hundred lives, led to travel restrictions and brought another downturn to an economy which had not yet recovered fully from the dotcom bubble burst. Subsequently, Hong Kong went through a period during which political issues, one after another, hit the headlines. Civil society, via the use of ICT, has become a more active participant in shaping the social agenda. Professional associations, community groups, scholars, researchers, social workers, NGOs and their constituencies are all keen to make their voices heard even more clearly in cyberspace. The social value of ICT has not only been acknowledged but raised to a new height as well.

Healthcare and ICT

Videoconferencing technology played an important role during the SARS outbreak. 3G services had not been launched in Hong Kong at that time. Travel restrictions led to increased use of videoconferencing by businesses and hospitals. SARS being a highly infectious disease had necessitated controlled hospital access, and videoconferencing enabled the major hospitals to maintain a degree of engagement with the community, and for patients with their families. The technology also allowed counselling and other support services to take place for the benefit of the patients' families and the community. All these services were made available via special sponsorships, IT professional groups and support from a range of civil society organisations.

The contribution of GIS technology was also obvious during the SARS epidemic. Mapping and GIS are important tools for identifying environmental factors and possible causes of contagious diseases and for mapping health information and visualising the relationship between spatial graphical data and virus distribution. Web-based GIS also makes it possible to disseminate timely information not only to the local population but also to a global audience. Locally, GIS was used to track the spread of the epidemic and the location of suspected cases. A collection of high-quality GIS websites was developed to provide researchers and the
public with such information, mostly with the help of civil society and commercial organisations.

Following the epidemic, the Centre for Health Protection, established under the Department of Health, unveiled an electronic disease-reporting system that will allow medical personnel to rapidly transmit patients’ symptoms and video images to the centre’s headquarters. Meanwhile, there have been discussions regarding the integration of the medical records of public and private healthcare systems for the public good. One of the major hurdles is the financing of the infrastructure for private hospitals and clinics. Of paramount concern is how to use electronic means more efficiently in combating health problems in this modern and congested city.

Political development and ICT

On 1 July 2003, around 500,000 Hong Kong citizens took to the streets demanding their political rights. Research indicated that around half of those demonstrators were motivated by information coming from the Internet or were encouraged by email forwarded by friends. More than 80 percent of the respondents of the web-based survey, whose sampling frame would probably be Internet biased, reported that they frequently exchanged community information, shared news and political jokes, and commented on public affairs over the Internet. It seems that for the computer-literate in Hong Kong, Internet exchanges have replaced shared news and political jokes, and commented on public affairs over the Internet. It seems that for the computer-literate in Hong Kong, Internet exchanges have replaced discussions at community halls and residents’ associations. They have also enhanced the power of the interpersonal network in promoting political participation. Such power has been demonstrated in events such as the peace rallies held in 2003 and 2004, the Protection of Victoria Harbour Movement, the debate about the methods for selecting the Chief Executive of Hong Kong, and the campaigns for the 2004 Legislative Council election. The power of the Internet has also constituted an emerging trend in Hong Kong. Hi-Radio (http://www.hiradio.net), People’s Radio Hong Kong (http://www.prhk.org) and Radio 45 (http://www.radio-45.com), for example, all provide content that is not carried by the mainstream media.

Concluding remarks

Hong Kong will continue to be a major consumer and developer of ICT within Asia Pacific and globally. ICT has already become a necessity for the operation of the government and most businesses. It will continue to permeate the daily lives of citizens and will eventually develop to the extent that its deprivation will be considered unjust. To tackle the digital divide, two urgent needs should be addressed.

First, there is inadequate information about how specific disadvantaged groups are experiencing ICT. The general household surveys do not provide details of how people with disabilities, for instance, are accessing ICT. Moreover, having computers installed at home does not necessarily mean that family members with special needs (e.g., elderly people with disabilities) have access to ICT. More in-depth information is therefore required in designing suitable digital inclusion programmes. The government’s planned large-scale study on the digital inclusion level in Hong Kong will hopefully provide the much-needed insights.

Second, there is a need to inculcate a cultural change in the design and implementation of social policies to take into consideration across the board of the need to tackle the digital divide. For example, ICT is not acknowledged by the social security system as basic expenses. Also, broadband providers accept only credit-card payments, deterring low-income citizens and some elderly persons without credit cards from obtaining broadband access, even if they could afford it. These are issues that call for the concerted efforts of the government (the regulator), businesses (the providers) and civil society (for the users) to address them.

Notes

6. See note 3.
Overview

The World Summit on the Information Society (WSIS) held in December 2003, and the preparatory process leading up to the summit, has helped to focus the attention of Indonesian policy makers on the ICT sector. They have begun to review the policy and regulatory framework of the country to ensure that the objectives of WSIS are addressed, such as connecting half of the population to the Internet by 2015. Meeting the objectives is a daunting task. It will require revision of the current regulatory framework to create an enabling environment for the sector, which will include establishing an independent regulatory body and liberalising the telecommunications industry. Some of the required changes have surfaced as proposals for building community telecentres in rural areas and the adoption of a national strategy for universal service obligation. Most of these proposals are at the conceptual stage and under discussion by the authorities concerned. Not much government action or large-scale implementation of public projects is apparent.

A significant policy and regulatory change did occur on 5 January 2005 when the Ministry of Transportation and Communication Act No. 5/2005 was passed. It unlicensed the 2.4-GHz band used by WiFi equipment. Indonesians are now free to use such equipment without having to obtain prior approval or pay licensing fees. However, the 5.2- and 5.8-GHz bands are still restricted, and efforts are continuing to have these frequencies unlicensed as well. User groups have also begun to initiate activities to educate WiFi users on how to manage the frequency. Although the central government has unlicensed the 2.4-GHz band, user groups fear that local governments may now seize the opportunity to exercise their discretionary powers to control and levy fees on its usage.

In sharp contrast to relative public sector inaction are the many activities initiated by people’s movement at the grassroots. Most of the initiatives are community based, funded by the members themselves with minimal outside support including that of the government. The following are some of the most prominent grassroots movements:

- Groups.or.id is a free mailing-list service supported by Indonesian ISPs. The online communities usually fund the servers used to manage these lists. The service was running more than 2,500 mailing lists with over 65,000 subscribers in March 2004.
- IlmuKomputer.com is a WSIS award winner. It provides free ICT information to the Indonesian society and is self-funded.
- VoIP Merdeka provides free VoIP services to the Indonesian people and is operated by its members. It is one of the largest free VoIP networks in the world and is managed by more than 200 gatekeepers.

The private sector has also significantly increased the application of ICT in their operations. This is evident in the usage figures: 40–60 percent growth in the number of URLs for content in the Indonesian language, 150–200 percent rise in the number of URLs for content about Indonesia in the English language, and about 150 percent increase in the number of ICT-related companies. In addition, there has been a rise in the number of Indonesian Internet users, bandwidth consumption and Internet exchange traffic. We can conclude that ISPs have all benefited from the growth of Internet usage in the country.

Local online content

Using the Google search engine as the main tool, searches were conducted to determine the amount of content on Indonesia available in certain categories in both the Indonesian and English languages using at least ten keywords for each category. The results from this exercise are compared against those of similar searches conducted in the previous year, 2002. The extent of growth in content is evident from the comparison. Also evident are the significant differences in the amount of content webbed in the two languages.
Content on technology formed the largest category in the Indonesian language with 2.7 million URLs found in 2003, representing a 53 percent increase over 2002. Technological content was followed by news/current affairs with 2.5 million URLs (68 percent increase). The third largest category was industry/business with 1.9 million URLs (about 76 percent increase). Content on civil society ranked fourth with 1.7 million URLs (about 66 percent increase). Both the industry/business and civil society categories improved in ranking from fifth and seventh places in 2002 to third and fourth places in 2003, respectively.

The ranking of other content categories webbed in the Indonesian language as was follows: education, 1.6 million URLs (36 percent increase); culture/literature, 1.5 million URLs (38 percent increase); government, 1.5 million URLs (43 percent increase); health/nutrition, 1.2 million URLs (58 percent increase); commerce/tourism, 1.2 million URLs (76 percent increase); rural development, 870,000 URLs (67 percent increase); political groupings, 770,000 URLs (81 percent increase); agriculture, 404,000 URLs (67 percent increase); and NGOs, 310,000 URLs (34 percent increase).

Indonesian content webbed in English, which aims to reach a broader audience on the Internet, was consistent between 2002 and 2003 in terms of ranking of the categories. However, the number of URLs was significantly different between the two years. There were large increases, in the range of 140–240 percent, in the content in English as compared with the 30–80 percent increases in the content in Indonesian. Thus, although there was an increase in the content on Indonesia in both languages, English-language content grew much more than Indonesian-language content.

Unlike the Indonesian-language content, the English-language content placed significant emphasis on commerce/tourism, which ranked first with 29 million URLs, representing a 205 percent increase from 2002. This was followed by industry/business at 27 million URLs (221 percent increase), civil society 23.5 million URLs (205 percent increase), culture/literature 18.6 million URLs (233 percent increase), government 18.5 million URLs (209 percent increase), news/current affairs 17.4 million URLs (224 percent increase), education 14.5 million URLs (188 percent increase), technology 14 million URLs (186 percent increase), political groupings 8 million URLs (139 percent increase), health/nutrition 8 million URLs (236 percent increase), NGOs 7 million URLs (199 percent increase), rural development 6 million URLs (151 percent increase), and agriculture 6 million URLs (161 percent increase).

Thus, it is clear that Indonesian content in English placed greater emphasis on commerce/tourism, industry/business, and civil society. The interests and information needs of surfers who use the Indonesian language are obviously different from those who use English. It should be noted that both Indonesian and English content places less emphasis on rural development, NGOs and agriculture.

The ratio of content in the Indonesian language relative to that in English is interesting. In 2002, Indonesian-language content accounted for 15.3 percent of all content on the country, while the ratio of technology-related Indonesian content webbed in the Indonesian language relative to English was highest at 27.1 percent; it was followed by health/nutrition at 23.7 percent and news/current affairs at 22.0 percent. It would appear that Indonesian techies produced the most content as well as enjoyed the best access to online content. Unfortunately, in 2003 the ratio of Indonesian content webbed in the Indonesian language had declined relative to that in English. For example, in commerce/tourism, it was 7.1 percent in 2002 but 4.2 percent for 2003. In industry/business, it was 11.6 percent in 2002 but 6.7 percent in 2003. Indonesian-language content accounted for only 6–10 percent relative to content published in English for the various categories in 2003, which was much lower than in 2002. The decline was due mainly to significant increases in Indonesian content webbed in English.

Online services

E-commerce and e-business

Indonesia has more than 13 million cellular phone subscribers. This large subscriber base has created an attractive market for mobile services, such as SMS. Businesses based on SMS are flourishing. At the rate of US$0.05–$0.10 per call, SMS services are quite affordable to most users. Indonesian subscribers send about 20,000 SMS messages each day requesting for various services. It is therefore not surprising to see some service providers earning US$30,000–$60,000 each month from rendering such services.

PlaySMS (http://playsms.sourceforge.net) is an open source implementation of the main software used in providing such mobile services. It was developed by Anton Raharja, an Indonesian. A PC running PlaySMS, and connected via a data cable to a Nokia 6110, will serve as an SMS service gateway to an intranet/Internet-based network. A Linux server running Apache, MySQL and PHP script will be able to run such services.

Distance education and e-learning

The website IlmuKomputer.com won the 2003 WSIS prize for best practices in e-learning. It specialises in distance education and e-learning in computer science. Its mission is to operate a free online e-learning programme.1 The site is accessed mainly by Indonesians, who account for 80 percent of its users.

IlmuKomputer.com is managed by Romi Satria Wahono and run by a team of over 20 people.2 The website hosts
some 500 ebooks, tutorials and articles on ICT. It also includes scientific papers and theses. The content has not been fully indexed, but it is estimated to number about 100,000 pages in total contributed by about 130 authors. IlmuKomputer.com is disseminating its content not only through the Web but also on CDs. There are about 200 people spread across Indonesia who act as its CD distributors.

The website has a total of about 3,000 subscribers. It is also collaborating with 15 e-learning communities. It has 15 registered mirror sites to help cope with its high volume of traffic. In addition, there are numerous unregistered mirror sites hosted by various high schools and universities.

**Online communities**

Indonesia launched its own community-based discussion platform and several free servers on open source development in 2004. Indonesian communities funded all these activities on their own. The free mailing-list discussion platform is running at Groups.or.id. The mailing-list server, which was bought with contributions from many people, was connected on 31 October 2003 and with that Groups.or.id was born. It had more than 2,500 mailing lists with over 65,000 subscribers as of March 2004.

Work is currently underway to set up free webmail/popmail servers, development servers as well as other servers for the open source community in the country.

The impact of Groups.or.id was evaluated after two months of operation using the pflogsumm application. It revealed some interesting figures: A significant amount of traffic had been generated by the list. Total traffic clocked was 581 Mb. The server had received more than 50,000 email messages and delivered more than 120,000. There were 319 sending hosts/domains with more than 31,000 recipients and about 3,500 recipient hosts/domains.

In analysing the recipient hosts/domains, it was clear that Yahoo remained the top email recipient with a daily average of about 1 Mb. CBN.net.id ranked second with about 200 Kb, followed by Plasa.com, TelkomNet and Hotmail with a combined total of about 160 Kb. The analysis showed that many users who signed up to receive the lists preferred to do so via a free email service. This was different with users who posted their contributions to the mailing lists, who preferred to do their postings via CBN, TelkomNet, IndoNet and IndosatNet. It would appear that those subscribers who did most of the postings were happy to pay for more reliable email services.

The most active mailing list at Groups.or.id is Genetika. Most Indonesian ICT activists interact with each other via the Internet. The initiators of the discussions on the list are people who have left Kebumen and are now dispersed across the country.

**Industries**

**ICT**

Data about the ICT industry in the country may be gleaned from the websites of the Indonesian Chamber of Commerce (http://www.kadinnet.com) and the Indonesian Yellow Pages (http://www.yellowpages.co.id). There were a total of 1,608 Indonesian ICT companies listed in the Yellow Pages in 2003, a 148 percent increase from 2002 when the directory listed only 649 ICT companies.

The biggest increase was among companies doing web design: from only 2 companies listed in 2002 to 19 in 2003, representing an 850 percent increase. IT-related companies ranked next with a 571 percent increase, from 24 companies in 2002 to 161 in 2003.

The majority of Indonesian ICT companies are found in the computer software sector, which registered a 362 percent increase (68 companies in 2002 rising to 314 in 2003), and the Internet services sector, which saw a 169 percent increase (133 rising to 358). Computer programming consultants increased by 163 percent (52 rising to 137); ISPs rose by 93 percent (90 rising to 174); computer total solution providers grew by 167 percent (27 rising to 72); Internet companies increased by 51 percent (59 rising to 89); and software-related companies grew by 68 percent (88 rising to 148).

The growth in nearly all sectors of the industry indicates that demand for ICT-related businesses remains strong. However, it is interesting to note that companies listed as providing e-commerce services are diminishing. It is a logical consequence of the untrustworthy conduct of many Indonesian users, who used stolen credit cards to buy goods over the Internet.

Indonesian ICT companies are distributed unevenly across the country. Most of them are located in Jakarta, which is home to 1,114 companies (139 percent increase from 2002), followed by Surabaya with 143 companies (472 percent increase) and Bandung with 120 companies (60 percent increase). Only a small number of companies are located outside Java island: Medan (43), Bali (32), Palembang (4) and Makassar (6). The 76 companies operating in Yogyakarta in central Java in 2003 represented a 443 percent gain from the previous year. Its sultan has declared the intention to develop the place as a cyber city. Yogyakarta is known as a city of students with many universities and colleges. The presence of this rich pool of talent should contribute towards the realisation of the sultan’s plans.
Internet infrastructure

A commercial ISP operation was launched by IndoInternet, which is also known as IndoNet (http://www.indo.net.id), in 1994. The easiest way to trace the development of the Indonesian Internet infrastructure after this historic year is by monitoring the expansion of the activities of Indonesian ISPs. Much of the status of the commercial infrastructure can be investigated through the Indonesian Internet Service Provider Association, or Asosiasi Penyelenggara Jasa Internet Indonesia (APJII) in Indonesian (http://www.apjii.or.id). It had 124 members as of third quarter 2003. Out of this total, 93 ISPs were holding operational licences. Only 73 of the ISPs were connected to the Indonesia Internet Exchange (IIX). The ISPs provide services to more than 90 cities. 5

APJII provides its members shared facilities with IIX, the Indonesian Network Information Centre (IDNIC) and the Asia Pacific Network Information Centre (APNIC) in interconnection, domain registration and IP resource allocation. Not all APJII members require services such as IP address allocation and interconnection to IIX. Internet cafés and neighbourhood networks serve about 60–70 percent of all Internet users in the country. These activities are all privately driven with no government involvement.

The latest estimates of Indonesian Internet users and subscribers can be obtained from APJII’s annual report. 6 Generally, the total number of Internet subscribers registered with Indonesian ISPs accounts for only 10–20 percent of the actual total of Internet users in the country. There has been an average annual increase of 50 percent of both Internet subscribers and users. The estimated number of Internet subscribers in 2003 was 800,000. The estimated user population was 7.5 million. The 2003 figures represented significant increases when compared with 2002 totals of about 670,000 subscribers and 4.5 million users. A detailed study of the user profile was done by APJII. It reveals that the majority of users are male, young (25–35 years old) and educated, comprising high school graduates, university students and young professionals.

Most Indonesians prefer to use international domains, such as “.com” and “.org”, because of the ease and convenience of registering such domains. However, there has been a recent growth in new registrations under the Indonesian domain, “.id”, with 3,700 new domains registered in 2003 to bring the total number of domains to more than

The cyber café and telecentre in twilight zone

A posting dated 30 January 2004 by Heru Nugroho (hn@apjii.or.id), secretary-general of APJII, to several major Indonesian mailing lists with the subject title “Stop Press: Pengguna Internet di Indonesia” (Stop Press: Indonesian Internet Users) shocked many people. The writer shared his insights into the latest Indonesian Internet user statistics in his posting. The most shocking observation was the dramatic reduction in the number of Internet users surfing from cyber cafés. They accounted for less than 3 percent (or 200,000) of the conservatively estimated total of eight million Indonesian Internet users. Two years earlier, Indonesian cyber cafés were the major means of access to the Internet serving about 42 percent of the estimated two million Indonesian Internet users. The estimated total number of cyber cafés in 2003 was only 1,724, significantly less than in previous years.

On 12 March 2004, Michael Sunggiardi (Michael@sunggiardi.com) posted a comment on the mailing list telematika@yahoogroups.com. In it, he shared his experiences in serving the Internet community in the city of Bogor, about one hour’s drive from Jakarta. He reported that in 1998 there were 129 cyber cafés in Bogor. There were 40 left in 2003, of which only 20 enjoyed good patronage. The survey, which was conducted in early 2004, revealed an even worse condition for cyber cafés.

Discussions in the various mailing lists blamed high telecommunications tariffs for the sorry state of Indonesian cyber cafés. Other explanations included the conversion of cyber cafés into gaming centres, illegal tariffs imposed by local governments, and some local governments requiring cyber cafés to apply for a licence to operate as an entertainment centre.

An interesting posting by Heru Nugroho on 31 January 2004 revealed that there were more than 5,000 educational institutions connected to the Internet, including schools, universities, pesantre and madrasah (informal educational institutions). They accounted for more than 32 percent of the estimated total of Internet users, a big jump from 4 percent in 2001. Clearly, the education sector will contribute the most new Internet users in the future. Furthermore, this sector is able to self-finance its Internet access for as little as US$0.50 for each student per month, and it is able to recover its investment in one to two years. Unfortunately, the success of these educational institutions may also have contributed to the downturn in the business of cyber cafés.
18,200. This number of new domains was slightly higher than in 2002 when 3,200 were recorded. The number of new domains actually declined in 2001, which Budi Rahardjo, administrator of the top-level domain for Indonesia, believes was due to the worldwide collapse of the dotcom sector.

The number of IP addresses and AS numbers is growing steadily in Indonesia. A total of 2,377 IPv4 blocks with 69 AS numbers were allocated to Indonesian ISPs in 2003. An important change was seen in the allocation of 131,073 IPv6 accumulative blocks in the same year. No IPv6 allocations had been made previously. The allocated IPv6 blocks enable ISPs to begin building the next-generation Internet in the country.

APJII has established several IIXs in Jakarta in order to help reduce the volume of international traffic. The IIXs interconnect all ISPs based in Jakarta without any charges. Similar IIXs are planned for various other cities, such as Surabaya, Bandung and Yogyakarta. These new exchanges are required as most intra-city traffic is now routed through Jakarta. The multi router traffic graph reports issued by Johar Alam, the IIX administrator, show significant increases in the peak bandwidth transmitted through the various exchanges. The increases are due to the rising number of corporate subscribers. They are also due to users adopting Internet applications that require high bandwidth, such as MP3 file transfer, multimedia applications and online gaming.

Johar Alam of IIX and Heru Nugroho of APJII reported in early January 2004 that the peak bandwidth of all the IIXs in the country had been recorded in excess of 1.2 Gbps. This figure was double the peak traffic registered in March 2003 at 620 Mbps. Since the international traffic is normally about three times the local bandwidth, the peak Indonesian international bandwidth is estimated as about 3 Gbps. The peak local bandwidth is normally about 70–80 percent of the maximum bandwidth of the country. Thus, it may be estimated that the maximum bandwidth is about 2 Gbps. The ratio of incoming to outgoing Internet traffic is about 10:1 as Indonesians continue to consume much more information than they produce.

APJII data show that the government grants a large number of ISP licences. There appears to be minimal restrictions placed on the issuing of these licences. Licences had been issued to more than 190 ISPs, 29 network access providers (NAPs) and 24 multimedia providers by the third quarter of 2003, compared to 180 ISPs, 18 NAPs and 24 multimedia providers registered in 2002. It is interesting to note that there were only 2 licensed ISPs in 1994 when the sector was born. Out of the 2003 total, only 124 were members of APJII, comprising 111 ISPs, 6 NAPs, 4 multimedia providers and 3 providers of research and educational network services.

Key national initiatives

The VoIP Maverick Network, or VoIP Merdeka in the Indonesian language, was launched in cyberspace at genetika@yahoogroups.com on 12 January 2003. It was started in response to the increase in telephone tariffs on 1 January 2003. MaverickNet is a community-based VoIP network operating on the Indonesian Internet infrastructure. It is free and one of the most complex countrywide Internet telephony infrastructures ever implemented.

An open source gatekeeper (http://www.gnugk.org) was adopted as the main gate-keeping software. The MaverickNet architecture is based on a VoIP gatekeeper cloud that acts as the main switch. The VoIP softswitch forms quite a complicated tree structure comprising more than 200 public gatekeepers. RootGK normally acts as the highest-level gatekeeper in the infrastructure and is located at IIX. The second level is a stand-alone gatekeeper on the Internet used by the public and often referred to as an operator gatekeeper (OGK). The third-level gatekeeper is located at the proxy server. It is basically a proxy gatekeeper and often called the local gatekeeper (LGK).

A numbering system has been set up for MaverickNet. An endpoint (EP) with the number, say, 62888881234567 must register with a public gatekeeper that handles the prefix 6288888. If this EP should register with some other public gatekeeper, other EPs will not be able to call EP 62888881234567. There were a number of major public gatekeepers serving MaverickNet at the time of writing. There are two machines acting as RootGK located at 202.155.39.157 and 202.53.224.172. There were also others acting as public gatekeepers serving specific prefixes: 218.100.4.194 for area code 62 88 888, 202.43.162.189 for area code 62 88 999, and 202.150.8.15 for area code 62 88 925.

Some friends of MaverickNet are contributing their gatekeepers for public usage. Some of them are identified at http://gk.vision.net.id and http://voipmerdeka.net/gkregistration. A total of 147 regional/.operator gatekeepers are listed. In addition, there are unknown numbers of gatekeepers running at numerous proxy servers. The typical daily traffic comprises more than 2,000 calls serving thousands of users. It is interesting to note that some users make calls lasting several days.

Efforts were being made at the time of writing to integrate MaverickNet with other international gatekeeper networks. The integration is done through gatekeeper neighbours settings. There are several active gatekeeper neighbours in Singapore, Japan, England, Germany, Canada and Sudan. These neighbours are not the formal telecommunications gatekeepers but are run by volunteers in these countries.

The basic strategy adopted in building these free and low-cost VoIP networks was to educate the communities, with the mailing lists at voipmerdeka@yahoogroups.com and gk-admin@yahoogroups.com serving as the main vehicle.
The future community network

I have connected the LAN in my home as well as in my neighbourhood to the Internet for 24-hour access at 11 Mbps at the cost of Rp 330,000 (US$30) per month. In other areas, the cost for a similar connection may be as low as US$15 per month. Such low-cost 24-hour Internet connections would not be possible without the existence of neighbourhood networks.a

Unlike a normal community telecentre or cyber café that connects several computers within a room or a house, neighbourhood networks extend LAN cables (RJ-45 UTP cables) to adjacent houses and buildings. Basically, a WAN based on Ethernet LAN is deployed. Since the maximum length of a UTP cable is normally 100–200 metres, a hub is used to relay the signal beyond this distance to the next 100–200 metres to form a tree-structured LAN connection. To protect the cables from rats and water, they are usually run through plastic pipes laid along the neighbourhood drains. As more houses and computers in the neighbourhood get connected to the network, the installation cost per house can be reduced to around US$50–$80.

An analysis of the cost of running such an Internet infrastructure clearly showed that much of the cost of access arose from the rental of telecommunications lines and other tariffs charged by Telkom Indonesia. This drove us to seek a solution which bypassed Telkom. The next task was to find a low-cost broadband connection. We found it in off-the-shelf WiFi equipment. WiFi is basically wireless LAN equipment operating on 2.4- or 5.8-GHz frequency at speeds of 1–11 Mbps based on the IEEE 802.11 standard. It was originally designed for indoor installation and came with an antenna with a range of 100–200 metres. We often replace the factory-installed antenna with high-gain flat panels or parabolic antennae designed to operate at either 2.4 or 5.8 GHz to extend the range to 5–8 km.

The external high-gain antenna is connected to the WiFi card via a short 0.5-metre pigtail cable. Such a cable normally comes with an SMA connector and an N-type connector for connecting to the WiFi card and the external antenna, respectively. It is easy to build a low-cost 2.4-GHz antenna using a tin can measuring 90 mm in diameter and 215 mm in height. Such a home-made antenna can reach 1–2 km and costs approximately US$5–$10 each. Since WiFi normally operates at a very low power of 30–100 mW, we normally place the equipment in a plastic container and install it on top of a tower that is 20–30 metres tall so as to reduce signal loss. In this way, the distance between the antenna and the WiFi equipment is shortened to 0.5 metre. A LAN cable is then run from the back of the WiFi equipment on the tower to the neighbourhood network.

So with a US$100–$300 investment, we are able to enjoy an 11-Mbps broadband connection with ISPs within a range of 5–10 km. The cost for dedicated 64-Kbps 24-hour Internet access in Indonesia is about US$400 per month. If this monthly cost is shared among 20 to 30 houses in the neighbourhood network, the cost per house is reduced to an affordable US$15–$40 per month (which includes other operating expenses such as electricity and salaries for technicians to maintain the network). The same applies to school, office and other types of networks. It is therefore not surprising to see that there are now more than 5,000 outdoor WiFi nodes installed in Indonesia.

Having found the solution for building an alternative high-speed metropolitan area network, we need to now think of how to build alternative regional networks. Two main technologies can be considered:

- **Satellite backbone**: The cheapest solution currently available in Indonesia is the DVB-RCS (Direct Video Broadcasting–Return Channel via Satellite) backbone, which costs about US$200–$700 for 64 Kbps, depending on the arrangements with the satellite ground stations.

- **Fibre/microwave backbone of cellular phone operators**: The excess capacity of cellular backbones may be used to relay data traffic between cities. Local ISPs are already doing this for their operations.

Another controversial technology is Internet telephony. All of these options will be available to emerging network-based communities, which may challenge many paradigms underpinning today’s regulatory and policy framework.

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a The detailed technology for setting up such networks can be obtained from http://sandbox.bellanet.org/~onno. Those who need further advice and technical support can join the English-language mailing list wifi4d@dgroups.org.
Notes


2. An overview of the website, a summary of its activities and accomplishments, and information about the working groups associated with the site may be found at http://ilmukomputer.com/project/romi-ilmukomputercom.php.

3. The logbook of the Indonesian mailing-list server project is posted at http://www.ictwatch.com/milisproject. The first mailing-list server is a 600 MHz Pentium III PC. It was bought with contributions from many members of civil society: Onno W. Purbo, Irwin Day, Bona Simandjuntak, Donny B.U., David Sudijiman (leader of KPLI Jakarta), Rio Martin (an ITENAS student), M. Ichsan (administrator of Visionnet), Nies Purwati (secretary general of Mastel), Rusmanto (editor of Infolinux), I Made Wiryana (a professor at Gunadarma), Mas Wigrantoro R.S. (coordinator of GIPI Indonesia), Heru Nugroho (secretary general of APJII), Anton (manager of Telematics Indonesia), KPLI Jakarta, Nona, and others.

4. The majority of Indonesian open source developers may be contacted at developer@groups.or.id.


7. The working group for IPv6 may be reached at ipv6@apjii.or.id.

8. The list of gatekeepers can be found at http://voipmerdeka.net/gkregistration.
India

Madanmohan Rao

Overview

The digital economy of India during 2003–2004 was marked by an explosion in the cellular phone market, a boom in outsourcing, steady Internet growth, media convergence, growth in rural ICT initiatives, benchmarking with China, and (unfortunately) regulatory stumbling blocks. The president of India’s software lobby, Kiran Karnik, was featured on the cover of Forbes magazine as Man of the Year for 2003; and Business Week ran a high-profile cover story on the rise of India, especially its ICT and outsourcing industries. Paradoxically, India still has a long way to go in making ICT widely available to its population. A number of high-profile events have focused on the importance of bringing the fruits of the ICT revolution to a wider user base, especially in rural areas, where most of India’s population lives. As a benchmark of economic growth and ICT diffusion, it is becoming increasingly common to compare and contrast the domestic scenario in India with the corresponding environment in China. Unfortunately, regulatory potholes continue to hinder speedy progress on many fronts: private operator interconnectivity, VoIP, and wireless services eligibility.

In the ICT industry, the recent cuts in excise duty on computer hardware and cellular phones are expected to drive domestic demand for hardware in 2004–2005, according to projections released by the software lobby, the National Association of Software and Services Companies (NASSCOM), and the hardware lobby, the Manufacturers Association of Information Technology (MAIT). MAIT reported that PC sales in India during 2002–2003 grew 37 percent to reach 2.3 million units, compared to 1.7 million units sold in the previous year. PCs bought by businesses accounted for 81 percent of total sales and recorded an annual growth of 43 percent, while the number of PCs purchased by homes grew by 16 percent. Locally assembled PCs sold under brands such as Wipro, HCL, Vintron and Zenith garnered a market share of 26 percent (compared to 19 percent the previous year). MAIT projected that PC sales would have grown by 18–20 percent in 2003–2004 to about 2.7 million units.

The cellular phone market has been growing steadily since the late 1990s, but in 2003 these new telephones really took off in urban areas. NASSCOM forecasted the cellular phone user base to reach 33 million in 2003–2004 and 49 million in 2005. At the same time, Internet growth has been steady, particularly among youths and business professionals. The total number of Internet users is estimated at around 30 million. The big concern is the looming shortage of international bandwidth, which NASSCOM estimates will exceed 20 Gbps by mid-2005. Prices of international bandwidth are still not on par with those of neighbouring countries. This could throw a spanner in the works for Internet usage and the outsourcing business.

India ranks 37th among the 82 countries covered in the 2003 networked readiness index prepared by the World Economic Forum in partnership with INSEAD and the Information for Development Programme of the World Bank. Finland leads in the index, followed by the USA and Singapore (Rediff.com, 2003).

Software exports exceeded US$7 billion and accounted for 16 percent of the total exports of India. The total IT industry is estimated to be worth US$15 billion and employs over 500,000 technical and managerial personnel.

Wireless explosion

Research firm Gartner projected cellular phone connections in India to touch 56 million by the end of 2004, representing a steep growth of almost 96 percent over the previous year. Driven by the introduction of full-mobility CDMA cellular services and stiff competition among GSM operators, 2004 broke all records for growth in the Indian mobile market (Rediff.com, 2004a). Volatility in the cellular market is expected to continue until at least 2006 as the main operators carve out their future market positions and some other players attempt to establish their niche positions. Samsung and LG enjoy an early mover advantage, working with local operators such as Reliance. Nokia and Motorola have started to make their presence felt in the CDMA market.
In December 2003, the total number of mobile customers exceeded 28 million across the country, according to the Cellular Operators Association of India and the Association of Basic Telecom Operators, with GSM-based operators accounting for about 22 million subscribers and private CDMA-based operators accounting for some 6 million subscribers. Key GSM players include Reliance Infocomm, Bharti, Hutch and Idea Cellular.

According to the Telecom Regulatory Authority of India (TRAI), more than 20 million new telephone subscribers (including land lines) were recorded during the calendar year 2003, bringing the total number of telephone subscribers to around 70.5 million, or a teledensity of about 7 per 100. The average monthly growth of 1.5 million mobile subscribers achieved during 2003 was about 14 times higher than the average rate recorded in the preceding eight years. The minimum effective local call charge for cellular services had declined from Rs 14.51 per minute (for 400 minutes of usage per month) in March 1995 to Rs 0.77 per minute in September 2003.

“A major shift towards mobile telephony is now apparent, where the share of cellular connections in the new connections during April–December 2002 stood at 63 per cent up from 43 per cent last year,” according to a TRAI report. This growth has been largely in urban areas. The report reveals that private operators had provided only 7,123 village public telephones by December 2002, against the target of 97,806 in the first three years according to their terms of licence.

The average number of mobile operators per city is six in India, as opposed to two in China, three in Thailand, five in Malaysia and three in Indonesia. This level of competition has lowered tariffs in India, with a 300-minute package costing US$16 as against US$21 in China and US$40 in Malaysia (even with five players jostling for business), according to credit rating firm CRISIL (2003).

Revenue from value-added mobile services such as roaming and SMS has doubled from just 20 percent of the total revenue of cellular operators in March 2002 to nearly 40 percent in June 2003. Prepaid users accounted for 85 percent of the increase. Roaming tariffs are falling, but so is the average revenue per user. Some operators have already been bought out (e.g. Escotel), and further consolidation is expected.

The wireless explosion has also been accompanied by a spectacular growth in SMS-based content services (e.g. news alerts from Indian media) as well as Bollywood ring-tones, entertainment services and competitions (e.g. from Mumbai-based company Mobile2Win, which also offers mobile gaming services in China and the Philippines).

On the WiFi front, key Indian ISPs such as those owned by the Tatas, the Bharti group and Satyam Infoway (Sify) are installing WiFi hotspots in India. Sify has launched a WiFi service in the airports of New Delhi and Chennai for Rs 60 per hour; the company also has WiFi cards available for rental. The Bharti group, which already has broadband DSL offerings, will augment their service with WiFi boxes for Rs 3,000 (US$65). This package is targeted at residential users; other targets include conference and trade show venues like Pragati Maidan in New Delhi. India’s version of Starbucks, the Barista café chain, has 15 WiFi-enabled locations in Mumbai and Delhi, thanks to a tie-up with Tata Teleservices, which has a stake in the coffee chain. Tata also plans to target distributor networks and warehouses.

Campuses like those of the International School of Business in Hyderabad and the Indian Institute of Information Technology in Bangalore already offer WiFi access to students. Intel has begun marketing PCs with its wireless Internet chip in India. Data Access is working on seamless migration from WiFi to GSM-based Internet coverage. Systems integrators active in the business include Tulip IT Services and Convergent Data. Some hotels in India like Le Meridien and the Taj hotels already have WiFi installations. The offices of companies like Microsoft and the Punjab National Bank are WiFi enabled.

But hotspots in India numbered at best a few hundred as of late 2003. Government rules also do not encourage wide-range WiFi deployment. And business models for revenue sharing are still being worked out. Yet, further growth is expected in 2005. Cisco expects that the fastest-growing markets in the Asia-Pacific region for WiFi will be China, India and the Philippines.

**Online services**

MSN India expects the overall online advertising market in India to grow to US$100 million by 2009. MSN India has over eight million users and a 60 percent reach, according to a study conducted by ACNielsen. The website has over 60 advertisers including companies like Britannia, ING Vysya, ICICI, Coca-Cola, Intel, Seagram’s, Cherry Blossom, Citibank, and Cox & Kings. Its competitors include Yahoo and domestic players like IndiaTimes and Rediff. India’s Department of Tourism allocated Rs 2.5 crore (US$43,000) for an Internet advertising campaign that ran until March 2004 on local and international websites.

Bangalore has turned out to be the most Net-savvy metropolitan area in the country, according to the Indian Readership Survey, with an Internet usage penetration of 9.47 percent. It is followed by Chennai (9.43 percent), Mumbai (8.12 percent) and Hyderabad (7.92 percent). An average of 3.4 percent of the population in larger cities makes use of the Internet. This figure decreases rapidly among the lower-income groups and in smaller cities, especially in rural areas. Almost half the Internet users surf from cyber cafés (Flonnet.com, 2004). The popularity of cyber cafés is increasing rapidly, according to market research firm IMRB. But profit margins for the cyber café business are low because of intense competition as well as low entry and exit barriers. Satyam I-Way and Dishnet Hub are some of the major cyber café chains operating in the market (Rediff.com, 2004b).
Sports like cricket continue to attract heavy traffic to Indian websites such as CricketNext.com. Online travel classifieds are offered by sites like Traveljini.com. On the e-commerce front, LG Electronics estimated a turnover of Rs 50 crore (US$10.9 million) from its e-commerce site LGezebuy.com in 2003, up from Rs 13 crore (US$2.8 million) in 2002. E-tail players include Fabmall.com, Baazee and IndiaTimes. Fabmall’s online revenue was Rs 9.5 crore (US$2 million) for February 2001 and Rs 12 crore (US$2.6 million) in 2003, according to company sources. Online booksellers include Oxfordbookstore.com in Calcutta, FirstAndSecond.com and Rediff.

In addition to the steady growth of the Internet and the spectacular explosion of cellular phone services, notable development is also taking place in the convergence of media as players like the Reliance Group extend their operations across data communications, broadband and entertainment.

E-governance is the fastest-growing sector in the domestic IT market. A NASSCOM study conducted across ten states estimates that there has been a growth of 18 percent in this sector, which is worth Rs 1,400 crore (US$304.3 million). NASSCOM also estimates that the government can save up to Rs 500 crore (US$108.7 million) in transaction costs and increase its revenue by Rs 2,000 crore (US$434.8 million) each year through a better-managed tax collection system. E-governance is also expected to increase transparency, efficiency and accountability within the government. The government should first focus on bringing about efficiency in governance through the better use of technology and commit 3 percent of its budget to e-governance (Djindia.com, 2004).

**Industries**

The growth of the Indian outsourcing industry and its perceived threat to jobs in the West has been receiving high-profile coverage in the global media ranging from Wired magazine and the Wall Street Journal to Business Week and the Financial Times. Gartner had estimated that about 1 in 10 US technology jobs would go overseas by the end of 2004. In the next 15 years, more than three million US white-collar jobs, representing US$136 billion in wages, will depart for places like India, with the IT industry leading the migration (Forrester Research, 2004). India is now the second fastest-growing economy in the world. By 2008, IT outsourcing will be an annually US$57 billion industry, responsible for 7 percent of India’s GDP and employing some four million people. The top five US-based employers operating in India are GE, Hewlett-Packard, IBM, American Express and Dell, according to Wired magazine. Outsourced activities range from software development and medical transcription to pharmaceutical R&D and market research.

India provides a very attractive offshore environment for many IT-enabled services. NASSCOM has identified six key emerging service areas that Indian IT companies are likely to focus on: product data management, content management, enterprise application integration, business intelligence, wireless services, and straight-through processing. A study by the market research firm IDC estimated that India had cornered 70 percent of the call-centre business by the end of 2003. India’s business process outsourcing sector witnessed a growth of 70 percent in 2001–2002 and 65 percent during 2002–2003.

GE currently spends about 9 percent of its IT budget in India. Between 2001 and 2004, IBM’s personnel in Indian offshore development centres increased from 2,200 to 6,500, Accenture’s grew from 100 to 5,000, and EDS’s from 600 to 5,000.

**Key national initiatives**

A number of ICT initiatives have been launched in India targeting rural areas. These include the M.S. Swaminathan Research Foundation’s (MSSRF) Village InfoCentres in Tamil Nadu, the Gyandoot cyber kiosks in Madhya Pradesh, and Drishtee’s information kiosks. As a lead-in to the 2003 World Summit on the Information Society, a policy makers’ workshop was held on replicability and scalability issues pertaining to ICT for rural development. The policy recommendations which emerged from the workshop cover a spectrum of issues ranging from self-help groups and domestic software to virtual academies and alliance strategies, based on the following “8 Cs” framework (Rao, 2003):

- **Connectivity:** How affordable and widespread is ICT (e.g. PC, Internet access, software, community radio) for the rural citizen? What technologies are emerging and appropriate (e.g. wireless)?
- **Content:** Is there useful content (local and global) for rural citizens to use in their daily lives? Can rural citizens access and create relevant content? Does the content meet the educational, health, business and other needs of the local communities?
- **Community:** Are there online/offline forums where rural citizens can discuss ICT, community radio, applications and related issues of concern? Will decision makers take part in such forums?
- **Commerce:** Is there infrastructure (technical and legal) for e-commerce for citizens, businesses and the government? How much commerce is transacted electronically? What hybrid means of fulfilling transactions can be leveraged for G2C, B2C and B2B commerce?
- **Capacity:** Do rural citizens and organisations have the capacity or support (technical, managerial, policy and legal) to effectively harness digital tools for daily use? Can content and community activities be converted into knowledge assets?
**Culture:** Are policy makers, businesses, educators, citizens and the media forward-looking, open and progressive towards opening up rural access to ICT and harnessing these technologies? Or are there nervousness, phobia and lethargy about ICT impacts?

**Cooperation:** Is there adequate cooperation between citizens, businesses, academics, NGOs and policy makers to create a favourable climate for using ICT in rural areas? Can this cooperation be extended to policy initiatives at the national level?

**Capital:** Are there enough financial resources to invest in ICT for development in rural areas? What kinds of business and operational models exist for financiers? What kind of financial and social returns can be expected from rural ICT investments? What kind of knowledge goods and capital can emerge from rural ICT initiatives?

Key challenges remain in reducing the cost of PCs, community radio, Internet access and digital peripheral devices (e.g. webcams, LCD projectors, touch-screen devices) to levels which are affordable to rural communities. High import duties and obstacles to deploying used PCs are hindering efforts to increase access to ICT. Efforts should be taken to overlap government initiatives on ICT infrastructure, as infrastructure should not be wastefully duplicated. Government departments (e.g. telecommunications, education and agriculture) should synergise ICT and content initiatives for rural areas. Open source platforms and tools should be actively embraced.

Care should be taken to avoid the “IT first” or “IT only” traps, and connectivity initiatives should be coupled with content and services. In designing access infrastructure and services, adequate attention needs to be paid to back-end integration of processes and tools, and not just the pretty front-ends. Issues related to the design of the user interface, information architecture, language of presentation, and communication of information via alternative media (e.g. community radio) should occupy a key position. Rural users should be allowed to not just access but also create content. Digitisation of crucial content (e.g. government services) should be given priority. Portal templates for content and services should be allowed to not just access but also create content. Decent revenues from such commercial activities have been reported by 10 percent of the information centres in rural areas of northeast India (which are set up by the National Informatics Centre). Drishtee has observed that setting up 5–6 kiosks a month in rural areas is a viable pace of growth. Private sector company ITC’s e-Choupal is also a notable model for e-commerce, but it seems to be focused more on supporting the company’s internal business model rather than the full range of village information needs. While financial sustainability of telecentres is an important issue, social sustainability is even more important for rural communities.

Self-help groups (as with the MSSRF centres) play a key role in developing skills and expertise via peer reinforcement and intermediation. Private-sector and academic support in mentoring and collaboration is also called for.

There are multiple stages in the maturation path of a rural telecentre, evolving from the provision of basic computer services to participation in full-fledged knowledge-based activities, as shown below:

- **Basic phase:** Basic computer access, web surfing, downloading forms
- **Interactive phase:** Email, customising forms

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- **Publishing phase**: Creating webpages, websites, an intranet and CD-ROMs
- **Transactive phase**: E-commerce, job creation, marketing
- **Knowledge-enabled phase**: Digesting and localising knowledge assets, creating local knowledge assets
- **Integrative phase**: Integrating ICT, radio and traditional media
- **Knowledge-capitalising phase**: Leveraging intellectual capital for financial returns and gain
- **Globalising phase**: Exporting model and intellectual property to other parts of the world
- **Transformative phase**: Radical restructuring of the rural economy

Each stage requires a certain commitment in terms of material costs, human resource support, enabling alliances and policy guidance.

Care must be taken to select appropriate metrics for monitoring and assessing the growth, impact and performance of such village information centres. As noted earlier, social sustainability concerns should be given as much attention as financial sustainability issues. These centres should aim to benefit not just the better-off segments of society but also the underprivileged. Such metrics should fall into five categories: technology, process, knowledge, people and economics. Taken together, they capture the full range of infrastructure and social dynamics of a village information centre. The following are examples of the parameters for each category of metrics:

- **Technology/infrastructure metrics**: Number of machines, bandwidth, number of registered users, frequency of usage, hours and days of operation, multimedia nature of content (text/audio/video)
- **Process metrics**: Quicker access to information (e.g. market prices, healthcare), faster response to queries, fewer steps to get information (e.g. land records), key emergency services rendered, exploitative middlemen

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**Development is more than ICT**

India’s parliamentary elections in early 2004 proved to be the most electrifying in recent times, thanks to high-powered advertising blitzes around the theme “India Shining” and to the unseating of the ruling party BJP, which many experts and media analysts had predicted would win the elections. BJP was voted out, and among those who fell from the seats of power was Chandrababu Naidu, then chief minister of the state of Andhra Pradesh, who had a solid reputation as the most IT-savvy of all Indian chief ministers.

Naidu, the “laptop chief minister”, was known for making speeches backed by PowerPoint presentations and often referred to himself as the CEO (chief executive officer) of the state rather than chief minister. He put the city of Hyderabad (sometimes even referred to as “Cyberabad”) on the global IT map as a strong competitor to Bangalore, India’s Silicon Valley. Naidu got powerful figures like Bill Clinton and Bill Gates to visit his city, and he helped to lobby companies like Dell, Oracle, Computer Associates and Google to set up a presence in Hyderabad.

But the “cyber-fixation” should not have happened at the cost of the ignoring the poor, who are so severely hit by drought, debt and starvation that scores of farmers were driven to suicide. Some political analysts remarked that the state under Naidu had become growingly indebted to the World Bank and the British government’s Department for International Development.

“Cyberbabu” Naidu’s Telugu Desam party suffered a crushing defeat in the state elections after a nine-year reign. News headlines echoed this surprise and poked fun at the defeat: “Voters Delete India’s Cyber Savvy MP”, “A Reality Check on the Indian Information Superhighway”, “System Failure”, “Reboot in Hyderabad”. Naidu’s defeat “not only dampened the mood in the country’s booming information technology sector, but its shivers were felt in the spine of the Bombay Stock Exchange,” according to United Press International, which noted that, in a country where many politicians cannot even spell the word computer, Naidu would hold video chat with his officers across the state of 75 million people.

But to be fair, The Pioneer daily also said that Naidu’s removal was a protest vote, not a mandate against his vision of the power of IT; progress on the IT front should just not have happened at the cost of the rural agenda. The reality is that ICT for development is only one part of good government; other aspects like controlling corruption, looking after the concerns of rural as well as urban communities, and bringing the fruits of ICT to people well beyond urban constituencies are as important.

Catering to the needs of the global IT industry may endear politicians to major corporations and investors, but this should happen in tandem with local development initiatives. At the same time, it is important that policy makers not swing to the other end of the spectrum and completely ignore the potential of ICT industries and ICT for development.
removed, improved service quality in specific areas (e.g. telemedicine)

- **Knowledge metrics**: Number of ideas or innovations generated, rate of innovation, partnerships with knowledge institutions, conversion of information into knowledge, localisation of external knowledge, patents filed

- **People metrics**: Feeling of empowerment, sense of pride, feeling of ownership, satisfaction with reward or recognition, gender balance, positive impacts on the poor, number of volunteers, intensity of volunteer involvement

- **Economic metrics**: Revenues generated, number of jobs created or vacancies filled, number of companies created, number of new products or services offered, volume of exports

Government information services have been successfully delivered via information kiosks and the Internet in states like Tamil Nadu, Karnataka and Andhra Pradesh, such as issuing of encumbrance certificates for the sale of properties, High Court cause lists, application for passports and access to land records. Government agencies have helped to kindle interest in information kiosk operations in these states via government information services that can be blended with other offerings. The National Informatics Centre’s local portal solutions have also been used in rural ICT initiatives by the NGO Voices. The National Bank for Agriculture and Rural Development and the State Bank of India have made notable commitments to the application of ICT in development initiatives. These include micro-credit schemes, Kisan credit card, institutional development, and rural infrastructure projects. They have funded e-government projects in Himachal Pradesh and banking schemes for ICT-enabled services in villages. They have also linked self-help groups to financing schemes. There are reportedly one million self-help groups in India, 90 percent of which are run by women. The State Bank has commercialised 80 rural information kiosks in Tamil Nadu with its technology partner, n-Logue Communications. Sustainability has been achieved via revenues from the promotion of entertainment services at kiosks. At a statewide level, Project Akshaya has brought together a state player (the Kerala government) and a private sector player (Tulip IT Services) to create an Internet backbone network for the state, which can be used as a platform to launch a number of infrastructure initiatives.

**Regulatory environment**

Concern, controversy and confusion continue to mark India’s ICT regulatory front on issues ranging from wireless service definitions and handover rates to VoIP and cross-media convergence. For instance, cable operators are raising

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**Infokiosks: Momentum picks up on ICT for development in India**

Until recently, in the southern state of Karnataka, land record information was tightly controlled by government officials and middlemen like village accountants. Land deeds are crucial documents for farmers, who need to verify ownership status when applying for various loans to pay for seeds, fertilisers, insurance, medical services and the like. While they once had to pay between US$2 and $22 for a copy of the record, they now pay only 30 cents – if they avail themselves of an e-government kiosk provided by the state government.

The Karnataka state government’s Bhoomi (land) programme has computerised the land records of 6.7 million farmers in 30,000 villages, featuring 20 million deeds, which are now digitally accessible in the local language, Kannada, from over 200 government-owned computer kiosks in administrative offices across the state.

In addition to cost savings, the farmers now have additional protection against the possibility of fraud perpetrated by wily landowners, who would forge documents and swindle illiterate farmers. In Karnataka alone, for instance, deed fraud used to cost poor farmers an estimated US$20 million a year, but it has almost disappeared today, according to the World Bank.

Access to these databases by property professionals is provided for a fee, thus opening up revenue streams, which in turn can help to maintain financial sustainability of the project. The Bhoomi programme is already generating US$2.6 million a year in revenue.

The challenge now is to scale up this project to make the kiosks available in more locations across the state, increase the range of services provided and extend such services to other less IT-savvy states. A key role in bridging the digital gap will be played by such kiosks, which may be made available through cyber cafés, stand-alone initiatives launched by entrepreneurs, ISP projects, supply-chain computers in villages, or NGO initiatives.

Adapted from [http://www.businessweek.com/magazine/content/04_26/b3889003.htm](http://www.businessweek.com/magazine/content/04_26/b3889003.htm).
concerns about being “wiped out” by large private telecommunications operators. At the same time, many ISPs are asking TRAI to unbundle the local loop in both the fixed and wireless arenas.

TRAI may also block domestic Internet telephony. The Internet Service Providers Association of India has complained that tariffs announced by TRAI for lower pulse rates for ISPs would have an adverse impact on the growth of the Internet, resulting in a decline in usage as well as the number of subscribers. The present rate of Rs 1.20 per 180 seconds of Internet access for subscribers is slated to go up to Rs 1.20 for 120 seconds.

The cost of Internet access through PSTN dial-up is currently around Rs 32 per hour and is slated to go up to Rs 44 per hour, which will result in a 35 percent increase in the cost of Internet access. While this means basic telecommunications operators will rake in additional revenue annually from dial-up services alone, ISPs will have to shoulder the additional burden of dealing with customer churn.

TRAI and cellular operators have also had heated exchanges on revised interconnection charges and the ensuing increases in tariffs. While many of these differences of opinion are to be expected in the turbulent world of convergence, the regulator and the operators need to display more cooperative attitudes in areas like performance levels and service tariffs.

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Overview

Geography

Iran has a land area of 636,296 square miles or 1,629,807 square kilometres, which makes it the 16th largest country in the world. It is bordered by the Caspian Sea, Armenia, Azerbaijan and Turkmenistan to the north, Turkey and Iraq to the west, the Persian Gulf to the southwest, the Oman Sea to the south, and Pakistan and Afghanistan to the east. More than half of the country is mountainous, one-fourth is desert and the rest is cultivated. Iran has four distinguishable seasons, and temperature differences of over 40ºC have been recorded between different parts of the country, giving it much climatic diversity. Mount Damavand, part of the Alborz mountain range with a height of 5,671 metres, overlooks the capital city of Tehran, which has a population of 12.5 million. Iran’s unique geographical position in the Middle East and along the Silk Road, its free access to waterways, its special climatic conditions, and its rich natural reserves, including gas and oil, give it an edge over other countries.

Iran has a population of 66.4 million that is growing at the rate of 1.5 percent. Life expectancy is 69.3 years. The population is very young with 60 percent under 24 years of age and 20.5 percent between 15 and 24 years. The urban population totals 41 million, while the rural population numbers about 25.4 million. Ethnic groups living in Iran include the Turk, Fars, Kurd, Lore, Baluch, Arab, Turkman and Armenian.

Farsi (Persian) is the national and official language of the country. Turkish is also commonly used in the northwest provinces of Eastern and Western Azerbaijan, and Arabic is spoken in parts of Khuzestan in the southwest. English is taught as the second language in high schools, and as such the level of English literacy is relatively high.

Education in Iran is mandatory up to high school. Both public and private educational institutions are available. There are about 18 million students in schools and nearly 2 million in universities. Tertiary education extends to doctoral degrees. About 300,000–320,000 students graduate each year from university. In the past 18 years, close to 150,000 students in total have graduated from ICT and related courses.

Economy

Iran recorded a GDP of more than US$107.5 billion with an annual growth rate of 5.9 percent in 2002. The average annual growth rate was projected at 5.8 percent for the period 2002–2006. Iran is OPEC’s second largest oil producer. It has approximately 9 percent of the world’s total oil reserves comprising some 94 billion barrels. It also has the second largest reserve of natural gas in the world at some 812 trillion cubic feet. Iran’s oil and gas industries require heavy investment and redevelopment. Some projects are being developed on a “buy-back” basis, whereby foreign oil giants such as Totalfina Elf and Shell act as contractors to the National Iranian Oil Company. Oil exports account for around 80 percent of foreign exchange earnings. The government controls over 80 percent of the economy with the assistance of organisations such as UNDP.

The government has made the development of non-oil exports a priority. Traditionally, such exports have included carpets, pistachio nuts and dried fruit. Iran also possesses enormous mineral resources, including coal, copper, iron, zinc and gold, most of which have yet to be exploited. As a result, a number of processing industries have emerged, particularly steel. Iran is already the third largest producer of copper in the world.

Apart from being endowed with natural resources, the country possesses other attributes, including a broad domestic industrial base, an educated and motivated workforce, as well as a strategic geographical location that gives it access to an estimated 300 million people in the Caspian region, the Persian Gulf states and countries further east. The government is encouraging import substitution through joint manufacturing ventures with foreign companies.
so as to update the country's technological base and the management skills of the private sector.

Among the various sectors, agriculture accounted for 16.8 percent of GDP in 2002, industry 32.3 percent, and services 50.9 percent.

The ICT industry is relatively new in Iran, but it is growing rapidly and is now acknowledged as a critically significant sector of the country. The ICT market in Iran was flourishing in 2003 while much of the world was experiencing a downturn in the sector. This market is estimated to be worth US$1.5 billion annually and remains largely unexploited by foreign companies. All factors considered, Iran is thus an attractive country for investment and outsourcing.

**Infrastructure**

Communication services started in Iran in 1889, and since then the country's telecommunications networks have kept pace with innovations in the industry. Apart from the incumbent Telecommunication Company of Iran (TCI), there are 28 provincial telecommunications operators in the country.

More than 2.37 million fixed telephone lines were activated in 2003, bringing the total to about 14.57 million lines throughout Iran.

More than 1.19 million mobile phones were activated in 2003 to bring the total to about 3.38 million across Iran. TCI has planned huge investments for upgrading GSM facilities and providing more services. The total number of mobile phones in use is expected to hit 10 million by 2007/2008. In the long term, TCI plans to have 12 million units in use, 2 million of which will be prepaid. Another 10 million units will be provided by private operators. Mobile services now reach 668 cities and 38,798 villages across the country.

Huge investments are being planned and made by TCI in extending the fibre backbone to connect all the cities in the country. Data and traffic are now carried on a combination of copper, fibre, satellite and microwave networks, among which DSL, E1 and satellite connections are popular. New fibre optic cables totalling 10,000 km were installed in 2003, bringing the total length of the fibre backbone to 25,853 km.

TCI’s total investment in development and equipment in 2002 amounted to 61 billion rial (US$7.7 million). Its total investment in the fixed telephone network amounted to 663 billion rial (US$83.9 million).

**Industries**

**Electronics and hardware**

The electronics and hardware industry in Iran is active in the sectors of electronic appliances, microelectronics, computer hardware, telecommunications devices and smart cards. Iranian manufacturers are active in all these sectors. The main exporters to Iran are South Korea, Germany, France and Japan, with European companies mostly active in telecommunications devices. All the components used in the industry, except drives and chips, are produced domestically. Smuggling is a major problem, with all kinds of circuit boards, CPUs and RAM modules being illegally imported into the country.

Around one million PCs are sold annually. This market is worth about US$700 million and growing at an annual rate exceeding 30 percent. The electronics and hardware industry generates 0.5 percent of GDP. It has grown steadily over the past ten years and is expected to grow faster in the future with government support and enabling policies.

**Internet**

There are about 4.5 million Internet users in Iran, with the number growing by about 41 percent each year. More than 450 ISPs provide services to these users, most of whom use dial-up connections. Broadband services are available through some of the ISPs as well as TCI.

**Networks**

Iran’s networking structure consists of LANs, VANs and VPNs. Ethernet LANs are popular, and structured cabling is used extensively. About 100 Iranian companies are active in providing network-related services, including network equipment import and manufacturing, network design and installation, and cabling. The market value of this sector is around US$70 million per year, with 25 percent annual growth.

**Software**

The software industry is active in providing financial solutions, manufacturing information systems, office automation, graphic and design solutions, engineering and scientific applications, and e-learning solutions. The government has included this industry as one of six new industries that it will focus on. Measures that it has adopted to boost the industry include supporting domestic production, providing financial backing for software companies, and awarding government outsourcing contracts to Iranian companies. There are more than 500 registered software companies – and many more unregistered groups – in the country. Eight of them have received ISO 9001 and TickIT certification, with others planning and working towards certification.

The focus on the digital economy has raised the demand for software, coming mostly from the government, industry and businesses. The High-Tech Industries Centre has proposed that 1 percent of the national budget be allocated...
to software. International software companies are seeking partnerships with local software technology firms to exploit the domestic market, which is currently valued at around US$200 million, with a potential worth of US$500 million.

**Regulatory environment**

Preparatory work on the copyright law began in Iran ten years ago. The law does not protect foreign intellectual property at present, but this is set to change soon. The Software Copyright Law was passed by Parliament recently. It will protect all software produced in Iran; protection is expected to be extended to imported software products. Parliament also has given approval for the country to apply for WIPO membership.

Foreign investments in Iran are protected and guaranteed. The contract-awarding process is being amended to require all national ICT projects to be awarded to consortia comprising Iranian and foreign companies.

**Regulatory bodies**

**Ministry of Information and Communication Technology**

The main governing body of telecommunications in Iran is the Ministry of Information and Communication Technology, which was previously the Ministry of Post, Telegraph and Telephone. The change in name followed the redefinition of its mission, strategy and responsibilities, which was approved by Parliament in December 2003. The changes represented a fundamental shift of focus to the ICT industry. One of the major goals of the ministry is to break the existing monopoly and privatise the main telecommunications infrastructure of the country.

The ministry has the following general functions and responsibilities:

- Acting as the national body for ICT policy-making
- Setting standards and regulations as well as supervising the activities of the various communications sectors, including telecommunications, postal services, postal-bank services and IT
- Building and maintaining the communications infrastructure of the country
- Promoting and supporting the R&D and the use of ICT
- Governing the use of the country's radio spectrum and satellite orbits
- Protecting the radio transmission rights of the country.
- Protecting the security of postal mail, communication networks, as well as personal and organisational information
- Establishing rules and regulations for handling disputes and violations related to communications and IT
- Representing the government in international communications and IT unions and associations, as well as carrying out the terms of bilateral and international agreements

**High Council of Informatics**

The government bodies overseeing the software industry are the High Council of Informatics – which is headed by the President and is part of the Management and Planning Organisation – and the High-Tech Industries Centre, which is responsible for the industrial aspects and is part of the Ministry of Industries and Mines.

The High Council of Informatics has these responsibilities:

- Making IT policies and defining national IT strategies
- Expanding the IT development plans of the various sectors
- Making mid- and long-term plans for the expansion of fundamental and applied IT research
- Promoting the application of ICT

**High Council of Space**

The High Council of Space, headed by the President, has these functions:

- Utilising space and space technologies for peaceful purposes
- Protecting national space interests
- Employing space sciences and technologies for the country’s economic, cultural, scientific and technological development

Other government bodies that are involved in ICT matters include the Ministry of Science, Research and Technology, the Ministry of Commerce and the Supreme Council of ICT.

**Non-government organisations**

There are two main private IT associations: the Iran Informatics Companies Association and the Informatics Society of Iran.

**Iran Informatics Companies Association**

The Iran Informatics Companies Association was formed with the primary objective of catalysing the growth of the ICT industry in Iran. It is financed mainly by contributions from its 600 members. The association aims to help Iranian ICT companies improve their level of product and service development, besides updating members with market and industrial information. It also works closely with government bodies in establishing regulations against software piracy.
Informatics Society of Iran

The Informatics Society of Iran was formed in 1980 to prepare the ground for the application of informatics through establishing scientific and technical standards, studying the impact of computer technology on society, and familiarising people with the concepts of informatics. It also strives to promote the science of informatics through education and research, collaboration between industry and research centres, and information exchange among experts.

Enabling policies

The National Iranian ICT Agenda, locally known as TAKFA, was initiated to promote the ICT sector of the country. The ultimate goals that the government hopes to attain through TAKFA are poverty eradication, ICT-centric development of the country, creation of new jobs, privatisation of public organisations, increased foreign investment and involvement, promotion of non-oil exports, and development of high-tech industries. To realise these objectives, the government will invest heavily in ICT in Iran within the approved framework of TAKFA. Provided for in the plan are specific budgets for ICT projects as well as changes to laws and regulations to allow the country’s ICT needs to be served.

TAKFA will promote the development and application of ICT in various sectors: government (work automation, online services, e-democracy, etc.), commerce (e-commerce, e-banking, etc.), education (primary to tertiary level) and vocational training, social services and health, as well as culture (content in Farsi, the arts, etc.). It also aims to foster the development of small and medium enterprises in the ICT sector through initiatives such as technology parks and incubator schemes.

TAKFA’s budget for the year ending March 2003 was US$1 billion. It was raised to around US$1.4 billion for the following year. This amount comprised US$130 million assigned directly to existing national ICT projects, US$60 million for job creation through ICT projects, and 1 percent of the development budget (worth around US$1.2 billion) that was allocated specifically to ICT projects.
Japan

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Overview

Japan may at last be emerging from more than a decade of economic stagnation. Key economic indicators for the last quarter of 2003 showed that the economy grew 1.7 percent in real terms, the highest since the late 1980s. On an annualised basis, the economy grew 7.0 percent. Growth has been driven by strong exports, a modest recovery in private consumption and stronger industrial sector investment following a period of tough corporate reforms. Private consumption increased by 0.8 percent and, according to government sources quoted when the new data were released, this increase was based on sales of flat panel televisions, DVD players and other new IT products. Annualised private sector consumption increased by 2.1 percent. Many economists agree that a full-scale recovery towards long-term growth is not yet certain, but the indicators are better than they have been for many years.1

Consumer confidence seemed to have steadily increased throughout 2003. Dentsu Inc., Japan’s largest advertising agency, conducts an annual survey of Japan’s most popular products. The results of the survey, “2003 Hit Products in Japan”, released in December 2003, show that five of the ten top products were IT- or Internet-related. Dentsu’s main finding was that during 2003 Japanese consumers were gaining confidence that the economy was recovering and consequently were making bolder purchases, mainly IT, digital as well as entertainment and leisure products. Dentsu considered that this trend might continue more energetically the following year and “herald a full-scale recovery in individual consumption”.2 This consumer trend is very apparent when visiting any large Tokyo electronics store. Flat panel televisions, many times more expensive than traditional cathode ray tube models, are selling well. DVD players and recorders, digital video recorders and digital media servers have pushed VCRs to the back shelves. The great increase in floor space and prominence given over to these products is one of the most noticeable changes in consumer IT retailing of the past year.

Enabling policies and regulatory environment

Japan’s national ICT policy is directed by the e-Japan Strategy, which is led by the Prime Minister’s Office. The strategy was created as a response to concerns that, after decades of leadership in the global IT sector, Japan was beginning to lag behind. The new strategy established the general framework and goals for a raft of “e-policies”, with relevant ministries required to devise specific legislation and policy guidelines. During 2003, legislation and guidelines were introduced on a wide range of issues aimed at creating an enabling environment for e-commerce and a networked society. Legislation included new laws on digital signatures and on privacy and data protection, as well as revision of the commercial transactions law to make it compatible with the requirements of e-commerce.

In 2001, the Local Government Wide Area Network (LGWAN) began operation as one of the first projects of the e-Japan programme. The objective of LGWAN was to connect all the local governments on a secured network by March 2004. According to a survey by IDG Japan, 2,836 local governments were connected to LGWAN as of 8 January 2004. LGWAN provides a common information exchange system for all local, regional and national government departments so that they are able to share databases and a certified document exchange system. The system is making government work at all levels more efficient, but it is best known for having introduced the notorious Juki Net, the Basic Residential Registers Network System. Juki Net is essentially a national identification system that links all municipalities and prefectures so that central and local governments can share basic information on all residents: name, address, sex and date of birth. Juki Net has raised concerns over its impact on the right to privacy and the security of personal information, and the spectre of government as Big Brother scares many. A number of local,
city and prefecture governments have refused to deploy the system.

Revision of the Telecommunications Business Law

The biggest change in the regulatory environment was the revision of the Telecommunications Business Law, which oversees the business of telecommunications carriers, ISPs and other related operators. The amended law, which was enacted in June 2003, took effect in the second quarter of 2004. The previous telecommunications regime was considered to be stifling competition. The new regulations emphasize pro-competitive, market-oriented self-regulation and less reliance on government oversight.

Under the revised regulations, entry and exit barriers for the telecommunications business are lowered significantly. Carriers can begin business on a notification basis, rather than by permission or registration. The type distinction which categorised carriers according to their ownership of network facilities and service offerings was removed entirely creating a new generic class of “telecommunications carriers”. The revision also allows non-dominant operators to negotiate prices directly with their customers. Complex and time-consuming equipment compliance certification processes were abolished and replaced by a manufacturer’s self-compliance system.

A contentious late amendment to the law would force the incumbent Nippon Telegraph and Telephone (NTT) to allow other carriers access to its fibre network. It is common in Japan for telecommunications operators to be required to grant their competitors access to their legacy copper networks, but new networks and facilities are almost always exempt from these open access conditions. By forcing access to NTT’s fibre network, the government hopes to encourage more competition and more growth in the broadband market.

Change in radio communications regulation

With the growth of the wireless communications market, the need for more efficient use of radio frequencies has become very clear. The Ministry of Public Management, Home Affairs, Posts and Telecommunications (MHPPT) has begun the process of revising the current radio communications regime. Together with its advisory councils, it has nearly completed the policy development process, and a revised radio communications bill is expected to be discussed in the 2004 session of the Japanese Diet. MHPPT has begun allocating additional spectrum for WiFi and other unlicensed technologies. In addition, it is looking to wireless communications to close the digital divide in some underserved areas in Japan.

IT policy for education

By March 2003, over 99 percent of elementary, lower secondary and upper secondary schools in Japan were connected to the Internet, well ahead of the Education Ministry’s target to have all schools connected by 2005. However, these high basic connectivity figures hide problems that still must be addressed. A school can be counted as connected when just one Internet PC is present. Email accounts are not provided to children or even teachers; and while the use of the Internet is growing, it is not enough. As of 2003, 54 percent of elementary and lower secondary schools and 85 percent of upper secondary schools had their own school webpage.

Over the past few years, information identifying children, such as photographs of children’s faces, has tended not to be put online out of consideration for their privacy and for fear of abduction and child molestation, which have become major social concerns in Japan. This has tended to restrict some of the more creative uses of school websites. To encourage the use of the Internet, in 2003 the Japan Elementary School Webpage Award (J-KIDS Award) was held to recognise the often underestimated efforts of teachers and students who create webpages for their schools. The inaugural award went to the Omori Elementary School in Inzai, Chiba.3

IT literacy officially became part of the national curriculum for senior secondary schools in the academic year starting April 2003. IT is a general-purpose technology that can be combined with almost any other school subject, and children are expected to learn IT by looking at how it can be used for a particular purpose rather than to learn IT per se. Teachers of all subjects are therefore required to have a certain level of IT literacy and be able to use those skills in class. There is a very urgent need to train teachers so that they can practically apply IT skills in their teaching.

While the teaching and learning of IT is considered important, the potential benefits of using IT in other aspects of school life seem less well understood. As mentioned, even teachers do not have a personalised email account assigned by their school, and the use of IT is not integrated with other aspects of life at school. Teachers are unable to communicate by email with students, parents or the parent-teacher association. More needs to be done to harness the power of IT for educational purposes.

Industries

Broadband

Almost 15 million subscribers, approximately 32 percent of Japanese households, have opted for broadband Internet. The average growth rate in the first half of 2004 was around 425,000 new subscribers each month and is expected to remain above 400,000 per month. The number of home fibre subscribers exceeded 1 million in February 2004, and fibre subscribers were increasing by approximately 100,000 per month. Further growth in the fibre market is expected as new provisions resulting from the revision of the telecommunications law take effect.
NTT, the incumbent telecommunications operator, is not the gross leading provider of DSL lines, and this is an important feature of the very competitive Japanese broadband market. Tariffs for copper and fibre subscriber lines are very low, and regulations ensuring that competitors can gain easy access to NTT’s premises, equipment and network are enforced. It should also be noted that, unlike many other incumbents, NTT has not been obstructionist to these competitor DSL providers. The result is competition at all levels of the DSL market. Two companies, eAccess and ACCA Networks, wholesale DSL lines to other carriers and ISPs. In most other countries, wholesale is almost always only available from the incumbent. Companies like Yahoo!BB are able to build their own network from the customer’s home to their equipment in the NTT exchange and over low-tariff NTT fibre to their own backbone network.

Through having end-to-end control over their networks, Yahoo!BB, eAccess and ACCA Networks are able to decide what technology to use, and this has led to competition in service offerings as well as in price. After eAccess launched a 40-Mbps service in October 2003, Yahoo!BB followed with a 45-Mbps service at the end of January 2004. Bandwidth in Japan is the cheapest in the world: in January 2004, the 40-Mbps service from eAccess cost ¥2,880 a month, the equivalent of ¥72 per megabit (US$1 = ¥103).

VoIP

During 2003, Yahoo!BB began a VoIP telephony service as a means to attract new DSL customers. In some promotions, it gave away an Internet phone unit or sold it at greatly discounted prices. Calls are free to other Yahoo!BB users, and rates for domestic and international calls are significantly cheaper than those of all traditional telephone carriers. More than 90 percent of Yahoo!BB customers signed up for its Internet phone service. Other broadband service providers are offering similar services. A survey by Kyodo News at the end of 2003 found that 30 (27 percent) of Japan’s top 110 companies were using Internet phone services. Hitachi revealed that it had cut its annual calling expenses from ¥1.7 billion to ¥0.5 billion by using VoIP.

Mobile phones

In March 2004, there were more than 81 million mobile phone subscribers, but annual growth had slowed to just 6 million new users in 2003. However, the market is still vibrant and profitable: The number of 3G phone users reached 14.5 million, an increase of almost 9 million during 2003. More and new features were added to 2G phones, and a total of 50 million new telephone handsets were sold in 2003.

Profits are high: the NTT DoCoMo group earned a net profit of ¥494 billion on revenue of ¥3.282 trillion in the April–December period of 2003. DoCoMo’s average monthly revenue per user was ¥10,210 for its 3G service and ¥8,000 for its 2G service during that period, while that of the number 2 operator, KDDI, was ¥7,490 for its 3G and 2G services in the third quarter of 2003. KDDI has by far the largest 3G subscriber base – 13.5 million customers in March 2004 – and the most sophisticated services.

Cameras are now a standard feature on mobile phones. The top telephone models have a 2-megapixel camera with digital zoom. As lens quality increases, we can expect camera phones to displace not only disposable film cameras but also low-end pocket digital cameras. These high-quality cameras are also ideal for scanning text, reading bar codes, and storing URLs as well as email addresses, giving rise to new ways to find and purchase products. GPS-enabled phones are also

### Chaku Uta and the success of mobile content

Estimated to be worth US$2–$3.5 billion annually, the global ring-tone market is one of the unexpected successes of the mobile phone business. No one anticipated that these relatively low-quality music clips would become a global phenomenon. In Japan, the higher data rates of KDDI’s 3G system have helped to create a new variation of the ring-tone market called Chaku Uta.

Chaku Uta ring-tones are clips of real songs by real artists that can be downloaded and saved in MP3 format on the telephone handset. The song clips are typically 45 seconds long. People use them to see if they like a new release, perhaps later purchasing the full version of the song on CD or, more often, saving the clip as a ring-tone to be played when a call is received. Different songs can be set to play when different people call or email. Songs are played as 32-Kbps streams, a very significant increase in quality over even the best polyphonic ring-tones.

Downloads cost on average ¥105–¥210 for each clip. There are currently 30,000 clips to choose from, and new songs are added as they are released. In 2003, KDDI launched a video version of the service. It operates in the same way; but instead of just the song being played when someone calls, the music video also starts to play. KDDI users downloaded 3 million 45-second songs in June 2003. Vodafone Japan launched a similar service in December 2003, and NTT DoCoMo began its service in the first half of 2004.

The total mobile phone music market in Japan in 2003, for all types of ring-tones, is estimated at ¥108.5 billion.
available, allowing real-time navigation and location search. Screens are becoming larger – the largest now is 2.4 inches – with higher pixel density; they are also thinner, brighter and lighter, besides requiring less power to run. The image quality is good enough to watch television. In fact, a mobile phone television service was launched during 2003.

DoCoMo and Sony Ericsson released a telephone with a contactless cash card using the Felica system in early 2004. Contactless cash cards are widely used for commuter rail travel, for purchases in convenience stores and by companies as employee identity cards. A standard Felica chip can store up to 40 different applications, which might be different payment systems – for train and subway travel, convenience store purchases, orders at a favourite bar, etc. – or different identity management systems. The basic standards are universal, and technically it is possible to download new applications on demand. For example, a person in Japan might download and store the Octopus “touch and go” application on his or her telephone for commuting in Hong Kong during a business trip. Radio frequency identification (RFID) capability was added, and new telephones with encrypted infrared capability were made available from early 2004, enabling secure connections and payments between the telephone and a store checkout till or an automatic kiosk, for example. Mobile phones may soon be used for identity and payment management, which may have a profound impact on the nature of the mobile phone business. Mobile phones are exhibiting the potential to be extremely disruptive to many other products and services.  

Open source movement

Open source software (OSS) is commonly used as the operating system for Internet servers. In 2003, it became increasingly common to find the large-scale information systems of banks and securities companies and similar institutions based on OSS. However, proprietary software still persists for desktop use. A user survey of 446 Japanese companies conducted by atmarkIT Corporation in October–November 2003 found that 11 percent of the respondents used information systems built solely on OSS and nearly 60 percent of the respondents used OSS in one way or the other.  

The e-Japan Strategy encourages the adoption of OSS, and the Ministry of Economy, Trade and Industry (METI) articulates three reasons for this. First, OSS reduces dependency on a particular set of software, and the greater diversity brings increased security. Second, the availability of alternatives enhances effective procurement through optimal selection. And, third, OSS is expected to contribute to industry development, particularly in consumer electronics, by ensuring interoperability and innovation.

METI provides designated research grants for OSS development. In fiscal year 2003, it allocated a total of ¥1 billion in grants for R&D on operating systems, middleware, development tools and desktop infrastructure based on OSS. METI also considers that international collaboration and cooperation is highly important in OSS development and promotion. It has been widely reported that METI, the Chinese Ministry of Information Industry and the Korean Ministry of Information and Communication will cooperate to promote OSS development and deployment. Their ultimate goal is to create alternatives for “basic software” – which in many cases means operating systems – while at the same time ensuring interoperability and innovation in a rapidly changing technological arena and developing human resources. As part of these efforts, METI provided funds to the Center of the International Cooperation for Computerization to host the Asia Open Source Software Symposium, which has been held in Thailand, Singapore and Vietnam in 2003 and 2004.

Industry initiatives are also being undertaken. In February 2004, the Japan Open Source Software Promotion Forum was founded with a membership of users, vendors and academics. The forum aims to broaden the choice of software products in the market.

Looking to the future, the open source movement in Japan has already gone through an initial boom phase, and users are now learning how to make the best use of the applications and systems developed. OSS entered the market as information systems and is commonly used in webpages, user interfaces and similar environments. It has still to penetrate deeply into the mission-critical systems that control core functions such as customer billing, inventory management and personal records. However, the distinction between these two types of systems is becoming obscured as mission-critical business systems increasingly come to rely on customisation and personalisation made available through the information system. In this sense, OSS will move into mission-critical systems sooner rather than later.

Local online content

The Digital Content Association of Japan (DCAj) forecast in June 2003 that the volume of the entire digital content market in 2003 would grow to over ¥2 trillion, with approximately 20 percent coming from Internet and mobile content. Commercial online distribution of music and video content is becoming popular, but the volume is still relatively small, particularly for non-mobile content.

Online content has grown faster in the mobile market, where content providers have stronger control over the distribution channel and content protection mechanism for video- and music-enabled mobile handsets. The billing and payment system for content can be incorporated into the mobile operator’s billing process and the monthly telephone bill. The concern over “piracy” partly explains why content providers have been reluctant to make their products available in the Internet and PC market. But this concern is gradually subsiding as copyright protection mechanisms are being incorporated into online content for PCs.
With regard to piracy, peer-to-peer (P2P) file-sharing software experienced a tough time in 2003, particularly the two most popular systems, File Rogue and Winny (see sidebar on Winny). In 2002, as the result of the petition filed by major record labels, the Tokyo District Court issued an injunction against MMO Japan Ltd, the company behind the File Rogue service, for contributory violation of copyright. And in December 2003, the court judged that File Rogue violated the public transmission right of the copyright holders and ordered MMO Japan to pay ¥71 million in compensation.

File Rogue is similar to the original Napster P2P service: it acts as a centralised directory of the files made available online by the File Rogue client software. File Rogue users would look up the directory listing and download what they want. Theoretically, File Rogue itself is just an intermediary between the two parties, one who makes files available online and another who downloads those files. Not surprisingly, however, a considerable number of files are taken from copyrighted works without any permission, and this led to the court case.

**Trends**

If the government’s attempt to force open access to NTT’s fibre network is successful, the resulting increase in competition will lead to further broadband growth. Open access to the higher-speed, more stable fibre network will also encourage content and service providers to offer integrated television and video, voice telephony and high-speed Internet services, rather than focusing on high-speed Internet as they do today. The near future of broadband can be as the common “pipe” carrying all forms of communication to the home.

The most significant impact of the e-Japan Strategy has been to increase the awareness and pervasiveness of ICT in society. And the concept of pervasive ICT is at the heart of a new long-term e-Japan Strategy and a new ICT paradigm known as the Ubiquitous Network. The Ubiquitous Network is an ICT environment in which users can be connected anytime and anywhere, not just from in front of the PC. Mobile phones, Bluetooth and WiFi, for example, can provide different types of mobile access to the network.

**Winny, a failed dream**

Winny, which is named after the popular P2P file-sharing software WinMX (the letters N and Y come after M and X in the alphabet), was developed by a researcher at the University of Tokyo to enable users to securely and anonymously share files stored on their local disks with other Winny users. Winny, with an estimated 1.85 million users, is Japan’s popular equivalent of the infamous Gnutella P2P application.

The software is designed to transfer files via a “benevolent” third party that acts as a proxy in the transfer process. Because the proxy does not inform the receiving party about the origin of the file, and in many cases files are transferred via multiple proxies, the receiver of the file does not know where the file came from. Winny also encrypts the file being transferred and divides the file into smaller fragments that can be sent by multiple proxies. The Winny client software on the recipient’s computer then reconstructs the complete file from the fragments. This makes it extremely difficult for anyone monitoring the network to know what types of files are being transferred and by whom. Anonymity-conscious Internet users, particularly those gathering at the massive 2channel bulletin board system, welcomed the software.

Not surprisingly, Winny was often used for sharing copyrighted works, such as commercial video game CD-ROMs and movies. At one time, it seemed that no one could stop Winny from distributing whatever information was electronically available.

However, on 10 May 2004, police arrested the developer of the Winny system on suspicion of contributory copyright infringement. Initial indications are that police had made the arrest based on evidence that the developer attempted to directly assist copyright infringement, rather than on the illegality of the software itself. All the same, this was a surprising development. Winny is neutral to the content it shares. Just as a knife manufacturer is not responsible if someone uses one of its knives to stab another person, so Winny has been regarded as just a tool for exchanging information over the Internet and not responsible for the actions of those who use it.

Some say that this is the beginning of a cat-and-mouse game between law and technology, and more advanced software of a similar kind will be released shortly. However, the arrest has clearly threatened Japan’s community of P2P developers and users. Soon after news of the arrest was made public, a number of websites providing how-to’s and frequently asked questions on Winny were taken down, probably for fear that they would constitute another case of copyright infringement.

The Internet was once believed to be a new frontier where existing rules and regulations did not apply, but now it is being tamed by the real-world values and systems.
Intelligent transport systems and car navigation systems with GPS links will increase the range of access further. RFID chips, smart tags and intelligent sensors will enable interaction beyond person-to-person communication, allowing person-to-object and object-to-object connections (such as between a carton of milk and the refrigerator to indicate that the sell-by date has passed, or between a passenger car and a truck in a collision avoidance system). The Ubiquitous Network Society has become the long-term vision of Japan’s ICT policy and is expected to mature over the next few years.8

Notes


The state of ICT in Cambodia has not changed significantly since the previous edition of this volume, but some remarkable events – both positive and negative – did come to pass during this period.

Local online content

The King of Cambodia, Norodom Sihanouk, before his retirement and the election of his son Norodom Sihamoni on 14 October 2004 to succeed him, was probably the only head of state who used the Internet almost daily to communicate with people within and outside of the country. His website (http://www.norodomsihanouk.info) has been online since 2003 and had received more than 470,000 hits by the end of 2004. A link to His Majesty Norodom Sihamoni’s homepage has been added. It has sections to be expected of a royal website: biography, schedule of royal activities, and information about the royal family. But such content alone would not have attracted the 1,000 or so visitors per day to the website since the latter part of 2003. The visitors include the international media, who are drawn especially to the royal messages in which the king comments frankly on historical events and the constitutional crisis brought about by difficulties in the formation of a new government only in July 2004 following the national elections held in July 2003. These frank commentaries led the king to engage in a regular and wide-ranging public political discourse that would not have been possible without the Internet. The royal website provides an email address which renders the king accessible to the public, thereby putting in practice the concept of a “Kingdom with a King who shall rule according to the Constitution, and to the principles of liberal democracy and pluralism”.

On 1 April 2003, the first portal in the Khmer language (http://www.CambodiaCIC.org) with local access points in all 20 provinces in the country was launched as a channel to distribute news to community information centres. Each centre is equipped with three, five or ten computers depending on the demography of the province. The centres also serve as collection points for news, which is gathered daily and redistributed through the portal. This two-way flow of information between the centres and the portal helps to facilitate, for the first time, prompt communication between the provinces.

Apart from this historic achievement, there has also been an increasing number of websites about Cambodia, hosted within and outside of the country, in Khmer, English and French. These websites can be broadly grouped into three categories: government institutional information outlets (in Khmer and English), commercial websites relating mainly to the tourism sector, and websites of the development community including NGOs and UN agencies. Some of the websites in Khmer still suffer from the absence of a common standard for the use of the Khmer script in communication. Some of them present their Khmer content in the form of scanned graphics, which are slow and expensive to download. Others use one of the more than 20 different and mutually incompatible Khmer font families, often without specifying the font used. The more effective method of automatically prompting users to download fonts required to read a particular set of pages coded in HTML is being used increasingly by webmasters. Unfortunately, this procedure works only for browsers running on Microsoft Windows; a general solution for the Apple and Linux platforms is not yet available.

Despite the awareness that the digital divide can only be addressed with the creation of more local content, this did not happen as local content requires the use of a common Khmer script. The country did not have the resources needed to create software applications in Khmer until 2004.

Online services

The only field where an increasing number of services are offered online is tourism. Hotels, travel agencies and tour operators are the principal users of these services. Businesses
dealing with ICT products have also developed and adopted their own online services. Local online services are unlikely to grow significantly in the absence of a standardised Khmer-based information processing system which determines how data are entered and displayed on computer screens and how they are stored, shared and retrieved by users.

**Industries**

The computer industry in Cambodia continues to be dominated by ISPs and computer retailing and services companies. The latter sell imported branded products and clones manufactured locally using imported components.

A unique enterprise is DigitalDivideData, a not-for-profit company that reinvests its profits in activities that benefit poor local communities. The company gives preference to employing and training young people with physical disabilities to undertake data entry for clients overseas. It received a special award at the ICT for Development Platform during the World Summit on the Information Society in December 2003 in recognition of its work.

The sudden and harsh crackdown on Internet cafés providing VoIP services, after tolerating them for years, has led to the closure of some of these enterprises. They were providing international telephone calls at only US$0.05–$0.08 per minute. The government has since licensed, without public bidding, a company to run an exclusive VoIP gateway reportedly for 25 years, a long time in the fast-changing ICT sector. The company’s promotional material announces that the new service will cost 25 percent less than normal telephone calls to Europe and the USA, which cost US$1 per minute. However, this service was not yet operational as of mid-2004.

The coverage of the country by mobile phone providers has further improved, increasing the factor by which mobile phones outnumber wired phone connections. New statistics are not available, but in 2001 there were already eight times more mobile phones than wired phones in the country.

**Key national initiatives**

The Government Administrative Information System has been implemented since 2002 with assistance from South Korea. This e-government initiative presently networks and links the various ministries. The public has not been provided with practical details about the system, such as which

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**Email delivered by a mailman on a motorbike**

Since late 2003, a dozen villages located in the remote north-eastern part of Cambodia that have no running water, no electricity, no telephone, no television and no newspapers have been able to communicate by email.

A high-tech experiment is being conducted here using a system developed and installed by graduates of the Massachusetts Institute of Technology. This is how it works:

Early every morning, five motorcycles leave the hub in the provincial capital of Banlung where a satellite dish links the provincial hospital and a special skills school to the Internet for telemedicine and computer training. The motorcycles are equipped with a small device and an antenna at the rear for downloading and relaying email to computers via a WiFi card. The motorcycle riders begin their day by quickly downloading email at the hub. They then head out to the villages; and as they pass each participating school and health centre, they transmit the messages they have downloaded earlier to the respective computers and at the same time retrieve any outgoing mail queued in the school or health centre computers, which are equipped with similar devices. At the end of the day, the riders return to the hub to transmit all the collected email over the Internet to any point on the globe.

All schools involved in the experiment are equipped with solar panels to supply electricity to their computers. The teachers are trained to operate the system, and the school children are shown how to exchange information in the Khmer language with children in other schools. Students who can use a foreign language can access other information and contacts on the Internet. Local health workers have been trained to send patients’ medical reports and digital images not only to a hospital in Phnom Penh but also to the Massachusetts General Hospital and Harvard Medical School. The American Assistance for Cambodia and the Japan Relief for Cambodia are the prime movers behind this experiment.

While the results achieved are impressive, replicating this experiment in other locations will not be easy. The main obstacle is the enormous financial investment required. This is obvious from the list of donors who made the experiment possible: a Thai company which provided the satellite dish and connection, a manufacturer which donated the five new motorcycles, an airline which sponsored air transportation, two international foundations which provided the necessary financial backing, and a US bank which contributed the 100 computers installed in the villages.

services will be offered and when. It is envisaged that such plans will face various obstacles at different levels. Huge financial investments will be required to fulfil hardware and training needs. A fundamental change in attitude is also needed. At present, some government agencies do not even permit the public to photocopy official forms but insist on the use of forms issued and stamped by the agencies, for which a modest fee is charged.

This e-government initiative will also require applications which use the Khmer script, especially in the management of databases. The present effort in applying the finalised Unicode standard for Khmer to software applications is progressing along two different tracks: the first by a government group working on Microsoft applications, and the other by an NGO initiative using open source instruments.

Enabling policies

In July 2003, a National Meeting on the Formulation of National ICT Policies and Strategies was held with the support of the Asia-Pacific Development Information Programme (http://www.apdip.net) of UNDP. At the opening session of that meeting, the Prime Minister, who also chairs the National Information Communications Technology Development Authority, announced the following goals:

As I have mentioned many times, the formulation and implementation of ICT policies and strategies is crucial to keeping Cambodia firmly on the development track....

The formulation of the ICT policies and strategies that we discuss today is important for improving efficiency, reducing work time and the overall costs to meet our everyday needs as well as the needs in management, business and the government’s operation....

... Success in this regard will ensure that Cambodia will no longer be isolated or left behind the mainstream of the ICT revolution.

... This should be undertaken by promoting free and fair competition and preservation of the principles of the free market, which are the prerequisites for low costs and high quality of service...

At the same time, we should note with pride that our liberal policies in education and the strengthening of partnerships with the private sector, from both within the country and overseas, which I launched a decade ago, have been quite fruitful. Today, many educational institutions have been built in Cambodia, consistent with the rights, freedom and capacity of the Cambodian youth. All Cambodians have open access to information from overseas for study and general knowledge, through the Internet and email without any restrictive controls as is the case in some countries in the region.²

Regulatory environment

In spite of such goals, the regulatory environment has not evolved significantly beyond the situation raised by a World Bank consultancy some years ago, which predicted that “doing nothing is not an option, the Ministry of Post and Telecommunications as it is cannot long survive”.³ The prediction has been wrong, but it can be assumed that the national ICT plan as well as the telecommunications law, which has been in the drafting stage for several years, will bring about the many changes advocated by experts from abroad and echoed by the leadership in the country.⁴

Open source movement

An online mailing list for active users and others interested in using Linux has been in operation since 2003, but this alone does not confirm that an open source movement exists in Cambodia. There continues to be instances of college graduates of ICT-related courses who are unaware of open source software. On the other hand, local retailers are selling the latest open source software including the most recent versions of Debian, Mandrake, Red Hat, SuSE, TurboLinux and other Linux releases. There is obviously a growing demand for open source solutions.

The open source movement in Cambodia became more organised with the creation of the KhmerOS Initiative (http://www.KhmerOS.info). It aims to develop and deploy an end-user computer system and applications that can operate solely in the Khmer script which conforms to the Unicode standard. The user interfaces of popular open source applications, such as the Mozilla browser and mailer and the OpenOffice suite, which can be used in both Windows and Linux environments, are being localised in the Khmer script before they are released to the public. These releases will be accompanied by promotional and training activities at ICT educational institutions and local computer companies. The goal is to make open source instruments freely available for creating more software applications in Khmer. One major contribution of these efforts is the creation of sortable databases in the Khmer script, a facility which previously was rarely available.

This effort is not conceived as one closed project but as an open initiative. In a relatively short time, ICT-savvy Cambodians, locally and abroad, have come forward to contribute their efforts and achievements on a common platform. The KhmerOS Initiative shares its results with users as it finalises new applications for release.

Research and development

No high-level R&D projects in ICT have been reported in the country. The Computer Department of the Royal University of Phnom Penh and other institutions of higher learning such as the Norton University, are mainly engaged in education.
First steps in localising software in Cambodia

When the Open Forum of Cambodia (http://www.forum.org.kh), a local NGO, started the KhmerOS Initiative “to create software based on the Unicode standard for the Khmer language which can satisfy 80 percent of the needs of 100 percent of the users”, it was clear they were moving into uncharted ground. They did not only want to adapt software so that it could be used to write in the Khmer language, display on screen what is written, print it on paper and send it by email, they also wanted to translate all program commands, such as Attach, Edit, File, Format and Insert, as well as common computer terms such as floppy, keyboard and mouse.

These tasks, which seemed simple at first, have turned out to be complex. For example, they have yet to agree on whether to use a phonetic Khmer approximation of the English word mouse or to adopt the Khmer word kondol for this little creature. Proponents for both approaches think their choice is the best. In the case of the symbol @, they are divided between the artificial expression swaa and monkey, as this sign is often called in some languages.

The first phase of this initiative aimed at compiling a basic glossary of computer terms. Two persons were assigned full time to read through the monthly issues of the Khmer-language PC World Cambodia published over two years to pick out all relevant terms used. The same was done with a dozen books on ICT published in Khmer. The result of this effort was a 60-page document containing a list of terms sorted by the English version.

It is not surprising that Cambodian authors and translators have used different Khmer terms for the same English terms.

In the second round, the 60 pages of terms were reviewed by a group of Cambodian computer specialists and Khmer linguists to arrive at a common set of terms in Khmer. The finalised glossary will be used in translating the computer commands, help files and manuals of the software to be localised.

The process involves a lot of work. For example, to localise the Mozilla browser and mailer program, about 9,000 instructions will have to be translated. Some of these instructions comprise a single word such as “Save”; others involve two words as in “Save As”, yet others a phrase such as “Mail & Newsgroup Account Settings”.

The next and rather challenging task is to localise the OpenOffice suite, a set of open source programs that runs on Windows and Linux. The task will require the translation of about 21,000 instructions. More information about this initiative can be found at http://www.KhmerOS.info.

Though not a research organisation in the proper sense, the Cambodia One-Click Communication fellowship (http://www.cocc.biz), “created under a philosophy of Khmer to Khmer”, merits mention here. It is an initiative of lecturers and graduates from the ICT field to facilitate the exchange of information on ICT and to link international and national experiences in the sector. Information and knowledge gained in this way is being shared through regular training events on basic to advanced skills, as well as through the facilitation of international scholarships and the preparation of students for studies abroad. The initiative maintains institutional links with the Center of the International Cooperation for Computerization in Japan (http://www.cicc.or.jp). Its long-term aim is to create original software customised to local needs.

Trends

The vision expressed by leaders of the government to usher in a new era of the information society in Cambodia has so far not been realised. It is hard to imagine its actualisation with the existing backward-looking policies hampering economic progress and technological advancement. An example is the restriction of VoIP services; such services have helped to bring about significant cost reductions in other countries.

The progress achieved by the open source movement in many countries of Asia shows that an enabling and encouraging environment for praxis-oriented experimentation, research and production will release creative talent that helps to bring about economic and technological benefits to society. As the Cambodian leadership is anxious that the country is not left behind, present constraints are expected to be removed.

Notes

South Korea
Jong-Sung Hwang

Overview

South Korea (referred to as Korea in this chapter) is currently ranked highest in the world in terms of the development of information infrastructure. The country also enjoys the highest penetration of broadband Internet. As of November 2003, 11 million households (or over 70 percent of total households) and all schools have broadband Internet connections. As high-speed Internet becomes entrenched in everyday life, online services evolve from simple information searches to multimedia services, including e-commerce, online entertainment and e-learning.

Internet usage figures have shown a steep upward trend with the ever-deepening penetration of IT into government and social life. In 1997, the number of Internet users was only 1.6 million, but in 2000 it jumped to 19 million. This figure topped out at 30 million in 2004, representing 65 percent of the total population aged six and older (Korea Network Information Center, 2004).

ICT industrial production contributes 25.1 percent to Korea’s GDP, the highest among OECD member states. ICT exports take up a high 28 percent of total exports. Korea ranks fourth in the world in the production of ICT devices. Notably, the mobile phone market has grown at such an astounding rate that it now surpasses the fixed-line market, with 68 percent of the total population, and 79 percent of the population aged between 10 and 80 years, now using mobile phones.

Korea has faced great structural transformations in every field since the 1990s. As a result of rapid political democratisation, civil society’s influence over the government has increased and political transparency has improved noticeably. Knowledge-based industries like IT have developed to become a growth engine of the economy, while traditional manufacturing industries have declined in terms of their economic contribution. Socially, the activities and influence of young netizens have increased and the rights and benefits of historically neglected groups, such as women and labourers, have been extended.

ICT is an important enabler of such social structural transformation of Korea. The new technologies have helped to change communication structures from the top-down and one-way model to participation with lateral and two-way flows of communication. This change has noticeably improved democracy, equality and transparency. In addition, the rapid development of broadband Internet has enabled the provision of high-quality services at very moderate costs and promoted the social participation of various classes of people including the younger generation. The widespread diffusion and adoption of ICT has also become a core factor in spurring the growth of Korea’s ICT industry. The new technologies are affecting every facet of Korean society as an enabler of change and development by transforming the operational processes of major organisations, including the government and businesses, as well as changing people’s lifestyle and values.

However, the active and broad application of IT in Korea is only a recent phenomenon. Until the mid-1980s, Korea suffered from a shortage of wired telephones. There were only a small number of mobile phone users in the mid-1990s, and Internet use was limited largely to certain organisations, such as universities and research institutes. In the late 1990s, however, Korea experienced an explosive ICT growth. The number of mobile phone users passed the ten-million mark in 1998, while the number of Internet users broke through that mark in 1999.

In order to understand why Korea’s ICT growth was so rapid within such a short period of time, it is best to look at national strategies rather than market mechanisms. This does not mean that market mechanisms did not contribute to ICT development. In fact, through competition in the telecommunications market, efficiency was raised and private investment accelerated. However, the market mechanism of Korea at the end of the 1980s was not that different from those of many other countries because of the global trend of telecommunications market liberalisation. Thus, analysing...
Korean ICT growth based on market mechanisms would not be that enlightening. More revealing insights could be obtained by studying the effective combination of the traditional ICT development strategy in place since the 1980s with the new development strategy created during Korea’s economic crisis in 1997–98 that is based on a knowledge-based economy.

First among these insights, Korea has been promoting ICT development strategies for a long time through such projects as the Time-Division Exchange (TDX) Development Programme launched at the end of the 1970s, the National Basic Information System (NBIS) project started in 1987 and the Korea Information Infrastructure (KII) project begun in 1995. These projects were aimed at solving different problems Korea faced at various points in time. The TDX programme was introduced to overcome the shortage in wired telephones by developing a digital switching system. The NBIS project was aimed at developing basic databases and computer networks for public administration, research and education, as well as banking and finance. The KII project set out to create a world-class broadband network that connects the whole nation.

The explosive growth of ICT in the late 1990s can be regarded as the cumulative result of a series of national projects begun nearly 20 years ago. The government consolidated wired telephone networks, data networks and major databases with the goal of quickly building an information society via ICT utilisation and ICT industry development. During the process, strategic cooperation between the government and the private sector was made possible by the emergence of competitive private enterprises and the expansion of the domestic ICT market. The government played a primary role in initiating national projects at the beginning; but once the market had developed, it devolved that role to the market and switched its attention to the next generation of projects.

The 1997 financial crisis provided another opportunity for the reinforcement of Korea’s ICT development strategy. The fundamental cause of the crisis was overinvestment in manufacturing. The transformation from a manufacturing-centred economy to one that is knowledge-based was necessary for overcoming the crisis. Korea had chosen the ICT industry to form the core of its knowledge-based economy at that time. The size of investment in the ICT sector, as a percentage of total investment, was only 2.4 percent before 1999, but it jumped to 4.2 percent in 1999 and grew continually to 4.8 percent in 2000, 5.7 percent in 2001 and 6.1 percent in 2002. At the same time, the contribution of the ICT industry’s production to GDP increased from 8.8 percent in 1988 to 12 percent in 2003, which may be considered as a success in the structural transformation of the economy.

The rapid growth of ICT has led to Korea being ranked first place in the world in terms of broadband Internet services. In addition, the diffusion of PCs in 2002 was 23.5 million, or one PC for every two persons in the country. In other words, the fundamental ICT infrastructure has been completely built. In the case of information usage, the e-government project is approaching the final stages of implementation. E-commerce has also expanded widely, and the number of online banking users reached 17.7 million in 2002, 148 times more than three years before. The ICT industry has been contributing more than 30 percent of the annual GDP growth registered in Korea since 1997.

However, there are some remaining issues to be solved before Korea can fully attain an advanced information society status. Of top priority is the issue of increasing value creation and productivity through ICT usage. So far, the government has continually promoted process improvement, such as business process reengineering (BPR), and supported the development and diffusion of applications aimed at increasing efficiency in business and productivity in government. However, the efforts have not been very fruitful because of poor cooperation between related organisations and the lack of policy and structural improvement. The potential of ICT is not being fully tapped because Korean customs and social consciousness do not fully fit into the ICT paradigm.

Other major issues waiting to be solved are the digital divide and the misuse and abuse of ICT. Even though the number of Internet users has exceeded 65 percent of the total population, Internet use remains low among disadvantaged groups, such as the elderly, the uneducated and the lower-income people. At the same time, spam has grown rapidly at an average annual rate of 200 percent between 2001 and 2003. Misuse of personal information, hacking, virus attacks and cyber defamation are also on the rise. Although these are problems that every country is facing, they are more critical in Korea because of the highly developed ICT environment and the high speed of connections.

Various measures have been taken to address these issues. Firstly, productive IT usage is being promoted in government and business through establishing an e-government committee that reports directly to the President as well as implementing e-government holistically. Secondly, a Broadband Convergence Network project has been launched to advance the information infrastructure. It aims at integrating broadcast media and communication channels as well as building a secure Internet environment by 2010. Thirdly, nine new industries are being nurtured to sustain the development of the ICT sector.

Local online content

Portal and community sites

Web portals have made tremendous progress in building their brands, quality and content, and they are attracting more users. Many portals have reduced their dependence on
Internet advertising by diversifying their revenue sources through offering various e-commerce services and providing Internet entertainment, an area that used to be monopolised by old-media channels. In 2003, some popular portals were able to induce growth by expanding their web community base and offering a wider range of subscription-based entertainment services. As the mobile Internet market continues to expand rapidly, popular portals are developing products that deliver content via services integrated across wireless Internet and fixed-line networks.

Internet news and educational content

Internet newspapers are under increasing competition from web portals and websites operated by television networks that also offer up-to-date news. A few independent Internet newspapers, however, have successfully introduced subscription fees for premium content.

Online educational services are offered in the form of corporate training and adult extension classes. The B2B corporate training business is expected to surpass the B2C market. In 2003, online corporate training grabbed nearly 28 percent of the entire corporate training market, which is worth nearly 800 billion won (US$1 = 1,040 won).

Entertainment

Currently, popular Internet music sites consist mainly of webcasting and peer-to-peer (P2P) sites. The P2P service Soribada is the most popular music site among Korean users, while Bugs Music is the largest music-streaming website. In 2003, the Korean Internet film market was estimated to be worth around 80 billion won, while the turnover of the game industry was valued at 4.4 trillion won. Online games accounted for 704 billion won, or 16 percent of the total game market and an increase of 28 percent over 2002. The popularity of online games can be attributed to the presence of numerous PC bang (Internet cafés) and broadband Internet.

Online services

E-government

In early 2001, the government established the E-Government Special Committee, which reported directly to the President. It also invested more than US$118 million over two years in informatisation promotion funds for 11 major projects. The civil service eventually saved an estimated US$4.7 billion in operating expenses after these e-government initiatives were successfully implemented.

In April 2003, the new administration inaugurated the Presidential Committee for Government Innovation and Decentralization to carry out the President’s agenda. The committee comprises five subcommittees for (1) administrative reform, (2) personnel reform, (3) decentralisation, (4) financial/tax reform and (5) e-government. The President’s agenda includes innovating the government, and e-government has been chosen as a strategic tool for carrying out this agenda. The e-government committee will focus on the following areas: electronic administration, expanded common use of public information, service-oriented BPR, enhancement of the civil service, enhancement of business service, expanded electronic participation, reform of e-government-related laws, and specialisation of IT manpower and organisations. The committee identified 31 priority tasks for a five-year period beginning 2003.

E-commerce

According to a survey of the e-commerce industry conducted in the second quarter of 2003, the size of the B2B market was estimated to be around 50 trillion won, and the turnover of the e-marketplace had increased to 1.6 trillion won after registering a 15.5 percent growth over the corresponding period in 2002. There were a total of 264 e-marketplaces in the second quarter of 2003. There were also 3,320 online shopping malls, 36.8 percent more than the same period in 2002, with total sales reaching 1.7 trillion won.

The Government e-Procurement System, which is a one-stop resource for processing all the procurement of central and local governments as well as public organisations, is now known as the National Market (http://www.g2b.go.kr) and attracts increasing participation from the industrial sector. According to the above survey, the total value of B2G trading stood at 5.2 trillion won.

ICT industry

The rapid expansion of the ICT industry has aided the growth of the Korean economy. The amount of added value realised by the industry grew from US$25.9 billion in 1996 to US$73.7 billion in 2002. Such high growth has led to a considerable increase in the industry’s share of the export market, rising from 23 percent in 1997 to 28.5 percent in 2002. The industry’s contribution to Korea’s real economic growth increased dramatically in the 1990s, from a mere 4.5 percent in 1990 to 50.4 percent in 2000.

Domestic consumption and exports will continue to drive the progressive growth of the industry. In recent years, the share of ICT exports as a portion of total ICT production has been around 40 percent, underlining Korea’s rise in the world IT market. Thus, even in times when the domestic market suffers a slowdown, growth through strong exports is still possible.

The total number of workers in the ICT industry stood at approximately 697,000 at the end of 2002. The number is expected to grow continuously at an annual average of 4.4 percent, exceeding the 1.3 percent average rate for Korean industries, to reach 1,443,000, or 6.3 percent of the total national workforce, by 2006.
Key national initiatives

Broadband Convergence Network (BcN) project

A master plan for BcN was launched in December 2003 with the goal of building superhigh-speed networks that will facilitate the integration of telecommunications and broadcasting services and of wired and wireless networks using high quality-of-service features and IPv6. The aim is to create an environment that allows users to access all products and services conveniently, regardless of the information transmission model. BcN is in keeping with the trend of integrating telecommunications, broadcasting and the Internet. Conversion to IPv6 will solve the problem of address shortage with IPv4 and will provide more stable Internet services. An environment for fast mobile communication will be established to enable high-speed access at 2 Mbps through various types of wireless terminals.

The plan will proceed in three stages. The first stage, running from 2004 to 2005, will witness the exploration, development and elaboration of the initial concepts outlined in the plan; ISPs will provide partial services during that period. In the second stage, stretching from 2006 to 2007, up to eight million subscribers of wired and wireless services will have access to bandwidth of 50–100 Mbps. Finally, in the third stage, which spans 2008 to 2010, BcN services will cover the entire country with subscriptions upwards of 20 million.

Promising technologies for the next generation

In August 2003, the government announced that it would promote nine promising technologies that it trusts will boost Korea’s economy. These promising technologies are (1) intelligent robots, (2) home networks, (3) next-generation PCs, (4) next-generation mobile telecommunications, (5) digital content, (6) system-on-chip, (7) telematics, (8) embedded software and (9) digital television. The production value of ICT products is projected to increase by around 112 percent and ICT exports to expand from US$46 billion in 2003 to US$100 billion by 2007.

Enabling policies

Broadband IT Korea Vision 2007

Broadband IT Korea Vision 2007 was launched as the fourth master plan in December 2003 to succeed the third master plan, e-Korea Vision 2006, unveiled in 2002. The new plan, which adds some new projects to the previous plan, focuses on improving national productivity and individual quality of life through informatisation. BcN, discussed earlier, is part of this plan.

Broadband Internet in Korea

Korea currently has the most advanced broadband Internet infrastructure in the world. The number of broadband Internet subscribers has doubled every year since 1998 and exceeded 11 million in December 2003. This total represents 21 percent of the population in the country, but in actuality most Internet users in Korea are using broadband, with one broadband connection usually shared by several people. According to research by the Korea Network Information Center (2004), the number of Internet users in Korea in December 2003 was 29 million or 65.5 percent of the population, with 95.9 percent of them using broadband.

Three factors led to the rapid development of broadband Internet in Korea. Firstly, the development of broadband services was made possible by the nationwide Korea Information Infrastructure project, which saw the installation of a backbone network linking 144 cities with optical cable that created an Internet environment with no speed limit. Additionally, the laying of fibre-to-the-curb optical cable in residential areas enabled xDSL services to be provided everywhere in the country.

Secondly, liberalisation of the telecommunications sector helped to accelerate the expansion of broadband Internet. This move eased entrance into the broadband Internet market, which requires simply the filing of a notification as a value-added telecommunications service provider. The liberalisation succeeded in attracting fresh private investment while improving the quality of service. Charges to subscribers were reduced to a flat monthly rate of US$40.

Finally, an active ICT education programme catalysed demand and growth. The government has supported ICT education for ten million people since 2000 that is aimed at introducing people to ICT and training them to make use of Internet-based services. Housewives are a special target group, and the success of these programmes has led to homes being turned into ICT hubs.

With the installation of the Broadband Convergence Network, the country should be able to not only enjoy high-speed Internet services running at more than 50 Mbps but also benefit from high-quality services with the convergence of wired and wireless services as well as telecommunications and broadcasting services by 2007.
Government IT management

As the informatisation process matures, enhancing the effectiveness and performance of information resources will prove to be more important than introducing information resources. Furthermore, effective management of information resources is urgently needed to realise a true e-government. The government has been reviewing each year the status of IT management and the legal problems facing public institutions regarding their information resources. The Government Information Technology Management Reform Act aims to address these problems by introducing IT architecture into Korea’s IT management system.

Open source movement

Korea’s open source software (OSS) industry has been in constant development since the release of Linux; hence it has the ability and sophistication to compete with foreign developers. However, domination of the Korean market by a few commercial software companies – Microsoft, Oracle, IBM, Sun and Hewlett-Packard – has retarded growth in the use of OSS.

OSS offers the advantages of interoperability, greater reliability as well as lower security risk and eliminates reliance on commercial software vendors. With these in mind, the government launched a pan-department council in which government departments and affiliated organisations participate to promote the use of OSS in government and public services.

The other advantage of OSS is reduced costs. Switching operating systems running on Microsoft Windows or UNIX to Linux will reduce the total system operating cost by 80 percent. Hence, the Ministry of Information and Communication (MIC) has earmarked US$14.2 million for the development of Linux technologies. It has also driven Korea’s development of core Linux technologies by adopting Linux as the operating system for next-generation Internet servers since 2002. Another US$15 million has been allocated for 2003–2007 to be invested in developing OSS for PC operating systems and Internet browsers. MIC is also collaborating with various private organisations on the Home Network Prototype Project using OSS, which will run until 2007 on a budget of US$26 million (US$8.9 million from the government and US$17.1 million from private sources). In addition, the ministry plans to increase its support for university clubs involved in OSS experimentation and research.

The Korean Association of Information and Telecommunication has undertaken several projects, beginning in 1999 with the full support of MIC, which are geared towards furthering Linux’s diffusion across Korea’s PC market. At the same time, the Public Procurement Service has assigned the Linux software as a public procurement item for administrative information networks and has also pushed for the spread of Linux.

At the international level, Korea collaborated with China and Japan to launch a Northeast Asian forum to deal with issues surrounding the diffusion of Linux in the region. The three countries are establishing regional cooperation on open source issues, including information sharing, standardisation, joint research and pilot projects.

Linux is now also used in cellular phones. Motorola introduced in summer 2003 the SmartPhone, which operates on the Linux platform, and Samsung Electronics has started retailing its Linux-based cellular phone in China.

Research and development

The government has all along supported the development of the ICT sector and has created favourable conditions for Korean companies to participate in the sector. As a result, the competitiveness of Korean firms in the global ICT market has strengthened, and the ICT industry has become a driving force behind Korea’s economic growth. Strategic R&D investments in some technologies have brought great success. Prime examples of successful investments include TDX technologies, optical transmission systems, CDMA systems and DRAM, which together have created a market worth 168 trillion won, 220 times the 760 billion won spent on the R&D of these technologies.

Commercialisation following successful R&D of major technologies, such as CDMA, has created numerous job opportunities and enlarged the pool of ICT experts and professionals. ICT-related ventures have emerged rapidly as central players in Korea’s economic development and growth, displacing some of the traditional growth industries. The development of core technologies and the fostering of a critical mass of experts and professionals have become important facets of the national agenda.

Trends

Korea has undergone three stages of IT development since the early 1990s. The first stage, which lasted into the mid-1990s, saw the government successfully complete the construction of basic databases. The next stage witnessed the development and promotion of online services customised for the government, businesses and individuals, as well as the networking of the entire nation with high-speed connections. Starting around 2000, the government concentrated its efforts on integrating various information technologies, services and institutions. Many in government and business have expected the integration efforts to bring about considerable changes and improvement in the way society operates. Yet, for various reasons, the final stage is proving to be the most difficult to implement fully. In order to maximise the benefits of informatisation, it is necessary to continue reforming the legal and institutional systems and, at the same time, raise the capacity to utilise IT in all segments of society.
In this respect, a technology-centred approach, which proved so successful in the rollout of broadband Internet in Korea, will cease to be effective, efficient and sufficient. Hence, a new paradigm should be explored. An institution-centred approach is recommended, with the main focus on BPR, human resource development and institutional development. If the past gives any indication of the future, all signs suggest that IT investment will soon come to be evaluated less by its obvious, tangible benefits but increasingly by the value, implicit and explicit, it creates for society.

References

Laos
Phonpasit Phissamay

Overview

Laos (Lao People’s Democratic Republic) is facing many obstacles in introducing ICT to the country because of a shortage of skilled personnel. Expertise is required in building this critical capacity through human resource development programmes. The government established the Information Technology Centre in the Science, Technology and Environment Agency (STEA) in 2000 as the central agency overseeing the ICT sector. The centre conducts R&D and training and provides services related to ICT throughout the country.

Laos has a long way to go in providing its population universal telephone service. It is estimated that under 1 percent of households have a telephone. Less than half of the districts in the country have fixed telephone services, and only urban areas in half of the provinces are covered by mobile cellular signals. There is no specific plan for developing universal access to telecommunications services. The country faces immense technical and commercial challenges in expanding telecommunications coverage, as most of the population resides in rural areas while transport and electrical infrastructures are scarce and incomes are low.

Internet access is available only in those cities with telecommunications infrastructure. The Internet is used mainly for email and browsing. Only government ministries maintain their own websites, providing basic information on their respective roles and structures. E-government of the extent seen in developed countries is a distant concept for Laos. In fact, the government has not provided any online services.

Infrastructure

Four companies – Enterprise of Telecommunications Lao (ETL) of the government, Lao Telecommunications Ltd (LaoTel), Lao Telecom Asia Co. Ltd and Millicom Lao Co. Ltd (Tango) – provide telecommunications services throughout the country. Laos has 18 provinces, of which 5 are served by fibre optic networks in their capitals. ETL plans to cover the other 13 provincial capitals by 2004 and 142 district headquarters by 2005. As of September 2004, there were 86,236 PSTN lines in service provided by three operators. However, out of this total, only 1,706 were in rural provinces, covering 50 districts and 22 remote villages. There were only about 300 public telephones, all of them located in the larger cities. Also, there were 250,279 mobile phone subscribers served by four operators, with LaoTel controlling about three-quarters of the market. GSM networks are available in half of the provinces. LaoTel has established a backbone via a 34-Mbps microwave transmission system connecting 13 main cities to the country’s capital, Vientiane. It is also in the process of installing telephones in remote areas throughout the country. Despite the availability of mobile services for eight years, Laos has not experienced a wireless boom to the same extent as other developing countries have.

Currently, Internet access is provided by seven ISPs: ETL, LaoTel, Lanexang Internet Ltd, Planet Internet, KPL Internet (previously GlobeCom), Champalao Internet and Lao National Internet Committee (LANIC). All the ISPs are privately run except for LANIC, which is operated by the government and provides services to government organisations and academic institutions only. ETL, although government owned, operates as a commercial company. There were about 3,800 subscribers registered with the private ISPs as of May 2003. LaoTel also controls around three-quarters of the ISP market.

An analysis of subscribers data reveals that government organisations form 10 percent of the total number, local private companies 20 percent, local individual users 23 percent, and foreign users from embassies, international organisations and NGOs as well as business visitors the remaining 47 percent. Since 2003, LANIC has also provided free Internet access via wireless links to 16 government organisations and academic institutions in Vientiane. It is estimated that some 1,000 PCs are connected to this wireless network, together with about 500 PCs in six laboratories of
the National University of Lao PDR (NUOL). There were an estimated 15,000 Internet users in the country as of May 2003. This translates into a ratio of 2.88 Internet users for every 1,000 inhabitants. The number of Internet users had increased from 1 per 10,326 inhabitants in 1998 to 1 in 346 by December 2002.

It is estimated that there are 250 Internet cafés in the whole country with 70 situated in Vientiane Municipality. The connection speed at Internet cafés has improved significantly with the installation of fibre optic cables by ETL.

LANIC, NUOL, local ISPs and the Swedish Royal Institute of Technology are collaborating to establish the National Internet Exchange Gateway, which is expected to interconnect all the local ISPs through optical fibre. This initiative is funded by the Swedish International Development Agency.

ICT education

Most of the ICT specialists in Laos are graduates of foreign universities, mainly from Australia, France, Japan, Singapore and Thailand. Very few academic institutions within the country provide ICT education at the degree level.

In 1998, NUOL started the first computer science programme at the Department of Mathematics and Physics of the Faculty of Science, which leads to a Bachelor of Science degree in mathematics and computer science. The five-year programme begins with two years of foundation studies, which are compulsory for all NUOL students. The course focuses on the theories of mathematics and computing, as opposed to computer engineering, which deals more with hardware fundamentals and hardware design. More than 100 students have graduated from the programme.

In 2002, with assistance from the Japan International Cooperation Agency, the Department of Electronics of the Faculty of Science, which leads to a Bachelor of Information Technology Application. Students applying for this two-year programme must have at least a bachelor’s degree related to mathematics, electronics, engineering or management. So far, about 40 students have completed the course.

There are private colleges providing ICT education at the pre-university level in areas such as networking, database management, and accounting and management. These colleges include Lao American, Comcenter, Ratana, Sensavanh and Ques.

ICT usage

Internet usage in Laos is increasing faster than the growth in mobile phones, fixed telephone lines and computer ownership. The number of ISPs, Internet cafés and users has risen significantly. At the same time, prices have fallen dramatically. The Internet is used mainly for email and entertainment. There is very little usage for education or for obtaining government and commercial information.

A survey conducted by LANIC at the beginning of 2004 showed that the 25 government organisations in Vientiane own a total of 2,456 PCs. As these organisations have a total of 6,633 staff members, it may be concluded that each PC is shared by an average of 3 staff members. This ratio is high when compared to other developing countries. However, the PCs are not distributed evenly across the organisations. For example, the Ministries of Education, Communications, Finance, and Foreign Affairs, the National Bank and STEA own more than half of the PCs. On the other hand, the Ministries of Agriculture, Public Health, and Justice as well as the military have less than 10 percent of the computers, even though they have more staff.

The survey found that 31.7 percent of the PCs in these government organisations are connected to the Internet and 21.7 percent of government officers access the Internet every working day. These officers spend 60 percent of their time online on email, 37 percent on searching for foreign information, and only 2 percent on seeking local information.

In the private sector, computer systems can be found only in large companies; and only those companies that communicate with overseas partners have email and Internet access. There is very little ICT utilisation among small and medium enterprises because of the high cost of the technologies and the fact that their business is focused on the local market where there is little use of ICT for business communication and transactions. The only feasible e-commerce activities are found in the tourism industry. Since visitors to Laos are increasing, ICT usage in this industry is expected to grow.

Research and development

The Research Project on Building Rural–Urban Digital Link in Lao PDR, funded by a C$400,000 grant from IDRC of Canada to STEA and the Participatory Development Training Centre, aims to increase accessibility to and the development of basic skills in ICT in both the rural and urban areas of the country. The project established and equipped the Luang Prabang Multi-purpose Community Telecentre to support basic ICT skills training in the community. The centre also helps schools, businesses and development groups to adopt ICT to support their social and economic activities. Officially opened in March 2003, the centre is now running at full capacity after starting from scratch with users who lacked both basic computer skills and English proficiency. Nicknamed “e-Way”, it is open seven days a week. Many people have signed up for its courses, which are designed to provide participants with basic computer and English-language skills as a first step towards the acquisition of higher ICT skills.

IDRC is also funding the regional PAN Localization initiative to develop local-language computing capacity in Asia. STEA is taking part in this initiative to develop a Lao font, keyboard driver and lexicon, as well as a Lao–English
dictionary with sorting, spell-check and grammar-check functions.

**Open source movement**

The open source movement in Laos is not active, as the concept is still very new to the country. Also, most users have the misconception that they need to be skilled in computing, especially in programming, in order to use open source software. The lack of IT skills is one of the reasons why open source software remains unpopular. However, some initiatives are underway to promote its use.

The Open Source Laboratory of the Information Technology Centre in STEA was established in December 2002 with the assistance of the Francophone Organisation. The laboratory’s initial focus is to create awareness and promote open source software. It also conducts training courses on the use of such software.

Most, if not all, ISPs and new-generation telecommunications operations in Laos are acquiring hardware such as servers with the option of running Linux as the operating system of choice. The savings from using lower-cost freeware or custom shareware allow them to increase their hardware budget. There are an estimated 20 Linux servers operating in the ISP market. The National Internet Exchange Gateway is also using Linux for its email, web, firewall, and domain name system servers. LANIC has also encouraged the government to use Linux servers for Internet access and email. Some 20 IT engineers from various government ministries have been trained on Linux, and ten Linux servers have been installed in the ministries.

The LaoNux project is a Linux localisation effort initiated by Anousak Souphavanh, a Lao expatriate living in the USA. The project, funded by the Jhai Foundation, strives to bring the benefits of ICT to the masses by making the new technologies accessible to the people of Laos, the majority of whom cannot read or write English. The software it will introduce includes Lao OpenOffice and Xangdao.

Computer companies are also contributing to the open source movement by offering a free Linux operating system as an option when customers purchase new computers and servers. The savings on software costs allow customers to make further purchases. Major computer training companies also are providing training courses on open source. Ques College, in particular, teaches Linux as part of its main curriculum.

**Regulatory environment**

The legislation in Laos has not kept up with the rapidly changing ICT environment. Existing regulations were drafted at a time when the unique challenges of the ICT environment today were not envisaged. To boost the confidence of private sector investors and members of the public, clear legal guidelines and policies are needed. It is therefore essential to review and amend existing laws and regulations that are relevant to ICT development and, where necessary, enact new ones based on international best practices and model laws. There is also a need to strengthen existing regulatory institutions or establish new ones that can contribute to this process. These institutions may include government organisations, private sector groups, NGOs and community groups. Presently, the regulations governing ICT matters include the following.

**Telecommunications Law No. 02/NA**

This law was approved by the National Assembly in April 2001. It governs the regulation of telecommunications organisations and activities; the management of radio frequencies for radio communication, sound and television broadcasting, and other uses; the administration of IP address numbering and the Internet infrastructure; the management and use of satellite positions and orbits; the administration of the country code top-level domain; and the management of telecommunications and Internet services nationally and internationally.

The law provides for competition and cooperation among local and foreign investors in the construction, development and expansion of the telecommunications network and services within the framework prescribed by the government.

The management and oversight of the telecommunications sector is undertaken by the Ministry of Communications, Transport, Post and Construction at the national level together with its departments at the provincial level and its offices at the district level. The ministry is given the exclusive right to decide the issuance, suspension and termination of licences for the establishment and extension of telecommunications businesses.

**Regulation No. 141/PMO**

Issued in April 2000, this regulation governs the management, use and maintenance of the Internet in Laos. Its objective is to ensure that the Internet is used in an orderly, secure and efficient manner in accordance with national policies, laws and regulations.

Under this regulation, only LANIC is authorised to issue ISP licences. Moreover, any individual or organisation is prohibited from using the Internet in Laos for undesirable purposes, such as inciting acts to destabilise the society or the country, inciting acts of violence or crime, pornography, revealing state or military secrets, publishing false information or distorting information, and violating the privacy and rights of individuals or organisations.

**Enabling policies**

The national ICT policies and strategies have been formulated and they await national consultation and
government approval. The policies aim at developing and deploying ICT to support economic and social development that is progressive and sustainable. As resources are scarce, prioritisation is necessary. Also essential is a holistic approach that is pragmatic and effective in resource utilisation. At the same time, it is important to recognise the country’s economic vulnerability because of its heavy dependence on the external markets as well as the social disparities due to geographical and developmental gaps between the capital and the provinces.

The national vision spelt out in the policy document is to bring the nation into the digital age by building modern telecommunications networks with low connection costs and achieving a high rate of computer literacy among the people. ICT applications will be introduced to the banking, education, health, transport, and public administration sectors. The government will provide the political leadership and vision for the implementation of national ICT strategies and will pursue a top-down approach to facilitate integration. The salient objectives of the policies include these:

- To implement a national ICT infrastructure plan which includes the development of human and IT resources.
- To pursue priority ICT strategies, programmes and projects which accelerate development plans, stimulate growth, provide new opportunities in various sectors and create jobs.
- To provide universal access to telecommunications services at an affordable price.
- To provide a legal framework governing e-commerce transactions and to establish legal institutions that will protect consumers and businesses.
- To formulate a legal and policy framework to encourage the creation and protection of intellectual property as part of the country’s WIPO commitments.
- To promote open source standards and software as well as free or low-priced software.

**Trends**

The government aims to stimulate and develop production activities, to transform the focus of the economy from agriculture to services and industry, to develop the domestic market and link it to regional and global markets, and to improve the trade-related infrastructure of the country. To attain these goals, the following potential income-generating activities have been identified for study to determine if growth, productivity and income generation may be increased through the application of ICT:

- Improving irrigation systems to increase food production and promoting crop diversification
- Development of hydroelectric power facilities
- Forest resource management including reforestation programmes to sustain the production of high-value timber
- Development of various products for export
- Improving the quality of minerals for export
- Construction of warehousing facilities to take advantage of the country’s proximity to large markets
- Development of transportation and communications infrastructure
- Promoting economic and investment opportunities in Laos to foreign investors

It is important that there is ready access to information as well as sharing of information on the progress of projects among the agencies and the people involved. This will ensure that efforts are not duplicated, resource usage is optimised, expertise and technologies can be tapped by those who lack them, and results are communicated to help others make improvements and find solutions to problems.

To maximise the benefits that can be derived from ICT, priority should be given to developing the following areas:

- Expanding the role of the Information Technology Centre to make it more effective
- Nurturing professional and technical ICT experts who are able to plan, design, install and maintain information facilities
- Developing applications and systems for e-government to improve the effectiveness and efficiency of the public sector
- Strengthening ICT education by establishing a master’s programme in computer applications
- Introducing ICT into agriculture and rural development via the establishment of community-based telecentres in all the provinces
- Establishing provincial Internet gateways
- Establishing VSAT-based intranet connections to rural communities
- Strengthening Internet penetration and expanding e-business opportunities

Realising the vision of an information society must start with the interests of the people – not so much their interests as consumers, but more importantly their interests as citizens who need to have access to information and telecommunications services in order to participate effectively in the decision-making processes of the country.

**References**


Overview

As it gradually recovers from a prolonged civil war that lasted for two decades, Sri Lanka is now hopeful of rapid economic recovery and social development. The ceasefire agreement signed between the government and the Tamil Tigers in February 2002 has held for over two years, surviving various crises including a change of government in April 2004. Several rounds of peace talks have been held between the former combatants, through the mediation of the Norwegian government. These talks have gone into the nature and degree of devolution and power sharing, but they have so far been inconclusive.

Meanwhile, the Sri Lanka aid donor consortium has pledged over US$4 billion of highly concessional financing for the rebuilding of the economy, with particular emphasis on the north and east, which are directly affected by the conflict. The donors have made this package conditional on a continuation of the peace process. The economy, freed at last of the multiple impacts of war, is bouncing back. GDP grew at 5.9 percent and GNP by 6.4 percent during 2003.

Even though the guns have remained silent, political instability continues to affect every sphere of activity, holding Sri Lanka back from racing forward at full speed. The tussle between the all-powerful President from one party and the government from the other major party dominated the political landscape. This stalemate ended with the President’s party winning the general election in April 2004 – but divisive party politics continue. As the Central Bank (2004) has noted in its 2003 annual report, Sri Lanka is “at a crossroads, as prospects are high for a durable peace and a move towards sustainable, high quality economic growth. However, to reach this goal, a national consensus on major political and economic issues should be built through a series of wide and continued public discussions.”

ICT can play a key role in rebuilding Sri Lanka, but only if it is strategically deployed, optimising on the strengths of public, private, academic and civil society sectors. As this update indicates, the island nation is still struggling to create an enabling policy and legislative framework in which this could happen.

Local online content

When it comes to online content, it is difficult to determine whether the poor Internet growth has resulted in very limited locally generated and relevant content, or vice versa. Where content does develop, even at a slow pace, it is largely due to individual enthusiasm and effort. The many and varied institutions of government, academia and industry have so far contributed very little by way of local content. Most Sri Lankan websites are no more than online brochures, announcements and press releases, and content is rarely updated. Very little interactivity and few database services are on offer. As of May 2004, the two official government portals at http://www.lk and http://www.gov.lk both appeared to have ceased operations.

Most content on Sri Lankan websites is provided entirely in English – this is so even with most government websites, even though the Official Languages Policy stipulates that the government must communicate in all the three official languages of English, Sinhala and Tamil. A main problem faced by content developers is the lack of standard Sinhala and Tamil fonts. Although there are many Sinhala and Tamil fonts available, none of them are ubiquitous. Users who access many Sinhala or Tamil websites must install several different fonts in order to view all the sites. It is estimated that less than 10 percent of computers in Sri Lanka use Sinhala or Tamil, and almost all of these are used for word processing and publishing. There is negligible use of databases and other functions in local-languages (APDIP, 2003). Although attempts are being made to establish standard local-language font sets and keyboards, they have yet to bear fruit. Until that happens, it is unlikely that local-language content will increase.

During 2003, several online editions of popular Sri Lankan newspapers introduced paid subscription services, thus ending free access. At the same time, the number of online sources offering Sri Lankan news and commentary (all entirely in English) has increased.
Online services

E-government

Many government offices still operate with the minimal actual use of ICT, even when they have invested substantial amounts of public funds to acquire ICT equipment and facilities. As one assessment noted: “Ministries and departments are busy acquiring PCs, installing LANs, databases and Internet access. However, many of these systems do not fully automate a given process, with manual processes complementing the processes that have been automated” (Sri Lanka Development Gateway, 2003).

Various donor-driven projects for automating the public sector have failed to promote pervasive use of ICT in most government offices. Many offices have fully equipped computer departments or units, manned by junior to middle-level personnel, but senior managers lack ICT skills. Some years ago, the lack of IT literacy among public servants was seen as a major constraint in automating the public sector. The situation has improved, with most new, young recruits being computer literate, even if their superiors are not. But resistance to change at the top, coupled with the lack of vision and leadership, continues to hold back the public sector from entering the 21st century.

The same applies to putting government online. In spite of the ICT road map recognising e-government as a priority area, not a single government agency or department offered the option of completing an entire transaction online as of May 2004. None of the statutory dues to the government could be paid online.

Meanwhile, there have been some promising developments, due largely to the individual initiative of some officials. A good example is the Department of Immigration and Emigration, whose website (http://www.immigration.gov.lk) provides information about consular services and visa requirements, as well as allows users to download various forms required to obtain, change or extend travel documents. However, the completed forms cannot be submitted online – a physical visit and offline interaction are still required. The same department experienced less success when it introduced a computerised border and visa control system at ports and airports. With immigration officers struggling to operate computers, the system slowed down the whole process, leading to long lines and many complaints. Such mishandling of ICT introduction – where hardware was installed without adequate training for officers – would tarnish the image of public sector ICT tools.

ICT tools are not widely used in government procurement processes. A few government agencies have started displaying information on tenders and bids, but most of the time citizens have no way of accessing reliable and timely information on government contracts. The appropriate use of ICT tools can not only reduce costs and improve efficiency but also address the ever so ugly issue of corruption.

The Ministry of Finance has taken the first step to publicly display a summary of the 2003 budget allocations as well as budget circulars (of administrative instructions) and the 2004 Appropriation Bill on the website of the National Budget Department (NBD, http://www.nbd.gov.lk). The website is designed to enable the public, as well as line agency accountants, to view up-to-date budget estimates. Until now, only senior politicians and civil servants had access to current budget data, largely because of the costs and effort involved in publishing supplementary print editions of budget estimates. An email contact point in the Ministry of Finance is provided on the new website for direct questions. According to NBD, this is the first interactive G2G application in Sri Lanka. NBD believes this increased transparency of budget information could enhance political and administrative accountability (Senanayake, 2004).

Another new development is the automation of the offices of the President, prime minister and cabinet ministers and of Parliament, all inspired under the e-Sri Lanka initiative. This work started in early 2004. The e-Office of the President project aims to improve and automate administrative and support services for the Presidential Office. The current system will be replaced with a modern ICT-enabled system, with presidential staff being equipped and trained to make full use of ICT facilities. The system is to be fully compatible with the e-Parliament and e-Cabinet Office systems, with connectivity to the government intranet through a secure gateway (ICTA, 2004).

Distance education and e-learning

The first distance learning centre in Sri Lanka was inaugurated in 2001 at the Sri Lanka Institute of Development Administration. This is being used to train the executive and managerial staff of public as well as private sector organisations.

Meanwhile, two distance learning projects are being carried out with assistance from donor organisations. The first is a pilot project under the e-Sri Lanka programme, implemented by the Arthur C. Clarke Institute and supported by the World Bank. It intends to create a virtual learning infrastructure through the establishment of distance learning centres in selected sites in the North-Eastern, Southern and Central provinces, with links to distance learning centres in the capital, Colombo. The centres will provide interactive education using videoconferencing and online content to address the practical needs of both urban and rural citizens. Basic skills development and job opportunity enhancement are key objectives of this project (ICTA, 2004).

The second project is supported by a US$45 million loan from the Asian Development Bank to help modernise Sri Lanka’s post-secondary education system. The Distance Education Modernisation Project will set up a national network of telecentres and affiliated facilities in schools to provide a full range of quality distance and online learning.
courses for secondary school graduates who were left out of university (because of stiff competition for limited places). The project will run up to mid-2009 (Asian Development Bank, 2004).

E-commerce and e-business

Internet-based shopping malls have never flourished in Sri Lanka, and the few websites that offer such services have so far attracted few local users. Most of their customers are Sri Lankan expatriates who send gifts to friends or family in Sri Lanka. The best example is Kapruka (http://www.lanka.info), a website that sells books, flowers, cakes and sweets. It makes delivery to selected areas of Sri Lanka. This website restricts access from Sri Lankan web hosts, so it can only be used by non-residents. Neither supermarket chains nor other retailers have taken online marketing seriously, with the single exception of Keells Super (http://www.keellssuper.com). Fast-food delivery services, popular in Colombo and other major cities, are available by telephone only.

Internet banking is becoming popular, though not rapidly. The total number of commercial bank customers registered for Internet banking was 24,650 by end 2003 (Central Bank, 2004). An independent researcher estimated the number of active Internet banking accounts to be in the range of 7,500 (Kasturiratna, 2003).

However, there has been significant improvement in other financial areas. In February 2004, the Central Bank of Sri Lanka introduced four systems to make the financial processes more efficient and reliable: the real-time gross settlement (RTGS) system, the scriptless securities settlement system, the automated general ledger system of the Central Bank, and the treasury dealing room management systems.

The most significant among these is the RTGS system, which enables instantaneous transfer of large and time-critical payments among participating institutions, with the settlement made on a real-time gross basis. Once a transaction is entered into the system, it becomes final and irrevocable. This eliminates the main drawback of the previous offline system, namely, causing a series of delays when one transaction failed to be completed. It also eliminates the use of cheques in interbank transactions, facilitates liquidity management, and provides financial institutions an intra-day, interest-free liquidity facility. The current participants of the system are the Central Bank, all commercial banks, primary dealers and two specialised financial institutions.

With the introduction of the scriptless securities settlement system, all Treasury bills and Treasury bonds will be issued in electronic form. This system is integrated with the RTGS system to enable electronic payment and is expected to eliminate the inconveniences of paper-based securities.

Electronic means of payment are gradually becoming popular as alternatives to cash. Credit cards are the most widely used cashless payment method at the retail level. By end 2003, there were ten issuers of credit cards, nine of which were commercial banks. Intense promotional campaigns and changing banking habits have led to a continuous growth of over 25 percent per year in the volume of credit-card transactions in recent years.

Bank ATMs too have shown an exponential growth. By end 2003, nine banks had installed a total of 721 ATMs. Interestingly, the combined number of the branches of all commercial banks is only about twice that number. The majority of the ATMs are in major cities, but recently ATMs have been installed even in remote towns. Electronic funds transfer at point of sale (EFTPOS) is another popular mode of payment. The total EFTPOS base consisted of 5,114 machines by end 2003 (Central Bank, 2004).

Telemicine

Telemedicine services are not yet popular in Sri Lanka. The likely reasons for this are the small size of the country and the availability of healthcare facilities to a large section of the population. However, there is potential for telemedicine as specialist services are not evenly distributed. Such services are available only in the main cities, where only one-fifth of the population lives. Some 40 percent of the more than 600 medical specialists work in Colombo, where half of the 14 teaching hospitals in the country are located. There is a critical shortage of medical specialists in other regions, especially in the fields of neurology, microbiology and radiology (Ganawardana & Dantanarayane, 2002).

According to one expert, asynchronous communication modes and store-forward telemedicine models may be the most appropriate for Sri Lanka. There is evidence that store-forward telemedicine, especially in the areas of dermatology and pathology, is cost-effective, but its clinical efficiency may be less than that of real-time telemedicine. User-friendly web portals offering store-forward telereferrals would be one option that a doctor with even a 32-Kbps Internet connection, as well as a flatbed scanner and a digital camera, may be tempted to use (Mendis, 2003).

E-communities

Among the more active and effective e-communities are those belonging to, or supportive of, political parties. Most exist in the form of Yahoo or MSN e-groups, and use the Internet and email for recruitment or propaganda. The April 2004 general election saw the birth of several such e-groups. Of these, those created by the new Jathika Hela Urumaya (National Heritage party) stood out. The e-communities of this relatively small ultra-nationalist political party were able to score high in almost all the online polls, even though at the election the party could not get more than 5 percent of the votes, which won them 9 of the 225 seats in Parliament.
The Sri Lankan diaspora continues to dominate local e-communities. There is a growing number of e-groups and listservs focusing on particular aspects of politics, culture, social development or professional interests.

**Industries**

The ICT industry was one of the sectors worst hit by the economic setback Sri Lanka experienced from late 2000 to 2001. The setback was due to the twin effects of the global gloom after the September 11 attacks in the USA and the insecurity caused by the civil war. The industry has been struggling since to recover from it. While recovery has been partially successful, the country has failed to emerge as a key destination for ICT-related manufacturing and services, perhaps overshadowed by neighbouring India.

**Hardware and software**

There was no visible development in hardware manufacturing. Most PCs used in Sri Lanka are still only assembled locally from imported components, mainly because of the lack of infrastructural facilities to nurture a sophisticated electronics industry.

Except for a few isolated cases, there has been no notable improvement in the software industry either. The company that stands out is Virtusa [http://www.virtusa.com](http://www.virtusa.com). Founded in 1996 and headquartered in Massachusetts, USA, this US$100 million company has offices and technology centres in India and Sri Lanka. It has a staff of over 1,900, which is expected to increase to 3,000 by 2005.

**ICT-enabled services**

Sri Lanka has been identified as an ideal location for business process outsourcing (BPO) operations, but progress has been slow, probably because of the unstable political situation. Call-centre and digitising operations are low-key, and they have not grown in size or stature as has happened in India. There are fewer than six known call centres in Sri Lanka.

A key turning point was when HSBC decided to set up a 2,000-seat call centre in a Colombo suburb at an initial investment of US$30 million. The number of seats may be expanded to 10,000 in the next few years depending on the success of the first phase. HSBC Data Processing Lanka Ltd has already started constructing a large BPO centre equipped with the latest tools of the industry.

**Key national initiatives**

The e-Sri Lanka project, launched in November 2002, was tasked with the development of an ICT road map for Sri Lanka. The e-Sri Lanka policy resulted in the implementation of the Information and Communication Technology Act No. 27 of 2003, which established the Information and Communication Technology Agency (ICTA, [http://www.icta.lk](http://www.icta.lk)). ICTA, a wholly government-owned “enclave” organisation, has been operational since 1 July 2003. Significantly, it is not a typical government department or agency, and has a directorate with government and private sector representation. Its management team has been drawn from the government, corporate and academic sectors.

The mandate of the e-Sri Lanka policy is to build a national information infrastructure, create a framework for the promotion of software and ICT-enabled industries, reengineer the government and develop ICT human resources (APDIP, 2003). The ICT road map also details a portfolio of action plans targeted to be achieved by 2007. The programme is unique for two reasons. First, it is a national-level programme that receives the highest level of political backing. Second, it is an attempt to bring various aspects of ICT together, from IT education to e-government and from telecommunications to telemedicine.

Milinda Moragoda, the then Minister of Economic Reforms, Science and Technology, described its purpose as enabling Sri Lankans of all ages and social strata to reap the full benefits of the new digital economy. This vision of e-Sri Lanka is to be realised through a seven-pronged strategy:

1. Reengineering the government, including the introduction of e-government systems to deliver citizen-centric services
2. Building an information infrastructure and an enabling environment
3. Developing ICT human resources to meet the requirements of the local as well as global ICT markets
4. Encouraging investment in ICT and developing the ICT industry to establish Sri Lanka as a renowned destination in the global market for ICT-related manufacturing and services
5. Establishing the technical architecture and security standards
6. Bridging the digital divide with applications aimed at poverty reduction and social development
7. Encouraging e-leadership and policy-making at higher levels of government

Running as a multi-donor programme, with the World Bank playing the lead role, e-Sri Lanka has an initial investment estimated at US$50 million, to be expanded to US$300 million within three to five years. These are concessionary loans.

Given its high visibility, unusual institutional structure and political backing, ICTA, as well as the e-Sri Lanka programme, has come under much scrutiny and considerable criticism by the media, civil society and even sections of the government. Much of this criticism is justified given that ICTA, after more than one year of operation, has only succeeded in launching several pilot programmes.
ICTA’s birth was fraught with trauma. The ICT Act No. 27 of 2003 repealed the relevant section of the Science and Technology Act which had established the Council for Information Technology (CINTEC, http://www.cintec.lk), the apex state agency for ICT-related policies and activities for over 15 years. This move was questioned by industry, as CINTEC had a wider policy, advisory and development scope than does ICTA, primarily a project implementation body. CINTEC’s closure has been challenged in court by its employees, leading to a long-drawn battle during which CINTEC exists nominally without operations – a continuing burden on taxpayers.

ICTA’s failure to engage and adequately integrate with the rest of the government, as well as with the academia, industry and civil society, has been a key concern. This failure may be partially attributed to e-Sri Lanka and ICTA being perceived as an externally imposed, donor-driven effort. But the “not invented here” syndrome alone cannot explain why ICTA remains isolated and aloof. The agency has failed to identify its niche in the local ICT sector and – because of its “all or nothing” approach – has missed out on many opportunities to add value and build on what already exists in the various sectors.

Taking rural Sri Lanka to new horizons

Mahavillachchiya is no different from the 14,000 other villages in Sri Lanka. Located in the Anuradhapura district 240 km away from the capital, Colombo, this hamlet is home to a few hundred people, all engaged in subsistence farming. Only a few houses have electricity, and none have a telephone. It is beyond the signal range of mobile phone networks.

Yet, Mahavillachchiya is today known far and wide in the global village. A Google search results in over 50 hits. Through the sheer efforts of a school teacher and his students, the village has placed itself on the global Internet map. More interestingly, it has produced some of the finest writers, digital photographers, web editors, web developers, graphic designers, programmers and computer technicians in Sri Lanka. The oldest is 17 years old and the youngest only 7. Together, they have developed the first website in Sri Lanka that is designed entirely by the children, located at http://www.horizonlanka.com.

The man behind this success is Nandasiri Wanninayake (Wanni). He was appointed to teach English in his own village in 1997 and was paid about US$30 per month. Wanni found the students’ knowledge of English extremely poor. Many could not even utter a complete sentence. He took it upon himself as a challenge to develop methods to teach his students to use English in practical situations. Within a short period, a few of his students began to excel in their studies and produced their first handwritten magazine “Horizon”. It was photocopied and sent to foreign diplomatic missions in the faraway capital.

In response, the US Embassy donated a second-hand 486 computer and printer. Neither Wanni nor his students had ever seen a computer, let alone use one. But Wanni soon mastered the machine on his own and taught his students as well. Around this time, a journalist visited Mahavillachchiya and wrote an article on the efforts of this enterprising young man. Having read the article on the Web, a Sri Lankan expatriate working in Japan helped Wanni and his team to produce the first website for the “Horizon School”. This was the forerunner of the comprehensive and graphics-rich website they have today.

Today, Mahavillachchiya has a small computer centre, used by the students not only to learn computer skills but also to design websites for international clients. In addition, several students have PCs at home. A scheme named Digital Butterflies was started to encourage students to save money. When they have saved Rs 5,000 (US$50), Wanni finds a donor who will match that amount – just enough to buy a second-hand computer. The money earned from designing websites and graphics goes to a common account, which is used to develop the computer centre. Apart from being computer experts, all are now fluent in English. In July 2003, they presented their work at the annual sessions of the Computer Society of Sri Lanka.

Several reasons make this a unique experience in Sri Lanka. It is a genuine and successful attempt to bridge the digital divide and to overcome the English-language barrier. It was initiated from the village, not from the city. It has changed the lives and improved the prospects of a few dozen children. The youths at the village now have more career options than just to join the military (for men) or become garment factory workers (for women). They have marketable skills, confidence and, above all, an entrepreneurial spirit at a young age. Apart from initial equipment donations, no donor or government funds have supported this initiative – which is perhaps why it continues to thrive when donor-driven ICT projects die off after a while.

Some ICTA pilot projects addressed long-felt practical ICT needs, such as standardising Sinhala and Tamil fonts and keyboards, training selected public servants on ICT, introducing distance learning to some remote parts of the island, starting an e-money order system to replace the traditional money order system that has been used for over 100 years, establishing an electronic price information system at vegetable wholesale markets, setting up multipurpose telecentres, and automating the offices of the President, prime minister, cabinet ministers and other elected officials at national and provincial levels. Some of these programmes have already been completed, while others are in various stages of implementation.

But ICTA’s year-end report card is not satisfactory: for the resources it commanded and the hype it generated, it has delivered little tangible results. None of the pilot projects have made a visible impact at the economic or social level. There has been no appreciable improvement in the ICT industry that can be attributed to ICTA interventions. Not a single large-scale G2C e-government programme has been launched. Internet usage remains stifled by high capital and recurrent costs. Locally generated and relevant web content has not expanded. The situation in technologically backward areas of the country is completely unchanged, and the digital divide remains as acute as it was two years ago. Only a few ICT-related laws, regulations and standards have been established.

In its self-assessment, ICTA claims satisfactory progress, pointing out that it has so far received only a small portion of the external funds pledged. It also says many of its strategies are intended to bring long-term results. However, as the agency’s mandate is to achieve all its goals and wind up operations after five years, its entire modus operandi is built around that. The country’s ICT interests would have been far better served if ICTA had chosen to address glaring gaps and major bottlenecks in the ICT policy, legal and regulatory frameworks, leaving project implementation to those who are better equipped and mandated.

It remains to be seen how much the new government will change the scope and operations of e-Sri Lanka and ICTA. After many weeks of uncertainty following the April 2004 general election, the agency was placed directly under the supervision of the new prime minister. Media reports in June 2004 said the World Bank had agreed to provide another $5 million to ICTA, extending a much-needed lifeline. The loan is to be used to get all government departments for this major shake-up in the administration.1

Enabling policies

There have been only a few policy changes made in relation to ICT. The ICT Act No. 27 of 2003 provides for the creation of a National ICT Committee to drive policy-making in ICT, which is to include the ministers in charge of telecommunications, education, higher education and public administration.1

The National Telecommunications Policy was suspended in 2003, leading to greater regulatory uncertainty. There are no clear procedures for applying for and granting of new licences to operate both fixed-line and mobile phone services. The Central Bank (2004) noted in its annual report that “further expansion of the [telecommunications] industry to compete with other countries in the region has been impeded by inadequate bandwidth expansion, restricted licensing, prevalence of regulatory risk, etc.”

Regulatory environment

The most important development in 2003 was the opening up of the external telecommunications gateway to competition, thus ending decades of monopoly by the partially state-owned Sri Lanka Telecom. This paved the way for 32 other operators to be licensed by end 2003, leading to greater regulatory uncertainty. There are now clear procedures for applying for and granting of new licences to operate both fixed-line and mobile phone services. The Central Bank (2004) noted in its annual report that “further expansion of the [telecommunications] industry to compete with other countries in the region has been impeded by inadequate bandwidth expansion, restricted licensing, prevalence of regulatory risk, etc.”

Concerned by the growing volume of international telephony traffic handled by unlicensed operators, the Telecommunication Regulatory Commission of Sri Lanka (TRCSL) introduced the International Telecommunication Traffic Bypass Control Rules. The public was also advised to obtain international services only from licensed operators, whose quality of service is monitored (TRCSL, 2004).

TRCSL also introduced regulations for call centres, which stipulate that anyone operating a call centre in Sri Lanka should obtain their telecommunications links from an existing licensed provider. It also requires that the call-centre network not be linked to the local PSTN and not be used to generate international calls from Sri Lanka (TRCSL, 2004).

In October 2003, TRCSL standardised all local telephone numbers to ten digits irrespective of the operator and the

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Taking ICT to villages: A string of failures

Sri Lanka is a developing country with a high level of human development. With a UNDP human development index of 0.73, ranking it 99 among 173 countries in 2001, it does stand apart from all its South Asian neighbours. It has an adult literacy rate of 90.1 percent, infant mortality rate of 11 per 1,000 live births, and a pupil-to-teacher ratio of 14.5. Only 6 percent of the population of 19 million earns less than US$1 per day.

When it comes to bridging the digital divide, however, Sri Lanka has a dismal and disappointingly backward record. Among the fundamental factors that keep Sri Lankan society digitally divided are the high capital and operating costs, lack of infrastructure, absence of enabling policies and laws, and failure to produce standardised local-language fonts and locally relevant content. Unfortunately, the few initiatives – by the government, academia or civil society groups – have also largely failed to make appreciable impacts. Three such notable failures are analysed here.

One of them is the Kothmale Community Radio Internet project, which is widely cited as trying to take ICT to the village. Established in 1999, it used a “community radio” service to bring the World Wide Web closer to its listeners. A daily two-hour interactive radio programme allowed listeners to request (by live telephone or by post) specific information on any topics, which the presenters then sourced from relevant websites and summarised on air in Sinhala. This helped to overcome the twin problems of Internet access and English proficiency (UNESCO, 1998). The station also provided Internet access free of charge at two public libraries in its signal coverage area and operated a cyber café at the station itself.

While the project certainly appealed to communications researchers and journalists in search of a “good story”, it is highly debatable whether it helped to raise the living standards of the communities. The service only rarely provided information with any economic benefit. Because it was sustained entirely by external funds, the project quickly died when that funding ran out in 2001. The two websites launched under this project, http://www.kotmale.net and http://www.kirana.lk, are no longer active.

The village PDA scheme was another major failure. Comparable in some ways to the Simputer in India, this was to be a portable device providing real-time access to email, contacts, calendar and messaging functions at a fraction of the cost of a PC, using only one-twentieth of the bandwidth that a PC needs for Internet access. In the initial phase, village PDAs were planned to be used in a test run in a selected village in the North-Western Province. This never happened, and the much-hyped device never reached the marketplace. The company itself went bankrupt in 2003.

The Govi Gnana system (farmers’ knowledge) was launched in 2003 as a pilot project under e-Sri Lanka. It aimed to solve the interrelated issues of fluctuating agricultural produce prices and farmers’ poverty – the latter resulting from inadequate marketing, extension services and finance. The system was designed to provide an accessible, accurate, interactive and efficient ICT solution that improved the flow of price information between the markets and the farmers. The first phase was launched at Dambulla and Meegoda, two of the country’s major vegetable wholesale markets. The plan was to connect in a network an interactive platform to a number of trader terminals at the Dambulla Dedicated Economic Zone and a series of farmer terminals located within the zone and at Meegoda. This “electronic scoreboard” would allow the farmers to keep tabs on the best prices at any given time.

The reality of implementation has been quite different. Even by May 2004, after three months of operation, the project was not delivering the anticipated results. When Wijeya Pariganaka ICT magazine investigated the matter that month, many problems came to light. It found that very few traders had shown an interest in becoming a part of this system. Thus, the best prices obtained from them were meaningless. Most traders still used their traditional communication channels to find out the best market prices. The infrastructure was inadequate to support this sophisticated solution. During the seven hours the journalist spent in Dambulla, a provincial town in the northwest, four power blackouts happened – each time the central server had to be rebooted, resetting the previous price information. Already fed up with the system, some farmers and traders said it would have been far better if some public toilets were built instead, and at a fraction of the amount of US$90,000 spent on this so far failed system (Karunaratne, 2004). The implementers have claimed that it is too early to measure the success of this project.

Although it is premature to predict its fate, it is possible that another e-Sri Lanka project might be heading to a similar fate. Under the Vishva Gnana Kendra (Universal Knowledge Centres) project, 100 Internet kiosks cum communication centres are to be set up in rural areas. By May 2004, only six centres were in operation, with promises of another 50 to be operational “soon”.

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type of service. This has increased the number resource substantially to meet future demand.

During 2003–2004, TRCSL tried on several occasions to introduce the “calling party pays” scheme; but each time a deadline was set, it had to be withdrawn largely because of disputes relating to outgoing call charges as well as pressure from telecommunications trade unions. Sections of the public who enjoy subsidies in using fixed-line telephones also opposed the idea. The proposed scheme will increase the cost of fixed-line telephone calls while making incoming calls free on cellular phones. It is unclear when and if this scheme will be implemented. Meanwhile, mobile phone users have criticised the government’s proposal to introduce a 2.5 percent tax on mobile phone calls.

On the legislative front, the Intellectual Property Act No. 36 of 2003 superseded the Code of Intellectual Property Act No. 52 of 1979. This new law provides for the protection of software and computer programs, and it conforms fully to WTO and TRIPS requirements. A draft Computer Crimes Bill was approved by the Cabinet, while laws to recognise electronic transactions have yet to be drafted (APDIP, 2003).

The long delays in passing these laws have hampered the growth of the ICT sector.

Open source movement

Although comprehensive laws against software piracy have been passed, their enforcement is weak, resulting in the continuous, widespread use of pirated software by not just individuals but also many private sector organisations and even some key government organisations. The pirated versions of most software applications can be openly purchased in Colombo for less than Rs 200 (US$2). This has largely hampered open source software (OSS) development in Sri Lanka. In the few cases where licensed software is used, the choice seems to be based more on factors such as familiarity and brand loyalty rather than on a strict assessment of current and future needs and cost-effectiveness. No public sector institution has so far seriously considered shifting to an open source environment.

Nonetheless, the open source movement has gained momentum. The Lanka Software Foundation (http://www.opensource.lk), the first software organisation to explicitly promote OSS, was established in 2003. Among its objectives are to support OSS developers and projects with infrastructure development, funding, R&D, consultancy, training and other enabling facilities; to create an identity for the Sri Lankan OSS developer community; and to promote worldwide interaction, cooperation and coordination among OSS developers. It convened the first local open source conference in November 2003.

The Lanka Linux User Group (http://www.lug.lk) remains active in promoting GNU/Linux software. Started in July 1998 and based at the University of Peradeniya, it handles Linux installations and lends distribution kits. Its Linux mini-library contains Linux journals, Linux how-to’s, LaTeX documents, CDs and many other Linux resources. Its members exchange their experiences through a mailing list.

Trends

Sri Lanka’s inability to consolidate its ICT sector is both alarming and depressing. Political instability, regulatory uncertainties, policy gaps, poor infrastructure and inadequate laws have combined to inhibit progress in ICT-related industries as well as ICT-for-development initiatives. The country is seriously lagging behind its neighbours in adopting and nurturing newer technologies such as wireless and broadband.

A conceptual and perceptual barrier has been to equate ICT with only PCs and the Internet, with most players not appreciating that this term also includes mobile phones, radio, television and other digital technologies that gather, store and transmit information electronically. Using this broad definition, it can be argued that some of these telecommunications or mass media tools have indeed contributed to improvement in the quality of life. But the adoption of these tools has not been coordinated under any ICT sector plan but has happened as a result of developments elsewhere. For example, liberalisation of the telecommunications sector – which is always treated separately from ICT in Sri Lanka – has brought mobile phones within reach of many, even if high tariffs inhibit further growth.

As noted earlier, the e-Sri Lanka programme has produced a mixed bag of results, and its inability to work at strategic and macro levels represents a major missed opportunity. Unlike in India, where the state has created an enabling policy and legislative framework and allowed the industry and civil society to take ICT forward, the Sri Lankan government has shown an unhealthy tendency to dominate every sphere, even when it has no capacity or experience. Either mesmerised by the new technologies or co-opted by state propaganda, the mass media has mostly engaged in uncritical cheerleading of the scattered, unfocused ICT initiatives. External players – including some UN agencies – have exacerbated these anomalies for their own selfish gains, sometimes perpetrating development myths (such as the notion that community radio exists in Sri Lanka).

A recent UNDP study on how ICT contributes to human development in Sri Lanka also found highly uneven progress when assessed against each of UNDP’s Millennium Development Goals. ICT usage in achieving some of the goals, such as ensuring environmental sustainability, has been significant, while there is little or no ICT involvement in pursuit of several other goals covering areas such as health. The nexus between poverty alleviation and ICT tools also remains a tenuous one, with several pilot projects addressing income disparities failing because of inherent technological or design weaknesses (UNDP, 2004).
Despite a plethora of studies, there still is a crying need for a long, hard and candid appraisal of Sri Lanka’s ICT potential and performance. If an inclusive, strategic and coordinated approach is not adopted soon, the island nation will remain one of Asia’s most glaring “might-have-beens”.

Notes

1. Unfortunately, this had not happened up to May 2004. It can be attributed to political instability. The new Minister of Science and Technology, who assumed office in April 2004, has said he would take the initiative forward.

2. There is no community radio in Sri Lanka, and all the so-called community radio services are rural transmissions of the wholly state-owned and state-controlled Sri Lanka Broadcasting Corporation. Applications by community groups for licences to operate genuinely community owned and managed radio stations have been ignored by successive governments since broadcast liberalisation started in the early 1990s.

References


Overview

Myanmar’s population is growing steadily at an annual rate of 2.0 percent and was estimated at 50.1 million in 2001. The majority of the people live in rural areas. The labour force is currently estimated at 18 million people, of whom 63 percent are engaged in the agriculture sector. The national teledensity is very low, estimated at less than 1 percent. As of 2004, there were 416,182 telephones in the country, which means a telephone density of 0.79 per 100 people. This figure indicates that much effort needs to be invested in the development of the telephone network to meet the needs of the people. Digitisation of both the switching and transmission systems is 70 percent complete. Obsolete manual telephone switchboards, open-wire carrier systems, analogue radio systems and high-frequency radio systems are still in use in parts of the country. There are plans to replace the existing systems with more reliable digital systems that can support the effective utilisation of ICT.

Myanma Posts and Telecommunications (MPT) is expanding the telecommunications infrastructure by establishing new microwave routes, introducing GSM mobile phone systems and building satellite ground stations for both domestic and international communication. VSAT units and the IPSTAR broadband satellite system are also being introduced to remote regions. Myanmar is connected to the SEA-ME-WE 3 submarine cable too. Another achievement is the successful launch of a project to link all the large cities in Myanmar via fibre optic cable. The Yangon–Mandalay fibre link has already been completed.

Internet services are provided by an ISP established by MPT in March 1998. The services are being extended gradually in phases according to the technical capability and capacity of the ISP and the perceived social and cultural impact on the people. Top priority for Internet access was given to government departments, diplomatic missions and international organisations. Private companies were next.

There were more than 35,000 subscribers to email services in the country at the end of 2004, comprising mostly government departments, foreign diplomatic missions and private companies. These subscribers also make use of IP telephony, mainly for international calls rather than domestic long-distance calls. MPT recently introduced IP telephony for domestic long-distance calls from one location in Myanmar on a trial basis through a domestic satellite connection.

Online services

E-education

The Ministry of Education and the Ministry of Information in 2000 started a project to establish e-learning centres in high schools, colleges and universities. The Myanmar Education Research Department transmits courses via satellite to television sets and computers located at these centres. Most of the centres operate in a one-way mode that allows them to receive broadcasts only; a few centres operate in a two-way mode that allows learners to interact during the broadcasts. The Universities of Distance Education also make use of the e-learning centres to support their programmes. The centres, in addition, act as reference and study facilities where students can consult their teachers. A total of 621 e-learning centres had been established across the country by the end of 2004, most of them located in rural areas.

The Universities Central Library has begun conducting e-exams over the Internet for the Diploma in Library and Information Management and the Library and Information Science basic course.

The Myanmar Higher Education Network will be established soon to link all the local higher education institutions to overseas education networks.

Enterprise portal

An enterprise portal allows companies to integrate their business processes with online content and applications. The Myanmar World Distribution Co., a leading ICT company in Myanmar, has established the Kinetic enterprise portal,
which offers modules such as customer relationship management, accounting, report management, database management, multimedia, security, e-learning, e-commerce, e-governance, and employee database. The portal was built using UNIX/Linux and other open source software. It has more than 1,000 corporate users in the country and also hosts the intranets of some government ministries and that of the Myanmar Maritime University. Other users include the Myeik and Phaungyi telecentres.

E-government

A pilot project to issue 5,000 e-passports to government officials and business travellers has been launched. Although looking the same as the existing passport, the e-passport contains an 8k radio frequency identification chip embedded in the back cover. The chip stores the photograph, thumbprints and other personal information of the passport holder as encrypted digital data. Upon departure from and arrival at Yangon International Airport, travellers place the passport in a scanner connected to systems at the Ministry of Home Affairs, the Ministry of Immigration and Manpower and the Ministry of Finance for processing. The consortium Myanmar ICT Development Corporation and its member companies are in the process of establishing a national certification authority. This initiative is one of the e-government pilot projects started by the ICT Application Committee of the e-National Task Force. The task force was formed with the agenda to bridge the digital divide in Myanmar. Its members include officials from relevant ministries, computer professionals, and representatives of business associations. The task force is leading the development of the national IT master plan. Online procurement has been established to enable government ministries around the country to procure products electronically from both local and international suppliers via the Internet. Operating on a G2B model, the system was set up to enable government agencies to independently make direct purchases, as well as to process tenders and quotations, with the aim of better managing procurement processes, lowering costs and increasing productivity.

Industries

The Myanmar ICT Development Corporation – a consortium of 50 private companies – invested in the development of the Myanmar ICT Park in an attempt to boost the software industry in the country. The government provided the land and infrastructure for this venture. Inaugurated in January 2002, the park now hosts 36 local and foreign companies employing a total of nearly 600 software engineers. The aim is for the park to evolve into an ICT hub in the country. It is part of the ICT master plan to stimulate the development of the domestic ICT industry by attracting local and international partners to form a cluster of ICT-related businesses supported by a world-class infrastructure and technologies.

Assistance for the hardware industry is provided by the Myanmar Computer Industry Association, a non-profit NGO founded in 1998 under the leadership of the Myanmar Computer Federation. The association, which has a membership of more than 200 registered hardware vendors, promotes local and international exhibitions as well as organises delegations, seminars, and project-financing loans for start-up companies. It also helps organise the country’s annual international ICT exhibition, which is the largest trade event in Yangon. The ICT services industry in Myanmar is small, with over 20 companies providing services such as network design and planning, Internet gateway and sub-ISP facility set-up, and systems administration.

The ICT industry in Myanmar is served by a number of NGOs. One of them is the Myanmar Computer Federation, a non-profit organisation established in 1998. It aims to contribute to the socioeconomic development of the country and to identify and implement the measures necessary for the development and diffusion of ICT. It also aims to provide opportunities for the youth, especially students, to be trained in the use of ICT. To these ends, the federation has organised many activities with the help of member associations and other local and international organisations. It has also been working closely with the Myanmar Computer Science Development Council and the e-National Task Force.

The Myanmar Computer Professionals Association (MCPA), an NGO established in 1998, has more than 4,000 members in Yangon. Its objectives are to upgrade its members’ computer science knowledge; organise symposiums and seminars for its members; cooperate in R&D activities in computer science and technology; and strive for the establishment of associations of computer professionals at the township, district, state and division levels.

There are nine special-interest groups within MCPA each focusing on one of these areas: communication technology, Internet, Linux, multimedia, networking, language technology, software engineering, programming, and hardware. Workshops, seminars and training courses are organised regularly in these interest areas. They are open to not only professionals but also school leavers and students. MCPA conducts certification examinations in all these areas for students and professionals. The certification is now recognised by ICT companies.

Key national initiatives

An intelligent vehicle registration system has been introduced in Myanmar. It uses a contactless smart card that stores data from the wheel tag, vehicle identification card and ownership logbook on a microchip. The chip can be integrated with other applications, such as access control, transport services, biometrics and e-purse. Crypto-algorithm security technology will be deployed to protect against
manipulation and counterfeiting of the card. The chip embedded in the card offers a flexible memory structure for up to 28 applications and up to eight files for each. Portable smart-card readers and PDAs will be issued to the traffic police for retrieving the data stored on the card. More applications, such as a payment system for parking, are planned. A local group of professionals is involved in developing the applications, which they intend to introduce to overseas markets.

Regulatory environment

The e-Legal Infrastructure Committee was set up to look into ICT-related legislation. It was assigned the task of drafting the Myanmar Cyber Law, which it carried out in two stages. In the first stage, stopgap measures in the form of orders were introduced within existing laws. The order on WANs was issued in this way. The second stage saw the drafting of a comprehensive cyber law, which was passed in 2003.

Subsequently, in April 2004, the State Peace and Development Council passed the Electronic Transactions Law. The law recognises the authenticity and integrity of electronic records and electronic data messages and gives legal protection to transactions carried out over computer networks. It provides for the transmission, receipt and storage of local and foreign information through the application of electronic transaction technologies. It also provides for communication with regional and international organisations, foreign countries, local and foreign government departments and organisations, private organisations, and individuals through computer networks. The law applies to any person who commits any offence actionable under the law within or outside the country through the use of electronic transaction technology.

Aside from legislation, the Myanmar Computer Emergency Response Team (mmCERT) was formed to respond to computer-related incidents and to develop mitigation strategies for members.9 It also runs a national alert service and an incident-reporting scheme in cooperation with other computer emergency response teams worldwide.

Open source movement

In 2004, the Myanmar Linux User Group planned the establishment of a new Special Interest Group on Open Source Software10 and invested much energy in collaborative efforts on open source software (OSS) with groups from Cambodia, Japan, Laos, Thailand and Vietnam. A memorandum of understanding on this collaboration was signed during the fourth Asia Open Source Software Symposium held in September 2004.

The Myanmar Unicode and Natural Language Processing Laboratory has been set up to promote OSS development and natural language processing.11 The laboratory has developed the Myanmar Linux operating system. It is in the process of compiling a local-language dictionary that can be used by all engines and algorithms. It is also working on issues relating to natural language processing (including natural language comprehension and generation), word division, contextual parsing, and general algorithm for understanding and generating the local language.

A search engine for conducting searches among ".mm" websites has been developed using OSS. The website also runs email directory and web directory services using OSS.12

Research and development

A cluster of important research efforts is focused on developing and applying the Myanmar script in computing. It comprises a project to develop a Myanmar font that conforms to the Unicode standard, a Myanmar Linux localisation project, and a GNOME translation project to develop a GNOME X window environment running the Myanmar language. These projects are being undertaken with limited resources and support.

At the same time, a Unicode-compliant Myanmar Office suite is being developed based on the Linux foundation and the Mozilla development framework. And the Graphite Rendering Engine Implementation and Testing Project is working to render the first workable Unicode-compliant Myanmar font on both Microsoft Windows and Linux operating systems.13

A Beowulf clustering project was being planned in 2004 to build the first Beowulf-style high-availability cluster using low-end Pentium computers for supercomputing and R&D purposes.

Trends

Future efforts within Myanmar's ICT sector will be focused on three OSS-related areas. The first will be to organise and set up a national-level task force on OSS. The second will be the development of an e-government framework based on OSS. The third will be collaboration with the various ASEAN open source centres and consortia.

Notes

Mongolia
Lkhagvasuren Ariunaa

Overview

Mongolia has come a long way since Genghis Khan introduced a point-to-point horseback postal system in the 13th century. The country now has 3 telecommunications companies, 6 ISPs, 2 mobile phone operators, and over 50 software development companies. There are an estimated 50,000 people working in the ICT sector. The sector contributed 6.3 percent to the country's GDP in 2003; this contribution has been rising steadily from 2002–2003.

A number of progressive changes occurred in the ICT sector in Mongolia during 2003–2004. A new Department of Information and Communications Technology (ICT Department) has been set up at the Ministry of Infrastructure; previously, there was only one person looking after the ICT sector at the ministry. This department drafted a law on ICT in consultation with various stakeholder groups. These groups include representatives of government organisations and agencies, NGOs, donor and international organisations, as well as representatives of the media. The draft law has been presented to the government. It will be submitted for another round of discussion and lobbying within the government and among members of parliament after the June 2004 national elections led to the formation of a new coalition government and the election of new members of parliament. The new government, recognising the importance of ICT for development, has established the Information and Communications Technology Agency (ICT Agency).

The acquisition of a major portion of shares in Magicnet, the first ISP in Mongolia, by Bodicomputer, the second ISP in the country, has laid the groundwork for more mergers and acquisitions within the ICT sector. The number of ISPs has now been reduced to six. However, the total bandwidth to Mongolia has grown owing to connections established by RailCom, in collaboration with TransTelecom and China Unicom, and the resulting access it obtained to fibre optic links with neighbouring China.

The telecommunications sector is headed for change with the announcement that a third mobile operator will be privatised. These two plans were unveiled by the previous government but left to the new government to implement.

The merger of the two NGOs dealing with ICT issues in Mongolia – the Mongolian Information Development Association (MIDAS) and the Mongolian Information Technology Association (MONITA) – has helped to raise the visibility of Mongolian ICT stakeholders in the global ICT community. Mongolian NGOs have now joined the World Information Technology and Service Alliance and the Asian–Oceanian Computing Industry Organization, thereby increasing the opportunity for Mongolian ICT stakeholders to participate in international initiatives.

Online services

The total number of active Internet subscribers has grown by 8 percent since 2002, when there were about 40,000 registered subscribers and over 140,000 Internet users. The number of names registered under the “.mn” domain has been growing steadily, and 1,300 names were registered as of mid-2004. An increasing number of local organisations are registering “.mn” domain names.

Telemedicine

A telemedicine project was started linking six locations in the country to the Third Hospital. Chest X-rays taken in these six locations are transmitted to the Third Hospital where they are reviewed by the country’s leading cardiologists, who then send their diagnosis and advice back to the doctors at the six locations.

Distance education and e-learning

The public administration reform programme of the Asian Development Bank has supported the installation of videoconferencing facilities connecting 12 aimag and the
Communication and Information Technology School of the Mongolian University of Science and Technology. The facilities are being used to train government personnel. The Ministry of Education, Culture and Science has engaged the school to conduct e-learning programmes in 15 subjects. Each programme involves 40 hours of interaction via videoconferencing. Two pilot programmes in mathematics and biology have been successfully conducted for more than 300 teachers. Training in the remaining 13 subjects is being conducted over the 2004/2005 academic year.

World Bank staff and representatives from the government, businesses and NGOs involved in various World Bank projects are using the bank’s Global Development Learning Network to conduct videoconferencing. The World Bank is also supporting the Fiscal Technical Assistance Project, which has built a nationwide network connecting government fiscal units at the aimag level. Offices at the soum level will be connected at a later stage. The network is currently used for transmitting government fiscal data and information, but it can also be used for accessing the Internet and other online services, including distance education.

E-commerce

E-commerce has not been widely introduced in the country, with banks providing the most sophisticated services. Golomt Bank and the Trade and Development Bank were the first to introduce online banking services, including providing online account statements. Other banks have begun to follow suit. Although no statistics are available on the number of registered users of online banking in the country, Golomt Bank reported over 2,400 users of their service. Credit- and debit-card services are becoming more widespread with card payment now accepted in selected hotels, restaurants, banks, shops and even hospitals.

E-democracy

An e-democracy project was implemented by the Mongolian Foundation for Open Society (MFOS), also known as the Soros Foundation. It consisted of two components: training in e-governance at the E-Governance Academy in Estonia and developing the concept of e-democracy for Mongolia. A team of Mongolians participated in a five-day training programme on e-governance at the academy during which the experiences and expertise of Estonia were shared. For the development of the e-democracy concept, an international expert was invited to introduce the concept to officers of the Cabinet Secretariat, Parliament, the Presidency and other government organisations, as well as to representatives of civil society organisations, businesses, and members of the ICT community. After that, the draft concept paper was developed with the participation of NGO representatives, ICT professionals and policy makers.

Industries

Telecommunications services

The privatisation of MTC has not commenced, even though the government had planned for it to take place before the end of 2003. The country’s telecommunications network is gradually being upgraded from an analogue switching system to a digital system. All aimag central telecommunications networks and around 20 percent of the major soum networks have been upgraded. MTC also operates 23 VSAT stations.

RailCom owns and operates a large part of the fibre optic network in Mongolia. The company has made an aggressive entry into the country’s telecommunications market, especially after signing agreements with TransTelecom (Russia) and China Unicom to connect the northern and southern terminals of its network to the networks operated by these two companies. RailCom leases its cable network to mobile phone operators MobiCom and Skytel and to ISPs Magicnet, Micom and others. However, the telecommunications sector continues to be restrained; privatisation of MTC will hopefully lead to the opening up of the sector to full competition.

MobiCom continues to be the leader in mobile phone services in Mongolia. Its services had reached all aimag centres by the end of 2003 with over 250,000 subscribers signed up. In order to reach the aimag centres, MobiCom had built, in some cases, a new telecommunications backbone using fibre optic cable, radio links and VSAT.

MobiCom and Skytel will have to contend with greater competition when a third mobile operator is awarded a licence. Invitation to bid for the third licence was issued prior to the mid-2004 national elections, but the elections have delayed the processing and award of the tender.

The World Bank in March 2004 started a study to evaluate the feasibility of establishing a Universal Service Obligations Fund to facilitate universal access in the country. The main thrust of the study is the provision of telecommunications access to rural areas, in particular to soum and the herding community.

Internet services

Two ISPs, Bodicomputer and Magicnet, merged in 2003, setting a trend for more mergers and acquisitions to follow in the industry in the near future. At the same time, new ISPs started operations in rural areas either as primary or secondary service providers. Erdenet was the first rural area to receive ISP services in 2000. Since then, an ISP has set up in Khovd, and another is planning to set up in Dornod.

Two more Internet exchanges have been established in Mongolia in addition to the Mongolia Internet Exchange. The two new operations are dedicated to Internet data traffic that originates and terminates within Mongolia.
Internet cafés and public access centres

The number of Internet cafés remains stable. However, there is a growing tendency to convert them into online gaming centres so as to recoup the high cost of Internet connections. The gaming centres run online and networked games that target the youth.

The Metropolitan Library continues to be a model public Internet access centre. NGOs, international agencies and donor organisations are supporting the establishment of public Internet access centres.

Hardware and software

The National IT Park, established with the support of the South Korean and Mongolian governments, provides opportunities to new ICT entrepreneurs through its incubator programme. The costs for the use of the premises, electricity supply, Internet connections and other utilities are borne by the National IT Park to reduce the financial burden on newcomers to the industry. There are more than 20 small companies and groups of entrepreneurs hosted there. Applicants for the incubator programme face fierce competition. The performance of successful candidates is evaluated six months after placement in the programme against the business plans they submitted earlier.

Key national initiatives

MIDAS enjoys a good reputation for representing the interests of various stakeholders of the ICT sector. The NGO has been implementing projects and organising activities to support and promote the development of ICT in Mongolia with the collaboration of stakeholders, government officials, businesses and other NGOs. The association has also become a key contact point for international agencies and donor organisations. MONITA, another NGO, recently merged with MIDAS.

The Mongolia Development Gateway is promoting ICT development through activities such as hosting websites for

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Cyber aimag

The Mongolian Foundation for Open Society has been supporting and funding the establishment of community information centres (CICs) in 3 of the 21 aimag in Mongolia for more than four years. The main objective of the CICs is to introduce Internet services to people living in rural areas. This portion of the population comprises about 1.5 million people.

After the main objective of the CICs had been achieved, which was confirmed by a mid-term evaluation of the project, the foundation proceeded to implement the cyber aimag project in these three aimag. In this phase, high-speed radio modems were deployed to directly connect secondary schools, tertiary educational institutions, the local governor’s office, the judiciary, and FM radio stations to the Internet so that they do not have to pay telecommunications charges.

As a result of these initiatives, over 5,000 residents of the three aimag have been successfully introduced to the Internet and its services. They can now communicate by email. A boy living in Dornod aimag could talk to his mother, who was working in South Korea, using VoIP. Herders use the CICs to send email to their children who live in other places. Youths make use of the CICs to chat online with their friends living in and outside Mongolia.

Despite these successes, many issues remain to be addressed by the people of these aimag. Among these are the ownership of the CIC network, maintenance of network equipment, building of human resource capacity, securing funding for Internet connections, and management of the network and connections. Human resources are one of the most important factors determining the continued success of the project. Recruitment for the cyber aimag project was done by the local governor’s office in consultation with the project implementation staff. Some of the people hired did not have knowledge and experience in ICT, while some others had some ICT background but no experience managing such large-scale projects.

The project has included training for the managers and technicians recruited. The training seems to have been largely successful. The manager of the cyber aimag project in Dalanzadgad, Umnugovi aimag, was offered the position of human resource manager by one of the leading mining companies in Mongolia and appointed to head their office in Dalanzadgad aimag centre. The manager of the Dornod cyber aimag developed a business plan to transform the project into a state-owned enterprise in order to sustain its operation in the long term.

The only problem was with the Bayankhongor cyber aimag project, which failed because its manager had little experience and no vision of the future of the cyber aimag network. It is hoped that an NGO will be formed in future to expand the cyber aimag network.
poverty reduction and rural development projects. It launched the official website of the Mongolian Economic Growth Support and Poverty Research initiative in July 2004 to disseminate information about the strategies for implementing, monitoring and evaluating activities related to poverty reduction.

**Regulatory environment**

In 2002 and 2003, two major plans were considered and approved by the National ICT Committee, an advisory body to the government. The first was the setting up of the National IT Park, and the second was the establishment of the ICT Department within the Ministry of Infrastructure. The ICT Department is responsible for all issues relating to ICT, including information and network security and the development of policy and regulatory documents. It initiated the drafting of the ICT law.

The draft ICT law was not well received by government organisations, businesses and civil society organisations. A working group was formed to review and propose amendments to the draft law, supported by technical assistance provided by the World Bank and MFOS. The bill consists of one general law and three supporting laws on e-governance, digital signatures and electronic transactions. The amended draft law has been submitted to the government for review.

The Communications Regulatory Commission was established with support from the World Bank and the Asian Development Bank as an independent regulatory and licensing body for the ICT sector. In practice, it is not totally independent, since it reports to the Office of the Prime Minister and the ICT Agency.

**Open source movement**

MFOS introduced open source software to the local ICT community through three Mongolians who participated in an eRiders open source project. This was followed by a national seminar on open source held in Ulaanbaatar in March 2004. The event brought together representatives of software development companies and the government. Policy and regulatory issues related to open source software as well as the coordination of and collaboration on its development and use were discussed. The national seminar was a follow-up to the regional open source workshop organised by the Asia-Pacific Development Information Programme.

**Research and development**

MIDAS has been involved in a number of studies, including a project supported by IDRC to look into the ICT policy and regulatory framework of Mongolia. The project sets out to analyse approved laws, regulations and policy documents.

Another project is a feasibility study of videoconferencing facilities supported by MFOS.

InfoCon Co. Ltd and the Mongolian Development Gateway jointly conducted research into the current status of ICT development in Mongolia. The results were published in late 2003. The study assessed the infrastructure, the market as well as the legal and regulatory environment for ICT in Mongolia. It also looked into the information infrastructure and information sources in the country. Several households in Umnugovi aimag that owned computers were studied to learn about information usage in rural areas.

**Trends**

Although steps have been taken to address policy and regulatory issues, the lack of an ICT law will affect the development of ICT in the country. Public opinion differs on the draft ICT law. Arguments for the enactment of the law include the creation of favourable conditions for the development of ICT; the presentation of an opportunity for the government to consult with the public on the new technologies and to raise awareness; and the promotion of ICT use in businesses through incentives, tax exemptions and other benefits as stipulated in the law. Opponents of the law take the position that ICT has been developing in Mongolia over the past ten years without any regulations and that the new law may actually impose constraints on its further development.

Another concern that needs to be addressed relates to the lack of autonomy of the Communications Regulatory Commission, the principal regulator of the ICT sector, which continues to report to the government. The regulator also lacks knowledgeable and experienced staff, with only one person handling Internet- and information-related issues.

The National ICT Committee has been involved in a number of initiatives to promote ICT development in the country. It succeeded in obtaining investment from the South Korean government to build the National IT Park as well as assistance from the Indian government to establish videoconferencing facilities and public Internet access points. However, the committee remains an advisory body. Mongolia lacks a national ICT programme to introduce ICT to all sectors. The recently established ICT Agency has been given the role of coordinating ICT-related activities across the different sectors.

An increasing number of training institutes have been established to meet the growing demand for professional and technical personnel in the ICT sector. ISC Mongolia and the Cisco Academy offer internationally certified engineering courses, which are slowly gaining popularity among ICT workers. Enrolment is expected to grow along with increasing demand from software development companies for internationally certified workers to work on outsourcing contracts.
Content development is another important area for action. Although websites are growing in number, so is static and rarely updated content. Content producers need to understand the importance of keeping online information current, as static content will discourage users, ultimately defeating the purpose of the websites.

Notes

3. An aimag is an administrative unit. On average, there are around 75,000 people living in one aimag within an area of 80,000 square kilometres.
4. A soum is an administrative unit smaller than an aimag, usually with around 1,000–5,000 people. Each aimag has 15–20 soum.
5. Post and Telecommunications Authority of Mongolia.

References


**Overview**

It is no secret that the economy of Macau is growing, and it is growing fast: it surged 15.6 percent in real terms in 2003, and more than 25 percent in 2004. The driving forces behind this spectacular boom are a mix of gambling, tourism, and construction, both public and private, as Macau is hosting the East Asian Games in November 2005 and also wants to become the Las Vegas of Asia by 2006. Gambling is a big thing in Macau, and this shows both in the city landscape – there are now 17 casinos! – and in the weight of gambling in the economy of the territory: gambling-recorded gross revenue climbed by 40 percent to a total of 42.5 billion patacas¹ in 2004, and taxes on casinos’ revenue account for more than 75 percent of the Macau Special Administrative Region (SAR) government earnings. Tourism is of course partly fuelling this growth frenzy, and tourists from China have now replaced Hong Kong people as the main source of visitors: 16.7 million people visited Macau in 2004, an increase of 40 percent over the previous 12 months, and 57 percent of them came from mainland China.²

Macau is a small place of 27.3 square kilometres and the home of 465,000 inhabitants. A “Chinese territory under Portuguese administration” since the 16th century, it was returned to China under the “one country, two systems” formula in December 1999 and thus became the second SAR after Hong Kong. Remnants of 450 years of encounter between the West and the East can be seen everywhere in the territory: lifestyles are diverse and cultures have gotten used to a tolerant cohabitation. However, although Chinese and Portuguese are the two official languages, over 97 percent of the population speaks Chinese and less than 1 percent Portuguese. Cantonese is the main dialect, but Mandarin is gaining ground. Identity-wise, only 45 percent of the residents were actually born in Macau, even though more than 80 percent of the population has been living in the territory for more than ten years.

All in all, if the prospects have never been so promising since the middle of the 19th century, when Macau waned in the shadow of Hong Kong, the challenges have equally never been so great: Macau’s true identity has still to be carved – it cannot rely solely on its role as a bridge to a China that has been “opening up” for the past 25 years – and the gambling industry with all its negative mores has yet to successfully become an entertainment industry that truly capitalises on the territory’s unique value-added character.

In many respects, the development of ICT in Macau reflects these dilemmas and challenges: partial telecommunications liberalisation in 2000 led to great expectations, some of which have already proven to be disappointing. However, the potential remains and can easily be activated to the full.

**Local online content**

Local news content is widely available in both Portuguese and Cantonese. Teledifusiao de Macau (TDM), established in 1982, broadcasts free-to-air radio and television programmes in the two languages. There are no fewer than eight newspapers in Chinese and four others in Portuguese. In addition, there are now a daily, *Macau Post*, and a business-oriented monthly, *Macau Business*, in English, both started in 2004.³ For better or for worse, most of these titles are heavily subsidised by the government, and the content – rarely critical – does not really go beyond neighbourhood concerns. The great majority of the people in Macau are more easily seen reading the *Apple Daily* or *Mingbao*, the two main dailies from Hong Kong. Currently, one of the worst fears in the territory is a plan, which is still under discussion, by *Apple Daily* to publish a Macau edition, a move widely seen as prefiguring the end of many “genuine” titles from Macau. Hong Kong magazines are already flooding the news stands, and local residents tend to watch Hong Kong television channels. TDM’s successive losses over the years – close to MOP$60 million in 2004 alone – have forced the company to sell its own stake to the government in March 2005, meaning the government now fully owns it.
In general, the same “detrimental” Hong Kong proximity can be felt when examining web surfing in Macau. According to the latest survey conducted by Angus Cheong Weng Hin and his team from the University of Macau, 4 Macau netizens when asked “what are the websites you most often visit (multiple choices possible)” replied “Macau websites” for 40 percent of them but “Hong Kong websites” for 78 percent! Nevertheless, a fast-growing economy and an overall tertiarisation of economic activities, especially tourism and gambling, seem to be conducive to “more” local content. The few examples that follow illustrate this trend and provide a glimpse of Macau’s real potential. One should be aware that a growing number of websites in Macau – if one excludes the official portals – are using only Chinese, or a combination of rich content in Chinese and summarised parts in English, while Portuguese is progressively being sidelined.

Government and government-run cultural and tourism institutions

The impressive and just revamped government portal (http://www.gov.mo) catering to “the citizen, the tourist, and the merchant” publishes content in simplified and traditional Chinese, Portuguese and English. The main website for local and international arts is run by the Macau Museum of Art (http://www.artmuseum.gov.mo). The beautifully designed and ever-resourceful Cultural Institute (http://www.icm.gov.mo) also offers ideas for cultural tours in Macau at http://www.macauheritage.net. Users can check up programmes and purchase tickets to exhibitions, films, music shows and other events online at Macauticket (http://www.macauticket.com). Art lovers can catch up on the arts with a regional reach at Macauart (http://www.macauart.net). And visitors can download tourism-related information in six scripts, including Japanese and Korean, at the Macau Government Tourist Office website (http://www.macautourism.gov.mo).

Information and entertainment content

The Macau Yellow Pages (http://www.yp.com.mo) is a vital starting point to search for suppliers of goods and services. Macaustreet (http://www.macaustreet.com) is a local lifestyle portal for young people. The local version of Sina.com, a news and information website from China, may be reached at http://macau.sina.com. Macau’s “main” ISP and sole broadband access provider, CTM, offers news, entertainment content and customer service at http://www.cyberctm.com.

Higher and continuing education

The main institutions of higher education all have an online presence, including the University of Macau (http://www.umac.mo), the University of Science and Technology of Macau (http://www.must.edu.mo), the Polytechnic Institute of Macau (http://www.ipm.edu.mo), the Inter-University Institute of Macau (http://www.iium.edu.mo) and the Institute for Tourism Studies (http://www.if.edu.mo). The Macau Productivity and Technology Transfer Centre (CPTTM, http://www.cpttm.org.mo) is a non-profit organisation established with the help of the government and the private sector to promote higher productivity and greater competitiveness in Macau. It offers ICT training modules and degrees.

Local news

The Macao Daily News (http://www.macaodaily.com) has the largest circulation among Chinese newspapers in Macau. It is read by Macanese at home and abroad. Va Kio Daily (http://www.vakiodaily.com) is the other major Chinese newspaper. Two of the most well-known Portuguese newspapers are Ponto Final (http://www.pontofinalmacau.com) and Jornal Tribuna de Macau (http://www.jtm.com.mo). TDM, the only free-to-air television and radio broadcaster, runs a website (http://www.tdm.com.mo) which provides real-time streaming videos. Macau Cable TV (http://www.macaucabletv.com) was awarded a 15-year franchise to provide cable television services in Macau. At present, it offers more than 55 channels to its subscribers. Two interesting independent English weblogs about Macau are found at http://www.macau.org.uk and http://macau.blogharbor.com/blog.

Online gambling

Dr Ho 888 (http://www.drho888.com) is the online casino operated by Dr Stanley Ho, the territory’s richest man, who used to have the monopoly on gambling in Macau and who still holds one of the three casino franchises through Sociedade de Turismo e Diversoes de Macau (STDM). Macauslot (http://www.macauslot.com) belonging to Sociedade de Lotarias e Apostas Mutuas de Macau (SLOT) is a subsidiary of STDM. Founded in 1989, SLOT is the first government-franchised company to sell instant-winning lottery tickets on passenger ferries running between Hong Kong and Macau. In 1998, prior to the World Cup, SLOT was granted the franchise by the Macau government to offer soccer betting, thus becoming the first government-franchised company in Asia to operate a sports betting business. This was followed by a government franchise for basketball betting in December 2002.

Online services and industry

Commercial Internet services have been provided by Companhia de Telecomunicações de Macau (CTM), a former monopoly, since 1995. Starting in 2000, a handful of other companies also began to provide public Internet access. They included Macauweb, CPCNET Macau, Ideasys Company, Netel and MacauNet. Despite partial liberalisation, however,
all these access providers, except for CTM, have today either ceased to exist or have reoriented their business towards content hosting. Meanwhile, Macau Cable TV seems to have no plans to provide broadband access. As such, CTM is de facto the only provider of broadband services in Macau. Broadband has become the most popular way of accessing the Internet since August 2004 and connects about 60 percent of all Macau Internet users.5

Macau adopted early on an interesting public tariff structure where service quality levels are a full part of the service licensing criteria of both Internet and telecommunication services. Internet service tariffs, which are reviewed regularly, are posted on the websites of the ISPs as well as on the website of the Office for the Development of Telecommunications and Information Technology (GDTTI).6 GDTTI was established in June 2000.

These licensing requirements have led to a transparent market for Internet services, where “elementary” broadband services are available for MOP$110 per month (60 hours, 512 Kb downstream, 128 Kb upstream), with each additional hour costing MOP$1.8.7

Because liberalisation of the ISP sector in 2000 did not bear the expected fruit of introducing competition into the market, CTM has pretty much recovered its status as a monopoly. Only SmarTone and Hutchison, two Hong Kong mobile service companies that entered the market in March 2001, are posing a true challenge to CTM in providing mobile Internet services, based exclusively on the GPRS standard for the time being.

According to GDTTI, as of February 2005, there were 30,583 registered subscribers to dial-up Internet services in Macau, clocking up a total of 684,405 hours per month. There were also 48,251 registered subscribers to broadband services, consuming a total of 4,199,850 hours per month.8

More interesting are the data collected via the survey conducted by Angus Cheong. As of December 2004, the penetration rate of the Internet in the population was as high as 46 percent (among people 6–84 years old), or 43 percent going by the more conservative World Internet Project definition (among those 18–74 years old). The majority of Internet users (51 percent) were below 24 years of age, who on average connected for 13.2 hours per week, with 87 percent of the users connecting from home and only 24 percent connecting from the office and 19 percent from their school or university. Most of the time spent online was dedicated to firstly “writing/reading/exchanging e-mail” (2.7 hours), secondly “looking for information/news” (2.5 hours), thirdly “participating in chatrooms and forums (ICQ/MSN included)” (1.9 hours), and coming a distant fourth “online gaming” (1.1 hours).9

As for the usage of IT in the business sector, a report released by the government in 2004 indicates that the overall usage rate among businesses had held steady at 33 percent in 2002 and 2003. Service-oriented businesses (including travel agencies) and larger companies registered the highest rates. According to the same report, there were only 325 business establishments that had a webpage or website, but more than 36 percent of companies with more than 100 employees acknowledged having a website or webpage.10 This seems to be in line with information provided by Directel,11 which disclosed that it has about 1,000 clients for mailboxes and webpages at the Macau Yellow Pages (accounting for about 5 percent of all companies in Macau). Half of the companies are for now only interested in what is referred to as an “e-copy”, a simple webpage posting of a digitised version of the company’s promotional material without any clickable links.

Key initiatives and enabling policies

Many institutions and organisations are involved in fostering distance learning in Macau. The Macau Schoolnet project was launched as early as March 1997, linking eight schools via dial-up Internet access. In 1999, CTM began its i.Campus project, providing high-speed Internet access with free leased lines, the necessary equipment and technical support to participating academic institutions.12 Over 110 local institutions have participated in this programme. In addition, CTM launched its i.Campus card in June 2002 granting special access to students so that they can seek knowledge on the Web at their own leisure. Also, CTM’s website MACAUeLearning (http://www.macaulearning.com) offers links to online courses, course enrolment and other e-learning services, as does the Macau Central Library (http://www.library.gov.mo).

Many signs indicate that Edmund Ho Hau Wah’s administration is committed to fostering IT use and IT training in Macau. The Chief Executive stressed in his policy address of November 2004 that getting young people online would be among his priorities in the years to come.13

The partial liberalisation of the gambling and telecommunications industries represents the most significant enabling policy issued since 2000, despite the quasi-monopoly reclaimed by CTM via the popularity of its broadband services. However, CTM is coming under tremendous pressure, due mainly to dissatisfaction with the quality of its services and management among many ICT professionals.

Regulatory environment

Prior to 1981, before CTM was established as Macau’s incumbent telecommunications provider, “residents had to wait many months simply to have a telephone connected. Direct dialing was not an option and a telephone call to nearby Hong Kong was a lengthy procedure and had to be placed through an operator.”14

CTM was established in October 1981. It is now a joint venture between Cable and Wireless PLC (51 percent), Portugal Telecom International (28 percent), CTTIC Pacific
(20 percent) and the Macau SAR government (1 percent). As a private company, CTM had enjoyed a monopoly on telecommunications via a concession contract granted by the government. This exclusive licence was valid for 20 years and was only revised by the Sino-Portuguese Liaison Group during the negotiations over Macau’s return to Chinese sovereignty. In October 1999, CTM’s concession was thus renewed for local, international and transit fixed telephone services, telegram service, fixed telex service, fixed service for data transmission, and rental circuit services for a period of 12 years, up to 31 December 2011.\(^{15}\) According to this new concession contract, CTM has to pay the Macau government a royalty amounting to 9 percent of its total operating revenue and “shall transfer to the Territory the whole of the facilities involved in the franchised services free of any charges, encumbrances and liabilities” at the end of the concession. This revision thus paved the way for the liberalisation of Internet services, mobile phone services, long-distance voice telephony and other value-added services by 2001.

In June 2000, telecommunications regulations were separated from those for postal services with the establishment of GDTTI, the new regulating body for telecommunications and IT.

In March 2001, two new entrants, both of them from Hong Kong, were selected along with CTM to provide GSM 900/1800 mobile services. They were Hutchison Telephone (Macau) Company (with a minority stake from Japan’s NTT DoCoMo) and SmarTone Mobile Communications (Macau). Most people in Macau acknowledge that liberalisation has led to very healthy competition benefiting consumers in terms of quality of service and pricing. GDTTI has been forced to lower its indicative (and bounding) prices to take into consideration market forces. It is reported that CTM has only 51 percent share of the mobile market (down from 80 percent in 2004). As of February 2005, there were 233,269 subscribers of public mobile phone services, representing more than 50 percent of the population. The figure did not include users of prepaid services.\(^{16}\)

China Unicom was awarded the first Macau CDMA licence in March 2005 in what is widely seen as a trade-off at a time when it was still negotiating with Portugal Telecom over a possible partnership deal to redistribute the ownership of CTM. Portugal Telecom wanted to increase its share in CTM from 28 to 45 percent, while China Unicom was set on acquiring 49 percent of the shares from Cable and Wireless and CITIC Pacific. China Unicom is the only CDMA operator in mainland China. Its successful bid for the CDMA licence in Macau did not come as a surprise within the industry. The three mobile operators – CTM, Hutchison and SmarTone – nevertheless each issued statements expressing their concern that a fourth mobile operator in Macau “will affect the healthy development of the market” and that it would create a lose-lose situation for all four operators. Bidding for 3G licences is scheduled for 2006.\(^{17}\)

The long-awaited digital certification to be offered by the Macau Post Office should become a reality soon, as a digital certification law is expected to be passed before the end of April 2005, thus facilitating the development of e-government.

Among the recent bills debated, one must mention the new rules for cyber cafés that were passed as a law in July 2003. Although intended to protect the youth from online pornography and violence, this law is very restrictive on minors aged from 12 to 16 years. They are allowed in cyber cafés only between 4 p.m. and 10 p.m. during weekdays and after 8 a.m. on Saturdays, Sundays and public holidays. Such a preemptive move may not be the best approach to encouraging “youth online”.

The Macao Network Information Center (MONIC), a department of the University of Macau managing “.mo” domain name registration, announced on 26 February 2005 that it had revised its rules for domain name registration with effect from 1 March 2005. Under these new rules, existing domain name holders are now required to pay annual subscription fees for their registered domain names and to confirm the accuracy of their domain information in MONIC’s database. Existing “.mo” domain name holders have been permitted to subscribe to an additional second-level domain name which is consistent with their existing domain names in a trial service. For example, the holder of the domain “xyz.com.mo” may also register the name “xyz.mo” on a first-come-first-served basis. This trial service is scheduled to end on 31 August 2005. MONIC only allows third-level domain name registrations for “.com.mo”, “.net.mo”, “.org.mo” and “.edu.mo”. An annual fee of MOP$200 is now levied for each registered domain name.\(^{18}\)

The new rules are justified by MONIC on its website as an enhancement of its services to respond to “a higher demand for Macao domain name registrations and inquiries”. However, this cannot hide the sad truth that the number of Internet hosts in Macau is on the decline. According to the Internet Systems Consortium’s Internet domain survey, the number of Internet hosts under the “.mo” domain dropped from 152 in July 2002 to a mere 70 in January 2005. This places Macau in between Tajikistan (72) and Djibouti (58), and far behind Taiwan (ranking 11th worldwide with 3,516,215 Internet hosts), Hong Kong (25th with 856,244 hosts) and China (43rd with 163,626 hosts).\(^{19}\) Since the number of Internet hosts is one of the main indicators of the status of Internet infrastructure and the development of an Internet economy, one has to worry for Macau. The obvious reason for the decline in this number is once again the detrimental effect of the territory’s proximity to two dynamic Chinese-speaking entities: Hong Kong and Taiwan.
Open source movement and ICT research

Open source software is being actively promoted by local ICT-related associations and educational bodies. It is particularly true of CPTTM, which is providing specific and lengthy training to support Red Flag Linux, a Chinese version of Linux developed by the Chinese Academy of Sciences. CPTTM is even organising an annual Open Source Software Forum and OSS Application Competition.

Macau, being a small territory and having no established history in engineering training, conducts limited research into ICT. The United Nations University’s International Institute for Software Technology (http://www.iist.unu.edu) is about the only institution that offers a research and training programme in computer science and software engineering that is focused on the software technology needs of developing countries. Cisco Systems has also partnered with CPTTM and its Cyber-Lab to establish the first Local Network Academy. There are also frequent collaborations in this area between higher education institutions, such as the University of Macau, the University of Science and Technology of Macau or the Polytechnic Institute of Macau, and local associations, especially the Macau Information Technology Association (http://www.ita.org.mo).

Prospects

Partial liberalisation of the telecommunications sector has raised the expectations of Macau people and particularly IT specialists. Unfortunately, with the exception of mobile services, liberalisation has not lived up to its promises.

The popularity of Hong Kong websites among Macau Internet users coupled with the steady decline in the number of Internet hosts in Macau is a clear indication that there is a lack of confidence in and recognition of local online services among Macau residents. The cause of this is not a lack of training and expertise. Macau has access to good teaching facilities and some very talented web designers. At the same time, GDITTI has proven its ability to respond to needs and enact strict and fair regulations.

Some put the blame on the lack of knowledge of the old generation, or on the tendency of businesses to consider ICT as a somewhat superfluous way of advertising. The lack of promotion and awareness building may be another reason: Internet- and ICT-related articles are almost non-existent in newspapers and magazines published in Macau, and most activities organised to promote ICT are one-time events. There is a lack of sustained promotional and educational programmes.

Las Vegas-style casinos and monster events like the East Asian Games are full of possibilities, but will they prove sustainable for the Macau ICT sector? Macau’s mixed heritage (Macao, Cantonese and Portuguese) along with its manifest Chinese destiny is the key to much-needed “glocalisation”: a global reach with local characteristics that will root the confidence of Macau people in their own abilities and capacities.

Notes

1. The pataca (MOP$), the local currency, is pegged to the Hong Kong dollar and thus indirectly to the US dollar (HK$1 = MOP$1.03 and US$1 = MOP$8.03).
2. For all economic data, see the quarterly Macao Economic Bulletin and the Monthly Bulletin of Statistics, both published by the Macau government (see http://www.dsec.gov.mo/index.asp?src=english/html/e_sitemap.html), and also the new English monthly Macau Business.
3. The Macau Post is a sorry and bound-to-fail attempt at independent journalism, while the Macau Business is certainly the most interesting and most focused English publication to date.
Maldives
Malika Ibrahim

Overview

The Maldives is an archipelago of about 1,192 low-lying coral islands, which cluster into over 20 atolls, spread over an area of 900,000 square kilometres in the Indian Ocean. A total population of about 270,000 resides on about 200 islands, and another 87 islands are exclusively developed as tourist resorts. Population density varies considerably across the country, with only 6 islands having more than 3,000 inhabitants and nearly 70 islands having fewer than 500. A quarter of the population lives on the island capital of Malé, where most of the country’s facilities, services and opportunities are concentrated. Decentralisation away from Malé is hampered by a lack of basic infrastructure and a poorly developed inter-island transportation system.

The entry of computers into the Maldives can be traced back to the mid-1980s, when the first computer centre was set up at the Ministry of Planning, Human Resource and Environment (now Ministry of Planning and National Development). A minicomputer DG S120 was acquired and installed in the Computer Centre of the Statistical Section of the ministry through the support of UNDP. In the past decade or so, the Computer Centre has carried out all the data processing activities of the government. In addition, it assisted other government organisations in implementing their computerisation plans, including computer procurement, installation and maintenance as well as software selection. It also acted as the word processing centre for the Statistical Section. The responsibility for establishing a national computer centre was transferred to the Ministry of Communication, Science and Technology when it was formed in 1998. The National Centre for Information Technology was hence set up with the key role of guiding the adoption of IT standards within the government. Specifically, it will focus on four strategic directions for the government: standardisation of open systems interconnection, setting up of e-services, portability of applications, and adoption of government-wide open systems.

The partly state-owned telecommunications company Dhiraagu provides telephone and Internet connectivity across the islands. Internet access on the remote islands is hampered by high costs and inaccessibility. In 2003, an additional licence was issued to a second ISP.

Owing to the flat terrain and the short distances between some of the islands, radio modems are often used for data transmission. Broadband services are available in Malé, while satellite services are utilised on the more remote atolls. The local script, Thaana, is used on several local websites. Websites related to the Maldives are visited extensively by tourists planning to visit the islands. Local users are mostly from the younger generation and balanced between males and females.

Given the challenges presented by the geographical dispersion of the country, the government views the adoption of e-government, along with its other initiatives to develop an ICT-enabled community, as a cornerstone of its strategy to narrow the digital divide and to deliver facilities, services and opportunities to all its people. In this regard, it has initiated a number of programmes, including the e-government initiative called the Information Technology (IT) Development Project, and is formulating a national ICT policy.

Content

Education

A number of programmes have been undertaken to deliver distance education to the people. The Non-Formal Education Centre has offered English courses through distance education for more than ten years for adults living on the atolls. The Tertiary Institute for Open Learning, part of the Maldives College of Higher Education, provides distance education programmes at the foundation and post-secondary levels. It also administers a Bachelor of Business degree and a National Diploma in Architectural Technology from the Open Polytechnic of New Zealand. Other courses include mathematics, physics and chemistry from the Indira Gandhi National Open University. Subsidised Internet access has
been provided to educational institutions, and computer studies have been introduced into the curriculum.

Health

Maldives enjoys one of the highest health standards in South Asia with declining infant, under-five and maternal mortality rates and increasing life expectancy at birth.

Under the infrastructure development programme, 15 health centres have been established, and 4 health centres have been upgraded to atoll hospitals. On 26 islands where these facilities are not available, health posts have been established to provide basic health services to island communities.

During the current national development plan period, the health information system has been strengthened with a focus on improving the vital registration system. Under this programme, a LAN has been established between the Health Information Research Unit of the Ministry of Health and the central hospital, Indira Gandhi Memorial Hospital. Also, computers have been provided to all healthcare facilities except the health posts.

The Ministry of Health runs a website (http://www.health.gov.mv) that provides information on the nutritional content of locally available fruits, information on communicable diseases, and a forum on reproductive health. The Indira Gandhi Memorial Hospital posts its doctors’ duty roster on its website (http://www.igmh.gov.mv).

Fisheries

Since its inception, the Marine Research Centre has focused on research activities related to the development and management of marine resources. It also provides information on maintaining the health of the marine environment. Research at the centre is organised around four areas: inshore research (mariculture development, survey of reef resources, identification and cataloguing of economically important species); coral reef research (reef monitoring, Crown of Thorns research, management of coral mining, endangered species, cataloguing of marine invertebrates); offshore research (tuna biology and stock assessment, bait fish stock assessment); and fisheries technology (market studies, fishing vessel and gear development, product quality maintenance, technology transfer).

The Ministry of Fisheries and Agriculture publishes a daily fact sheet on the five best islands for fishing on its website (http://www.fishagri.gov.mv). Other content includes prices at the Malé fish market, fisheries laws and regulations, fisheries statistics, and services forms.

Mass media

Maldives has three daily newspapers and several weekly and fortnightly newspapers and magazines. All the dailies carry content in both Dhivehi (the local language) and English. Most of the major local papers also have an online presence, such as Haveera Daily Online (http://www.haveera.com.mv), Aafathis News (http://www.aafathisnews.com.mv), Miadhu News (http://www.miadhu.com) and Evening Weekly (http://www.eveningweekly.com.mv). These news sites publish in both English and Dhivehi. Apart from reporting on the latest happenings in the country and internationally, they also include sports, the local weather, business news, a photo gallery and some video clips of interesting events.

The national Television Maldives is operated by the government, broadcasting for most of the day and night to all the islands. The Voice of Maldives, the government-operated radio service, is available throughout the country. Both these services broadcast in Dhivehi and English. The Voice of Maldives also broadcasts via its website (http://www.vom.gov.mv). Several cable television operators provide entertainment, sports and news packages.

Commerce and tourism

The exquisite resort islands of the Maldives, scattered across the Indian Ocean, have established a unique place in the global tourism market in a little more than three decades of operation. The tourism sector is a major source of foreign exchange and of local employment. The existence of the resorts has also facilitated the development of the telecommunications network and the energy system in the country.

The resorts require ready and reliable Internet access to enable them to stay in touch with the global market and at the same time offer their guests good communication links to the rest of the world. Increasingly, the resorts are providing online booking facilities, a move that will attract more business while reducing their dependence on external charter operators. To be effective, such online reservation systems require the capacity for credit-card payment over the Internet, which is not currently available in the Maldives. However, local banks and the tourism sector are working to create this capacity in the near future.

Besides the information published by individual resorts, tourists can also find on the website of the Maldives Tourism Promotion Board (http://www.visitmaldives.com.mv) a guide to the Maldives, its resort islands and cruise boat services, as well as links to all the resorts.

Energy

The Ministry of Communication, Science and Technology is tasked with formulating policies on energy, regulating the energy sector, and promoting the development of renewable energy. One of its major challenges is to establish an energy agency that will gather relevant data from major stakeholders and convert this information into a knowledge base for the purpose of medium- and long-term national and
organisational planning. A forecast of energy demand, as well as the resulting socioeconomic impact, will be made based on the analysis of present and past energy and macroeconomic data.

The observatory of the energy agency will create and manage a database and information system of energy, economic and environmental data to keep track of variables such as energy demand by sector, major sources of energy, economic variables (e.g. GDP) and social indicators (population, households, etc.). Since the country is small and the database will not be very large, it should be possible to carry out modelling and forecasting using simple spreadsheets. Proper analysis and presentation of the data will help the government to better plan energy supply and to educate consumers on the significance of energy supply, economic and environmental indicators. This information can be made available to registered members through an electronic medium and disseminated to others via the Internet.

**Online services**

The geographical dispersion of the Maldives makes the provision of basic services to all the inhabited islands a major challenge. The government, which is leading the initiation of online services, is therefore exploring the feasibility of providing online public services through the IT Development Project. E-government will enable the provision of the same online services to the people living on the numerous islands, even remote ones, and allow them to participate in the policy-making processes.

The project will also explore the possibility of offering distance education and telemedicine to the atolls. To improve IT literacy, IT courses have been introduced in secondary schools. In addition, the Maldives College of Higher Education conducts ICT-related courses in its Faculty of Management and Computing. At present, a private hospital is offering telemedicine services to the public. However, its effort has been hampered by the lack of Internet connections that are fast enough to support telemedicine applications and are affordable.

E-commerce has enormous potential for this popular tourist destination. It can also help to enhance the operations of local businesses and promote industry development. To facilitate e-commerce, the IT Development Project is investigating the feasibility of an e-payment gateway to be operated in collaboration with local banks. Almost all the local tourist resorts have a website providing information on their services, but few offer online reservations. This is an area that needs improvement as it will give the resorts an edge.

Another initiative, the Digitally Empowered Development in the Island Communities, will see the provision of e-community services to the atolls.

**Portals of empowerment**

Most of the islanders of the Maldives are particularly isolated because of the wide expense of ocean separating the islands. The islands are still economically dependent on Malé. As there is limited travel between islands, local traders and small businesses have little information about the resources, products, services and needs of the other islands. Furthermore, telephone calls between the islands are expensive. Internet access is not readily available, and even in Malé the cost of access can reach up to US$3 an hour. Island dwellers therefore have few avenues to market their goods and services. The dhoni (local boat) schedule is often disseminated only by word of mouth. Similarly, information about educational opportunities and events on neighbouring islands is not readily available.

The Digitally Empowered Development in the Island Communities project is one of the initiatives designed to meet the information needs of islanders. The plan is to establish web portals that focus on community-related content: island profiles with basic statistics, profiles of small enterprises, art and handicrafts, events and activities, local resources, employment opportunities, and development programmes. Experiences of the communities will also be shared on the websites, and a bulletin board service will provide news about the communities. The establishment of public information kiosks on the atolls by the IT Development Project will enable more people to access the portals. The websites will give local businesses national and international exposure and enhance their access to external markets. They will also create awareness about the potential social and economic benefits of ICT use.

In order to ensure sustainability of the portals, the communities on two participating atolls are being trained in information and website management so that they can eventually update the websites locally. Stakeholder workshops for content development and capacity building are also conducted. The communities are informed about the portals through advertisements, discussions and meetings. The portals are expected to be sustained after the project period by funds generated from advertising and other services provided by the portals.
Industries

Hardware and software

Both internationally recognised computer brands as well as clones are sold in the country. Computer network solutions and services, mostly in the form of LANs, are also available.

Most computers use the Microsoft Windows platform. Indigenous software programs have supported the Thaana script for some 15 years. Now, Windows XP also supports the script, thus considerably increasing the potential for developing indigenous software and local content. Local software developers provide customised programs to both the government and businesses. The most common type of solutions developed is the software for operating retailers’ point-of-sale machines.

Maldives IT Village

A feasibility study has been completed on the concept of an IT Village in the Maldives. It looked at the revenue that can potentially be generated through software development and IT-enabled services. Maldives is regarded as a good venue for IT investment because of its political stability, resort island environment, reliable telecommunications infrastructure and low crime rates. Additionally, it is an attractive tourist destination. The country has a young, educated population with 99 percent literacy. The plan for the IT Village is to provide the infrastructure and the environment required for IT companies to operate locally, regionally and globally from the Maldives.

Infrastructure

Telecommunications

Maldives has seen considerable development in its telecommunications infrastructure and services over the past decade or so. Beginning with virtually no telephones outside the capital, it has now developed a backbone infrastructure covering the whole country. Telephones are now available on all the inhabited islands.

Prior to 1988, the government provided national telecommunications services, while a foreign operator provided international telephone and telex services under a franchise agreement. This arrangement caused many problems, the most significant being the lack of funds to invest in infrastructure. The small market size and the dispersion of the population over a large area separated by the ocean posed great risk to any commercial investor.

In 1988, a joint venture company, Dhiraagu, was formed between the government and Cable and Wireless of the UK to provide national and international telecommunications services. The aim of this joint venture was to obtain the necessary expertise, experience and support from the foreign partner to jumpstart and modernise the telecommunications operation so that the new company could be run commercially. The result has been an overwhelming success. The company started making profit and the quality of service improved with basically no additional financial support from the government.

The responsibility of providing universal service rests with Dhiraagu in return for exclusive rights to provide basic telecommunications services in the country. The company completed development of a nationwide infrastructure by May 1999 to provide basic access to every inhabited island. The backbone network comprises largely microwave radio links. However, one stretch of sea is too wide for a microwave radio link and a satellite connection was deployed. Some radio links stretched the technology to its limits with very tall transmission towers. The backbone includes what is believed to be the world’s longest over-water microwave link. Despite these challenges, basic telecommunications services were rolled out to all the inhabited islands ahead of schedule.

To ensure that services are offered to the public at an affordable price while, at the same time, maintaining a reasonable return to the company, every tariff proposed by Dhiraagu is carefully assessed before it is approved by the regulator.

Mobile telephony

A cellular mobile service was introduced to the country in 1997 using AMPS technology on a trial basis. Because of high demand, it was upgraded to GSM in 1999. As is the case almost everywhere in the world, the growth of mobile telephony in the Maldives has been phenomenal. Within a few years, mobile telephony has overtaken the fixed-line base of 27,000. The mobile customer base is now in excess of 100,000. Mobile coverage is currently available in the central areas of the country covering 40 percent of the population. Plans have been made to extend the service to other parts of the Maldives.

The country has a teledensity which is one of the highest in the South Asian region. Beginning with a teledensity of less than 2 in 1995, it now has over 10 fixed-line telephones per 100 people. The figure improves to 1 telephone for every 5 people when mobile phones are included. However, access can be improved further, especially on the islands outside the capital. Even though Malé enjoys a teledensity of 1 fixed telephone for every 4 people, in rural areas the figure drops to about 1 telephone for every 32 people. Residential lines are available in the capital and on a few other islands where the size of the population can support a commercial service. Since some of the islands have expressed interest in developing their own telecommunications network, there may be potential for private participation in extending the infrastructure to homes on these islands. New technologies and efficient utilisation of technologies such as GSM could help to improve access.
Non-telephony services

Until 2000, the focus of the telecommunications sector was to develop and expand the national telecommunications infrastructure to achieve universal access. This goal was accomplished before the target date. The network was designed to provide basic telephone services. However, demand is now increasing for more advanced services and better access to global information. An example is the rising demand for higher bandwidth to accommodate information-based services. Since the existing network was designed mainly for voice communication, the infrastructure will need to be upgraded to enable data communication.

The current backbone network comprises 155-Mbps SDH and 34-Mbps PDH links with circuit switching at 64 Kbps. International connections are only available via satellite. The cost of installing a submarine fibre optic cable is still prohibitive considering the existing limited volume of traffic. The present infrastructure will not be able to support a wideband data network that transmits nationwide multimedia services. Ways of upgrading the network are being studied.

Internet access

Internet services have been available in the Maldives since 1996. They are now available throughout much of the country, mainly via dial-up. Leased-line access is also available, targeting large businesses and government offices. Recently, ISDN and ADSL access has also been introduced. However, their access charges are still considered high.

There are two ISPs in the Maldives, one of which is Dhiraagu. The second ISP licence was issued to Focus InfoCom Private Limited (http://www.rol.net.mv) in May 2003. The new ISP introduced true non-line-of-sight nomadic/mobile broadband access at a flat monthly rate within a coverage area of 20 km. The mobility offered by the technology has revolutionised the way people access the Internet. The flat-fee structure has also revolutionised the usage-based tariff regime introduced earlier by Dhiraagu. Additionally, in order to provide affordable Internet access to the island communities, the company has successfully tested two-way satellite broadband services which can serve as low-cost backhaul connections to the island networks. It has also deployed a WiFi network based on the IEEE 802.11b standard to distribute services to customers within a radius of 30 km. This network has created the possibility of establishing hotspots at resorts, the airport and other population centres within its coverage area, enabling cheaper Internet access to a wider range of users.

On some islands where there is no public access to the Internet, cyber stations are being set up. Special offers are also given to island communities in the form of preferential rates for telephone lines for operating cyber cafés and other public Internet services.

Level of digital access

In November 2003, ITU published the world’s first global ICT ranking – the digital access index – in its 2003 edition of the World Telecommunication Development Report, in time for the World Summit on the Information Society. To determine the overall country score, the index combines eight variables covering five major areas. These areas are identified as availability of infrastructure, affordability of access, educational level, quality of ICT services, and Internet usage. The index is an indicator of the potential challenges for the country in adopting ICT. It also helps countries to identify their strengths and weaknesses in the ICT area. Maldives scored 0.43, which is classified as medium access. In UNDP’s Human Development Report 2002, which focused on ICT as the main area of analysis, Maldives was ranked 72 with low access.

In order to improve digital access in the Maldives, several key issues need to be addressed. Firstly, although telephony services are available nationwide, the telecommunications infrastructure is still not fully developed. The trunk network consists mainly of 34-Mbps digital connections, which are narrowband and do not support broadband applications. Secondly, the country’s geography does not economically justify laying a fibre optic backbone network. Therefore, radio systems will dominate the network for the conceivable future, limiting the bandwidth available in many parts of the country. Thirdly, except in the capital, the population is thinly distributed over many islands, making the nationwide provision of broadband services very costly. Fourthly, the provision of international connections solely via satellite again imposes limitations on bandwidth and the speed of access to the global information infrastructure. It also restricts the deployment of time-sensitive applications.

Key national initiatives

Acknowledging the potential of an “interconnected” government in improving efficiency, transparency and accessibility, the government is developing through the IT Development Project a common government network that will provide the desired level of interconnectivity. The project, which is funded with a soft loan provided by the Asian Development Bank, will establish a network that connects all government and parastatal agencies in Malé as well as in the capitals of 20 atolls. This network will enable electronic delivery of public services, including public health services, application for national identity cards, and registration of vessels, vehicles and aircraft. Public Internet kiosks will be built on the islands to provide easy access to government information and services.

The government network is designed to support communication through VPNs within government organisations to facilitate information exchange between organisations and to provide a secure gateway between the government and
the Internet. It will comprise two separate components to be developed in two phases: a metropolitan network serving government offices in Malé and a WAN extending from Malé to serve the atoll capitals and eventually the island administration offices.

The WAN is expected to meet the following objectives: enhancing the effectiveness and efficiency of public administration; improving the quality, availability and timeliness of public services; facilitating the delivery of government information to the citizens and to the international community; and stimulating participation of citizens in public affairs and building a sense of partnership between the government, citizens, communities and businesses.

The metropolitan network will be a high-speed backbone that interconnects the independent LANs of about 66 government and parastatal organisations in more than 40 locations within Malé.

Since very few government organisations at present have access to a developed ICT infrastructure, both the physical infrastructure and applications need to be developed before they are in a position to use the government network for purposes other than email and Internet access. Among the network applications to be developed are databases for the sharing of commonly used information resources among government agencies; organisational communication systems including email, document transmission, video and audioconferencing, and net-meeting facilities; broadcast and webcast services for the dissemination of news and information; and websites for publishing information for citizens, investors, entrepreneurs, traders and tourists.

The National Centre for Information Technology has been tasked to manage the network. It will also lead the computerisation of government organisations and the development of their information systems. The centre will centrally coordinate IT policies, strategies, standards and practices for government agencies as well as the development of the required skills for government staff.

The success of the network will depend partly on the applications running on it. In order to complete any process or procedure that requires inputs and decisions from different organisations, standardisation is needed, including standardising the format of the information that is collected and shared.

In addition, the lack of government personnel with ICT training will have to be addressed urgently. ICT specialists will be needed to provide internal and external support essential for making effective use of the network. Moreover, the role of ICT in government has to be understood at the highest organisational level. High-level officials should not only support the adoption of ICT but also be able to use the technologies in their work.

Dhivehi content will constitute the bulk of the information that will be used over the network. Existing documents will need to be converted into electronic formats that are retrievable by the various applications.

To facilitate access to the government network and the Web by island communities, multipurpose community telecentres are being built on the islands to offer another option to the Internet kiosks. In addition, community portals have been set up on two atolls as part of the Digitally Empowered Development in the Island Communities programme. Business models are being studied for both the telecentres and the portals to ensure their sustainability and success in the long term.

### Enabling policies

#### National ICT policy

The formulation of the national ICT policy is underway. To make the formulation process consultative and participatory, all stakeholders are involved from the early stages. An initial draft of the policy has been prepared. Work is continuing to finalise this draft and to design the strategies and actions required for implementing the policy. The formulation of the business models for the multipurpose community telecentres, the Digitally Empowered Development programme and the digitisation of the information from key sectors, such as health, fisheries and agriculture, are components of the ICT policy.

#### Science and Technology Master Plan

The Science and Technology Master Plan identifies key sectoral issues and opportunities for the application of existing and emerging technologies. Three major sectoral issues have been identified, and they are private sector participation, the environment, and equality. The government can facilitate private sector participation by creating a conducive environment that boosts investor confidence with enabling macroeconomic policies, good social and physical infrastructures, efficient public services, and a favourable business climate. Both the environment and equality are clearly areas of national importance where technologies can play a developmental role, such as the use of GIS for environmental planning and the development of information infrastructure and applications to bridge the urban–rural divide as well as income and gender disparities.

The master plan also addresses the issue of IT application, in particular the role of ICT in public services. A synopsis of ICT applications in several public agencies was prepared and the establishment of the national computer centre and the government network proposed. The master plan also considers the telecommunications sector and identifies the need for sectoral reform through the enactment of appropriate laws, the establishment of a regulatory body, and the liberalisation of the telecommunications and Internet markets. Also addressed are technology issues relating to other sectors, including fisheries, tourism, transport, energy, education, and health.

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Multipurpose community telecentres

The multipurpose community telecentre is a technology hub that provides a variety of services to different user groups within a community. It may simply be a “telephone shop” which provides local and international call facilities. It may also offer Internet access and email services, and sometimes even fax and photocopying services. Larger centres may even undertake secretarial services, business card and stationery printing, computer training courses, and newspaper publishing. The telecentres are run on a not-for-profit basis and are usually community owned and managed.

The establishment of telecentres on sparsely populated remote islands with limited transportation links presents a great challenge. Operating costs are usually high and technical support difficult to obtain and expensive. The islanders’ low incomes limit their ability to meet the cost of operating the telecentres. It is also hard to find people with the skills needed to manage and operate the facilities. Most of the islanders have never operated a computer before, let alone use Internet and email services. Hence, it is important to consider the options for sustaining the telecentres prior to their establishment.

In the capital, Malé, most people access the Internet from public access points such as cyber cafés. Some of the other islands have taken the initiative to develop their own Internet access facilities. They include the atolls Lhaviyani, Baa, Laamu, Dhaal, Meemu, Addu and Fuah Mulak. The community initiatives of these atolls became the subject of studies on the feasibility of telecentres.

A 2001 survey conducted by the government sketched a profile of ICT users and identified their needs, the facilities they used, and their perception of the value derived from using these facilities. It found that the telecentres were used by a small number of users and a large proportion of the people on the islands were not aware of the Internet, its uses, and the potential benefit it may give them. However, a large number of people were ready and willing to take advantage of this new technology. It was observed that usage of the telecentres increased on those islands which conducted public awareness and training programmes in their communities.

The survey deduced that the telecentres may be sustained based on three models of operation. The main factor determining the most suitable model for a particular island is the purchasing power of the community. This factor is closely related to the size of the population on the island. Islands with a population larger than 5,000 people may adopt a commercial business model for operating their telecentres. Islands with a moderate population size of approximately 3,000–5,000 people should adopt a community-operated model. Islands with small populations of fewer than 3,000 people should adopt a “mixed” model, sustaining their telecentres partly with contributions and input from members of the community and partly with subsidies from external sources.

Telecommunication Policy

The Maldives Telecommunications Policy 2001–2005 is aimed at the development of the telecommunications sector towards achieving the targets of the Sixth National Development Plan and, ultimately, the economic and social developmental objectives envisaged in Vision 2020. It also guides the sector in developing ICT services to link the dispersed communities and reduce the impact of geographical isolation and physical separation on the island communities.

The most prominent aspect of the policy in relation to closing the digital divide concerns the opening up of the telecommunications market. It also recommends improving accessibility to ICT and making ICT use extensive, reducing telecommunications charges, expanding telecommunications services to close the gap in service provision between Malé and the other islands, strengthening the authority of the regulator and improving the legislative framework, and making government revenue from the telecommunications sector less dependent on the profits derived from the sector.

The policy encourages private sector participation in providing services to the islands outside Malé. It also encourages competition especially in Internet service provision.

Sixth National Development Plan

The Sixth National Development Plan 2001–2005 provides the framework for the development of sectoral plans and programmes. It recognises the need for the private sector to play an increasingly substantive role in the socioeconomic development of the country, and thus recommends the establishment of an enabling environment to stimulate private sector growth. Its broad development objectives cover the diversification of the economy; the improvement of educational, health and social services; the enhancement of human capacity and productivity; the reform of the legislative, regulatory, governance and administrative systems; the development of sustainable and cost-effective transportation and telecommunications infrastructures; and the maintenance of sociopolitical stability and national unity.

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Vision 2020

Vision 2020 sets a challenging development target for the Maldives to become one of the top-ranking nations among middle-income developing countries by 2020. It envisages moving the country into the knowledge-based economy via an educated, knowledgeable and competent citizenry. The vision’s economic goals include the development of the Maldives into a regional free trade hub, adoption of an export orientation, service and industry strengthening, employment creation and wealth distribution.

Vision 2020 also sets a number of goals for social development and quality-of-life improvement by addressing issues of equality, security, healthcare delivery, education, gender disparities, the environment, work ethics and a caring society.

Regulatory environment

The government has established an independent entity, the Telecommunications Authority of Maldives, which is empowered to strengthen the regulatory framework for the ICT sector. The framework will aim to enhance services through private sector participation and competition.

As noted earlier, a private company has been licensed to provide Internet access. This is expected to make Internet services more affordable and accessible to the public. Efforts are also being made to liberalise the mobile telecommunications market.

Meanwhile, a national committee has been constituted to help the liberalisation of the services sectors according to WTO recommendations. The experience in the country shows that even in a very small market with many physical and geographical constraints, the telecommunications sector can be successful if properly managed and if a conducive environment can be created for investors.

Open source movement

In the Maldives, awareness of open source software (OSS) and its potential benefits is growing. The use of Linux is also becoming very popular among the youth. However, there is no active promotion of OSS. Hopefully, this will change with the National Centre for Information Technology having been set up.

The new ISP is using Linux at the core of its network as well as Linux-based applications for various other Internet services. It is also using OSS for securing its network and other computer systems. Additionally, it is helping its customers to adopt similar solutions in the belief that it will have better control and flexibility in maintaining its network software, besides significantly reducing the cost of maintenance in the long run. The availability of global support for OSS over the Web also influenced its decision to adopt Linux.

Research and development

Maldives at present has three research centres: the Marine Research Centre, the Environment Research Centre and the National Centre for Linguistic and Historical Research. A research centre exclusively for ICT has not been established so far. Private sector research into ICT is also almost non-existent. However, as part of the Science and Technology Master Plan, a National Research Foundation for ICT will be established. The foundation’s main role will be to promote innovation and technology transfer to meet the specific, and often unique, needs of the nation.

Trends

E-government and the use of mobile technologies seem to be the future of this geographically dispersed country, as the provision of public services to all the inhabited islands has always been a challenge to the development of the country. The IT Development Project will ensure that online public services will be made available to the remotest islands through the establishment of information kiosks. These kiosks will be complemented by the multipurpose community telecentres. The feasibility of providing local content from these telecentres is also being explored. Meanwhile, the enactment of appropriate laws to create an enabling environment for e-government services is under consideration.

Besides e-government, distance learning, telemedicine and e-commerce also have enormous potential in this nation of atolls. Education is a priority area in the Maldives, which has one of the highest literacy rates in South Asia. The tourism industry, one of the largest economic sectors in the Maldives, will probably benefit from wide-scale introduction of e-commerce to link the resorts and tour operators to tourists around the world and to enable online reservation and payment.

Mobile telephony is another area with tremendous potential. To promote media convergence, an infrastructure that supports both voice and multimedia services has to be developed. An IP-based infrastructure, instead of the legacy telecommunications infrastructure, may be the foundation of future networks, which must be able to support multiple services with better utilisation of available bandwidth.

References


Overview

The untimely death of a pioneer of the Multimedia Super Corridor (MSC), the exit of Malaysia’s longest-serving prime minister, the proposed merger of the country’s top two ISPs, the indefensible police raid on the office of Malaysia’s premier independent Internet newspaper, Malaysiakini – these were some of the main domestic developments in “digital” Malaysia during 2003. Beyond Malaysia’s shores, world events such as the US invasion of Iraq, SARS and the bombing in Bali all played important roles in shaping the Malaysian political–economic environment.

In September 2003, Dr Othman Yeop Abdullah, the first executive chairman of Multimedia Development Corporation (MDC), the organisation charged with the coordination and implementation of the MSC project, died of lung cancer at the age of 62. He had retired from the civil service in 1996 after serving at the Ministry of Primary Industries, the Ministry of Energy, Telecommunications and Posts, the Modernisation and Manpower Planning Unit of the Prime Minister’s Department, and a local university as vice chancellor. Upon retirement, he was picked by Dr Mahathir to help spearhead the much-heralded digitisation of Malaysia by chairing MDC. Under his stewardship, the MSC surpassed the milestones that had been set for what many have described as Malaysia’s most ambitious national project. However, the last few years of his tenure saw increasing criticism of the MSC, as similar initiatives in other countries, most notably Hong Kong and Singapore, had evidently surpassed the accomplishments of the MSC.

The retirement of the feisty prime minister, Dr Mahathir, in October 2003 continues to raise questions about the future of Malaysia’s ICT policies and strategies, with many observers still unsure where the new prime minister, Abdullah Ahmad Badawi, will concentrate his priorities. As one MDC senior executive put it in a recent conversation, “At present, we seem to be outside the radar range of the new PM as he targets corruption and other social ills.”

On 20 January 2003, the police raided the Malaysiakini office, seizing 15 computers and 4 servers, crippling the web-based independent newspaper for about ten hours. In a protracted “investigation” of a purportedly “seditious” letter published in the paper, the police interrogated the senior editors with no formal charges being levelled against them. A year after the raid, Malaysiakini donated the remaining computers still under custody to the police.

In the 2004 budget, tabled in Parliament in October 2003, it was proposed that the country’s two top ISPs, TMNet and Jaring, be merged. Despite promising cheaper broadband access, the proposed merger sparked an outcry from local users fearing the creation of a monopoly. The merger has since been abandoned by the newly appointed Minister for Energy, Water and Communications, Dr Lim Keng Yaik, who said that his ministry had discussed the proposed merger and had decided in favour of preserving a competitive environment in the ISP market.

Local online content

The bulk of local content available on the Internet is still provided by news and mass media organisations, as evidently is the case with many other countries. The online edition of Malaysia’s premier English daily, The Star, remains the most popular website. Other newspapers such as Malaysiakini and The Edge continue to depend heavily on the Internet to convey their news messages, though for different reasons.

Malaysiakini, due largely to its independent and politically critical stance, has been unable to obtain a publishing licence from the Home Ministry, despite having been around for more than four years. This is a problem faced by many other politically “independent” newspapers in Malaysia attempting to present views that, if not critical, are not blindly supportive of the government. The much-criticised Printing Presses and Publications Act 1984 (Amended 1987) has not been further amended, let alone repealed, by the government, despite being petitioned by an overwhelming number of (mainly) mainstream journalists. The act enjoins all regular publications to have a publishing
licence before being published. And the licence has to be renewed on a yearly basis. Thus far, the Abdullah administration has not granted *Malaysiakini* such a licence. Hence, despite having become a veritable Malaysian institution in a relatively short time, it hobbles on as a web-based daily newspaper, making losses due largely to the shortage of subscribers and advertising revenue.

*The Edge*, on the other hand, is principally a business paper, and it has a publishing licence with which it publishes a Sunday edition. For the rest of the week, up until 1 December 2003, it ran only a daily Internet newspaper called *The Edge Daily* ([http://www.theedgedaily.com](http://www.theedgedaily.com)) carrying real-time business news and also longer features. However, on 1 December 2003, it launched *The Edge Financial Daily*, a printed paper distributed with *theSun*, Malaysia’s first free national newspaper. Both belong to the Nexnews Bhd stable after Nexnews acquired 100 percent of Sun Media Corporation and 70 percent of *The Edge Communications* in October 2003. Unlike *Malaysiakini*, *The Edge* thus far has not been deemed controversial and has had no problem getting a licence and also advertisers for its weekly print edition.

Malaysian artists have also begun utilising the Internet, enriching it with news, features and reviews about the contemporary art and culture scene in Malaysia. One such portal is Kakiseni ([http://www.kakiseni.com](http://www.kakiseni.com)).

Overall, the main complaint remains that of static content with many local websites, principally, though not exclusively, government websites. Disappointingly, even the National Information Technology Council (NITC) website ([http://www.nitc.org.my](http://www.nitc.org.my)) suffers from this malady, declaring the late Dr Othman as an ongoing council member and still addressing Dr Mahathir as chairman and prime minister several months after his retirement. It does not say very much of Malaysia’s ICT strategies and plans if simple updating of crucial websites like that of NITC cannot be done.

### Online services

Malaysian Internet users have been seeing a steady increase in online services. In this regard, the banking industry especially has capitalised on the Internet, bringing their services to cyberspace. Malaysia’s premier bank, Maybank, for example, continues to expand its online services from the initial online banking services to online insurance, bill payment, stock trading, loan and investment services ([http://www.maybank2u.com.my](http://www.maybank2u.com.my)). Other banks and finance companies have begun to follow suit.

There is a downside to this, though, with increasing cases of attempted fraud. In many of these cases, fraudulent copies of webpages tricked users to send their personal information to the perpetrators.

The Islamic (Syariah) court received a boost in January 2003 when the government introduced a three-year project to implement a high-speed computerised court management system. The following month, the government launched the E-Syariah application system “to help speed up the administration of justice under Syariah law.” All this seems to suggest that the E-Syariah project will improve the administration of justice in the syariah courts. Realistically, however, one finds it a wee bit difficult to believe that computerising the syariah court system will improve its administration of justice in view of the fact that Muslim women’s groups have long levelled charges of discrimination against court officials. Indeed, it is this tendency to look at technology, including ICT, without looking at wider social influences on events and issues that invariably will result in the perpetuation of the real problems.

### Industries

The number of companies – Malaysian, foreign and jointly owned – with MSC status continues to increase. MDC figures indicate that the number of such companies grew from 812 in 2002 to 984 in February 2004. Out of the total, 675 are Malaysian owned (share ownership of 51 percent and above), 283 are foreign owned (foreign share ownership of 51 percent and above) and 26 are joint venture companies. The majority (946) are MSC technology companies.

### Key national initiatives

Apart from the computerisation of syariah courts, the key national initiatives over the past 12 months appear to have been in the areas of combating piracy, imposing price controls on software and clamping down on spam.

In May 2003, the police and trade enforcement officers began raids and checks on companies in an anti-piracy campaign dubbed *Ops Tulen* (Operation Original). The newspapers happily wrote accounts of music and computer piracy gangs being “crippled”. Knowing that such raids were “seasonal” and that the enforcement authorities, being understaffed, could not keep up such a campaign, these gangs had held out. Pirated computer software continue to be displayed and sold by the dozens in many shopping arcades in Kuala Lumpur or Penang.

In June 2003, the Domestic Trade and Consumer Affairs Ministry proposed price controls on music CDs, VCDs and computer software. This sparked off a controversy, but true to form – in September 2003 new ceiling prices for CDs were announced and were to be imposed on 1 January 2004. However, implementation was deferred to 1 April 2004, presumably because of the probability of an early general election.

In August 2003, the Malaysian Communications and Multimedia Commission proposed “several measures to clamp down on spam, including defining spam for regulatory purposes, imposing mandatory measures on service providers, and a multi-tier plan to resolve spam-related complaints and disputes.”
Enabling policies and regulatory environment

Several new cyber laws were scheduled to come into force in 2004. These include the Personal Data Protection Act, the Electronic Transactions Act and the Electronic Government Activities Act. The first act is aimed at protecting the privacy of personal data residing in computer systems and those transmitted. The act, it is believed, will increase confidence in online transactions. The second act is aimed at boosting e-commerce by providing legal recognition of electronic transactions. The last act is aimed at facilitating online government interactions with the public.5

The Third MSC International Cyberlaws Conference, held in 2004, had as its theme the intriguing title “Advancing Cyberlaws: Educate, Regulate, Practise and Enforce”. The meeting was aimed at, among other things, “advancing Malaysia’s cyberlaws and to propose strategic directions for the future”.6 MDC, one of the main organisers, said that legal issues related to personal data protection, telehealth, wireless technology and open source software would be highlighted. It would seem, going by the initial reports of this meeting, that the regulatory environment is one area that has remained static and that discussions on how to improve it are ongoing.

However, it needs to be stressed that empowering though the cyber laws of Malaysia may turn out to be in the end, we cannot simply ignore the existence of numerous other laws that have been around way before the introduction of ICT – more encompassing laws that disempower. Hence, while advancing cyber laws sounds good and progressive, we must not forget the realities in Malaysia of the existence of laws

The e-village and Malaysia’s creative industry

There are bound to be hiccups, or indeed failures, with even the most well-thought-out major initiatives. And that has been the case with some of the “flagship” projects associated with phase 1 (1996–2004) of the Multimedia Super Corridor (MSC). A combination of factors, including lack of leadership, poor implementation and red tape, has been blamed for failed flagship projects such as the telemedicine project and the e-village. It is public knowledge that the company responsible for the telemedicine project failed to deliver and the Ministry of Health had to endure constant delays before finally being forced to take over the implementation of the project. More recently, news of George Lucas’s company, Lucasfilm, setting up digital animation facilities in Singapore and not in Malaysia raised new questions about the failed e-village project. The project was initially aimed at providing a hub for Malaysia’s creative industry to enable it to compete and, according to some pundits when it was first mooted, to meet – if not surpass – the technical and aesthetic standards of Bollywood, if not Hollywood. The village was supposed to have been built in Cyberjaya; but akin to the stuck telemedicine flagship, e-village did not really get off the ground because the company awarded the contract to build and develop the village went bankrupt and had to pull out, leaving Multimedia Development Corporation (MDC) to pick up the pieces.

To be fair to MDC, recent reports suggest that more thought is being put into the development of the e-village under MSC phase 2. However, one gets the nagging feeling – at least from the anecdotal accounts available from some news reports – that MDC would need substantially more than the present funds it is getting from the government to make e-village a success in phase 2.

The two main grants currently available for companies in the creative industries are from MDC and the Malaysia Venture Capital Management Bhd (Mavcap). As of August 2004, Mavcap’s Cradle Investment Programme offered grants of up to RM 50,000 (US$13,300) to individuals, while MDC had provided grants of up to RM 600,000 (US$160,000) for students to embark on two-year projects on digital storytelling, the final products being short films or animations. But these amounts are clearly peanuts in an industry which needs to spend millions on production costs alone.

Singapore has allocated RM 440 million (US$117 million) to develop the country’s creative hub. In the meanwhile, Malaysia has allocated RM 42 million (US$11 million) “to finance local creative content development” under its five-year Eighth Malaysia Plan, a fraction of Singapore’s budget. And a large portion of Malaysia’s budget reportedly has already gone towards infrastructural costs.

The idea of an e-village may bear fruit in the longer term; but under current funding circumstances, and also considering the lack of skills and creative talents locally, as evident in the “old” media of television where storylines and character development remain pathetic, perhaps it would be wise for us not to hold our breath.

Sources: The Edge Weekly, netv@lue2.0, 12 July 2004; 30 August 2004.
such as the Sedition Act, the Printing Presses and Publications Act, the Official Secrets Act, and of course the Internal Security Act, all of which work in tandem to make the wider regulatory environment rather restrictive. Moreover, despite the assertions of greater accountability and transparency by Abdullah’s administration, it is quite clear thus far that very little will be done to amend or repeal these laws and develop a more liberal environment.

Open source movement

The open source movement in Malaysia, while not exactly firmly gripping the imagination of the public, nonetheless has seen some positive developments over the past year. As far as deployment is concerned, it has been reported that small and medium enterprises are using open source software (OSS) more than larger corporations. OSS is quite prolific

Malaysiakini – A different “success” story

If successes were simply measured in terms of financial and economic viability, it would be extremely difficult to count Malaysiakini as a success. Indeed, five years after it was set up as Malaysia’s first daily alternative news website, Malaysiakini is still struggling to make ends meet, still desperately trying to get enough paying subscribers to enable it to become fully self-sustaining.

But a success story Malaysiakini undoubtedly is, especially in the context of a country which, when Malaysiakini came on the scene in 1999, was still reeling from the economic and political crises brought about by the Asian financial “meltdown” and the Anwar Ibrahim saga.

It was a time when the credibility of the Malaysian media was, arguably, at an all-time low. It was indeed a time when the Malaysian public was confronted by a cowed mainstream media that allegedly was churning out more misinformation than information, a time when cries of reformasi (reform) were still reverberating, albeit mainly on the streets of the federal capital, Kuala Lumpur.

Into this scenario came Malaysiakini, essentially, according to its co-founder and editor-in-chief, Steven Gan, “to advance press freedom and to ensure that there can be such a thing as an independent media”. Whether one supports or opposes it, it cannot be denied that Malaysiakini thus far has done that, breaking stories that others have been too afraid to handle and following up with hard-hitting reports.

But perhaps what has really endeared Malaysiakini to its largely urban audience is its lively “Letters” page, which allows its readers to freely comment on current issues with little censorship, if at all. This is quite unlike the situation with the letters page in many of the mainstream newspapers, which evidently will not entertain discussion of certain “sensitive” topics. One clear example of this media self-censorship involves a callous and inflammatory speech by an official from UMNO (United Malays National Organisation, the country’s dominant political party) at the September 2004 UMNO General Assembly warning certain Malaysians not to question the special rights of Malay Malaysians. While much of the mainstream media chose not to discuss, let alone criticise, the speech, Malaysiakini allowed its readers to provide critique. It even provided space for its regular columnist and respected academic Dr Farish Noor to write a damning critique of the shameful comments made by the official.

Malaysiakini has had to pay a price for its independent stand. The government has thus far not granted the publisher a licence to publish a weekly print version of Malaysiakini, more than two years after an application for the licence was made in September 2002. And harassment has been widely reported. Its office has been raided by the police, and many pieces of its computer equipment taken away, after the youth wing of UMNO made a police report about Malaysiakini having published an allegedly seditious letter. Its founders have been summoned by a senior government official for a “chat” on its activities and its (unproven) links with “foreign elements”. But such forms of apparent intimidation clearly point to the fact that this small media organisation is making an impact.

More than simply projecting itself, Malaysiakini more recently has introduced new social commentators to a wider Malaysian public. Thus, it provides links to independent – and non-Malaysiakini – writers such as blogger Jeff Ooi, whose critical – but certainly refreshing and thought-provoking – blogs have raised the ire of people in high places.

Whether Malaysiakini survives, let alone succeeds financially, in the long term would very much depend on the support of a very fickle and often politically and socially apathetic Malaysian middle class. But on the basis of its contributions to press freedom thus far, Malaysiakini certainly deserves more than its share of breaks.

a. The Edge Weekly, netv@lue2.0, 1 December 2003.
in public universities, with, for example, Universiti Sains Malaysia having a Linux laboratory and the International Islamic University running Oracle on Linux for its student registration exercises.\(^7\)

In May 2003, the Open Source Compatibility Centre (http://www.mncc.com.my/oscc), supported by a number of organisations and vendors, was opened in the capital, Kuala Lumpur. Its joint operators are the Malaysian National Computer Confederation, training company Advanced Technological Studies Sdn Bhd, and software solutions developer and integrator Adfunk Solutions (Malaysia) Sdn Bhd. The centre aims to provide “opportunities for developers to test the compatibility, interoperability, coexistence, ease of use and performance of multiple networked servers and clients running various Linux distributions and different Unix flavours, Microsoft server operating systems, FreeBSD, MySQL, OpenOffice Suite and other open source and proprietary operating systems and applications”.\(^8\) It also conducts demonstrations of OSS deployment in numerous environments.

In October 2003, the government set up a US$36 million open source fund for start-ups developing OSS. Called the OSS-Platform Investment Programme, the fund aims to form 40 commercially active OSS companies over the next two years.\(^9\)

The government unveiled the Malaysian Public Open Source Software Master Plan in July 2004 calling for OSS to be procured as the preferred choice. Procurement will be made on the basis of interoperability, security and value for money. The government announced at the same time that the Open Source Compatibility Centre will serve as the focal point for its work in implementing the plan. The master plan has set some immediate targets. These include having 60 percent of all new servers and 20 percent of all computer labs in schools running on OSS by 2005. More than 50 government agencies already run some form of OSS within their offices. The software used includes email clients, browsers, firewalls, server applications and office suites.

The government had opted for OSS in mid-2002, when preparatory work and consultations began. The planners had visited China, France, Germany and the UK to see how OSS to be procured as the preferred choice. Procurement will be made on the basis of interoperability, security and value for money. The government announced at the same time that the Open Source Compatibility Centre will serve as the focal point for its work in implementing the plan. The master plan has set some immediate targets. These include having 60 percent of all new servers and 20 percent of all computer labs in schools running on OSS by 2005. More than 50 government agencies already run some form of OSS within their offices. The software used includes email clients, browsers, firewalls, server applications and office suites.

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In spite of the above efforts, the local open source movement appears to be one made up of small groups of adopters and users, with little clear indication yet of developers and champions coming into the equation to enable open source to evolve more rapidly. Only a few large local vendors, such as DRB-Hicom and MIMOS, are presently supporting the movement. Similarly, very few people are involved in community-style development activity. Despite the fact that MIMOS initiated the Asian Open Source Centre (http://www.asiaosc.org), it would seem that the culture of sharing and OSS development is still not there.

There are, of course, numerous reasons one can put forward for this relatively slow adoption of open source. The first is the lack of publicity and marketing, as compared to the strategies employed for the established and highly commercialised systems. Then there is the perceived lack of applications, its supposed “unfriendliness” for general desktop deployment, and confusion about its benefits among the less tech-savvy. In many ways, arguably, it could be seen as a case of David and Goliath, akin to the all-too-familiar struggle between the giant transnational companies and the little one in a competitive, capitalist market. In the Malaysian context, while the political will evidently is present, it has yet to be seen whether this will transfer to political action in a consistent, long-term manner.

**Research and development**

In a recent article aptly headlined “What R&D Culture?”\(^10\) The Star writer L.C. Wong liberally quoted a damning report by Dr Nikolai Dobberstein, a partner in McKinsey & Co. Malaysia, a consulting firm that played a key role in the planning of the MSC. According to the report, currently Malaysia spends only 0.5 percent of its GDP on R&D. More than that, “95 percent of the patent applications in Malaysia in 2001 were based on technology researched elsewhere”. According to Dobberstein’s study, Malaysia has an R&D portfolio that is too diverse and without sufficient resources. Furthermore, limited capability and inadequate private sector input and sponsorships dilute the relevance of public sector R&D efforts.

**Trends**

If the progress status of the MSC’s flagship applications is anything to go by,\(^11\) it would appear that the digitisation of Malaysia is coming along smoothly and, more importantly, that it will benefit all Malaysians in the long term. Here, I am reminded of what I believe the eminent economist Lord Keynes had to say about “the long term”, namely that in the long term we are all dead. To reiterate, perhaps to belabour, a point made at the end of my chapter for the previous edition, the jury is still out on the real, experienced benefits of digitising the country when other inherent factors are often pushed aside. While the E-Services project, for example, may indeed improve immensely the process of enquiring about and paying traffic summons, it goes nowhere near addressing concerns and first-person reports about abuse of power and police brutality, just as the E-Syariah project goes nowhere towards addressing questions about syariah court officials’ attitude towards women.

Hence, if one wishes to be seduced by the hype that comes with the technology, one could say that, in Malaysia at least, the trends look pretty good. But, as I have tried to illustrate at numerous points in this short essay, we still need to factor in the human dimension and larger questions of
power in attempting to discuss trends. To be fair in this regard, after getting a landslide victory in the 2004 general elections, the Abdullah administration appears to be making the right statements, the right overtures. In a keynote address delivered at the Microsoft TechED 2004 developers conference held in Kuala Lumpur in September 2004, the Science, Technology and Innovation Minister, Jamaluddin Jarjis, acknowledged the fact that in this so-called networked world inequalities do exist. Quoting official statistics that indicate only 17 percent of Malaysian homes have PCs and, out of this, only 7 percent of home PCs are in rural areas, Jamaluddin stressed that PC prices in Malaysia were too high, so “the government was undertaking a PC ownership initiative to improve accessibility, affordability and computer literacy”.12 How these statements will be translated into concrete action remains to be seen.

Notes

2. The Star In-Tech, 30 December 2003, 12.
5. The Star In-Tech, 3 February 2004, 3.
**Overview**

Nepal formally accorded priority to the development of the ICT sector with the launch of IT Policy 2000. Unfortunately, judging from the performance of the sector over the last few years, it is fair to say implementation of the policy remains slow and many actions stipulated in the policy remain just words on paper. However, some of the key national initiatives to develop the ICT infrastructure, such as the construction of the first IT park and the information superhighway, are on the verge of completion. The commissioning of these initiatives, occurring in tandem with the return of an encouraging environment for foreign investment, should boost activities in the ICT sector over the coming years.

Recent efforts such as the licensing of private rural telecommunications operators, as well as the liberalisation of the telecommunications market, are excellent examples of enabling initiatives undertaken by the government. The establishment of telecentres is also very much welcomed, although the pace is much slower than desired. The Internet has made a difference to the lives of many people in Nepal, thanks largely to the bold initiatives of the private sector, which took the lead in introducing Internet services. Over the past few years, government departments have shown an increasing awareness about the potential of ICT, and they are establishing a growing presence on the Web. The government finally enacted the long-awaited Electronic Transactions Act in 2004. The passage of the bill is expected to spur the growth of e-commerce and other forms of online transactions. However, the current unsettled political situation in the country may curb this growth. Indeed, the most crucial factors for advancing the ICT sector may be the security, peace and political stability of the country.

**Local online content**

The number of local websites has increased substantially. English is still the main language used in online content. The main types of content found at these websites are news and current affairs, tourism, and government information. Nepali content can also now be found in any topic, ranging from agriculture, sports and food to culture, music and jobs.

It is encouraging to find a new government portal site at [http://www.nepalhmg.gov.np](http://www.nepalhmg.gov.np) that provides links to the websites of all government ministries, departments and agencies. Still, the URL for the portal could be simplified to [http://gov.np](http://gov.np), in the manner of the portals of many other governments in the region.

Among the notable local websites is the pioneering AgriPriceNepal ([http://AgriPriceNepal.com](http://AgriPriceNepal.com)) which provides comprehensive agricultural commodity intelligence to traders. The content is available in both English and Nepali. Another site [http://www.nepalnet.net](http://www.nepalnet.net) ranks the top 51 Nepalese websites. The current affairs and news provider [http://www.nepalnews.com](http://www.nepalnews.com) continues to rank first in this list. The enterprising site [http://www.thamel.com](http://www.thamel.com), which provides information on businesses in the Thamel area of Kathmandu, won the World Bank’s Tony Zeitoun Award for successful entrepreneurship and innovation in 2003.

The travel industry has been actively engaged in promoting their business through websites such as [http://www.nepalnature.com](http://www.nepalnature.com). Online GIS data on Nepal are provided by the International Centre for Integrated Mountain Development ([http://www.icimod-gis.net](http://www.icimod-gis.net)).

One of the major issues related to content, both in terms of production and consumption, is the use of local languages, particularly Nepali. Content is only useful if the information offered is relevant to users and presented in a language they understand. The Nepali Language in Information Technology Steering Committee of the High-Level Commission for Information Technology (HLCIT) has been set up to look into these issues and to encourage the use of Nepali online and in software applications.


Online services

E-commerce

The banking industry has made good progress in introducing online services, including telephone banking and, in a few cases, Internet banking. Kumari Bank has also introduced mobile banking. Other companies have generally used their online activities for promotional purposes than for providing more convenient services to customers.

The passage of the Electronic Transactions Act needs to be quickly followed by the development of an online payment system in the absence of an electronic fund transfer system and credit cards. It will take many years for B2C e-commerce to develop into an important economic activity. In the meanwhile, there are numerous business websites where customers can place orders but make payments offline by bank drafts and other conventional forms of fund transfer. The sites http://munchahouse.com.np and http://www.acp.org.np are examples of those operating this hybrid form of e-commerce. There are also websites offering full-fledged e-commerce, but they tend to be hosted by service providers located outside Nepal. Examples include http://Dhukuti.com, http://eshopNepal.net and http://nepalshop.com.


Among the niche products and services that Nepal could market via e-commerce to consumers overseas are handicrafts, pashmina fabric, ready-made garments, carpets, herbal products, spices, hotel and tourism services, and software development and IT-enabled services.

E-government

The Rural–Urban Partnership Programme is supporting 11 partner municipalities in adopting the e-government model that was successfully implemented in Bharatpur. The Bharatpur e-government initiative was reported in the last edition of this publication. E-government is one of the most promising uses of ICT which will benefit the people. The success of its implementation in one municipality indicates that it can be introduced to other areas of the country as well. The HLCIT is also working with various ministries to develop online applications for issuing citizenship certificates, driving licences and passports.

Industries

According to an estimate of the Computer Association of Nepal, the volume of business in the ICT sector has exceeded Rs 1 billion (US$13.5 million). This total comprises services, training and education, software export, hardware sales, network integration, and consultancy. The ICT sector in Nepal has not been officially classified as an “industry” and therefore does not receive the benefits that the government accords other manufacturing industries.

Hardware manufacturing

There is very little hardware production in the country. Mercantile PC is the only branded computer being manufactured in Nepal which is ISO 9001 certified. There are, however, now a good number of local companies that assemble PCs from imported parts. The tariff on ICT products is presently fixed at 5 percent but will be completely removed by 2010 in line with WTO membership requirements.

Software origination and export

The IT policy set a target of Rs 10 billion (US$135 million) for export of software and related services to be achieved by 2005. There is little hope of achieving this ambitious target. Merely riding on the waves of progress made by neighbouring countries on software development is not going to help Nepal. Recent analysis indicates that these countries have been successful because their software houses have acquired international software standard certification. This is certainly one of the strategies that can be adopted to boost Nepal’s software export capacity.

There are a small number of Nepalese companies exporting software. Very recently, Hi-Tech Valley, an established firm, became the first software company in the country to acquire ISO certification. Achieving such international standards is crucial for attracting foreign investment in software production and export. Entrepreneurs have also conceded that the country lacks highly specialised IT personnel to help expand Nepal’s software development business.

ICT education and training services

The rapid growth in the number of IT colleges in the country between 1999 and 2004 has not led to a corresponding increase in students. The colleges are experiencing a significant decline in enrolment recently. They are finding it increasingly difficult to attract students, as new employment opportunities for graduates are not being created. The number of unemployed IT graduates has risen considerably. One estimate projected that Nepal would have a surplus of 3,000 IT graduates by the end of 2004 and an additional 4,500 by 2005. The lack of standards and quality control has also emerged as an issue in ICT education. The country now appears to have sufficient skilled IT workers; what is required is perhaps quality workers.
IT-enabled services

Nepal has the potential to export IT-enabled services and bid for outsourcing contracts from US and European companies. The country offers cost advantages, a 12-hour time difference with the USA, and a sizeable pool of English-speaking and computer-literate workforce. These are attributes shared by successful outsourcing centres located in neighbouring countries such as India, China and the Philippines. The services which Nepal can export include medical transcription, call centres, data entry and processing, website development, and data conversion.

There was much hype a few years ago over Nepal’s prospects in providing IT-enabled services. A number of companies were started in the country to provide these services. However, it is sad to find very few of them still operating. Many of the companies have closed down, particularly those offering medical transcription services. The government had signed an agreement with Unlimited Numedia, a private medical transcription company, to train workers in anticipation of the expansion of this industry. However, with the setback in this sector, this training contract has also run into problems. Fortunately, the two call centres, Himalayan Telecommerce and Serving Minds, are doing reasonably well.

The reasons for the failure of ICT services companies are several. Foreign companies seem to have difficulty with Nepal’s labour laws and foreign direct investment regulations, besides having concerns about security in the country. It is also difficult to retain workers, as many young ICT workers are attracted by the higher salaries and better career prospects in other countries. Furthermore, as noted earlier, the ICT sector is officially not an “industry” yet and so is not entitled to the benefits enjoyed by manufacturing industries.

The ICT services sector needs to be developed, as it not only brings in foreign exchange for Nepal but also provides employment to the youth. Policy makers and entrepreneurs have to work together to make use of this opportunity.

Service providers

A reflection of the recent past shows that it is the ISPs who have made the greatest difference to the ICT sector in Nepal. The private sector was the first to provide Internet access in 1995. Since then, the number of ISPs has grown together with the number of users. At the same time, new technologies have been introduced into the market. Broadband is the latest of these technologies, and it has attracted many experienced Internet users in the cities. The timely deregulation of the use of VSAT helped to bring about this growth and, especially, to create a competitive environment. One of the most attractive elements of the Internet revolution is the rapid fall in the cost of access. In 1995, when the Internet was first introduced to Kathmandu, Mercantile Communications Pvt Ltd charged Rs 15 (US$0.20) per minute; it now charges Rs 15 per hour. Similarly, when unlimited Internet access via dial-up was introduced in Nepal in 1998, it cost Rs 5,000 (US$70) per month; the rate has since been reduced to as low as Rs 750 (US$10) per month. The number of Internet users in Nepal has soared as cyber cafés quadrupled in number and their charges fell.

Broadband Internet access is being launched by private sector ISPs in Kathmandu city. There are also plans to provide Internet access and cable television through fibre optic networks. The Nepal Telecommunications Authority (NTA), the regulatory body and licensor, has already awarded Subisu Cablenet Pvt Ltd a licence to operate an Internet access service via a fibre optic network. More companies are waiting for a similar licence. NTA is also planning to provide ADSL to ISPs. This should help ISPs to enhance their quality of service.

There are currently 22 ISPs operating in Nepal, and the country’s total bandwidth is about 25 Mbps downlink and 10 Mbps uplink. Studies carried out by the Computer Association of Nepal and the Internet Service Provider Association of Nepal reveal that there are about 200,000 Internet users in the country, of which about 40,000 are subscribers. In 1999, there were about 290 domain names registered under “.np”; this total increased to close to 4,600 at the beginning of 2004.

The launch of the local Internet exchange (http://www.npix.net.np) has facilitated the exchange of local traffic among the principal ISPs. This has benefited the ISPs by freeing up bandwidth while providing users with faster download speeds at the same time.

Key national initiatives

IT park

The government has handed over the responsibility of constructing and operating the first IT park to the newly established HLCIT. Efforts are being made to open the park by the end of 2004. Completed buildings in the park have been allocated to small and medium ICT enterprises. Large companies will be provided with plots of land connected to the completed infrastructure for constructing their own buildings and facilities to meet their particular requirements.

East–west information superhighway

Much of the work involved in laying 880 km of fibre optic cable along the East–West Highway has been completed. It is one of the few projects included in IT Policy 2000 to be completed within the stipulated time and is undertaken with assistance from the Indian government. Completion of the fibre network, locally referred to as the National Information
Super Highway, is expected to trigger rapid growth in the development and deployment of ICT in Nepal.

**Rural telecentres**

An estimated 85 percent of the population of Nepal lives in rural areas. The latest teledensity figures are 0.16 (0.13 in 2002) for rural areas and 16.63 (14.74 in 2002) for urban areas. Rural areas remain almost totally isolated, without access to telephones and other basic services. Adding to the challenge is the mountainous and rugged terrain of most of the country, making development efforts difficult and very expensive compared with similar initiatives carried out on more hospitable terrain. Private operators are only interested in investing in the profitable urban areas, leaving the responsibility of extending services to the non-profitable, marginalised, rural areas to the government.

Rural telecentres are being established through a number of different programmes. However, the pace of construction is very slow because of security problems in the country. The government, with UNDP support, has set up community information centres in 11 districts to provide rural areas with access to ICT. Additionally, under the Rural–Urban Partnership Programme, rural telecentres have been established in selected village development committees within the 33 rural market centres that this programme focuses on. The Tenth Five-Year Plan, which started in 2003, has set the target of building at least 1,500 community information centres in the country.

There is no doubt that the establishment of telecentres will go a long way in helping to close the digital divide, but at the same time the lack of local content, especially in the national language, must be addressed to render the telecentres useful to the people and their operation sustainable. Telecentres should respond to the communication and information needs of the communities they are intended to serve.

**WiFi Internet for yak farmers**

Yak farmers in the five mountain villages in Myagdi district and adjacent areas are using wireless Internet technology to keep in touch with their families. They are taking advantage of a wireless network set up in the remote region, where there is no other means of communication. The initiative is based on an innovative idea developed by a local educational pioneer Mahabir Pun and backed by volunteers and donations from people within and outside the villages. It aims at bringing the Internet to this isolated part of the world. Pun is also trying to break the cycle of poverty in his mountain village of Nangi by bringing the villagers into the computer age. He founded Himanchal High School, where he sees the Internet as the way to improve local children’s education.

**Enabling policies and regulatory environment**

**IT sector**

The experience of the last few years indicates that IT Policy 2000 has been an excellent but perhaps overly ambitious plan that has been difficult to implement. The National Information Technology Centre, set up under the Ministry of Science and Technology (MOST) to act as a policy maker, facilitator and regulator of the sector, has not made much headway in the implementation of its mandate. Insufficient resources were allocated to the centre for its activities. There has also been a lack of coordination between the Ministry of Information and Communications (MOIC), which is entrusted with the oversight of telecommunications, and MOST, which is the coordinating agency for IT. The government, recognising these shortcomings, formed HLCIT under the chairmanship of the Prime Minister, who is assisted by a full-time vice chairman and secretary together with nine members. This new commission has now replaced both the National Information Technology Development Council under the chairmanship of the Prime Minister and the National Information Technology Coordination Committee under the chairmanship of the Minister of Science and Technology. The National Information Technology Centre will now serve as the secretariat of the commission, and its executive director as the member secretary of the commission. This new institutional arrangement will hopefully bring the desired benefits to the overall ICT sector. It may also be worthwhile to explore merging MOST and MOIC for the purpose of bridging the existing coordination gap between these two ministries to raise efficiency.

The IT policy has generally not been effective in attracting foreign investment in ICT. It lacks an explicit clause providing incentives for foreign investors in areas such as IT-enabled services and software development; it only promotes foreign investment in infrastructure development. According to the government itself, many of the policy initiatives contradict current government rules and regulations, making implementation rather difficult. Unless a coordinated and comprehensive approach is taken to address these issues in an integrated manner, the government may not be able to create a conducive environment for foreign investment in this sector. In a major change of its foreign investment policy, the government is preparing to open up the secondary market, including ICT, to foreign investors. This is viewed as an encouraging move. Additionally, a one-point service will be established in the Department of Industry to assist investors; and with Nepal now formally a member of WTO, the telecommunications sector is opened for foreign direct investment. WTO membership will also have implications on tariffs for imported ICT products.
In spite of the challenges, there is some positive progress in the implementation of the IT policy. The first IT park will start operation soon, and the east–west fibre optic cable is nearly completed. The policy has also created awareness of the potential role of ICT in the government. Many government departments have established their presence on the Web to provide information on their mandate and activities. The next step should be to provide online services such as bill payment, revenue collection, and procurement.

The Electronic Transactions Act was passed after pending in the House of Representatives for three years. The bill provides for the recognition of digital signatures and legalises electronic documents. It also lays down laws for computer-related crimes. However, there are gaps in the act: it does not address many important aspects of e-banking transactions nor provides for the modes of online payment. These omissions aside, the act is widely seen as a very important step forward in promoting the use of ICT. The next step is to develop the regulations and bylaws needed for its smooth implementation.

Finally, it is time to review IT Policy 2000 comprehensively by evaluating its failures and successes as well as its weaknesses and strengths. This review should identify new strategic directions and help in the revision of the policy to make it more effective and result oriented.

Telecommunications sector

The Telecommunications Act 1997, the Telecommunications Regulations 1997 and the Telecommunications Policy 1999 are the main policies determining the legal and policy framework for telecommunication in Nepal. Their enactment enabled the liberalisation of the telecommunications sector and brought about the positive changes that followed. The decision made in the Telecommunications Policy 1999 to allow ISPs to arrange their own international connectivity using VSAT technology proved to be a pivotal development. Nepal is the first nation to adopt this strategy in South Asia. VSAT helped ISPs to increase their international Internet bandwidth, raise their quality of service and improve their competitiveness while at the same time significantly reducing their costs and hence their charges. It would not be overstating the case to say that this early step towards market liberalisation transformed the ICT market.

In a major attempt to further liberalise the sector, MOIC in 2004 amended the 1999 policy to promote private sector participation and competition in all market segments. The new policy aims at ending cross-subsidies and privatising the Nepal Telecommunications Corporation (NTC). It will phase out the licence regime, thus removing the limit to the number of licences issued, by the end of 2004. This revision also paved the way for Nepal’s accession to WTO.

The licensing of a private operator to roll out services in rural areas was another welcome initiative approved in 2003. In the same year, Nepal saw United Telecom Ltd, the first private telecommunications operator in the country, launch a basic telephone service based on WLL technology, marking the end of a three-decade monopoly by the state-owned NTC. Applications from new private mobile phone operators, who will also eventually compete with NTC, are also being considered.

Most importantly, NTC has been restructured as a new company with a new name – Nepal Telecom – with the government slowly withdrawing from its management. This is a momentous step forward by the country. The company is now an autonomous entity, with full independent authority to make its own decisions. It plans to sell shares in the company to the public and transform itself into a publicly owned enterprise.

The presence of multiple operators and the increase in private ownership of enterprises are likely to bring the same advantages and spark the same degree of growth in the telecommunications sector as those triggered by VSAT in the ISP and Internet market earlier.

The government’s efforts towards universal access, a multi-operator environment, fair competition, and simplification of the licensing process are all positive steps that are much welcomed. However, the rapid liberalisation along with the sector’s evolution into a multi-operator environment has rendered the job of regulation much more complex. The promotion and maintenance of robust competition will require effective regulatory oversight. This is where policy makers and the telecommunications regulatory body, NTA, need to proceed cautiously. The rapid pace of change in the sector is in the meanwhile making it difficult for newer members of the industry to keep abreast of the changes. This trend will undoubtedly continue and will require frequent review of policies to ensure that they remain current.

Open source movement

GNU/Linux and software such as OpenOffice suite are attracting interest in Nepal. The non-profit private library Madan Puraskar Pustakalaya is coding and developing a version of Linux in the Nepali language. There is now an active Nepalese mailing list on Linux. However, there is no official policy on open source software. Users and interested software professionals in the country are forging international partnerships on open source solutions through South Asia Partnership Nepal, Bellanet, and other institutions and groups abroad. The majority of local ISPs are using open source software in their operations.

Research and development

Madan Puraskar Pustakalaya, in collaboration with UNDP and MOST, has completed its font standardisation project and produced a Unicode-based Nepali font. The new font
has introduced many possibilities to Nepalese users in disseminating information and communicating in Nepali using ICT. Additionally, the library is representing Nepal in the PAN Localization project (http://www.panl10n.net), a regional initiative aimed at developing local-language computing capacity.

**Trends**

It is hoped that the new IT commission will set new directions for the overall ICT development of the country. Progress on two fronts should help the efforts of HLCIT. The completion of the IT park will help to attract foreign investment in software development. Likewise, the completion of the east–west fibre optic cable is expected to increase the deployment of ICT in Nepal. It will serve as the backbone for the expansion of telecommunications services along the East–West Highway, enabling fast and reliable transmission. The fibre optic cable connection to Lhasa, Tibet will provide the country with additional bandwidth for international access.

Nepal’s mobile phone density was about 0.46 percent in 2004 compared with 0.09 at the end of 2002, while fixed-line density increased from 1.42 to 1.64 in the same period. The government aims to raise fixed-line density to 4 by 2007. The ongoing laying of fibre optic cable from the eastern to the western region, and within Kathmandu valley, will help the development of telecommunications facilities. The new infrastructure, combined with the opening up of the telecommunications sector, makes the target achievable.

The liberalisation of the telecommunications sector is likely to speed up growth, improve the quality of service, and lower tariffs. A larger number of operators are expected to enter the sector offering their services to all market segments.

IP-based networks are increasingly being adopted as alternatives to traditional circuit-switched telephone networks in many countries. The advantages of these networks are well understood by Nepal’s policy makers. Thus, it is likely that VoIP will be approved by the government in the near future. Legalising VoIP should make telecentres more popular, as voice communication will enable the people to make better use of the Internet. Perhaps VoIP should be seriously considered as one of the main areas of growth for Nepal’s ICT sector.

It is hoped that progress will be made in the development of online modes of payment following the enactment of the Electronic Transactions Act. The act provides an important legal framework to protect consumers and businesses, which will help to build trust and confidence in e-commerce.

No national IT development strategy can be successfully implemented without a sound human resource development programme. The country should focus on producing highly skilled workers and professionals with advanced expertise.

Finally, the political and social environment will be an important factor influencing the development of a country. The present uncertainty makes it difficult to forecast accurately the direction in which Nepal is headed.

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New Zealand

Overview

New Zealand is still working out how to maintain a sustainable ICT industry since the crash of technology companies in the stock market at the beginning of the millennium. While government initiatives in IT for social development continue with modest success, New Zealand’s market economy assumes that the private sector should play a major role in socioeconomic development – but this has not been the case.

The state of ICT companies continues to highlight the difficulties faced by smaller firms in the globalising ICT market. Statistics New Zealand (2004) figures show that the value of sales in the IT sector fell by 1 percent in 2003 to around NZ$7 billion. The value of IT exports fell 30 percent to NZ$677 million, below even the 2001 figure.

Despite the downturn in ICT markets generally, consumer use of new technologies continues to increase, particularly in the use of mobile phones and related communications technologies. New Zealand telecommunication companies reported a massive upsurge in the use of text messaging and photo messaging over the December 2003–January 2004 holiday period. Christmas Day saw 4 million text messages sent from Telecom mobile phones and around 3.5 million sent on New Year’s Day. That was up from a typical usage level of around 3 million. On New Year’s Eve, Vodafone’s network sent 3.8 million messages, up from 2.2 million the year before. Christmas Day had a record 4.8 million messages (Brislen, 2004).

However, in the business-to-business sector, two of the most well-known software exporters have faced difficulties – after being touted as the companies most likely to take New Zealand’s ICT sector to “the next level”. Middleware vendor Jade Software lost NZ$15.6 million in 2003 as operating revenue dropped by a third. Healthcare software provider Peace has had a couple of rounds of job cuts due to sluggish market conditions in the USA. Both companies create custom software solutions, and part of their decline could be related to the increasing emphasis on open standards and concerns about being locked into particular vendors.

Anti-spam software producer Marshall Software, which had been sold to US company NetIQ, announced that its New Zealand development team would be disbanded and future work done in Texas. One of the newer successes, Navman, exporter of GPS systems, is now mostly owned by US interests (Griffin, 2004).

These events are instructive for policy makers in other Asia-Pacific economies seeking to facilitate growth in their ICT sectors. The cliché of Internet economics during the 1990s was that in any given “marketspace” there would be one company making a lot of money, two making some money, and many losing money. This relates to Bartos’s identification of a bimodal structure in network economies (Bartos, 1996), with a few large businesses and many very small ones. Simply put, in a global environment it is very difficult for smaller nations to create businesses that shape markets and achieve high levels of growth. Some attention needs to be given to the structure of these markets rather than assuming that all kinds of companies can be scaled effectively.

There are a number of ICT advocacy organisations in New Zealand, but the one best placed to respond to these issues is the ICT Taskforce, a government-convened group consisting of a range of industry leaders in the ICT sector. The ICT sector sits alongside biotechnology and the creative industries as one of three key areas on which the government is focusing resources as part of its Growth and Innovation Framework (GIF). The taskforce was charged with developing ambitious strategies to increase the contribution of ICT to New Zealand’s economic growth. Their report (New Zealand Information and Communications Technology Taskforce, 2003) laid down a challenge to both industry and the government to remove the identified barriers to growth and establish 100 companies that each turn over more than NZ$100 million over the next decade. This would help raise ICT’s contribution to GDP from 4.3 percent in 2003/2004 to 10 percent. Developing such large organisations could be challenging with only 16 local ICT companies having annual
sales exceeding NZ$100 million, half of those being arms of multinational enterprises. Some 7,500 companies identify themselves as part of the sector, represented by more than 40 diverse industry groups.

The barriers identified by the taskforce include limited access to capital, lack of management expertise, tax matters, and regulatory issues affecting growth. Interestingly, none of these are ICT specific. The other factor noted is a downward trend in the number of young people studying mathematics and the sciences, though how this relates to the growth of ICT firms is not clear, particularly when the identified shortcomings of many local firms lay in non-technical areas such as marketing and management.

While the goals recommended by the taskforce are interesting, the average New Zealand firm has fewer than five employees, a small customer base and a limited supplier base. For these businesses, generic applications such as email and web browsing (and applications based on this, such as online banking) are an area where significant productivity improvement can be made (Swain, 2003).

On the whole, the taskforce’s recommendations perhaps show the limitations of single-sector thinking about national issues. The industry’s response has been mostly along the lines of “give us money or tax relief and let us get on with it”. However, the New Zealand ICT industry’s track record does not necessarily inspire confidence that it has a clear vision of how benefits for the country as a whole can be achieved. Rather than convening industry associations, there is a clear need to integrate industry, academic, policy-maker and community perspectives on ICT development strategies.

**Government response to the ICT Taskforce’s recommendations**

The government’s response to the ICT Taskforce’s report has been rapid, with a number of projects announced totalling in excess of NZ$50 million in expenditure, including the following. Statistics New Zealand ([http://www.statistics.govt.nz](http://www.statistics.govt.nz)) will prepare a range of new ICT statistics and redesign existing data collection techniques to meet OECD standards. An annual publication of all ICT statistics will be prepared with a view to providing a statistical base for monitoring progress towards the ICT growth target.

The Tertiary Education Commission ([http://www.tec.govt.nz](http://www.tec.govt.nz)) is developing two initiatives to specifically help build the capability of the tertiary education system in response to the taskforce’s report. The first initiative, Enterprise Training for Emerging Industries, explores new models for industry-oriented training with shared agendas between the educational sector and industry. The second initiative, Entrepreneurship and Knowledge Transfer, is specifically targeted at addressing the lack of commercial and entrepreneurial skills among graduates and existing decision makers in business. In a project to increase support for technology (hangarau) curriculums in secondary schools, the initial phase would be to establish a Community of Learning in Technology through consultation and collaboration based in an electronic environment. The community would include classroom teachers, pre-service and in-service educators (including teachers of hangarau in schools), tertiary technologists, technology researchers, technology experts in industry and the Crown Research Institutes.

The Futureintech programme is aimed at raising awareness of ICT as a rewarding career among students, teachers and parents. Students will be exposed to industry role models, and both career advisors and teachers will acquire an improved understanding of the employment potential in science, engineering and technology.

The GIF Sector Project Fund is established to help industry bodies carry out a range of practical projects, including enhancing sector networks and building capabilities such as management and leadership skills.

The ICT Global Executive Development Programme will address the shortage of skilled leaders and marketing/sales executives with the experience to take a company global. It provides mentoring for the chief executives of ICT companies with a NZ$5–$15 million valuation that wish to grow further.

The HiGrowth project ([http://www.higrowth.co.nz](http://www.higrowth.co.nz)) is a charitable trust established to lead the ICT industry’s ten-year growth strategy. It is led by a 5-member board and a 30-strong advisory council comprising a cross-section of industry leaders. Its purpose is to drive the achievement of the growth target through practical initiatives such as building the sector’s human resources, increasing the commercial knowledge base and supporting the sector’s senior executives through improved mentoring and knowledge-sharing networks.

In spite of these initiatives, industry bodies are seeking to improve collaboration with the government on issues such as procurement. Although New Zealand is a market economy, a large proportion of ICT expenditure comes from government funds, and the private sector is keen to gain more control over these projects. Whether this will have positive outcomes remains to be seen.

Overall, the government is promoting three major strategies: first is to “build a stronger pipeline” of ICT companies with an export focus, another is to promote New Zealand as a centre for ICT services, and the last is to encourage greater domestic use of ICT in sectors such as agriculture.

If the above analysis suggests scepticism about the ability of the private sector alone to undertake development in the national interest, the recent decisions of the two main telecommunications operators to halt free peering for domestic traffic bring the reasons into sharp relief. Peering is a voluntary agreement among local Internet networks to exchange traffic with each other for no charge. This has
generally meant that ISPs have not charged for national traffic, only for international traffic. In May 2004, Xtra (the Internet services branch of Telecom New Zealand) abruptly stopped peering at the Wellington Internet Exchange, causing a major slowdown and an increase in traffic charges for the providers of some popular websites. Now TelstraClear, a subsidiary of the Australian telecommunications firm Telstra and New Zealand’s second largest ISP, has announced that from 1 November 2004 it will stop peering completely. This will result in increased charges for sites or networks that want to make their content available to users on either of these main networks, particularly TelstraClear’s. It may even result in certain content not being accessible. The burden will fall most heavily on independent organisations with limited financial resources.

**Shifting philosophies of the government**

A worrying announcement came from the government in 2004 that it had signed a deal with Microsoft to put its software into every school. While the government secured an excellent deal (e.g. schools will pay just NZ$99 a year for Windows Server 2003, about 3 percent of the list price for businesses), the terms of the deal remain secret. There is a concern that the deal merely creates an ongoing market for the US company, when the resources could be better put into open source software and supporting local developers (Gifford, 2004).

New Zealand also distanced itself from many other countries in Asia Pacific by supporting the role of US-based ICANN in controlling the global Internet addressing system. Overall, the government failed to make a proactive contribution to the World Summit on the Information Society, limiting its goals to learning about other countries’ policies and raising New Zealand’s profile on the world stage. A stronger leadership position could have been expected from the government at this important event, particularly given New Zealand’s potential role as a bridge between Asia Pacific and developed countries in the West.

**Key national initiatives**

**Project PROBE (PROvincial Broadband Extension)**

Project PROBE (http://www.probe.govt.nz), a government investment worth tens of millions of dollars, is set to make broadband Internet available to all New Zealand schools and provincial communities by the end of 2004. A joint initiative of the Ministry of Education and the Ministry of Economic Development, PROBE is a unique partnership between the central government, local governments, regional groups and the private sector. The government facilitates the request-for-proposal process among local suppliers and allocates funds to successful private sector infrastructure providers.

Preferred tenders for all 14 Project PROBE land-based regions were announced in 2003, and in 2004 local ISP ICONZ was selected as the preferred supplier for a satellite link for remote areas. The service will run from the IPSTAR satellite operated by Thai company Shin Satellite.

A delay has been encountered in some regions when Woosh Wireless, the selected supplier for four regions, admitted that it would not be able to achieve the ambitious timeline set by the government in three of the regions. The contracts have been passed to Telecom New Zealand (National Business Review, 2004).

**Aotearoa Maori Internet Organisation (AMIO)**

A new Maori organisation, AMIO (http://www.amio.maori.nz) has been established to begin defining what the Internet is to Maori, how Maori are and will be affected, and how Maori culture and identity are impacted by the technology. The group also aims to foresee and predict the long-term impact on Maori society and identity. It is also taking an active role in issues relating to indigenous intellectual property and cybersquatting.

**Local online content**

Commercial content companies continued to drop in number in 2003, with ISPs such as Xtra becoming significant content aggregators. However, there are a few exceptions. One of them is http://biggie.co.nz, a new website for New Zealand’s electronic dance music community. It contains one of the largest online forums and was recently voted winner of the Entertainment section in New Zealand Netguide’s annual awards.

A new service Irirangi.net.nz provides online access to all Iwi radio stations (community radio stations serving certain Maori tribes). This is an extremely significant initiative given the rapid dispersal of tribal members away from their traditional locations to other places within and outside New Zealand. Another important indigenous initiative is Aotearoa Café (http://www.aotearoa.maori.nz), an online community launched in 2003 for discussing issues of interest to Maori.

**Online services**

**E-government**

The government is currently undertaking a review of ICT services across the different ministries to see if a case exists for shared arrangements. At present, each ministry and government agency makes its own decisions on ICT, though limited collaboration on voice and data networks has taken place through the social services ministries. A report was released in March 2004 and is available at http://www.e-government.govt.nz.
INCIS: A legacy with lasting effects

If there is a New Zealand story which highlights the high-risk nature of ICT development, it is the New Zealand Police computer mainframe INCIS (Integrated National Crime Information System). The origins of INCIS go back to 1985, and the request for information from suppliers was released in 1992. An Ernst and Young report noted that IBM had advised the police, prior to contracting, that it was impossible to achieve the technology specified. But the police ignored the advice and proceeded with the contract. The project was halted in 1999 with only 30 percent of it completed, and a budget that had overrun from NZ$95 million to NZ$135 million. In 2000, the INCIS mainframe was sold. IBM and the police settled out of court over who was to blame for the failure. The failure of the project not only hampered police activities but also adversely affected the willingness of the government to undertake ICT development.

The purpose of INCIS was to support operational policing by providing improved information, investigation and analysis capabilities. The ambitious functions for INCIS included management of criminal information, cases and investigations, crime trend analysis and intelligence analysis. The police viewed many overseas police IT systems but decided none were adequate, and they set about building a world-leading IT system with unproven technology.

The INCIS project underwent significant changes in focus over its lifetime ranging from police strategy to financial objectives, and then to a technology project. As the scope of the project developed, it was decided that business process reengineering would be required. This extended the time frame for INCIS’ development significantly, during which time the technology landscape changed markedly.

Further hampering the project’s development was the requirement from the police of a fixed-price contract, despite the scope of work not being entirely clear. This led to the police rejecting a proposal from Andersen Consulting that suggested a high-level integrated design project and proof of concept to clarify the scope of work before a price and specification could be settled. The police were also not prepared to compromise on the technology used for INCIS.

Eventually, conflict arose between the police and the contractor, IBM, over the scope of work and what was included in the initial contract. These disagreements were serious, but they were largely glossed over in status reports from the project director. A government commission of enquiry found that the issues were directly attributable to the police proceeding with the contract before they were ready organisationally and before the technical solution was determined.

In 2000, a commission of enquiry noted the lessons learnt from the INCIS failure and made recommendations. The lessons learnt from INCIS for the commissioning of large government IT projects include the following:

- The business case needs to adequately address technology and risks.
- Overambitious technology should be avoided.
- Technology needs to be firmly fixed at the time of contract.
- An adequate project charter, proof of concept, blueprint, independent quality assurance (IQA), and change control are necessary.
- Business process reengineering should be completed before development.
- Adequate resources in terms of skilled and experienced governance and management are imperative.
- Appropriate governance and management structures should be in place.
- Parties should be prepared for contract and the form of the contract needs to be appropriate.
- Sound quality and risk management processes must be in place.
- Human resource problems and relationships are important and need to be addressed.
- An undue degree of reliance on the contract should be avoided.
- An appropriate structure should be in place for effective approval or monitoring of the project by the government.

The report of the commission of enquiry should be required reading for anyone involved in the commissioning of large ICT infrastructure projects. While New Zealand may not want to boast about this particular instance of “unprecedented ICT development”, the report remains a very useful document to help others avoid making similar errors. The report is available from http://www.justice.govt.nz/pubs/reports/2000/incis_rpt/index.html
The government is exploring other lower-level shared solutions. The full-scale electronic procurement project GoProcure has been devolved into a number of smaller initiatives after failing to get all government departments interested in using the system. The State Services Commission is now focusing on the networked sharing of supplier information rather than a single point of purchasing for vendors working with all government agencies.

In January 2002, the government attempted to gain control of the newzealand.com domain under a legal challenge through WIPO. The challenge was unsuccessful, and the government was forced to pay NZ$1 million to gain possession of the domain (ITworld.com, 2002).

LandOnline

The LandOnline project (http://www.landonline.govt.nz) provides comprehensive information on all land blocks surveyed in New Zealand. It is the first system in the world to combine electronic lodgement of survey data with the ability to access survey data and maps via the Internet. Designed for property professionals, it also makes certificates of title and other land records available to individuals seeking information on their properties.

Connecting Communities

The government sponsored a conference for community-based organisations to discuss strategies for the effective use of ICT and networks (http://www.connectingcommunities.govt.nz). The conference, held in November 2003, covered awareness raising, mapping and building of community strengths, digital storytelling, tools for community groups, technical support, community-based learning and virtual communities. The participants synthesized the experiences in their own communities and produced a road map for communities to use ICT for development.

Public Access to Legislation

The Public Access to Legislation (PAL) project, which will put all acts of parliament and government regulations online, was due at the end of 2002 but remains delayed and under independent technical review. While there are rumours of dispute between the government and the lead supplier, Unisys, both sides claim this is untrue and that the review was initiated as part of a government-wide strategy to commission reviews of all ICT projects that expose it to significant risk.

HealthIntelligence

HealthIntelligence (http://www.healthintelligence.net.nz) is a new model of regional ICT services sharing among the District Health Boards in the Wellington and Taranaki regions. Capital and Coast District Health Board IT manager Andre Snoxall says the board’s IT costs have risen in the past five years from around NZ$5 million to NZ$12 million per annum. More than half of that amount is spent on IT infrastructure. The plan is for the boards to share authentication, helpdesk, email, scheduling, networks, Internet access, health intranet access, office automation, as well as filing and printing services.

Library services

New Zealand’s local libraries (http://www.lianza.org.nz) have joined forces to buy electronic information previously only larger public and university libraries could afford. The deal allows any member of a public or school library to access information from online databases Gale and EBSCO, including magazines, journals, reference books, historical documents, biographies, maps, photographs and graphics, as well as reference databases. The Ministry of Education funded secondary school libraries’ participation. The deal is a great example of opportunities for the government to act on behalf of diverse groups to gain discounted access to international information sources.

Enabling policies and regulatory environment

Changes in the control of “.nz”

InternetNZ (http://www.internetnz.net.nz), previously the Internet Society of New Zealand, took over control of the “.nz” top-level domain from Waikato University in the late 1990s. It created a company known as Domainz to run the registry and sell new domain names. Because this function placed it in competition with other domain resellers, InternetNZ was forced to give over the “.nz” namespace to a professional commissioner, and in 2003 it sold Domainz to Australian registrar Melbourne IT for NZ$2 million. InternetNZ is positioned as advocate for New Zealand’s Internet development, but its functions are not yet clear.

Applications development and support facility

In March 2003, international computer services company EDS received NZ$1.5 million to establish an applications development and support facility in New Zealand. The government grant recognises the highly skilled jobs that would be created by this initiative, and the grant is dependent on those jobs eventuating. The support is an attempt by the government to position New Zealand as a supply of talent cheaper than the USA and more “culturally compatible” than low-cost South and Southeast Asian countries. The move reflects the government’s two-pronged approach to economic development: providing support to growing local companies.
and giving incentives for foreign companies to base large-scale operations in the country.

Local loop unbundling

The Telecommunications Commission led by Douglas Webb was very active through 2003, making waves with its recommendation for local loop unbundling – making the “last mile” of the telecommunications network available for other companies to resell, forcing greater competition for the formerly state-owned Telecom. At the end of the year, Webb announced a retreat from that position in the commission’s final report (New Zealand Commerce Commission, 2003). Australian telecommunications analyst Paul Budde speculated that the decision may have had a political component, with the government perhaps worried about a takeover by Australian telecommunications company TelstraClear if Telecom’s position were weakened considerably (Brislen, 2003a).

The backtracking disappointed many firms who were expecting to install their own equipment in Telecom’s exchanges. Telecom, New Zealand’s largest telecommunications operator and biggest listed company, preempted the unbundling by offering to introduce its own unbundled data service to competitors, who will be allowed to sell a wider range of high-speed Internet (ADSL) services through Telecom’s exchanges, leading to lower broadband Internet prices. Unfortunately, there is little clarity on exactly how this will be achieved and what the costs to Telecom will be.

Pricing continues to be a key issue with broadband access. All ADSL services currently run on Telecom’s exchanges, allowing it to effectively have a monopoly on pricing. Keith Humm (2003) calculates that Telecom’s data caps mean that even a plan with a high monthly fee gives only 30 hours of full-speed use before resulting in significant data charges.

Telecommunications Service Obligation (Kiwi Share)

Telecom’s Kiwi Share has been renamed the Telecommunications Service Obligation (TSO) to reflect a requirement that it provides a mandated minimum level of telephone and Internet services nationwide. The loss it incurs from these services is approximately NZS$65.6 million per year, which in 2004 was split among the major telecom-communications providers based on their share of the market.

The TSO model is currently highly unpopular among telecommunications firms as a way to provide service to commercially non-viable customers (CNVCs). “It is an absurdity that carriers other than Telecom have to fork out a share of Telecom’s costs, even though they could in many circumstances provide a similar or better service themselves without a need for a community subsidy. They should be allowed to compete to do so,” Australian telecommunications analyst Paul Budde weighed in on the matter, saying a total rethink of TSO is needed. “I don’t mind a high TSO if it was to be allocated to build new infrastructure in New Zealand; this should be combined with the Probe initiative. Such a TSO should be totally controlled by the government not by Telecom.” Budde suggests operating a separate fund, paid for by the TSO levy, to build and maintain the CNVC network (Brislen, 2003b).

The government is currently adding a telecommunications relay service as a TSO to facilitate wider participation by the hearing and speech impaired. The Telecommunications Commission is also investigating number portability across different networks.

Open source movement

In 2003, the Government Information Services Managers’ Forum (http://www.govis.org.nz) organised a conference on open source solutions for government. The conference included speakers from IBM, Microsoft, research agencies and government units, who discussed the benefits and challenges of developing open source software for government agencies. The conference is a marker of increased awareness about open source software in New Zealand, which has been assisted by the official endorsement of the Linux operating system by large multinational enterprises such as IBM.

Research and development

The Foundation for Research, Science and Technology (http://www.frst.govt.nz) is contracting with two academic/industry groups to form ICT research consortia. It is looking at subsidising two such consortia. One of them, the Medici, will explore new graphical ways of presenting business information and facilitating collaborative working. The other consortium will deal with health IT. The consortia bring together a number of private companies and public sector research organisations. The private companies will contribute at least NZ$1 million in total to each consortium.

References


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Philippines

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Overview

The Philippines continues its transformation into a knowledge-based economy with significant policy and regulatory developments. A new Commission on Information and Communications Technology was established in January 2004, and a new Optical Media Law that adds teeth to the effort to combat digital piracy came into force in February 2004. In addition, the National Telecommunications Commission (NTC), the regulatory body for the telecommunications and broadcast industries in the Philippines, has issued rules for WiFi, VoIP, and cellular phone number portability. It has got involved too in the administration of the ".ph" domain name. Significantly, the courts have also weighed in on ICT regulation with their rulings on telephone billings and a domain name dispute.

The government, as the single biggest ICT consumer, continues to move forward with its e-government efforts. Notable are its mobile government initiatives, an e-government fund and continuing progress of government agency websites.

The mobile phone industry remains the shining star of the Philippine ICT sector. Competition, innovation and the continuing Filipino love affair with the cellular phone have pushed mobile phone ownership to more than 25 percent of the population – six times higher than wired phone penetration.

Industries

The Philippines is proof that competition in the telecommunications sector leads to better and innovative services at lower costs. Before competition was introduced in the country in 1993, telecommunications services were the pits. In 1990, the Department of Transportation and Communication announced the National Telecommunications Development Plan 1991–2010, which targeted a teledensity of 2.4 by the year 2000 and 3.5 by 2010. But by 1998, a mere five years after the introduction of competition, the targets were surpassed. Today, teledensity is at 10. In fact, currently there are more telephone lines than there are subscribers.

Even more impressive is the effect of a liberalised and competitive telecommunications market on the uptake of cellular phone services. The Philippines is among the countries with more cellular phones than fixed/wired phones. And this is not simply due to the deterioration of fixed/wired phone services. Between 1999 and 2002, the number of fixed/wired phones increased by 446,491, making the Philippines the ninth best performer in the Asia-Pacific region in terms of the absolute number of new lines for the period. However, in the same period, cellular phone subscribers increased by 11,366,250! This made the Philippines the fifth best in the Asia-Pacific region in terms of the absolute number of new cellular subscribers and seventh best in terms of percentage increase (at 399 percent).1 At the end of 2003, there were close to 22 million mobile phone subscribers.2

Cellular phone services in the Philippines started in 1991 using analogue technologies. But analogue’s dominance did not last. Problems related to cloning and poor billing by service providers boosted the shift to 2G. By 1999, GSM was already the new standard in the market.

The shift to digital technology, the brutal competition for market share, and the 1997 financial crisis led to consolidation in the cellular marketplace. The five original cellular providers have been reduced to two: Smart Communications, which had 54 percent of the market by 2003, and Globe Telecommunications, which had 46 percent. In the middle of 2003, a new cellular phone provider, Sun Cellular, entered the fray offering lower-priced SMS and voice services.

Because of the intense competition for subscribers, the mobile service providers continue to extend their reach by opening new cell sites in remote areas. Smart claims that its 4,000 cell sites provide coverage to 80 percent of the entire archipelago.3 The providers have also been upgrading their networks with EDGE technology. Smart has announced that
it will continue rolling out more multimedia services over its EDGE network.

Widespread marketing of multimedia mobile phones in the consumer market was also seen in 2003. Subscribers, equipped with the latest models, are able to surf WAP sites, access websites via GPRS, and send image, audio and video files via MMS. But given the high cost of sending MMS messages, SMS is expected to remain the messaging service of choice for Filipinos in the foreseeable future.

SMS was introduced in 1994 by Globe as a free service. It has since become an important source of revenue for cellular service providers. A 2003 Pulse Asia Survey reveals the depth of the Filipino love affair with SMS: 94 percent of Filipino cellular phone users send text messages via SMS, and an amazing 70 percent of these texters send as many as 10 messages a day, with another 13 percent sending 11–20 messages per day. This means that there are almost 21 million texters in the country with 14.5 million of them sending as many as 10 messages each per day and another 2.7 million sending 11–20 messages per person a day.

A recent innovation introduced by cellular service providers is over-the-air reloading or topping up of prepaid credits. This service was launched in the Philippines in mid-2003 by Smart through its product dubbed “e-load”. In the past, prepaid users (comprising approximately 95 percent of mobile phone users) had to buy plastic “cell cards” with values of Php 300–1,000 (around US$5.5–$18) to load credits into their mobile phones. These cards are available in telecommunications shops and convenience stores. With e-load, all a subscriber needs to do is go to a retailer and state his or her telephone number and the amount to be topped up.

After only four months, e-load transactions exceeded one million a day. It had become the preferred way to top up credits – two-thirds of top-ups by prepaid subscribers were done via e-load. What makes e-load popular is not just convenience but the introduction of smaller top-up amounts. Before e-load was introduced, the smallest credit amount was Php 300. Today, Smart subscribers can buy credit amounts as low as Php 30, 60 and 115. The lower amounts not only help existing subscribers to overcome a significant barrier in paying for their credits, they also reduce the barrier for new subscribers, particularly those in the low-income brackets, who make up the greater part of the population.

Another innovation introduced into the market is dubbed “pasa-load” (pass a load) or “share-a-load”. The service allows subscribers to transfer mobile phone credits directly to another subscriber within the same telephone network. Parents can now top up the phone credits of their children from their own mobile phones. Parents are able to give or lend each other phone credits to send SMS messages or make calls. But pasa-load/share-a-load is not just about convenience, it is also creating a new “currency” among youths. For example, students who need cash can “sell” a portion of their prepaid credits (probably paid for by their parents via e-load) to any one of their friends in the same telephone network with pasa-load.

In 2004, mobile service providers introduced cash services. Smart’s “cash padala” (send cash) allows subscribers to send “money” to another Smart subscriber via SMS. The “money” can be redeemed at any Smart partner office or outlet. This service specifically targets overseas Filipinos who send remittances to their families in the Philippines via banking and non-banking channels. On the other hand, Globe’s “G-Cash” lets subscribers pay for purchases in participating stores via SMS. Prepaid subscribers can buy credits from Globe’s authorised dealers.

**Policy and regulatory environment**

A number of important changes in the policy and regulatory environment affecting ICT development were implemented in 2003 and 2004.

**Commission on Information and Communications Technology (CICT)**

Foremost was the creation of CICT as the government’s primary policy, planning, coordinating, implementing, regulating and administrative entity to promote, develop and regulate integrated and strategic ICT systems as well as reliable and cost-efficient communications facilities and services. CICT has the mandate to carry out the following tasks:

- Ensure a policy and legal environment that will promote a level-playing field and healthy competition, public and private sector partnerships, strategic alliances with foreign investors, balanced investments between high-growth and economically depressed areas, the growth of ICT industries, and broader private sector participation in ICT development.
- Foster and accelerate the convergence of ICT facilities.
- Ensure universal access and high-speed connectivity at a fair and reasonable cost, as well as the provision of services in areas not adequately served by the private sector.
- Foster the widespread use of emerging ICT.
- Establish a strong and effective regulatory system that will ensure consumer protection and welfare as well as protect the privacy and confidentiality of personal information.
- Promote the development of ICT expertise in the country’s human capital.
- Encourage the use of ICT in support of the development and promotion of the country’s arts and culture, history, education, public health and safety, and other sociocivic causes.
- Sustain the development of the nationwide postal system as an integral component of the overall development of ICT in the country.
CICT will take on the ICT-related functions of several government agencies, including the Department of Science and Technology and the Department of Transportation and Communication.

President Gloria Macapagal-Arroyo signed an executive order in January 2004 creating CICT as an interim measure. It is hoped that a Department of ICT, which the ICT private sector has been lobbying for since 1992, will soon be created through legislation. Prior to CICT, the Information Technology and E-Commerce Council was the highest policy-making body on ICT concerns.

**Optical Media Law**

President Arroyo signed into law Republic Act No. 9239 or the Optical Media Law in February 2004. The law imposes strict rules for the manufacture, reproduction and sale of optical discs with the intention of deterring digital piracy. It also provides for the creation of the Optical Media Board, which will issue licences for the import, export, acquisition, sale or distribution of optical media, manufacturing equipment, parts, accessories and manufacturing materials. The law specifies measures for regulating the use of optical media to distribute pirated material. It further makes clear that the measures are meant to regulate uses “for commercial purposes”, taking exception to uses for personal or non-commercial purposes.

While applauded by the mainstream entertainment industry, the passage of the law has raised some concerns among the ICT community. Writing to the Philippine Cyberspace Review email list of IT professionals, Roy Cruz, a software developer and independent songwriter, raised the concerns of independent filmmakers and songwriters about the possibility of encountering legal hurdles when distributing their works. The more telling critique of the law is articulated by Leo Magno, an ICT journalist. Magno points out that, by focusing on the regulation of the medium – the optical disc – in combating piracy, the law reflects “the entertainment industry’s fear of technology and how digital content can be reproduced with impunity. It is this fear, more than the fear of losing what they claim to be millions of dollars or pesos in potential revenue, that fuels their perceived immediate need to enact a tougher law on digital media. . . . It is the fear of losing control. It is the fear of consumers, practicing their right to fair use, to utilize technology to organize and file their digital assets on their own.” He counsels that “what the local media industry needs to do now, in the face of technological change, is to come up with innovative sales and distribution methods instead of trying to stop a tsunami of technological waves”.

**Court rulings on ICT issues**

In June 2000, NTC issued a memorandum detailing rules and regulations on billing for telecommunications services. Among other things, the rules included strict schedules on delivery of billing statements, grace periods for paying bills, and verification of the address of each buyer of prepaid SIM cards. The memorandum also sought to change the unit of billing for cellular phone calls to six seconds per pulse instead of one minute per pulse. The various telecommunications providers affected by the rules filed a joint appeal asking NTC to reconsider. The appeal was later elevated to the Supreme Court. In a decision issued in November 2003, the Supreme Court decided in favour of the providers.

Another major court ruling relates to the first and most controversial domain name dispute in the country. In 2000, the local telecommunications giant PLDT filed a P1.35 million (approximately US$25,000) lawsuit against Gerry Kaimo alleging that he was violating the company’s intellectual property over the PLDT trade name by publishing a website with the domain name pldt.com. Adding salt to PLDT’s wound (which uses the domain name pldt.com.ph), Kaimo had also published material critical of PLDT on his website. Unfortunately for PLDT, the court found that “PLDT has not been able to show its entitlement to the relief prayed for”. An appeal can be expected from PLDT.

**WiFi regulation**

Unlike in the USA and other developed countries, in the Philippines a licence is required for using the WiFi frequency. In the first half of 2003, Globe Telecommunications started deploying WiFi hotspots in the country. In June the same year, an NTC official was quoted as saying that commercial WiFi services, and even Bluetooth use, were still “illegal” in certain regions in the Philippines. This claim stemmed from the fact that the frequency used for WiFi was already licensed by NTC to utility firm Manila Electric Company (Meralco) as far back as 1993. Meralco uses this frequency for internal communication and supervision of its facilities in Metro Manila, Central Luzon and Southern Luzon.

Following public forums that NTC conducted in a bid to determine the best resolution for the use of the frequency, regulations were issued governing WiFi use in the Philippines that effectively lifted the ban on the use of the 2.4-GHz frequency. The guidelines allow private entities to deploy WiFi regulation

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Unfortunately, WiFi has not been used by NGOs and civil society groups for developmental purposes as in Indonesia. Current regulations, particularly the need to secure NTC permits and licences for outdoor equipment, will probably hamper the deployment of WiFi for developmental purposes.

VoIP regulation

VoIP is a controversial issue in the Philippines. Telephone companies are wary of its potential to reduce their revenues, while ISPs are excited over the possibility of increased revenues by offering the service. Presently, the government seems to favour the former. NTC has released draft guidelines ruling that only telecommunications companies will be allowed to offer VoIP services.16 ISPs, which are categorised as value-added service providers, will not be allowed to do so. Private companies are allowed to use VoIP only internally and not as a chargeable service outside the company.

A nationwide Internet café chain, Netopia, has been offering international calls via VoIP even before the NTC guidelines were written. International calls made through Netopia are charged only US$0.10 per minute in contrast to US$0.40 per minute for calls made using mobile or land-line phones.

Domain name registration

The increasing significance of the Internet in social, economic and political life has made the administration of the “.ph” registry an important issue. There has been only one registry right from the start. It was headed by Joel Disini, who became the registrar by the simple fact that he was the first person to apply for the job. Over the years, people had become dissatisfied with the way Disini was managing the registry. Some complained that registration for “.ph” domain names was more expensive than for the domains “.com”, “.net” and “.org”. Registering a “.ph” domain name costs US$70 for two years – almost three to four times the price of registering a “.com” domain name. The issue came to a head when Disini announced that he would market “.ph” to telephone companies the way that “.tv” of Tuvalu was being marketed to television companies.

The controversy generated by Disini’s plan brought the government into the picture. After numerous consultations with all relevant stakeholders, the government announced in 2003 an alternative arrangement to govern the registry. The new guidelines stress that the “.ph” domain is a national property and that the government has jurisdiction over policies and decisions related to the administration of the Internet domain.17 NTC was given an “oversight” function over the “.ph” domain name registration. Disini, however, retains the registry and remains the registrar. But to ensure that all relevant interests are protected, the government, with the consent of Disini, has created an advisory board to the registrar.

Number portability for cellular phones

Early in 2004, Congress urged NTC to draw up new regulations that would allow cellular phone subscribers to keep their mobile phone numbers even when they switch operators. This facility, known as number portability, has been in place in Hong Kong since 1999. The Federal Communications Commission also recently approved a number portability scheme for the USA.

However, a study by one of the mobile phone operators indicates that number portability may not be an important issue in the Philippines.18 The findings show that number portability has a larger impact in countries where the postpaid subscriber base is more dominant than the prepaid base, which is not the case in the Philippines, where about 90–95 percent of cellular phone owners are prepaid subscribers. Furthermore, Philippine cellular subscribers have virtually no loyalty to operators. A number of them have two cellular phone numbers, one from each provider.

E-government

A June 2004 study of the Congressional Oversight Committee on eCommerce examined the state of e-government in the Philippines by looking at the national government agencies’ use of the Web, email, and SMS-based services to serve the public.19 It shows that, of the 24 departments and constitutional bodies assessed, all of them have websites that are linked to the government portal (http://www.gov.ph). All these websites provide basic information about the agencies, 83 percent allow the downloading of forms, 79 percent also serve as a channel for public complaints, 75 percent provide information on procedures, and only one site allows financial transactions.

Almost all the 24 agencies studied (96 percent) have email access, and 79 percent of them publish the email addresses of senior officials on their websites. But given the low level of Internet penetration, very few people are able to avail themselves of this opportunity to contact government officials via email.

A more promising development in terms of citizen-to-government (C2G) communication is the use of SMS by the government. Over half of the agencies (54 percent) provide SMS-based services that act as a channel for citizens to register complaints (42 percent), provide information (25 percent), and serve as a direct line of communication with the head of the agency such as the secretary or minister. An example of such an SMS-based service is Text117, which is a channel for Filipinos to report crime and other illegal activities to the police by text. Text USOK (Smoke) is a conduit for citizens to participate in the government’s anti-smog campaign by reporting, via SMS, smoke-belching vehicles plying the streets of Metro Manila (see sidebar).
Government websites

Government websites are the bright spots of the Philippine e-government initiative. In the 2003 UN Global E-Government Survey of 173 of the 191 UN member states, the Philippines ranked seventh overall in the web presence index. The other countries in the top ten were (1) the USA, (2) Chile, (3) Australia, (4) Mexico, (5) UK, (6) Canada, (8) Singapore, (9) Denmark and (10) Sweden.20

Aside from the UN survey, the 2003–2004 networked readiness index of the World Economic Forum gave the Philippines a favourable rating for its government’s online presence, ranking it 49th out of 102 countries. In terms of the sophistication of online government services, the Philippines was ranked at 20th place. Significantly, it was one of only eight middle-income countries that qualified for stage 3, or transaction stage, in the World Economic Forum’s Survey of National Government Websites.21

It is not surprising that the Philippines rates well in international surveys of government web presence. President Arroyo gave a directive in April 2002 requiring all government agencies to reach at least stage 1 of the UN–ASPA (American Society for Public Administration) five stages of e-government. In July 2003, the National Computer Center (NCC) released a new set of guidelines for government compliance to the Electronic Commerce Act that aim to guide government agencies towards stages 2 and 3 of the UN–ASPA prescribed standard.

NCC also monitors the websites of government agencies. Its most recent report states that 99.5 percent (373 out of 375) of the national government agencies were online as of end 2003. Of the 373 agencies with websites, 122 or 32.7 percent were in stage 1 (emerging web presence), 157 or 42.1 percent in stage 2 (enhanced web presence), and 91 or 24.4 percent in stage 3 (interactive web presence). The remaining 3 agencies were in stage 4, or transactional web presence, which means that users are able to make complete transactions via the website. These agencies were the Bureau of Internal Revenue, the National Statistics Office and the Securities and Exchange Commissions. No agency websites were in stage 5 – fully integrated web presence.22

In September 2003, NCC reported that the local governments in all the country’s 79 provinces, 115 cities and 1,500 municipalities have a web presence. This is a significant development as the same agency reported that in June 2002 only 51 percent of provincial and city governments

Mobile government in the Philippines

M-government is a subset of e-government. It is the use of mobile devices and/or wireless technologies to improve government operations and to empower citizens. The advantage of m-government over traditional e-government is that it makes public information and government services available to citizens and officials anytime, anywhere. In developing countries where there are more cellular phones than Internet connections, most citizens would experience the benefits of e-governance through m-government.

As the Philippines is the self-proclaimed SMS capital of the world, it is not surprising that SMS or texting would find its way into governance. As in other parts of the world, SMS is being used to improve communication between government and citizens as well as to engage the citizenry in governance. It is estimated that over half of the Philippine government departments and independent commissions provide SMS-based services.

Citizens who used to send mail and telegrams to the President through the post office can now send SMS messages to President Gloria Macapagal-Arroyo through a service called TXTGMA. Overseas Filipino workers and their relatives in the Philippines can seek assistance from the Department of Foreign Affairs through TXTDFA.

To encourage citizens to help in the battle against crime, the Department of Interior and Local Government has set up a centralised emergency and crime-reporting service called Emergency 117. Metro Manila residents can report crimes and emergencies, as well as make complaints about abusive law enforcement officials, by calling or sending SMS messages to 117.

SMS is also in the service of environmental protection. Citizens can bring their concerns to the Department of Environment and Natural Resources through a service called DENR@YourService. An NGO in partnership with the Land Transportation Office is asking citizens to help enforce the Clean Air Law by reporting smoke-belching vehicles on the streets of Metro Manila via SMS.

SMS is also deployed in public health services. During the SARS epidemic, the Department of Health established a SARS hotline for people who wanted to know more about the disease or make a report about it.

The Department of Education and the Civil Service Commission have deployed SMS to improve the internal operations of the government. Their respective SMS-based services are good examples of how m-government can be used to involve various sectors of the society in governance. The DETxt service was introduced in February 2003 as a new channel of direct communication between the various stakeholders of the education sector with the Secretary (Minister) of Education. It is also used to fight corruption in the Department of

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and 3 percent of municipal governments had websites. In 2004, NCC’s target was to upgrade local government websites from static to enhanced or interactive web presence.23

Aside from this initiative for e-governance in local government units (or eLGU), NCC is developing web information systems, including the real property tax system, the business permits and licensing system and the treasury management systems. This eLGU initiative is not only an effort to promote a common standard in e-government for local governments, it is also a big boost to the free and open source software movement in the country as NCC is developing these systems using open source technology. NCC’s eLGU efforts received a boost when they were allocated Php 100 million from the e-government fund.24

E-government fund

In 2003, the Department of Budget and Management, in compliance with an executive order from the Office of the President, created the e-government fund. Under the 2003 national budget, the e-government fund amounted to around Php 4 billion. Close to half of the amount has been allocated to eight priority projects of various government agencies. The projects earmarked include a portal for the more than three million overseas Filipino workers, a national business registration system, automation of import declaration, a science and technology e-library and an e-government portal. Although the e-government fund accounts for only 0.08 percent of the national budget, it supports only projects that involve two or more agencies.25 The funds for the computerisation projects of national government agencies remain within each agency’s control and are not part of the e-government fund.

E-elections

In 1997, the Automated Election Law was signed, which required the Commission on Elections (COMELEC) to conduct massive computerisation of its voting and registration system.26 In the following year, COMELEC conducted partial automated elections in the Autonomous Region of Muslim Mindanao as a pilot test of computerised elections.

In 2003, COMELEC invited bids for a computerisation contract to install a nationwide system in time for the national elections in May 2004. The bidding and awarding of the

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Education. A good example is its deployment in the Text Book Count Project, which was implemented to ensure the delivery of 37 million textbooks and teachers’ manuals worth Php 1.3 billion. The elementary and high school textbooks and manuals are to be distributed within 5,623 school district offices all over the archipelago. The project was jointly developed and implemented as a partnership between the Education Department, civil society organisations and the private sector (book publishers and freight forwarders) to prevent “ghost”, or non-delivery of textbooks. SMS has become the major communication line of the parties involved in the project. Ordinary citizens are also able to report to DETxt anomalies in textbook delivery. This texting service has emerged as the preferred communication channel because it allows fast exchange of information and thus results in immediate action.

The Civil Service Commission (CSC) launched TXTCSC to provide citizens with a channel to complain, suggest, commend or inquire about CSC matters and any other government matters, giving them a weapon to fight against a corrupt and inefficient bureaucracy. TXTCSC seeks to become not only a text-based information service for the whole government but also an immediate response system at the service of the citizens. In its vision, if a citizen is not given proper attention in the course of transacting with a government agency, he or she can report the matter on the spot (via SMS) to CSC, which will then send a representative to provide the citizen with the appropriate assistance.

While its deployment in governance in the Philippines is perhaps the most extensive in the world, SMS is not being deployed in a number of critical areas. There are no SMS-based applications for m-transactions (like Norway’s SMS income tax returns) and m-payment. Furthermore, using SMS for voting (like in local elections in the UK) has not been explored. In sum, while the Philippines receives high marks for encouraging citizen activism, there are still a number of important SMS applications that have not been considered which can facilitate citizen–government transactions and enhance citizen participation.

It is also worrying that there seems to be no government-wide m-government strategy. At present, each agency develops its own applications as it sees fit, and there is no central portal for all these services. Consequently, there are many different numbers for all these services, which may lead to confusion and frustration.

M-government in the Philippines has proven wrong the belief that citizens are unwilling to pay for government services. Filipinos are not only paying to get basic information needed to deal with the bureaucracy, they are also willing to spend money to bring their concerns before the appropriate officials.
project was controversial from the start. In January 2004, six months after the project was awarded and barely four months before the national elections, the Supreme Court ruled that COMELEC “awarded the subject Contract not only in clear violation of law and jurisprudence, but also in reckless disregard of its own bidding rules and procedure”. It ordered that the election computerisation effort be stopped and the polls be reverted to manual counting.

This reversion to manual counting contributed to the agonisingly slow vote count in the 2004 presidential elections. But it is important to note that the Supreme Court questioned the credibility of the bidding process, not the automation of elections. The computerisation of elections is high on the political agenda of President Arroyo.

**Initiatives**

The First Philippine Development Innovation Marketplace showcased the innovative development ideas of civil society groups. Out of about 1,800 submissions, about 100 ideas were selected and showcased during a two-day exposition. Among them were the Computer Education on Wheels and the Entrepreneurship for the Masses programmes.

The Bagong Henerasyon (New Generation) Foundation plans to set up a computer learning centre on wheels to provide free computer skills training in a formal school setting to out-of-school and out-of-work youths. The idea is to bring the school to the most remote and depressed areas in the country using a mobile computer laboratory set up in a container van. It will be equipped with 20 computers complete with the necessary teaching tools. The van will stay parked for five weeks in each location to train at least 300 youths in basic computer and livelihood skills. The training and certification will be provided by an established computer education centre.

In another initiative, the Let’s Go Foundation proposes to package audiovisual presentations and programmes on entrepreneurship in VHS tapes and VCDs. VHS tapes and VCDs are widely used even on remote islands in the Philippines. With the entrepreneurship videos, the foundation aims to instil an entrepreneurial spirit around the country, as well as equipping its audience with appropriate skills and knowledge required for becoming a successful entrepreneur.

The Philippine Center for Investigative Journalism – a pioneer in investigative journalism in the country with a record of exposing and fighting corruption in government – launched an information website called i-site (http://www.i-site.ph). The site provides information such as government structures, the assets of government officials, the family, businesses and other interests of bureaucrats, their legislative performance and other election-related facts. Original documents not ordinarily available to the public, such as government reports, are also provided.

A pioneering effort to use SMS in the development community is Tambuli Txt. The Foundation for Media Alternatives, a Filipino NGO, developed Tambuli Txt to provide civil society organisations an SMS communication platform to help them strengthen their networks, enhance community building, and strengthen the social capital in the country. Tambuli Txt broadcasts development-related content using a system that allows simultaneous delivery of text messages (of 160–320 characters in length) in real time to very large numbers of recipients who have access to mobile phones. Messages are sent to a server and, upon editorial approval by designated content managers, are then transmitted simultaneously to the subscribed members of a particular group. This process is similar to the production of a newsletter for dissemination. The system is effectively an SMS newsletter. Subscribers are charged the normal value-added service rate for wireless content (Php 2.50 per message).

**Trends**

The fresh electoral mandate given to President Arroyo augurs well for the development of ICT in the Philippines. In her June 2004 inaugural speech as the 14th President of the Philippines, she identified ten goals that she hopes to achieve by 2010. Significantly, digital technologies and their widespread use are explicitly identified as necessary in reaching three of those goals, which are education for all children in computer-equipped schools, connecting the country through transportation networks and digital infrastructure, and automation of the election process.

Even if President Arroyo did not give prominence to ICT in her inaugural address, her past support for ICT development would still have given ICT-for-development advocates reason to cheer her continuation in office. In her first three years in office, Arroyo had been very supportive of ICT-for-development efforts, exemplified by her assumption as chair of the Information Technology and E-Commerce Council, the public–private body that formulated ICT policies in the country. As was noted earlier, she also created the Cabinet-level CICT as well as the e-government fund.

While support from the highest level for ICT initiatives can be expected, the precarious fiscal position of the government might negatively impact on ICT development. It is not unlikely that there will be reduced government expenditure for e-government projects, but the fiscal challenge can also be an opportunity to show how deployment of ICT can make a difference to revenue collection in particular and solving the fiscal crisis in general.
Notes


3. Ibid.


29. Tambuli is a horn used by traditional Filipino rural communities to alert their people to community meetings and to danger.

30. GMA’s Variations on the Same Theme, Philippine Daily Inquirer, 1 July 2004, 1.
Overview

A number of initiatives have been introduced in the ICT sector after a new government took office in November 2002. The new government has continued to give the sector high priority for development. It has been supporting ICT development via a two-pronged strategy. The first part of the strategy aims at generating work for the local ICT industry, which is still reeling from the 2001–2002 economic downturn. The second part sets out to help small and medium enterprises embrace ICT to enhance their performance and competitiveness. At the same time, these enterprises, as well as public sector organisations, have come to appreciate that ICT can enhance productivity. Some of these companies have set up office LANs and websites and adopted ICT applications.

The Internet has become an essential tool for business communication. The use of broadband services has started to grow in homes and offices located in major cities. This trend is expected to accelerate. Efforts to network the country continue, and so far over 1,800 towns and cities have been plugged into the Internet backbone.

The telecommunications sector remained the focus of attention during much of 2004. The growth of cellular networks accelerated during the year resulting in a doubling of subscribers. Cellular phone subscribers are expected to surpass fixed-line phone users before the end of 2004. The year has been rightly regarded as the “telecommunications policy year” as it saw key policy changes taking effect. The fixed-line telecommunications deregulation policy was announced, formally bringing to an end the incumbent operator’s monopoly and setting the stage for the opening up of the sector to major investors. Two new cellular licences were awarded in April 2004.

The initiatives to develop local online content and promote the use of local languages online also gained momentum. Local-language newspapers continue to lead in developing local-language online content as well as introducing innovative services such as online news delivery via cellular phones.

The year also saw some revival of the ICT industry, specially the outsourcing segment. The companies that survived the downturn have emerged more focused, having learnt from their past experiences. New firms have also sprouted to capitalise on the new opportunities in outsourcing. A number of them set up call-centre operations to provide back-office services to foreign-based companies. This segment of the ICT services market is expected to grow in the years ahead because of favourable fundamentals.

Looking back at the early efforts to promote the ICT sector, it is found that they have not been able to achieve their objectives. In fact, the sector appeared to have shrunk during the first half of 2004 when a number of ICT companies folded. This was due primarily to the latent effects of the global dotcom crash and to geopolitical insecurity. The e-commerce and e-government initiatives, which represented the core of the ICT industry development strategy in 2000–2001, were not able to achieve any visible success either, owing to the inertia in revamping official processes and systems. Nonetheless, the pilot programmes started in these critical areas are likely to act as agents of change for the future.

Meanwhile, the Human Resource Development Initiative has achieved mixed results. Universities and other educational institutions have been upgraded, and a critical mass of students has been trained in various facets of ICT. However, the downturn, coupled with the delay in providing assistance to the industry is creating a growing mass of unemployed ICT workers.

Online services

Although the government continues to be the leading enabler of online services, the private sector has also begun to provide services online. These services include online banking and stock trading, which have emerged as successful examples of e-commerce.
E-government

The official government portal (http://www.pakistan.gov.pk) was launched to provide citizens with information on the government, its activities and its services. It currently offers about 400 Mb of information from various official sources and is expected to grow at the rate of 100 Mb per month.

The portal was followed by the launch of http://www.forms.gov.pk, from which about 500 official forms can at present be downloaded. More forms will be made available over time. At present, the system does not allow online submission of digitally signed forms, but plans are underway to make this possible in future.

The government is also in the process of making its land and property record management system accessible online. People living in rural areas, and often even urban residents as well, have long faced a multitude of problems in the transfer and inheritance of land and property. Disputes relating to land and property records have multiplied in the past 25 years and now account for almost half of all court cases relating to land and property ownership and transfer. The situation is due to the archaic land record management system, which was first implemented in the 18th century during British rule. The old manual system is cumbersome and prone to manipulation, corruption and extortion by functionaries. It also fails to provide the government with meaningful data for planning purposes. The system could not be improved in the past despite repeated attempts to reform it because of various reasons, including the lack of ownership of the process, inadequate technology and a lack of foresight.

A new system has now been developed and is undergoing trials in the province of Punjab. Early results from the trials indicate that it is likely to revolutionise the way land records are managed. The software is based on a standard Urdu interface. The new system mimics the administrative processes of the manual record-keeping system currently in use, thereby making it user-friendly to the revenue officers who will be operating it. Successful implementation of this system will likely emerge as the most effective indigenous application of ICT addressing one of the biggest administrative problems in the country. It is hoped that it will also help to bring about transparency and efficiency and to reduce corruption throughout the country in matters relating to land and property.

Meanwhile, the tax department, capitalising on the potential of ICT in data management, has mandated that certain tax information be filed electronically. Plans are also underway to roll out a public key infrastructure following the establishment of the Certification Council in 2004.

E-commerce and e-business

E-commerce is an area that has lagged behind. Despite various enabling measures being taken, such as the implementation of the Electronic Transactions Ordinance 2002 and the establishment of the banking data communication network, significant large-scale e-commerce activities are still lacking.

The stock market boom, however, has facilitated online stock trading activities after a number of stockbroking firms developed their own systems for online trading. This service has received enthusiastic response across the country. Its success has led to the development of other innovative applications, such as the provision of online stock market information on GPRS cellular phones, mobile commerce applications for bill payment, and inventory and salesforce management using PDAs.

Banks and other financial institutions have also found ICT helpful in upgrading their delivery of services to customers. All banks are now connected to one of the two national ATM backbones.

Habib Bank, the largest state-owned (now partially privatised) commercial bank in the country, operates more than 1,100 branches throughout the country. Some of the branches are located in areas that lack basic telecommunications infrastructure. The bank has faced the perpetual challenge of collecting banking data from these remote

Online stock trading takes off

The Karachi Stock Exchange introduced in 2003 AKDTrade.com, the country's first online stock trading system. Industry observers were at first sceptical about the system given the lack of an e-commerce infrastructure and limited reach of the Internet in the country. However, the system has proven to be remarkably successful; and since its launch, two billion shares have been traded online, exceeding Rs 100 billion (US$1.7 billion) in total value. This initiative is a clear demonstration of the immense potential that e-commerce has even in a country with an underdeveloped telecommunications infrastructure. AKDTrade has also introduced Pocket Stocks, a cellular phone application that provides live stock quotes to Ufone cellular subscribers.

The popularity of AKDTrade has prompted other companies to launch online stock trading services. At least five companies have done so, and more are in the pipeline. This success has given e-commerce activities in the country a major boost.
branches and updating their records in a timely manner. Capitalising on the expanded Internet connectivity in the country, the bank developed an innovative system called SIMEX (Secure Internet/Intranet Managing Exchange) to gather data on a daily basis from its branches throughout the country. This new system also helps in the intelligent consolidation of data gathered at the head office of the bank and in the secure transfer of information between the branches and the head office via VPN connections protected by public and private key encryption. The system has built-in intelligence that does not allow the branches to send data to the central repository until the branch accounts are balanced at the end of the day, thereby minimising errors in data entry, reporting and transmission to the head office. This innovative system has helped to improve the efficiency of the bank’s operations. A project of this magnitude would have been inconceivable even two years ago. Its success has now encouraged numerous other organisations that operate branches in various parts of the country to consider similarly innovative systems to improve their operations.

Distance education and e-learning

E-learning has also lagged behind in terms of the level of enrolment. The downturn in the ICT industry and the corresponding decline in employment opportunities have affected enrolment for IT education across the board, including distance education programmes.

Industries

The ICT sector was perceived as a major driver of Pakistan’s economic growth at the turn of the millennium. It was expected that businesses would capitalise on the boom in outsourcing and, consequently, the telecommunications market would expand. However, the sector has not lived up to expectations. The effects of the economic downturn and deflation of 2001–2002 have lingered right through 2004. Fortunately, some specialised ICT companies survived and, after restructuring, began growing again in the second half of 2003.

The offshore call-centre industry was active throughout 2004, with at least 15 new centres of various sizes set up primarily to provide back-office services to companies based in Western Europe and North America. Although this sector is still in the early stages of development, the timing seems to be right, as an increasing number of multinational companies are considering offshoring their back-office functions in order to trim their operating costs. The government has also been forthcoming with support for the industry and readily addressed key problems such as unreliable connections and office space shortage. Pakistan is now perhaps the only country in the region where the incumbent telecommunications operator is mandated to provide service-level agreements for international connectivity to call-centre operators as well as free back-up connectivity on satellite and submarine fibre optic networks.

Virtual university’s take-off delayed

The launch of the Virtual University was considered a major milestone in the field of ICT-related higher education. The project envisioned a modern platform for distance education using broadcast media and the Internet to deliver high-quality education throughout the country and build a critical mass of ICT professionals.

The Virtual University potentially addresses the critical shortage of ICT expertise in the country with the innovative concept of bringing scattered teaching resources onto a single platform and then making them available to students across the country, as well as to students overseas, all at a very affordable cost. Students interact primarily through the Internet with faculty members and learning resources while lectures are delivered through television broadcasts or video recordings.

The futuristic vision of the Virtual University will take time to realise as it has yet to generate the required momentum. Its enrolment is less than a third of what was projected for 2004. This is attributed to a number of factors. Firstly, the global downturn in the ICT sector and the resulting reduction in the number of jobs in the industry has not motivated students to enrol in the numbers originally anticipated. Secondly, the student support system of the Virtual University needs to be refined in terms of improved interaction with faculty members and local coaching arrangements where students are able to interact face-to-face with faculty members or tutors. Other barriers include course structures which do not allow professionals to sign up for its programmes and possibly undergraduate programmes that are not suited for implementation in a distance learning mode.

The project therefore has not yet achieved the desired level of success in the short time since it rolled out its programmes. In light of the changed circumstances of the global ICT market, the Virtual University of Pakistan is already reorienting its goals and objectives. A number of degree programmes in the liberal arts have been started and the overall project targets are being revised.

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The call centres are also encouraged to locate in special-purpose technology parks set up in all the major cities where they only have to pay for utility usage. This sector is expected to undergo major expansion in 2005–2006.

The telecommunications industry has continued to expand, and local companies are increasing their role as providers of products and services to not only local customers but also companies abroad. Some local manufacturers have begun to export products such as microwave radios, fibre optic cable, and payphones. Companies are eyeing the deregulated telecommunications market, as they will have a much larger clientele for both equipment and services.

### Key national initiatives

Although English is the official language of business in Pakistan, only a small section of the population is well versed in it. Thus, the use of only English on the government portal means that most citizens will not benefit from it. The task of converting the content on the government portal and elsewhere on the Web to Urdu, the language commonly understood all over Pakistan, is enormous and difficult to accomplish.

To help tackle this challenge, the Centre for Research in Urdu Language Processing (CRULP) was established at the National University of Computer and Emerging Sciences in Lahore to undertake R&D activities related to the use of Urdu and the regional languages of Pakistan in computing. It is working on areas such as speech processing, computational linguistics and script processing. It is developing a machine translation system which takes English text on the Web and converts and displays it in Urdu at the click of a button. This will enable most Pakistanis to have access to English-language material on the Internet. The key components of this project include the development of an Urdu lexicon, an online Urdu dictionary, an online English-to-Urdu machine text translator, and an Urdu email and website reader. Another major component is a text-to-speech converter, which will be available to content developers to incorporate in their automatic voice response systems. CRULP has also led initiatives to develop flexible and compatible Urdu fonts for use in modern operating systems. The initiatives undertaken at CRULP are recognised by organisations such as IDRC and Microsoft. The centre is supported by government and IDRC grants.

The government has also been improving and modernising the citizens’ registration system over the past years in order to gather data for economic planning, resource distribution, governance and social development purposes. These efforts include the computerisation of the records of citizens and upgrading to state-of-the-art national identity cards. After a number of attempts, the national data management initiative has been streamlined and has started to show results. A citizens’ database and national data warehouse has been developed by the specialised agency set up for this purpose called the National Database and Registration Authority (NADRA, http://www.nadra.gov.pk). It has taken NADRA approximately three years to put the processes and systems in place to enable systematic inputs, computerisation of citizens’ records and the subsequent integration of the records. One of the most prominent features of the database is that it is designed with Urdu support and also multilingual capabilities to support the various languages of Pakistan. This project has also proven to be a trend-setter in the development of Urdu standards on large-scale systems. To its credit, NADRA has issued 35 million computerised identity cards to citizens and also created a GIS resource complete with maps, statistics and a geographical profile of the entire country. The NADRA system is likely to emerge as the most valuable repository of national information for supporting national development plans.

Another significant initiative of national importance is the plan to provide district courts around the country with online access to the latest statutes and case laws. A problem perpetually faced by ordinary citizens is access to justice in a timely and prudent manner. Ordinary citizens cannot afford expensive lawyers with extensive resources and are therefore limited to lawyers who lack the resources to competently defend their clients. Even judges face the same predicament, as some district courts, especially those in the remote areas of the country, do not have well-stocked legal libraries containing up-to-date statutory and case laws or enough research material to aid the judges in their decision-making.

In order to solve this problem, the expanded Internet infrastructure has been used to provide members of the legal community, even at the remotest location, with access to a digital library of statutory and case laws over the Web. The process of accurately digitising the case laws and statutes, which were developed over decades, has been long-drawn and challenging. This task has been largely completed, and authentication of the online data is now underway. The availability of this online library is expected to significantly improve access of both urban and rural communities to the judicial process. It also has the potential to change the nature of the long-drawn conventional legal processes across the country.

On the education front, ICT laboratories are being set up in 2,000 schools across the country to impart ICT skills to the young generation. The plan envisages the introduction of ICT education in all the 8,000 secondary and higher secondary schools in the country.

The Pakistan Education and Research Network is an important national initiative to develop a data communication infrastructure interconnecting all local universities on a fibre optic backbone. So far, 50 universities in all the major cities have been connected. The aim is to increase collaboration among the universities and allow them to share resources.
Enabling policies

Despite delays, the telecommunications deregulation policy was finally approved, opening up the fixed-line telecommunications sector to full competition in July 2003. The policy was generally welcomed by investors for its open nature, which facilitates entry into the market of local and long-distance telecommunications service providers. Some critics, however, object to the performance obligations on long-distance operators, which were developed with the view of preventing deflation of the market and inefficient entry of operators. Nonetheless, the policy has been successfully implemented. Bidding for the WLL frequency alone has generated revenue in excess of US$200 million for the government. Additionally, 12 long-distance and international operators have been licensed. A second round of licensing has been announced by the Pakistan Telecommunication Authority.

The other major development was the formulation of a policy for the cellular mobile sector which will enable the entry of two new cellular operators through an open auction process. This policy was necessitated by the rapid development of the sector and the continued shortage of supply from existing operators, which forced the government to act in the interest of consumers. Leading international operators bid for the new licences, and two new cellular operators have been licensed at bids of US$291 million each. They are expected to launch their services after March 2005.

Open source movement

Pakistan can potentially benefit from the large-scale adoption of open source software. The government has supported open source for a long time, but little progress is evident in terms of its use and development. The government has embarked on the establishment of an open source resource centre as well as an initiative to automate processes in the local industries using open source solutions. The resource centre has the mandate to develop and support R&D activities throughout the country and to identify suitable open source products and standards.

Trends

Both the government and the private sector are committed to developing the two vital sectors of ICT and telecommunications in the country. The opening up of the latter to full competition will make this sector one of the most active. International companies were drawn to bid for the new cellular licences, and a similarly active interest is expected in the fixed-line domain once tenders are invited.

The development of the Internet infrastructure has already started to pay dividends. The provision of broadband Internet access via DSL to homes and small offices is likely to expand.

E-commerce has been slow in development, but activities may soon pick up following the success of online stock trading services.

The open source movement is likely to develop further in the years ahead with strong official support. Meanwhile, efforts to develop the use of local languages in digital media have borne fruit. Applications and tools with Urdu interfaces are now available for publishing, web authoring, training, accounting, management information systems, and database packages. The next logical step is for developers to make available content and applications in the local languages to meet the information needs of a large segment of the population who is not conversant with English.
Overview

Indicators

Singapore’s key economic sectors continue to be in manufacturing, construction, utilities, wholesale and retail trade, hotels and restaurants, transport and communications, financial services, and business services. Its GDP was S$159.1 billion in 2003, with a per-capita GDP of S$38,023 (US$1 = S$1.70).¹

In Singapore’s ICT sector, computer ownership in households grew from 63.9 percent in 2001 to 73.7 percent in 2003. Computers are increasingly seen as a necessity in the home, rather than luxury items, especially for families with school-going children. In 2003, 64.4 percent of homes had Internet access (dial-up and broadband connections). Broadband penetration of households was 39.6 percent compared to 17.7 percent in 2001 and 24.2 percent in 2002. There were 2.6 million (62.6 percent) computer users in 2003, compared to 1.9 million (46.0 percent) in 2001. There was a corresponding increase in the total number of Internet users from 1.6 million (38.7 percent) to 2.1 million (51.0 percent). About two-thirds of individuals aged 15 years and above owned a mobile phone.²

Development

The government, through the Infocomm Development Authority of Singapore (IDA), has continued to push forward initiatives and programmes to develop and enhance the ICT industry in Singapore. The results are reflected in the improvement in the key ICT indicators cited above.

Progress in such efforts has been made notwithstanding the downturn of the economy during the 2002–2003 period, the difficult market conditions and the regional competition facing the industry. A greater focus has been placed both by the government and the industry on cutting costs and reducing wastage in an effort to bring about maximum returns in a period of uncertainty.

For the industry, the economic downturn has led to some consolidation among market players. Major players and national icons, such as Singapore Airlines, have not been immune to the onslaught of problems, particularly since the SARS outbreak in early 2003, which brought to the surface underlying threats. Many ICT companies have found the need to expand beyond the shores of Singapore to countries such as China and Indonesia. Government agencies, for example IDA and International Enterprise Singapore, are aggressively helping companies to enter new markets in China and other countries in the region. Companies competing primarily for business domestically have found meeting their bottom line a difficult challenge during a period of cost reduction across the board. There are signs that the economy is recovering and that companies are transitioning out of the difficult period. Nonetheless, the need to look beyond the limited size of the Singapore market and grow internationally will remain a key thrust for local companies in the years ahead.

To better understand the underlying factors supporting and driving these developments and other successes in Singapore, we will consider the importance of instituting a suitable infrastructure and a pro-investment environment, nurturing competition, and implementing effective regulation. With successes, there are also failures that are useful to review. We will thus briefly look at some of the lessons learnt along the way leading to where Singapore is presently.

Infrastructure and investment

The achievements that Singapore has made over the years in the advancement of ICT may be attributed to the vision and drive of early pioneers from back in the 1980s in recognising the importance of technology to the development of the economy. As early as 1979, the government had recognised the need for computerisation, and a Committee for National Computerisation was formed, chaired by the Senior Minister of State for Education. In 1981, the government established a separate statutory board (the National Computer Board, the precursor of IDA) to
implement the first National Computerisation Plan with a focus on computerising the civil service, developing an indigenous IT industry and growing a pool of local IT manpower. Through the years, various plans and initiatives were put in place in step with Singapore’s economic growth: the National IT Plan in 1986, IT2000 in 1992, and Infocomm 21 at the turn of the century. Each of these plans contained elements that addressed different segments of society: business, government and the people. The combination of the vision, a core group of dedicated IT professionals working towards that vision, and a forward-looking government that was cognisant of the importance of technology brought together the right mix of factors for the sector to grow.

On the investment front, in 2002 the total foreign equity investment in Singapore was S$228.6 billion and total foreign direct investment was S$238.6 billion, of which S$9.4 billion was from the sector of transport, storage and communications. The highest investments were in the sectors of manufacturing (36.3 percent), financial and insurance services (35.2 percent) and commerce (15.9 percent). The top investors in 2002 were the USA (14.5 percent), Japan (13.9 percent) and the UK (13.8 percent), followed by the Netherlands, Switzerland, British Virgin Islands, Cayman Islands, Bahamas, Germany and Bermuda. The key indicators from 1998 to 2002 show a steady growth in foreign investment. At the time of writing, more up-to-date data were not yet available to suggest whether foreign investment in Singapore has been affected by the trend of business operations relocating from Singapore to other regional countries where costs are lower. The strengths that have attracted foreign investment to Singapore appear to have remained thus far – good infrastructure, skilled workforce, conducive environment for business, a low crime rate and a stable government.

Singapore’s investment overseas in 2002 amounted to a total of S$273.1 billion compared to S$274.5 billion in 2001. The largest investment destination was the British Virgin Islands (13 percent), China (12 percent), Bermuda (9.2 percent), Malaysia (8.2 percent) and Hong Kong (8.1 percent). Each of these destinations had a higher level of investment in 2002 compared to 2001.3

On the international front, significant strides have been made by the government in negotiating and concluding a number of bilateral trade agreements with key trading partners, most notably with the USA. Such initiatives form part of the broader efforts to help the local industry become more internationally and externally oriented. The agreements negotiated by the government provide a stepping stone to help local players open doors in foreign markets.

Competition

IDA’s efforts to manage the ICT industry since the full liberalisation of the telecommunications market have been instrumental in creating a more competitive telecommunications industry and lowering basic telecommunications charges for businesses and consumers.

It is useful to contrast the development of the cellular mobile phone and broadband markets in Singapore in relation to the underlying competitive landscape. The mobile phone market took off in the late 1990s with intense competition between the incumbent telecommunications provider and a new mobile provider, with a third mobile operator introduced a few years after. Today, the incumbent is no longer dominant in this segment of the market. Notwithstanding that Singapore introduced mobile phones into the market later than some other countries, the penetration of mobile phones has rapidly reached 89.9 percent, more than double that of fixed lines (44.6 percent).

By comparison, the broadband market had fairly limited competition when the technology was first introduced, and there was also no competition within each mode of access. There were two providers, with the incumbent telecommunications operator offering an ADSL solution and a cable television company offering a cable modem solution. The government’s earlier efforts in the late 1990s to improve broadband penetration through incentives and other funding schemes had met with limited success. However, after that initial slow start, a significant increase in competition between broadband providers (within different modes of access) and lower underlying cost structures (due to market liberalisation) had significantly boosted broadband subscription. The 2003–2004 surge in broadband subscription attests to the effectiveness of competition in bringing about greater demand and market maturity, and thus higher penetration.

Continuous effective competition is essential to sustaining the industry’s growth. As with mobile phone subscription, it is expected that broadband subscription will eventually surpass traditional dial-up Internet subscription as the use of the Internet becomes more pervasive and the more technologically savvy younger generation enters the workforce. Effective competition will allow new services that are being planned for the future to catch on at a much faster rate.

Regulation

IDA’s primary focus has been on developing suitable policies and regulating the telecommunications sector. While developmental efforts and initiatives for the broader IT sector are being further expanded, IDA and the Attorney-General’s Chambers conducted several rounds of consultation in 2004 relating to the amendments of Singapore’s cyber laws to help IT and e-commerce development.

It is expected that more innovative application-level services will be provided over the telecommunications and data network infrastructure. Regulation will continue to be important, with a gradual shift of focus and emphasis from the telecommunications infrastructure to higher-level policy issues such as facilitating new services to provide high-
quality voice and video services over data networks (which are potentially independent of traditional telecommunications companies) as well as addressing emerging problems and issues at the application level, such as spamming and cyber security. As the solutions for such new problems may no longer be satisfactorily resolved at the domestic level, international cooperation between countries and greater participation by Singapore in international forums and discussions may be essential to enable Singapore to adapt to the rapidly evolving ICT environment and to meet new challenges. Looking further ahead, broader civil society issues such as the impact of ICT on lifestyle, on citizen–government interaction and on the concept of democracy may need to be addressed.

Some lessons

Amid the progress made by Singapore in its ICT development, there are also some lessons that can be learnt. One of the underlying drivers of ICT adoption is the cost of telecommunications infrastructure and the extent of Singapore’s connectivity to the region. Singapore’s telecommunications market was fully liberalised (down to basic telephony services and lifting the cap on foreign ownership of telecommunications companies in Singapore) only in 2000, although certain telecommunications services (e.g. mobile phone services, Internet access provision) had been opened up several years earlier. This phased approach had given regional competing economies an edge in attracting internationally competitive telecommunications players into their markets and to lay submarine cables to establish a network of connectivity to the region. Prior to liberalisation, infrastructure cost had been one of the factors that led companies to consider establishing their regional headquarters in countries other than Singapore. After four years of liberalisation, the telecommunications market in Singapore is now highly competitive (with IDD call charges to popular destinations falling by more than 60 percent, for instance), and this has led to greater innovation and availability of services in the market.

Early adoption of technology comes with its inherent risks. Singapore’s bold moves in earlier years have resulted in a large number of systems being deployed, some more successful than others. In the late 1990s, an initiative to deploy interactive multimedia kiosks in areas of high pedestrian traffic did not result in a viable business model that could be sustained. However, after the turn of the century, a new generation of kiosks providing bill payment and other ancillary services has found a niche area to thrive in. Another example of the risk-taking nature of innovation was the National Library Board’s decision to use radio frequency identification (RFID) to electronically tag library books. Although RFID was a relatively untested technology at that time, the library’s highly computerised and automated borrowing and return system has turned out to be a success. Library members are able to borrow and return books, and even pay fines for overdue books, through an entirely automated system.

The speed of technology evolution is another factor to consider as an early technology adopter. While systems such as LawNet and TradeNet have been hailed as significant successes and milestones when they were first deployed, there is now a greater cost and resistance to the deployment of newer technologies to replace or upgrade such systems because of considerations of maintaining continuity and securing returns on the original investment. With legacy systems in place and operating, it may sometimes be more difficult to switch to leading-edge technology.

Since the 1980s, the path taken by Singapore has been a challenging one. Looking ahead, with greater competition from other countries in the region, and with the emergence of economic giants such as China, there is a need for Singapore to look at the path taken, learn from the lessons and move ahead with the benefit of hindsight.

Local online content


In addition, the following websites also offer useful information on Singapore, Big Trumpet (http://www.bigtrumpet.com.sg) is an initiative of NTUC Income, the insurance subsidiary of the national cooperative, the National Trades Union Congress. The website is built on Microsoft’s .NET technology through a project called .NETMySingapore to develop XML web services in Singapore. The technology enables community web services to be connected together. This website features key components such as “MyCareer” (job enhancement and matching activities), “MyClub” (special-interest clubs), “MyFolder” (financial, educational, medical and personal information), “MyHome” (home services: tutors, contractors, online shopping), “MyMoney” (insurance and financial planning services) and “MyWorkPlace” (interaction with colleagues and the workplace). The portal links different information systems together and allows users to access their personal information on any device, at any time and at a high level of security.

The portal Can.com.sg (http://www.can.com.sg) offers a variety of local map and transportation information, coupled with other local highlights and features. It provides a valuable source of information relating to getting around and how to find things in Singapore. Given a location, the portal allows the user to find amenities and other services in
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In striving to be a networked government, the objective is to create an environment for government agencies to collaborate, share information and leverage on collective knowledge to serve the public seamlessly and effectively. A government-wide policy on data protection is already in place and coordinated with the TrustSg effort. In addition, a coordinated, proactive and preventive approach will be undertaken to enhance the government’s overall ICT security preparedness for any contingency.

One of the important national initiatives supporting e-government is SingPass, an infrastructure that enables a single password to be used for all e-government services, regardless of which government agency is providing the service. It is intended to simplify the authentication process for citizens using online government services, without the need to separately register with each service and to remember a different user identifier and password for each service.

**E-lifestyle**

An annual e-Celebrations campaign is held to promote an e-lifestyle. Initiatives such as the National IT Literacy Programme equip Singaporeans with basic ICT literacy skills. The NEU PC Programme (an expansion of the PC Reuse Scheme) appears to contribute to the growth in home computer ownership as it continues to make available new and used PCs to needy families. There are also other initiatives aimed at promoting the use of broadband (during the Broadband Month) and also consumer confidence (through the TrustSg nationwide trust mark). Other fairs with specific themes, such as e-Festival@Great Singapore Sale and e-Festival@Homemakers, are aimed at promoting ICT to different segments of the population.

Internet access terminals and numerous WiFi hotspots are emerging in the market, in particular at popular fast-food and other food and beverages outlets. The demand for such access points in public places points to people’s increasing comfort with the use of technology and the greater need to remain connected even while on the move.

**E-commerce and e-business**

A number of initiatives have been launched with the objective of encouraging greater business adoption of ICT and e-commerce. These include the development of a centre of competency by NEC in Singapore to facilitate automatic global e-procurement for NEC’s international procurement offices. Another initiative is the RI3K reinsurance exchange for the Asian insurance market. This platform provides straight-through processing to allow end-users to integrate their own systems with the central exchange. Such a solution

the immediate vicinity of the location. It also hosts an event calendar as well as a discussion forum on selected issues.

Singapore Airlines provides flight information and booking services at its portal [http://www.singaporeair.com](http://www.singaporeair.com). It allows travellers to determine airfares, check flight schedules, purchase plane tickets, carry out check-in for flights (from Singapore and other selected countries served by the airline) and select seats, make choice of cuisine for business-class travellers, preview on-board entertainment, and redeem frequent-flyer miles.

The portal Cut Waste ([http://www.cutwaste.gov.sg](http://www.cutwaste.gov.sg)) was launched in conjunction with the government’s setting up of the Cut Waste Panel. It allows members of the public to offer suggestions on how the government can cut its spending in various areas. The suggestions and the responses are posted on the website. Some of the responses to suggestions offer a good insight into the government’s rationale behind certain policies.

**Online services**

**E-government**

The government launched its second e-Government Action Plan (eGAP II) in July 2003. The plan was valued at S$1.3 billion and aims to meet the primary objectives of delighting customers and connecting citizens through a networked government. This new three-year plan is a follow-up to eGAP I launched in 2000.

IDA, the architect of eGAP II, has stated that the focus of this plan is to transform the public service into a networked government that delivers accessible, integrated and value-added e-services and helps to bring citizens closer together. The investment of S$1.3 billion is for upgrading infrastructure, developing capabilities and further improving electronic public services. Some visible tangible benefits from productivity improvement will be the reduction of fees for government services and licences and faster processing time.

More than 1,600 e-services have been implemented, representing 90 percent of all the key government services suitable for electronic delivery. The targets ahead for 2006 are to implement 12 more cross-agency integrated services, have 90 percent of the customers of public services use e-services at least once a year, and achieve an 80 percent level of satisfaction with the overall quality of the e-services. Where possible, mobile technologies will be deployed to provide personalised, location-specific and time-sensitive e-services.

In relation to connecting citizens, new ways will be sought to encourage active citizenry and community bonding. Technology will be used to explain public policies and their rationale online and provide another channel for public feedback on policy formulation and review. Technology will also be used to reach out to citizens in Singapore and overseas and allow them to participate in the policy-making process. Internet technologies will be used to form new online communities or to support existing ones.

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the domestic market. Within the domestic market, industry revenue for 2003, compared to 45.9 percent from 20.2 percent, software 15.5 percent, IT services 9.9 percent, accounted for 46.1 percent, telecommunications services $32.83 billion in total revenue, up from $32.17 billion in 2002. The export market accounted for 54.1 percent of the ICT industry revenue for 2003, compared to 45.9 percent from the domestic market. Within the domestic market, telecommunications services comprised 41.1 percent of the revenue. The significant areas of growth in the domestic market were hardware retail (up 40.1 percent), content-related activities (up 2.5 percent), and telecommunications services (up 2.0 percent). However, there was a decline in IT services (down 29.1 percent) and software (down 21.5 percent). In contrast, revenue from the export market was dominated by hardware retail (63.6 percent) and software (24.2 percent).

In the liberalised telecommunications sector, as of January 2004, there were 32 facilities-based operator licensees and 692 services-based operator licensees.

### Mobile commerce

In 2001, in an effort to make mobile commerce a viable reality in Singapore, IDA gathered local mobile and wireless operators to collaborate with industry partners to develop a nationwide mobile payment platform. This collaborative effort came to a conclusion some two years later in 2003, when IDA announced that four out of the five trial systems are to be commercialised. The infrastructure is expected to connect key parties such as financial institutions, telecommunications operators, merchants and other service providers to create an environment for consumers to easily and conveniently make payments through portable devices such as their mobile phones.

The four trial systems that are going ahead commercially are Blink, Go Virtual, TeleMoney and YW8. Two of the systems, Go Virtual and YW8, will be provided by a consortium of local banks through the Network for Electronic Transfers (NETS). The other two systems will be commercialised by the Systems@Work as well as Mobile Solutions and Payment Services. Technical trial is ongoing for the fifth system, Gemini.

The success of this collaborative approach towards solution building demonstrates that bringing multiple players in the market together can expedite development and deployment of key infrastructures compared to individual companies launching their own proprietary and closed solutions, and it creates an infrastructure that is not tied to a specific operator.

### Industries

In 2003, the Singapore ICT industry grew by 2.0 percent to $32.83 billion in total revenue, up from $32.17 billion in 2002. Of the total revenue, the hardware retail sector accounted for 46.1 percent, telecommunications services 20.2 percent, software 15.5 percent, IT services 9.9 percent, and content-related activities 8.3 percent.

The export market accounted for 54.1 percent of the ICT industry revenue for 2003, compared to 45.9 percent from the domestic market. Within the domestic market, the significant areas of growth in the domestic market were hardware retail (up 40.1 percent), content-related activities (up 2.5 percent), and telecommunications services (up 2.0 percent). However, there was a decline in IT services (down 29.1 percent) and software (down 21.5 percent). In contrast, revenue from the export market was dominated by hardware retail (63.6 percent) and software (24.2 percent).

### Key national initiatives

#### Connected Singapore

Since the Infocomm 21 strategy was articulated in 2001, Singapore has made significant strides in moving its ICT industry forward. The full liberalisation of the telecommunications sector was an important foundation and catalyst upon which industry growth was further built. Despite the downturn in the economy both globally and within Singapore since then, it is expected that ICT will continue to be an engine of growth for the nation and an enabler for other sectors. Hence, in 2003, IDA articulated an updated and fine-tuned vision entitled Connected Singapore, comprising four key strategies:

- **Infocomm for connectivity, creativity and collaboration:** This strategy aims to bring ICT products and services to the masses with a view to enriching lives, to drive the development of an infrastructure to enable the production of these products and services, to promote useful applications and encourage their use, and to promote greater literacy in ICT. Infrastructure and applications are both important in the drive towards greater infusion of ICT into society. The programmes are targeted at different levels and segments of society, including schools and the masses.

- **Digital exchange:** This strategy aims to make Singapore the hub for global distribution and trading of digital content, products and services as a new source of economic growth. It builds on the existing infrastructure and business environment to encourage digital exchanges to be cultivated and to grow. A wide spectrum of media, including interactive media and entertainment, digital publications and software, is to be explored (see *Digital cinema* below).

- **Engine of growth:** This strategy targets economic activities and jobs in ICT to create new opportunities. Capabilities will be developed, and assistance will be rendered to help companies grow beyond Singapore’s borders. Specific target growth areas to be nurtured are wireless technology development, multimedia content management, web portal development, and security.
services. Industry collaboration is expected to be an important element of the strategy.

- **Agent for change:** This strategy aims to help both businesses and the government use ICT more effectively and serve their customers better. Clusters of businesses will be examined to identify ways through which ICT can be leveraged to their advantage. The government, through its e-government initiatives, aims to enhance the experience of citizens through the appropriate use of ICT solutions.

Underlying these four broad strategies are three foundation areas that IDA will also address:

- **Capability development:** There is a need for greater and more specialised expertise in the ICT sector, as the needs of businesses and industry grow. Various programmes are already in place to facilitate the development of the manpower and skills needed.

- **Technology planning:** Given the pace of technology evolution, clarity of the direction of technology development is an important element in guiding Singapore’s path. IDA plays a key role in charting the vision, trends and development of the technology landscape for Singapore, as well as in facilitating trials on next-generation technologies. Suitable technology standards also need to be established to enable interoperability between different solution providers.

- **Conducive business environment:** The final component of the underlying foundation is the creation of a business and regulatory environment that is pro-business. Here, IDA, as a policy maker and regulator for the ICT sector, will play an important role in facilitating fair competition between industry players and in creating an environment that businesses will thrive in.

**Digital cinema**

IDA and the Media Development Authority (MDA) launched an initiative to develop the digital cinema industry in Singapore. The initiative forms part of IDA’s Digital Exchange strategy under the Connected Singapore vision and part of MDA’s Media 21 strategy. It brings together the focuses of both agencies – IDA on building capabilities and capacity to process, manage and distribute digital content, and MDA on developing content.

Digital cinema represents a transformation from the traditional film-based system to a digital-based system that started from the introduction of digital sound some years ago. Newer technologies such as encryption can provide greater security for film distribution and deter piracy. It is expected that a significant number of new job opportunities will be created in the areas of post-production and infrastructure for digital cinema.

This initiative was undertaken at the same time as one of the local cinema chains, Eng Wah Organisation, converted 20 of its screens to digital cinema. An outdoor digital screen was planned too. This involved S$9 million of industry spending.

**Enabling policies**

Singapore continues to push for the establishment of free trade agreements (FTAs) with a number of countries around the world. As of December 2004, FTAs have been concluded and signed with New Zealand, Japan, the European Free Trade Association, Australia, the USA, and the Hashemite Kingdom of Jordan. Negotiations are still underway for FTAs with ASEAN and China, Bahrain, Canada, Egypt, India, Republic of Korea, Mexico, Pacific Three (New Zealand, Chile and Singapore), Panama, Peru, and Sri Lanka.

Among the FTAs already concluded, the US–Singapore FTA represents one of the most significant achievements. Together with the e-commerce chapter of that FTA, the two countries also signed a joint statement on e-commerce aimed at strengthening the environment for e-commerce. There are also important provisions covering new aspects relating to intellectual property rights (IPR).

**E-commerce commitments**

The two governments stated in the joint statement on e-commerce that they recognise the importance of e-commerce as an engine of growth and commit themselves to taking steps domestically to realise the full potential of e-commerce (see sidebar). E-commerce is expected to enhance the standard of living of citizens and create new jobs and opportunities. Small and medium enterprises will also benefit from having access to a worldwide market.

In the chapter on e-commerce within the FTA, the two governments commit that they will not apply customs duties or other duties, fees or charges in relation to the import or export of digital goods by electronic transmission. Where a digital product is imported by some other physical medium, the customs value shall be determined based on the carrier medium, without regard to the value of the digital product. The same treatment shall be given to all digital products irrespective of where the products were created or who the owners of the products are. Scheduled programming content is not included within the scope of digital products.

**Intellectual property rights provisions**

Of the wide-ranging issues covered in the US–Singapore FTA, one of them is the protection of IPR. The main features of the IPR provisions are outlined in the sidebar. Both countries are expected to give effect to the various IPR obligations under the FTA within time periods ranging from six months to one year from the entry into force of the FTA on 1 January 2004.

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Abstract of the US–Singapore Joint Statement on E-Commerce

The two governments endorsed the following principles and policies that will guide the development of e-commerce:

- The private sector should lead in the development of e-commerce and in establishing business practices.
- Both governments should avoid imposing unnecessary regulations or restrictions on e-commerce.
- Governments should encourage effective self-regulation through private sector codes of conduct, model contracts, guidelines and enforcement mechanisms.
- Cooperation among all countries will assist in creating a seamless environment for e-commerce.

The statement also noted that governments should work towards a global approach that supports the recognition and enforcement of electronic transactions and electronic authentication methods (including electronic signatures). It endorses an approach that:

- removes paper-based obstacles to electronic transactions by adopting relevant provisions from the UNCITRAL Model Law on Electronic Commerce
- permits parties to a transaction to determine the appropriate authentication technologies and implementation models for their transactions, with the assurance that those technologies and implementation models will be recognised and enforced
- permits parties to a transaction to have the opportunity to prove in court that their authentication technique and their transaction are valid and
- takes a non-discriminatory approach to electronic signatures and authentication methods from other countries

On e-commerce value chain, the statement noted that the sectors of telecommunications, transportation, customs, electronic payments, delivery and distribution services, and marketing and advertising are essential to e-commerce. The following principles are supported by the two governments:

- Telecommunications reforms ensure the development of more efficient telecommunications services needed to lower the cost of getting online and doing business online.
- Open skies agreements and other liberalised transportation regimes are necessary to make it easier and cheaper to ship goods ordered electronically from one country to another.
- Efficient and effective customs administration facilitates efficient product delivery.
- Overly burdensome marketing and advertising restrictions that place onerous costs on merchants should be avoided.
- Swift, secure, reliable, cost-effective and internationally interoperable electronic payment systems are essential.
- Efficient, liberalised delivery and distribution service regimes are essential.

The statement also covers a number of other wide-ranging areas including the following:

- The two governments will cooperate in the promotion of the APEC Principles on International Charging Arrangements for Internet Services (ICAIS), which endorse commercially negotiated charging arrangements.
- The two governments encourage international cooperation among regulators and law enforcement authorities to deal with illegal activities, including criminal and terrorist activities on the Internet.
- The two governments recognise that e-commerce falls within the scope of WTO rules and commitments. Trade barriers to the free flow of content do not exist today and should not be created in the future. Any taxation of e-commerce transactions for the supply of goods and services should be clear, consistent, neutral and non-discriminatory.
- On electronic payments, private sector leadership should be recognised, and a competitive market for electronic payment should be encouraged.
- On consumer protection, consumers should receive effective protection in the online environment, promoted through the enforcement of consumer protection laws and regulations. There should be industry-supported mechanisms to empower the consumers and resolve consumer complaints and concerns.
Provisions on IPR in the US–Singapore Free Trade Agreement

The two countries commit to entering into and complying with a number of international treaties including the Convention relating to the Distribution of Programme-carrying Signals Transmitted by Satellite (1974), the WIPO Copyright Treaty (1996) and the WIPO Performances and Phonograms Treaty (1996). There are specific commitments governing trademarks (including geographical indications), patents, and copyright and related rights, as well as commitments relating to enforcement issues and limitation of liability of service providers.

In the area of Internet domain names, the two countries commit that their governments will continue to participate in the Government Advisory Committee of ICANN to address government concerns relating to domain names and the country code top-level domain (ccTLD). They also commit to implementing dispute resolution procedures modelled after the ICANN Uniform Domain Name Dispute Resolution Policy (UDRP) within their respective ccTLD to resolve cases of bad-faith registration that violates trademarks.

For copyright, the FTA specifies the mutual obligations that need to be provided with respect to areas such as reproduction right, temporary reproduction, communication to the public, works made available to the public, term of protection, prohibition of the circumvention of effective technological measures, criminalisation of offences, protection of rights management information, and the use of only authorised software by government agencies. Limitations and exceptions may be made for free over-the-air broadcasting and other non-interactive transmissions. There are circumstances under which circumvention of effective technological measures is allowed, such as in non-infringing reverse engineering activities, non-infringing research activities to identify and analyse flaws and vulnerabilities, prevention of access of minors, and non-infringing activities to correct the security of a system.

The FTA includes an article that deals with the protection of encrypted programme-carrying satellite signals and stipulates civil and criminal offences for certain types of activities related to the decoding of such encrypted signals as well as the reception and further distribution of such decoded signals.

The FTA sets down general obligations for the enforcement of IPR in both the civil and criminal jurisdictions. In addition, there are special requirements in relation to border measures relating to the enforcement of IPR.

The FTA provides for limitations on the liabilities of service providers. The two countries are obliged to implement legal incentives for service providers to cooperate with IPR owners to deter the unauthorised storage and transmission of copyrighted materials, as well as to implement limitations in the law on the remedies for service providers in copyright infringement that they do not control occurring over their systems and networks. These limitations are confined to situations such as transmission of content without modification, automatic caching, storage directed by users, and hyperlinks. Service providers will have obligations including implementing a policy to terminate infringers’ accounts and accommodating technical measures for copyright protection, as well as adopting a notice and take-down process with respect to infringement. Where a service provider removes or disables materials in good faith, the countries are obliged to provide exemption of liability in their respective laws for any resulting claims.

Regulatory environment

Computer misuse

The Computer Misuse Act was first enacted in 1993, modelled after the UK’s Computer Misuse Act 1990. In 1998, it was amended to address new types of attacks (e.g. denial of service) that had evolved with the spread of the Internet. The amended act recognises that some computer systems are critical to the nation (e.g. those for banking and finance, emergency services and public services) and thus harsher punishment will be meted out to offenders who secure unauthorised access to such systems. It also allows for orders for compensation to be made to victims of computer crime. The amendments aim to deter computer criminals with harsher penalties for repeat offenders and to provide police with wider investigative powers, including the power to access encrypted data where authorisation has been obtained from both the Commissioner of Police and the Public Prosecutor.

In 2003, the act was amended again to make provisions in two specific areas. The first is for the Minister of Home Affairs to be able to authorise a person or an organisation to take steps necessary to prevent or to counter a threat to national security, essential services, defence, or foreign relations of Singapore, where there are reasonable grounds to believe that such a threat exists, before the offence is committed. The provision also grants added protection for the informants of such threats. The second area is for certain offences under the act to be compounded, thus allowing the police greater flexibility in taking action in incidents of minor offences.
The act, since its enactment in 1993, has been extra-territorial in nature – that is, it applies to any person, regardless of nationality or citizenship, both outside and within Singapore. In particular, it will apply if the computer, program or data relating to an offence is in Singapore. The act does not require every computer crime to be reported. However, the Monetary Authority of Singapore has required that all incidents involving financial institutions to be reported to it.

Domain name registration

The Singapore Network Information Centre (SGNIC, http://www.nic.net.sg) implemented a Registry–Registrar (SgR2R) System with effect from January 2003. The system allows multiple registrars that are accredited by SGNIC to register domain names under the country domain “.sg”. SGNIC reserves the right to reject or refuse a selected name if it is the full or abbreviated name of government agencies, or if it gives rise to a misconception about racial and religious harmony or other social issues. Disputes over domain names may be dealt through the Singapore Domain Name Dispute Resolution Policy (SDRP).

Consumer protection

A new Consumer Protection (Fair Trading) Act came into force on 1 March 2004. This act, in general, does not apply to transactions between businesses but focuses on transactions between businesses and consumers (i.e. individuals procuring for personal use). It covers all goods and services that are provided to consumers, whether they are paid for or are supplied under a gift, lease, contest or other arrangement. However, there are specific transactions that are excluded from the application of the act: the sale and purchase of real estate, employment contracts, and transactions regulated by acts under the purview of the Monetary Authority of Singapore (e.g. Banking Act, Commodities Trading Act). The act defines the principles of what constitutes an unfair practice and specifically names certain activities as being unfair practices, including some promotional tactics.

Unfair trading, however, does not constitute a criminal act. Instead, consumers who have been the subject of such practices may pursue a legal action in court for monetary or other forms of compensation or relief. There is no enforcement body established under the act, although the Consumer Association of Singapore and the Singapore Tourism Board have charge over the act. Consumers must bring their own legal action to seek remedies. A S$20,000 financial limit and a one-year time limit are imposed by the act.

There is a special provision for a direct sales contract that arises from an unsolicited visit by a supplier to a consumer to make a sale. For such contracts, the consumer has the right to cancel the contract within three days after the day of the transaction. However, the supplier has no duty to inform the consumer of his or her right of cancellation, although there are incentives for the supplier to do so.

Open source movement

Industry

In November 2003, the second Asia Open Source Software Symposium was held in Singapore. It was hosted by the Singapore Linux User Group together with Japan’s Center of the International Cooperation for Computerization, with the objectives of building a cooperative community and promoting collaborative developmental activities among participating economies. The symposium was first held in March 2003 in Phuket, Thailand, in recognition of the fact that there was a need for direction to be set in relation to the open source movement, which was not well coordinated thus far.

The meeting in Singapore attracted speakers and attendees from numerous countries in the region. The speakers each covered open source development in their respective countries. Participants came from government organisations and IT policy-making bodies, officially funded
R&D groups, businesses and industry players using open source, academia, and institutions involved in human resource development and supporting community groups. There were two sessions for discussing open source legal issues and e-learning.

Government

IDA, as the agency responsible for monitoring the development of open source, has provided within its government bulk procurement system alternatives of both open source and commercial software for back-end systems. Purchase decisions are made by the individual agencies according to their specific needs and requirements. The agencies will consider and compare the overall system cost of the various alternatives and pick the system that offers the best value for money. Other factors such as maintenance costs, support costs, in-house capability, and interoperability with existing systems and applications are also taken into consideration. Government servers are presently using a mixture of open source and commercial software solutions.

For desktop systems, IDA has assessed the suitability of using open source solutions for office productivity suites and desktop operating systems. It is presently not ready to recommend open source for office productivity suites, as the savings in licence fees need to be balanced against other cost factors, including support costs, interoperability and retraining. The issue of interoperability is of particular concern, as documents have to be exchanged both within the government and with organisations outside the government. The government also presently benefits from lower licence fees on bulk licensing arrangements with commercial software vendors.

In relation to open source solutions for desktop operating systems, views and sentiments on their use are still divided. Indications so far are that open source solutions are more readily used and accepted by sophisticated IT users. With time, usability and support concerns for open source are expected to be resolved. IDA will continue to monitor the ongoing development and will review the stand, if necessary, in future based on the principle of getting value for money for the government as a whole.15

Research and development

In 2003, 20.0 percent of ICT companies invested in R&D. Software products commanded the largest share of R&D expenditure (65.8 percent), followed by hardware products (32.8 percent). The other products and services commanded less than 2 percent of R&D expenditure.16

Some notable developments in R&D include the opening of a S$30 million R&D laboratory in Singapore by Hewlett-Packard (HP).17 HP’s existing plant in Singapore is its global manufacturing centre for a range of networking products. The new facility will bring its R&D capabilities in networking hardware, such as high-speed digital and analogue circuits, to Singapore. The intention is for greater knowledge transfer with the production site and to improve the design process and manufacturing efficiency.

Another significant development is the launch of the National Grid Pilot Platform (NGPP). The purpose of the NGPP is to create a national infrastructure to link up computing resources in Singapore so that they can be shared through a secure, reliable and efficient network for a variety of purposes, including education, commerce, entertainment and R&D.

The NGPP is co-funded by the Agency for Science, Technology and Research, the Defence Science and Technology Agency, the Economic Development Board, the National University of Singapore, Nanyang Technological University, the Singapore–MIT Alliance, and IDA. The participating research institutes have committed to sharing their computing resources on the NGPP.

The NGPP has also received strong support from ICT vendors, such as Cisco, StarHub, Singapore Computer Systems, Dell, IBM, HP, and Sun Microsystems, who have each contributed equipment and services to the initiative.

Trends

IDA has identified key technological trends and developments in conjunction with the local industry, which were presented in its fourth Infocomm Technology Roadmap and unveiled at a public seminar in November 2002.18 The key trends identified are as follows:

- **The “new” megabit broadband for better two-way communication:** It is expected that broadband via ADSL and cable modem will replace dial-up as the dominant means of Internet access by 2007. It is also expected that the Internet upload speed will match the download speed.

- **The connected home for a connected lifestyle:** The convergence of technologies involving information, communications and entertainment will see appliances and devices around the house being brought together, connected and operated over an integrated IP-based network. A variety of digitised information will be available on PCs, home entertainment systems, media servers and game consoles.

- **Mobile wireless going broadband to offer new ubiquitous services:** By 2007, 3G networks will be in place with the computing capabilities of mobile devices improved significantly. The concept of “anytime, anywhere, any device” will become a reality by then. Mobile services will evolve into rich multi-party multimedia and instant communications, and corporations will bring mobile solutions to their workforce. Multimedia broadcasts and multicasts will feature in e-learning, seminars, and corporate marketing and advertising.
Security technologies that facilitate e-commerce: With greater demand for security solutions, more standards-based end-to-end security frameworks will emerge to meet business and consumer needs in dealing and transacting in the networked environment.

During the IX2003 Conference in September 2003, the Minister for Information, Communications and the Arts noted that the Asian economy, while fast growing at one stage, had undergone a very difficult period of crisis after crisis that affected the ICT sector adversely. Notwithstanding this setback, the prospects ahead appear positive. History has indicated how key strategic initiatives in IT over the years have helped to put in place the foundation for the present conducive business environment. Even in relation to the SARS outbreak, technology demonstrated its power and utility in the management of a public crisis by enabling the mass scanning of the body temperatures of arriving and departing passengers at the airport.

The minister also encouraged companies to exploit ICT to build their relationships with suppliers and customers to bring about greater efficiency all round. IDA is expected to play the important role of identifying business problems that can be addressed via technological solutions and finding ways for ICT to be used in enhancing the country’s competitiveness and economic growth.

During the World Summit on the Information Society in December 2003, the minister further noted that Singapore still faced challenges ahead, although it had made progress towards the vision of an information society. There continues to be a need to deal with the enhancement of access to multilingual content, to address digital divide issues to ensure the young and the elderly have meaningful access to ICT, to enable broadband access for more people, to sharpen the IT skills of the workforce, to keep workers updated with technological developments, and to effectively manage competition in the ICT industry. ICT will bring greater benefits to society as citizens become more active participants.

With the challenges ahead, it is the author’s belief that the role of IDA will be critical to Singapore’s ability to realise the above objectives. IDA will need to critically assess and examine its role and its capability. For instance, with respect to policy development, IDA needs to look beyond the present conducive market operating on top of the regulation of the telecommunications industry at the greater economic growth.

Notes

13. The full text of Singapore’s statutes can be found at http://statutes.agc.gov.sg.

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Overview

The ICT market in Thailand continues to expand. Its total value appreciated from US$817.14 million in 1999 to US$2,043.59 million in 2003. It grew 11.9 percent between 2002 and the beginning of 2003. The software segment expanded by 13 percent during this period and accounted for 17.7 percent of the total ICT market. The ICT services segment also performed remarkably, growing 21.4 percent in 2003 over the previous year.

Available data show that about 18,500 ICT engineers graduated from both public and private universities in 2001. A study conducted by the National Electronics and Computer Technology Centre (NECTEC) and Thammasat University indicated that about 122,700 ICT workers would be needed in 2004, especially software professionals. Unfortunately, this demand may not be fully met. NECTEC is gathering more comprehensive data on the country’s ICT human resource requirements.

As of 2003, Thailand had a fixed-line teledensity of 12.9 per 100 inhabitants, while mobile phone density and Internet penetration increased significantly to 30.6 and 10.4 per 100 inhabitants respectively. To further boost Internet access, the government is promoting low-cost broadband Internet services at less than US$25 per month.

Key national initiatives

A number of programmes implemented nationwide now allow the people to access ICT through facilities such as SchoolNet, TambonNet, telecentres and other public Internet access facilities. In addition to providing access, the Ministry of Information and Communications Technology (MICT) launched the Thailand Knowledge Centre, an e-library with vast amounts of information on science, culture, technology and social sciences. There are also programmes to increase computer ownership and to educate the youth on the right uses of the Internet. Meanwhile, a government agency was established to promote and support the local software industry.

Budget computer programme

To increase computer ownership, MICT launched the Computer ICT Programme in the first quarter of 2003 offering citizens low-cost computers sold with a preinstalled Linux and OpenOffice package supplied by NECTEC. The computer, including a regular monitor, was sold at US$250. Generic and brand-name computer vendors responded by slashing their prices to compete with the budget computer.

The programme also gave a boost to the open source movement, as the bundling of the budget computer with open source software has helped to create mass demand for Linux in place of the more expensive proprietary software. In a later phase of the programme, Microsoft decided to join in by offering a special version of the Thai-language Windows XP and Office XP package at a very low price (US$35). The offer was welcomed by the public, as more than 98 percent of individual users in the country use these applications.

GoodNet programme

The GoodNet programme was initiated by MICT and the Internet Café Club with the aim of turning cyber cafés into ICT knowledge centres. At least 300 Internet cafés had participated in the programme by the end of 2003. This new generation of Internet cafés offer basic computer classes and English lessons. The purpose is not only to raise computer literacy but also to create a new culture within the Internet user community and to change the perception of the cyber café as a gaming centre to that of an edutainment centre.

These Internet cafés agree not to promote bad values to the youth by steering them away from online games, pornography and chat. They are required to have at least one qualified staff, who is certified via a NECTEC IT user examination, to assist customers in the proper use of computers. The Internet cafés also provide products and services such as ring-tone downloading and edutainment
products. The GoodNet programme is supported by NECTEC, CAT-Telecom Public Company, GMM Grammy, the Association of Thai Software Industry, and Microsoft Thailand.

Software industry promotion

Following the success of Software Park Thailand in promoting software development, in 2003 the government set up the Software Industry Promotion Agency (SIPA) under MICT to provide support to the software industry. SIPA has taken on the tasks of investment promotion, similar to that of the Board of Investment, ICT human resource development and acting as a one-stop service centre for software houses. It is responsible for setting up a national software project that includes application hosting for small and medium enterprises, the development of logistics management software and the adoption of paperless trading by enterprises. The other target area is the promotion of the animation and multimedia industry.

SIPA will also help to promote mobile applications and online games, as these are potentially lucrative industries. At the same time, it aims to strengthen the national economy by reducing software import expenditure, which accounted for 70 percent of the total value of the software market in 2003. This move is also expected to offer the added benefit of boosting the local software industry and priming it for entry into the global software market.

Regulatory environment

Threats from malicious hackers, viruses, worms and other kinds of attacks have escalated in tandem with the growth of computer networks and systems. Disruptions to the country’s network systems can potentially cause significant losses to the national economy because of increasing reliance on computer systems and networks for business operations. Some developed countries have established mechanisms to protect critical infrastructures which are reliant on computer systems.

NECTEC set up the Thai Computer Emergency Response Team (ThaiCERT) in 2001 to improve the security of computer networks and systems and reduce risks to them through disseminating information aimed at raising security awareness, providing technical recommendations and conducting training programmes. More than 3,000 organisations in Thailand have signed on as members of ThaiCERT. The work of ThaiCERT is being expanded to cover roles in R&D as well as defining information security standards and measures for critical organisations. ThaiCERT also collaborates with key organisations to build networks of people working in the ICT sector to undertake special tasks. For example, it was a key provider of ICT services to the 2003 APEC meetings held in Thailand.

Open source movement

Most large enterprises in Thailand now operate their businesses on computer systems using licensed software. The business sector accounts for the largest share of the country’s software expenditure. The proportion of educational institutions and homes using licensed software is apparently less than that of large businesses. Educational and home users thus form a potential market for open source
software (OSS), which costs much less than proprietary software.

The most successful OSS in Thailand is the Linux operating system for Internet servers. Other popular OSS packages are the web server software Apache and database management systems such as MySQL and PostgreSQL. The OpenOffice package, with full support for the Thai language, is one of the most important OSS applications and has helped to promote the open source movement to Thai users. The package, consisting of Linux TLE, OpenOffice TLE, Mozilla and other useful applications, was preloaded onto more than 130,000 PCs delivered in 2003 across the country as part of the Computer ICT Programme.

OSS has also been the focus of regional cooperation. NECTEC, as the key organisation promoting the development of OSS in Thailand, cooperated with the Center of the International Cooperation for Computerization of Japan to organise the Asia Open Source Software Symposium. The symposium aims to promote and nurture the open source movement in Asia.

The latest OSS activity organised by NECTEC is to promote the teaching of OSS in schools. The number of schools teaching the use of the open source productivity suite, OpenOffice TLE and the open source operating system has grown steadily. Representatives from a number of these schools met in February 2004 to share their knowledge and experiences in running classes using only OSS. Prizes and awards were presented to outstanding schools and teachers.

NECTEC also cooperated with various groups of OSS users and developers to establish the Thailand Open Source Federation in November 2003. With NECTEC’s cooperation and advanced R&D support, the federation aims to promote and distribute OSS and to establish an infrastructure for supporting the development of OSS.

Research and development

A survey by the National Research Council of Thailand revealed that R&D expenditure on ICT in Thailand during 1999 was approximately US$4 million. Software development has been stimulated through the establishment of the Software Park and through incentives provided by the National Science and Technology Development Agency (NSTDA). The private sector is also now making considerable investment in R&D. Public sector R&D is funded by a number of agencies, such as NECTEC, NSTDA, the Thailand Research Fund, the National Research Council and universities. NECTEC itself is not only a funding agency but also a research institute. Its R&D is focused on electronics, computing, telecommunications and IT.

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Rural telecentres miss the bull’s-eye

A pilot telecentre programme was initiated in 2002 by NECTEC with government funding that aims to apply ICT to enhance the economic and social well-being of rural communities. Four communities with different characteristics and in different locations in the country were selected for the trial. Each telecentre is equipped with a set of ICT equipment, including PCs with Internet connection, telephones, fax machines, photocopiers, printers and digital cameras. With exposure to the Web, it was expected that members of the communities would be encouraged to undertake informal education and to conduct e-commerce. The telecentres were also expected to narrow the digital divide between rural and urban areas.

However, after a year of operation, it was found that the telecentres had not achieved the original goal, as there were only a small number of participants. There was a lack of familiarity with the new technologies, especially with the Internet, and most of the participants were not aware of the full potential of the Internet. The equipment in the telecentres was not used to full capacity, and the communities were unable to produce useful online content which was required for e-commerce and for promoting community knowledge. To get the programme back on course, the benefits of Internet use should be demonstrated to the communities while users should be educated on the capabilities of the new technologies.

NECTEC continued to give advice and consultation to the centres for another year after the first year of financial support. Two centres located in schools are sustained through donations and other forms of community support. The other centres have been adopted by a community development group. None of the centres can sustain their operations without community sponsorship and contributions.
Overview

Timor-Leste is the newest country in the world after gaining independence in May 2002 and enrolling as the 191st UN member a few months later. The country domain for Timor-Leste remains disputed between " tp" (Timor Portugal) and "tl" (Timor-Leste). Portugal ruled the territory for almost five centuries. The colonial era was followed by a controversial period of Indonesian occupation beginning in 1975 and lasting for more than two decades. The occupation culminated in a UN-sponsored referendum held in August 1999 when the majority of the people rejected the Indonesian proposal for autonomy, opening the way to independence.

The post-referendum destruction of the country caused enormous human suffering and forced more than half the population to leave their homes. It also cut deeply into the country’s economic and social infrastructures. Approximately 80 percent of the schools and clinics were completely or partially destroyed. The telecommunications and media facilities were not spared either, with the state radio and television stations, local newspaper offices and most of the 12,000 telephone land lines burnt or damaged. So, in many respects, Timor-Leste is now rebuilding from the ground up.

The first national human development report places the nation as one of the world’s least developed and poorest countries. Incomes are low, and per-capita GDP is estimated at only US$478. Very few people have received adequate education, and more than half the population is illiterate. Poor nutrition leads to more than half of all infants being underweight. And the country is still suffering from the destruction and trauma that followed the national vote for independence in September 1999. The elected government has devised plans and initiatives for rebuilding the nation. Reconstruction and community development are the top priorities.

Tetum is the language of the people of Timor-Leste. Unfortunately, it is not fully developed in terms of structure and grammar. The National University of East Timor is attempting to restructure the language as well as developing a Tetum–English–Portuguese dictionary. The government has decided to use Portuguese as the official language. Portuguese will likely continue to be widely used in the country over the next five to ten years. There is no website which is published completely in Tetum. The local newspaper Suara Timor Lorosae runs a website with content in Tetum and three other languages: Indonesian, English and Portuguese.

Infrastructure

ICT is new to Timor-Leste: the first computer arrived only in the early 1990s. As the communications infrastructure had been destroyed during the 1999 riots, the UN Mission in East Timor established an emergency communications system that was operated by Telstra, the Australian telecommunications corporation, in 2000 to facilitate communication throughout the territory and to serve the peace-keeping force, UN personnel and expatriates working in the country.

The lack of infrastructure limits ICT penetration. The government realises that having access to reliable information and communication services is crucial for promoting agricultural productivity and poverty reduction and for supporting private sector development. It established a telecommunications corporation named Timor Telecom in March 2003 in a joint venture with Portuguese Telecom and the private sector. Timor Telecom is entrusted to provide all telecommunications services to the population, including building the infrastructure (voice and data) and providing Internet connectivity. The infrastructure development plan emphasizes priority for economic development and a strong commitment to poverty reduction, but the first priority is to restore or establish essential facilities, telecommunications systems and public services. Although significant progress has been made in restoring infrastructure, including that of ICT, the quality and level of service remain woefully...
ICT is currently available mainly in cities such as Dili. In terms of power supply, the Dili area receives about 24 hours of electricity each day from the power grid. However, the rest of the country receives about 6 hours’ supply each day and sometimes even less because the damaged infrastructure has yet to be fully restored. Some remote areas do not receive any electricity supply at all.

The ICT infrastructure being rebuilt includes the essential facilities of radio communications, postal services, telecommunications facilities and various support services. Radio broadcasts now reach almost 90 percent of Timorese homes providing important agricultural and development information as well as entertainment. Newspapers also play an important role in disseminating information and knowledge to the people, but they are available only in the cities.

The telecommunications infrastructure and related services have expanded rapidly since Timor Telecom took over as the principal operator. The telecommunications network has been expanded to cover all the districts in the country, serving all the major towns. Cellular mobile services are now available throughout the countryside and are fast growing into a truly national system. Timor Telecom has exclusive rights to provide fixed-line local and long-distance (including international) telephone services, GSM mobile services and Internet services for 15 years until 2017.

Most of Timor Telecom’s customers make use of prepaid services. There are approximately 30,000 cellular phone users with 28,000 of them opting for prepaid services. Besides this number, there are another 2,000 land-line users. The company has made arrangements to provide its customers with roaming services in three countries: Portugal (via TMN, Optimus and Vodafone), Indonesia (via Telkomsel) and Australia (via Optus).

SMS has become popular among cellular phone users in the country, with an estimated 28,000 users. Users can send messages to the same three countries of Portugal, Indonesia and Australia, besides locally.

There are no precise records of the number of computers installed in Timor-Leste. The Ministry of Post and Telecommunication estimates that there are around 3,800 units. The total number of Internet users is estimated at 8,000. Timor Telecom provides Internet access via dial-up and leased lines offering a maximum bandwidth of 128 Kbps. The UNDP office in Dili operates its own Internet access service, which it provides to the staff of various UN agencies and selected donor organisations based in the country. No telecentres have been set up in the country, but there are half a dozen cyber cafés in Dili. The cost of Internet access at these cafés ranges from US$3 to $8 per hour. Most of the customers are government personnel, students and businesspeople. They use the cyber cafés to email, chat and download information from the Web. The offices of the World Bank and Banco Nacional Ultramarino provide free Internet access to the public. The local World Bank office maintains the only e-conferencing facility in the country.

The use of computers and networks is becoming more common in educational institutions and among students. ICT facilities access to journals, library services and databases, as well as scholarly and scientific exchanges. The most urgent concern today is the affordability and accessibility of ICT services. The current high cost of Internet access has prevented many people from going online.

In terms of media services, there are half a dozen radio stations broadcasting out of the capital, Dili, on both AM and FM frequencies. The government operates one of the radio stations; the other five are run by NGOs and private broadcasters. One of the radio stations, Radio FALINTIL, rebroadcasts programmes from the Voice of America. Community radios operated by community members or NGOs can be found in all the districts. TV Timor-Leste is the only local television station and is operated by the government. Cable television services are provided by foreign companies such as Indonesia’s IndoVision.

Human resource development

There are about a dozen ICT training centres located in Dili. Three institutions of higher learning are conducting ICT courses. They are the National University of East Timor offering a degree in informatics, the University of Dom Martinho Lopes offering a degree in IT, and the Dili Institute of Technology offering a degree in computer science, each of them with an enrolment of 40–50 students in these courses.

The IT Training Centre, a joint initiative of the Asia-Pacific Development Information Programme and Yayasan Salam Malaysia established in mid-2001, has conducted ICT training for some 1,300 trainees. The trainees include government personnel, undergraduates and youths. Apart from these public training programmes, Timor Telecom conducts its own in-house courses for its employees, which lead to Cisco certification.

MIMOS Bhd of Malaysia teamed up with the Global Knowledge Partnership, the Swiss Development Corporation, AOC & Associates, the National Youth Council of Timor-Leste and the Ministry of Education, Culture, Youth and Sport of Timor-Leste to conduct the Dili International Youth Forum in November 2003 as part of the Timor-Leste ICT Capacity Building Project. The forum’s purpose was to help develop the ICT Youth Action Plan for the next five years. Six projects were discussed for implementation.

Policy and regulatory environment

The current development in telecommunications access and services in Timor-Leste compares favourably with that existing under the Indonesian regime. The key concern now is to improve service quality and practical access while at
the same time reducing the relatively high cost of telephone calls and Internet access. The responsibility for regulating the telecommunications sector rests with the Ministry of Communication, Transportation and Public Works. However, no statutory legislation is currently in force to guide the regulatory functions of the ministry. Instead, the national telecommunications policy, which was prepared by the UN Transitional Administration in East Timor and adopted by the East Timor Transitional Administration as Regulation No. 2001/15 in late 2001, has served as the only policy framework. A much broader ICT policy remains to be developed.

Regulation No. 2001/15 provides for the privatisation and liberalisation of the telecommunications sector and for network development, including the use of the Internet and VoIP. It recognises that as Timor-Leste does not have its own resources to construct a new telecommunications system it is dependent on external financing to achieve the objective. A build, operate and transfer (BOT) project was thus designed to accomplish this task. Article 4.2 of the document states that the establishment of private networks will not be restricted but will be subject to government approval according to a set of criteria to be determined by the telecommunications regulatory authority. It also states that other contractors, independent of the BOT winner, may also provide these networks. No foreign investment limit is specifically set.

After the formal transfer of power from the UN Transitional Administration to the elected government in May 2002, the new government proceeded quickly with the BOT project and appointed Portuguese Telecom, the successful bidder, with a 15-year period of exclusivity. At the end of this period, the assets of the project will be transferred to the government, after which decisions will be made on whether to formalise a partial or complete privatisation of the assets. With this provision, all telecommunications services are to be provided exclusively by Timor Telecom as the universal service provider. According to the government, exclusive licensing is necessary to allow the BOT operator to recoup its investments with a margin of profit. Moreover, if competition were introduced from the beginning, operators would have concentrated on urban areas, leaving the less profitable rural areas unserved. There is a general view within the government that introducing competition at this stage in the development of the country will be counter-productive and will undermine the development of the sector.

In July 2003, the government passed two new laws. Law 11/2003 governs telecommunications, while Law 12/2003 provides for the establishment of the Communication Regulatory Authority, the official certification authority. These laws regulate facilities and service providers and not Internet content.

Timor Telecom continues to use the “.tp” domain, which was set up in the 1990s by the resistance movement. The hostmaster team at Connect-Ireland is responsible for the registration of “.tp” domain names.

ISPs are required to apply for a licence before starting operations. Three ISP licences have been issued, one to Telstra of Australia and two to local operators. However, all ISPs are required to purchase their bandwidth from Timor Telecom, thereby reducing their ability to price their services competitively. Timor Telecom is effectively providing most of the services.

**Trends**

Awareness of ICT in Timor-Leste will continue to increase, and the new technologies will gradually become tools of daily life. Timorese are fast realising that ICT is needed for the country’s development and that it serves as the bridge to a globalised and digitised world. However, the difficult economic conditions, brought about by recent events in the country, put computers out of reach of Timorese. At the same time, the lack of basic infrastructure and affordable access is hampering Internet use.

The government, private sector and civil society are working together to create low-cost solutions for developing the ICT sector. The development of local content in the local language is also being planned. Policy makers have to look into how the development of ICT infrastructure and services will be funded. The private sector, for now, seems more able to deliver reliable ICT services. Political will is needed in bridging the vast digital divide that separates Timor-Leste from the world community. The people should be consulted on the content, infrastructure and services that they need.
Taiwan

Ching-Yi Liu

Overview

Manufacturing and ICT equipment production remain Taiwan’s key economic sectors, while the service sectors of finance, commerce and transportation are the largest employer.\(^1\) Foreign exchange reserves stood at over US$200 billion at the end of 2003, and economic growth for 2004 is forecasted at 4.5 percent.\(^2\) The economy remains robust due in part to a policy of internationalisation and liberalisation.

The government continues to implement the Challenge 2008 National Development Plan, popularly referred to as Challenge 2008, which covers the period 2002–2007. This strategic plan emphasizes such goals as strengthening international competitiveness, upgrading the quality of life and promoting sustainable development. It is designed around ten programmes and involves substantial investments in manpower, R&D and innovation, logistics networks and the living environment. It also aims to achieve significant political, financial and fiscal reforms. Progress has been made in the various programmes notwithstanding the economic downturn and the SARS outbreak in 2003.

Industries

Telecommunications

All sectors of the telecommunications market in Taiwan have been opened up for competition. Among them, mobile telecommunications services and international telephone services have become the most competitive. There are more than 400 companies competing in the telecommunications services sector. The competition has obviously worked as evident in the number of mobile phone subscribers soaring to 25 million by the end of 2003 bringing the penetration rate to 111 percent.

Taiwan was ranked ninth in the world and third in Asia by ITU’s digital access index released in November 2003. The other countries in the top ten, which were almost exclusively European and Asian, were Sweden, Denmark, Iceland, South Korea, Norway, Netherlands, Hong Kong, Finland and Canada. Taiwan also was rated first in the world for mobile phone penetration, fourth for broadband Internet penetration, and fifth for fixed telephone penetration.\(^3\) Chunghwa Telecom remains the largest operator in the market in terms of the number of subscribers, minutes of usage, and revenue. Taiwan Cellular had merged with TransAsia Telecommunications in May 2001, while Far EasTone Telecommunications and KG Telecoms, the third and fourth largest mobile operators, initiated merger negotiations in July 2003. The mobile phone market was served by eight operators before it was opened to competition. It has been transformed during the five years following liberalisation, and there are now one small and three large operators.

Progress of the three new fixed network telecommunications operators, which received their licences in 2000, has been hindered by the slow construction of “last mile” connections. Consequently, they have focused on international calls and corporate subscribers.

Internet and broadband

Telecommunications liberalisation has brought about rapid growth in Taiwan’s online population and increased Internet usage by individuals and companies. According to survey findings of the Institute for Information Industry, Taiwan had a total Internet population of 8.8 million with a penetration rate of 39 percent in December 2003, an increase of 17 percent from that in December 1999. Another survey conducted by the institute in August 2003 showed that 57 percent of households were online, representing a 4 percent increase over the same month in 2002.

The number of broadband subscribers has seen rapid growth since 2001 when the government began promoting the service. The campaign led to the broadband subscriber base expanding from 262,800 at the end of 2000 to 3,043,300 in December 2003, an increase of 2.8 million subscribers. According to the same August 2003 survey, broadband users
Online services

E-government

Taiwan ranks first in e-government according to the Fourth Annual Global E-Government Study conducted by the Taubman Center for Public Policy at Brown University. The study measured the e-government performance of 198 countries by evaluating government websites using criteria that included the availability of publications, databases and disability access, the level of privacy and security, and the number of online services.

The Ministry of Finance in July 2003 launched an e-payment system to expedite payments in the government procurement process. The new system cuts the time needed for processing payments to 1–3 minutes, instead of the 1–3 days required under the old manual system. Payments are wired directly to the suppliers’ bank accounts. Under the old system, the ministry had to reserve funds amounting to NT$20–30 billion (US$606–$910 million) every working day for paying the suppliers of government procurement projects. The new system cuts the reserves required to about NT$5 billion (US$152 million).

E-commerce and e-business

A survey conducted by the Institute for Information Industry from 9 August to 3 September 2002 investigated Internet penetration in businesses, the methods of connection, the use of email and websites, and the disparity in Internet usage between industries. It also studied which Internet functions were deemed most important to the companies and what benefits and obstacles they had experienced in using the Internet.

The survey revealed that 61 percent of businesses in Taiwan had access to the Internet and that access had grown by 17.2 percent since 2001. The Internet penetration rate was highest among larger companies, while small businesses registered the highest growth in Internet access in 2002, expanding by 25 percent. Most businesses accessed the Internet by xDSL, followed by dial-up and leased lines. The number of businesses using broadband connections (xDSL and cable) increased to 70 percent.

The three most important functions of the Internet were messaging (82.8 percent), sourcing business information (74.7 percent), and providing online customer services (67.4 percent). The top three benefits of Internet use were perceived to be better communication with clients/suppliers (80.8 percent), improving work efficiency with clients/suppliers (79.8 percent), and improving work efficiency within the company (79.5 percent). Most businesses connected to the Internet were very concerned about the three threats of virus/hacking (78.5 percent), unstable connection (69.7 percent), and externalities. The top three factors that restricted enterprises from accessing the Internet were the threat of virus/hacking (78.5 percent), unstable connection (69.7 percent), and trading partners not having Internet access (64.6 percent).

Email was used by an average 85 percent of all companies that were online. This rate decreased with the size of the company, from 97.3 percent among large enterprises to 78.7 percent among small businesses. Among those using email, 40 percent used it to ask clients for price quotations and over 30 percent used it to place orders.

Only an average of 36 percent of companies that were online had set up their own websites. Again, this rate was affected by the size of the company, ranging from 74.2 percent of large enterprises to 26.2 percent of small businesses having websites. The proportion of businesses having websites was highest in the finance, insurance and real estate industry (53.4 percent), followed by the service industry (40.3 percent) and...
manufacturing (40.1 percent). Among these websites, 28.8 percent allowed customers to order online and 12.0 percent allowed suppliers to take orders online.

**Key national initiatives**

**Development of IPv6 networks**

Statistics compiled by the Asia Pacific Network Information Centre (APNIC) show that IPv4 addresses are being rapidly assigned. The six major national Internet registries in the Asia-Pacific region reported a 50 percent increase in the use of address space in 2003. Out of the total four billion IP addresses once available, only less than two billion remain for distribution. Some Internet experts predict that there will be a shortage of IP addresses in five to ten years because of the rising number of Internet users and the emergence of 3G mobile communications. The shortage will have a significant impact on the future development of the Internet.8

In Taiwan, the present IPv4 platform may no longer meet the future development needs of the Internet, especially in view of the rapid development of broadband networks and wireless communications. The government is actively promoting the development of IPv6 to address this challenge. Numerous organisations, including the Taiwan Academic Network, Academia Sinica, the National Center for High Performance Computing of the National Science Council, the Computer and Communications Research Laboratories of the Industrial Technology Research Institute, HiNet, Chunghwa Telecom Laboratories, the Taiwan Network Information Center (TWNIC), and the National Information and Communication Initiative Committee (NICI), have initiated efforts to develop and promote IPv6. NICI set up the IPv6 Steering Committee in October 2001 comprising representatives from the government, TWNIC, academic and research organisations, telecommunications companies and ISPs. The committee implemented a national IPv6 deployment and promotion project to effectively foster the development and application of the new protocol integrating the resources of industries, the government, schools and research institutes. The IPv6 project is being carried out in three phases over six years, beginning with the launch of an experimental network.

In addition, TWNIC took the lead in proposing the establishment of an IPv6 task force for the Asia-Pacific region. The task force was established in February 2004 with Taiwan as one of the major founding members. According to TWNIC, the number of IPv6 addresses released to Taiwan reached class 13 (unit:/32) by the end of 2003. This number places Taiwan in the tenth place worldwide and third in the Asia-Pacific region.9

**Digitisation of radio and television broadcasting**

Digital television and radio broadcasting technologies not only improve the quality of audio and video transmissions but also enable the more efficient and effective use of spectrum resources. Moreover, they make it possible for broadcasters to provide diversified services and multimedia content to meet the different preferences of consumers. The government has been working intensely to speed up the digitisation of radio and television broadcasting as well as upgrade the technologies employed by allied industries.10

Trial radio broadcasting using digital audio transmission technology was approved in 2000. The European Eureka-147 transmission system proposed by the local broadcasters was deployed to ensure that the experiment was consistent with the principle of technological neutrality that they had adopted. DGT then drafted a plan for trial broadcasting with five VHF band III channels (174–240 MHz), and 19 radio stations were selected to participate in the trial. Apart from these five experimental channels, DGT plans to include another four channels. These nine channels will eventually be used for broadcasting digital radio programmes. The authorities had issued 27 construction permits and 23 station licences for the trial by the end of 2003.

For television broadcasting, the government had set the target of having terrestrial stations begin digital broadcasting by December 2001 under a time frame approved in November 1997. It also made it clear that analogue channels would be closed when the digital television penetration rate exceeded 85 percent. The five terrestrial television stations in Taiwan responded quickly and began to deliver trial digital signals in mid-2000.

The European transmission system recommended by the broadcasters was adopted because it is better suited to Taiwan’s geographic environment and business model, since it offers the characteristics of mobile reception, better indoor reception, the capacity of a single-frequency network to improve coverage, and superior ability to resist multi-path interference.

The five television stations implemented a biennial plan for broadcasting digital television programmes to all regions for 2001–2002 with the construction of seven digital transmitting stations. Four transmitters located in the western region began transmission in May 2002. Another three transmitting stations, located in the eastern region, began operating in April 2003 effectively expanding the coverage of the terrestrial digital television network to 80 percent of Taiwan.
Regulatory environment

Regulations to promote development of the telecommunications industry

The government set up a National Communications Commission Preparatory Initiative Committee in 2003 to prepare for the establishment of an independent National Communications Commission (NCC) to oversee the communications and broadcasting industries. Later in the same year, the Communications Basic Law was passed and the draft of the Enabling Act of the National Communications Commission was formally submitted to the Legislative Yuan (Parliament) for deliberation.

The Communications Basic Law stipulates fundamental principles for the development of the communications industries, setting the stage for the revision of current laws regulating the telecommunications, broadcasting and IT industries. The passage of the Communications Basic Law and the creation of NCC are expected to accelerate regulatory reform in the telecommunications and broadcasting sectors.

Meanwhile, DGT has implemented regulatory measures to eliminate obstacles standing in the way of network expansion. As a first step, it encouraged Chunghwa Telecom, the market leader, and other private fixed network operators to convene meetings to negotiate arrangements for leasing the local loop so as to speed up infrastructure construction. DGT continues to monitor the progress of the construction of private fixed networks and at the same time facilitate the building of national broadband networks.

Work on building local loops by the new fixed network operators has been hampered by restrictions imposed by local authorities. At the same time, disagreement on the fees and period of leases has been difficult to resolve between Chunghwa Telecom and the new operators. As a result, competition has not increased in the fixed network market and broadband tariffs have not fallen substantially. This has led the Executive Yuan (Cabinet) to request that DGT draft a construction plan for a national common duct for broadband telecommunications. The plan has been submitted to the Ministry of the Interior for consideration. It is estimated that NT$30 billion (US$910 million) will be needed for constructing the common duct, which is to be carried out from 2004 to 2008. The Construction and Planning Agency of the Ministry of the Interior will be responsible for executing the project, while the central government will contribute the funds after the necessary lease agreements have been collectively planned and concluded among local authorities, fixed network operators, cable television operators and mobile telecommunications operators. The duct will be leased to these various operators to stimulate fair competition.11

Articles 38 and 38-1 of the Telecommunications Act were amended in May 2003 to respond to the new competitive environment of the industry. These new laws will regulate the installation of telecommunications equipment in buildings and spaces allocated for this purpose as well as the maintenance and utilisation of such equipment and spaces.

NICI also initiated a plan for evaluating broadband network construction by local governments in June 2003. Formal evaluation began in early 2004. An evaluation index and statistics of network construction in different areas of Taiwan will be provided to show the outcome of efforts by each local government to promote the national policy on broadband as well as to encourage local governments to assist telecommunications operators with the construction of broadband networks.

Regulations governing number resources and portability

DGT revised the telecommunications network numbering plan in 2000 to keep pace with technological developments and to meet the need for building a diversified network. The plan was revised in October 2001 and again in June 2003 to reflect the evolution of the telecommunications environment and to maintain fair competition in the market.

Additionally, Article 20-1 of the Telecommunications Act was revised to allow for the better management of number resources. The revised article authorises DGT to formulate its overall plan for the management of telecommunications number resources and to collect number usage fees. DGT announced the revised telecommunications network numbering plan and the relevant regulations on numbering in September 2003.

DGT also passed regulations on number portability to enable subscribers to retain their existing telephone numbers when switching to another operator. The scope of number portability is confined to the same service category. The regulations require operators to adopt centralised databases to manage the data of ported subscribers in order to facilitate the operation of number portability. They also set out the principles that need to be complied with when the operators cut over ported subscribers. All fixed network operators and mobile operators are to form a management committee to collectively supervise the establishment, maintenance and management of the databases.

Research and development

Telecommunications technology centre

DGT is planning the establishment of a non-profit telecommunications technology centre under Challenge 2008. The centre will have the following goals:12

- To integrate the certification of telecommunications and information products in the private sector and establish a central telecommunications equipment certification centre.
• To provide an advanced experimental platform for multimedia applications and for the testing, application and exploitation of communication protocols.
• To promote forward-looking telecommunications research, technology transfer and collaboration, and the nurturing of telecommunications research expertise.
• To develop Taiwan’s telecommunications sector as the leading industry building on the successes of the semiconductor and information industries.

The establishment of the telecommunications technology centre will be carried out over a number of phases between 2003 and 2006. The initial phase will see the establishment of three departments specialising in telecommunications, information and communication security, and broadcasting. DGT also established a preparatory office for the centre in August 2003, and it has selected Luchu Park in the Southern Taiwan Science-based Industrial Park as the permanent location of the centre.

IB3G project

The Executive Yuan announced in July 2003 the Integrated Beyond 3rd Generation (IB3G) project to integrate wireless LAN (WLAN) and mobile communications. The project will involve installing WLANs and integrating mobile networks to create an environment for broadband roaming on these networks and at the same time promote the development of related industries and services. To achieve this end, NICI has established a steering panel tasked with the responsibility of promoting the development of wireless broadband. An IB3G double network integration office has also been established under the supervision of the steering panel to coordinate the work of the Industrial Technology Research Institute and the Institute for Information Industry in promoting double network integration.

The IB3G office will combine the resources of industry, the government and the academia to make use of Taiwan’s strengths in WLAN equipment and cellular phone manufacturing and services to develop ten cutting-edge technologies, applications or services for double network integration in two years. Achieving this will make Taiwan a global leader in integrated double network technologies and services in the long run.

Trends

Copyright is one of the controversial issues affecting Taiwan’s ICT development. To address this issue, and to promote the free flow of ideas and the sharing of knowledge, Taiwan joined 23 other countries in launching a Creative Commons\(^{13}\) project in 2004. This initiative is headed in Taiwan by the Institute of Information Science at Academia Sinica. It hopes to herald a new era in which barriers that stifle innovation are removed, thereby boosting the growth of Taiwan’s digital content and multimedia industries and allied sectors.\(^{14}\)

Creative Commons will play the role of an information clearinghouse for authors, musicians, filmmakers, software developers, programmers and other innovators. The movement emphasizes the idea of “some rights reserved” (as opposed to the traditional copyright licence model that emphasizes the idea of “all rights reserved”) on creative works and allowing open access to the public, and it provides several different model licence agreements for creators to choose from for their appropriate uses. In other words, it encourages placing works in the public domain for non-commercial uses. Books, movies, music, videos and photographic images labelled “CC” (for “Creative Commons”) will be attributed to the original creators and still be subject to conditions on non-commercial sharing, copying and dissemination.

The Creative Commons movement has spread rapidly since its inception. It points to an alternative path for the future of innovation. Participation in this international movement augurs well for the future development of ICT in Taiwan.

Notes
11. Ibid.
12. Ibid.
13. Creative Commons (http://creativecommons.org) was started in 2002 by the US-based Free Software Foundation, with Stanford Law School professor Lawrence Lessig, Massachusetts Institute of Technology information science professor Hal Abelson, intellectual property law expert James Boyle and Japanese industrialist Joi Ito among the directors on its board.
Vietnam

Nguyen Trung Quynh

Overview

The ICT sector of Vietnam continues to make gradual progress. As of December 2004, the country had a total international Internet bandwidth of 1,892 Mbps. The Internet subscriber base stood at 2 million (2.5 percent of the total population), while the number of Internet users was 6.1 million (7.4 percent of the population). There were 10 million telephone subscribers in the country, representing 12.5 percent of the population. Fixed-line subscribers accounted for 54.8 percent of this total.

As of May 2004, the telecommunications operators in the country comprised the following: 6 providing Internet access, 3 fixed-line telephone services, 4 mobile phone services and 13 Internet services. Among the ISPs, Vietnam Data Communications had a 59.3 percent market share, Financing and Promoting Investment 22.6 percent, Netnam 7.0 percent, Saigon Postal 6.9 percent, Vietel 2.5 percent and IOC 1.7 percent.

The Ministry of Post and Telematics continues to lower charges for Internet and telecommunications services to match those in the region. During 2003, 12 types of services fees were reduced by about 10–25 percent.

Industries

Software

There were about 570 companies employing some 12,000 people engaged in software development and services at the end of 2003. An estimated 38 percent of them were local companies. This industry generated revenue of over US$75 million in 2002 and US$120 million in 2003. It grows an average of 41 percent annually.

Despite the presence of supportive policies and tax incentives, the annual value of the software market is far short of the government’s year 2005 target of US$500 million. This industry is still plagued by the lack of IT expertise and low productivity.

Hardware

The computer hardware market was worth about US$400 million in 2003. Foreign manufacturers include Fujitsu making circuit boards for hard drives, Samsung VINA producing monitors, and Canon manufacturing printers. There are also local companies, such as Hanel and Vietronic Thu duc, involved in hardware manufacturing.

The total number of computers sold in Vietnam in 2003 was estimated at 350,000 units, of which 15 percent were imported fully assembled and the rest were assembled locally. Most of the locally assembled computers are without brands. There were about 20 companies assembling Vietnamese-brand computers, which accounted for about 25–30 percent of the market and are considered of better quality than unbranded computers. Locally assembled computers are purchased mainly by private sector companies and households. About two million computers have been installed in the country, and computer sales are growing at about 20 percent per annum.

Enabling policies

The implementation of the Master Plan on IT Use and Development, which was approved in 2002, has produced some results. The plan aims to accomplish four main goals by 2005:

1. To raise the application and effectiveness of ICT throughout the country to medium level compared to other countries in the region, and to increase ICT application in the Party and state agencies, political and social organisations, and leading economic sectors such as banking and finance, in Hanoi and Ho Chi Minh City to the level of the more developed countries in the region.
2. To develop Internet and telecommunications networks of high bandwidth using modern technologies to provide consumers with a variety of services at prices that are comparable to or lower than average prices in the region. To link all provinces and cities throughout the country by fibre optic cables and to raise the number of Internet users to 4 or 5 percent of the total population.

3. To achieve an average annual growth rate of 20–25 percent for the ICT industry with the use of the new technologies to support the development of key industries and to help maintain high and sustainable economic growth.

4. To produce an additional 50,000 ICT experts of different levels, half of whom as high-level experts and professional programmers with a good command of foreign languages.

To help the attainment of the above goals, four main programmes were launched with the following focuses:

• Accelerating the use of ICT
• Developing and improving the telecommunications and Internet infrastructure
• Establishing and developing the ICT industry
• Developing ICT human resources

The master plan and the four programmes have led to some positive developments following implementation. The plan has guided the creation of new mechanisms and policies for promoting ICT use and development. In terms of usage, about half of local enterprises are deploying ICT to manage their business operations, including the manufacturing process and the performance of services. ICT has become indispensable to many companies, especially those in industries such as banking, finance, telecommunications and aviation. Some of the companies have even begun e-commerce to support their operations. In the government sector, ICT use has become common and some e-government services have been launched.

The use of ICT to support education and training has begun. There are about 300 webpages providing information on education, distance learning, university entrance examinations and others. Distance learning programmes have been established at key educational institutions and training centres. An education network, Edunet, is being developed by the Ministry of Education and Training together with the Ministry of Post and Telematics. Work commenced in 2003 to connect 2,057 upper secondary schools to the Internet. A total of 1,900 schools, universities, colleges and vocational training schools had been connected by the end of that year. This number included all the universities and colleges in the country; 10 of the universities were connected via their own leased lines, 40 had built LANs and 14 had established e-libraries.

People have begun to make use of digital information, especially online newspapers and newsletters. More than 20 online newspapers of all kinds had been established by the end of 2003. ICT has also been deployed for agriculture and rural development, as in the provision of online newsletters for rural residents and the establishment of 6,755 small libraries in commune centres offering printed material on agriculture and rural development and, in some cases, provide users with Internet access.

Infrastructure-wise, telecommunications networks are continually being modernised and expanded while telecommunications and Internet services are being diversified at the same time. Important steps have been taken to dismantle state-owned monopolies and introduce competition. The Ordinance on Post and Telecommunications issued in May 2002 has allowed every economic sector to take part in the provision of telecommunications services.

New services such as wireless Internet access, Internet telephony, high-speed ADSL, and CDMA mobile phone services have been launched. The charges of telecommunications and broadband services are falling, and price control mechanisms are being improved.

Policies aimed at promoting the development of the ICT industry have succeeded in attracting businesses to this sector. By July 2003, there were about 2,500 companies registered, of which about 500 were software companies. Centralised “software zones” have been established, especially in Ho Chi Minh City. The computer assembly sector, too, has made much progress with the establishment of nearly 20 assembly plants producing local brands from imported components. In 2003, these PCs accounted for a 25–30 percent share of the domestic market. Foreign hardware manufacturers have also set up plants here.

ICT education and training has evolved quickly in vocational schools, universities and colleges. Postgraduate studies are offered too. In addition, degree-level ICT courses are available to graduates from other disciplines to help build ICT capabilities in these fields. Many companies have invested in ICT training as well. There is significant international input in the training programmes, coming from Indian training companies and large ICT firms, US and Australian universities, and Japanese organisations. At the school level, computer science is now taught in upper secondary schools across the country, and it has been introduced as an optional subject in selected lower secondary and primary schools.

However, the master plan has not been entirely successful. The implementation of its plans and programmes is in fact low. As such, certain targets set for 2005 need to be adjusted. For example, the software export target of US$200 million is now deemed difficult to achieve by 2005. This slow pace of implementation stems partly from a lack of awareness and understanding among government officials of the importance of these programmes. Also, ICT use and
development has not been considered a priority in the implementation of socioeconomic programmes at the ministerial, departmental and local levels. Efforts at these levels are not synchronised, and mechanisms for coordinating, monitoring and implementing the programmes are inconsistent. Furthermore, an enabling environment for the development and adoption of ICT has not been fully established, with relevant legislation, mechanisms and guidelines still lacking.

In terms of adoption, policies to promote ICT use in the private sector are lacking. Funding is insufficient for the adoption of ICT in education, training and research. Although the government’s ICT capacity has been strengthened, it is not properly coordinated and sufficiently integrated across central government units, ministries, departments and local offices to allow them to effectively share and exchange information and to efficiently carry out public services.

Despite infrastructural expansion, the Internet subscriber base remains low, the use of broadband services limited, and the quality of Internet services uneven. The lower charges are still unaffordable to the majority of people. For example, the monthly cost of about US$70 for broadband connection is too high for most households. To speed up infrastructural development, the ICT sectors need to be further opened up to private investment. At present, most of the telecommunications companies and ISPs in the country are either wholly or partially state owned.

The synchronised implementation of two key programmes for developing the hardware and software industries has been delayed as a result of personnel changes in the agencies concerned, while policies on infrastructure development for ICT industrial zones are not coordinated. Policies and measures are not in place to help companies raise their competitiveness, to protect software copyright and to promote investment in the domestic ICT industry. For these reasons, Vietnamese companies are unable to compete in the marketplace.

There are still insufficient experienced, quality ICT workers, especially those at managerial levels, to meet the demand of the industry. There is no improvement either in the foreign-language proficiency of ICT professionals. Training programmes have not been standardised and updated regularly. Training for the software industry remains limited and is unable to meet the demand for software workers. Courses tend to focus on the use of popular applications, with limited advanced training.

Much work still needs to be done for Vietnam to catch up with the regional level of development in ICT.

Open source movement

In March 2004, a master plan for applying and developing open source software (OSS) for 2004–2008 was approved. The plan sets out the following objectives:

- To accelerate the application and development of OSS, enhance the protection of software copyright, reduce the cost of software, and promote the development of IT in general and the software industry in particular.
- To develop a core of competent technical experts in OSS application and development.
- To create OSS products that meet the needs and requirements of users in Vietnam.

The master plan lists out several tasks to be undertaken in order to meet these objectives. First, policies will be made to promote the application and development of OSS through establishing enabling mechanisms and incentives to encourage the participation of organisations in training, education and research in OSS; encouraging local and overseas Vietnamese individuals and organisations as well as international experts and organisations to invest in business development, technology transfer, and training in OSS in Vietnam; and stipulating the use of OSS in the public sector. Policy formulation will be undertaken by the Ministry of Post and Telematics.

Second, the use of OSS will be promoted beginning with trial deployment in Hanoi, Ho Chi Minh City and the ministries of National Defence and of Public Security before nationwide adoption.

Third, training in OSS application and development will be organised to build a pool of developers, technical support staff, teachers and instructors in OSS. Training programmes will be developed for government personnel as well as students in universities, colleges, vocational schools and high schools. Teachers, instructors and outstanding students will be selected for training abroad. The Ministry of Education and Training, the Ministry of Labour, Invalids and Social Affairs, and the Ministry of Internal Affairs will be involved in implementing these programmes.

R&D in OSS will be another priority area, and an R&D laboratory for OSS applications will be established. This area will be the responsibility of the Ministry of Science and Technology. Core software will be developed by localising foreign software that meets the requirements of the country. Open source standards will be formulated, a product quality testing and verification system set up, and a training certification system put in place. At the same time, business, research and educational organisations will be encouraged to provide OSS support services.

Lastly, international cooperation on OSS will be fostered through participation in activities organised by regional and international OSS organisations as well as collaboration with foreign partners in OSS research and business development.
References


Pacific Island States
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Overview

The 22 island states of the Pacific continue to face many challenges. These challenges have largely been economic, social, cultural and political in nature and are brought about by many factors, both external and internal. Many of these challenges are addressed in regional forums, and regional organisations are tasked to look after the concerns of the countries in specific developmental areas such as education, agriculture, health, fisheries, energy, environment and economic issues. Despite this regional organisational framework established to deal with regional issues, the diverse characteristics of the islands themselves compound the challenges, calling for even stronger collaborative, cooperative and development work at different levels and with different partners. ICT represents a new sector in the region and is recognised as an area that needs attention and support. This sector is currently being coordinated by the Pacific Islands Forum, and its status and development in the region vary widely. However, in terms of the rate of ICT development, countries may be categorised into three groups. The first group is made up of countries that are moving ahead with ICT development. The second group includes those that are planning and considering which direction to take. The third group includes countries that are not doing anything yet for different reasons.

A number of distinct characteristics can be observed in these groups. In countries that have full government support for ICT, and where there is a political will on the part of the leaders to move ICT ahead, development has been rapid. These countries include Samoa, Tonga, Palau, Marshall Islands, Niue, Vanuatu, Federated States of Micronesia (FSM), Papua New Guinea and Mariana Islands. These nations are looking to ICT to spur their growth and development and aiming to bring equality in terms of ICT access, use and service. On the other hand, in countries that have monopolies, growth has been stunted and political leaders are not in a position to make unpopular decisions. The countries that stand out include Fiji, Solomon Islands and, marginally, the Cook Islands, New Caledonia and French Polynesia. There are countries that would like very much to join the ICT movement but are constrained by the lack of infrastructure and resources to advance their development in ICT. These countries include Kiribati, Tuvalu, Nauru, and French Polynesia. In all the countries, however, there are people who question the rapid development or use of ICT. They suggest that the inequality in access to ICT and in the cost of services within a country could lead to greater educational, economic and social divides and even political unrest. Instead of concentrating on ICT, they feel that more basic necessities like water and electricity should be attended to first. Some argue that access to ICT is elitist and the infrastructure more expensive to access than water and electricity. They surmise that ICT for developing Pacific island countries will only widen the digital divide between the have and the have-nots, the urban and the rural populations, men and women, as well as the educated and the non-educated, adding to the social and economic problems of the countries.

In taking this line of argument, they assume that there is a standard sequence of development: where first a society must address its nutritional, electricity, water, financial and educational needs before installing new telecommunications and ICT facilities. But technology is moving very rapidly, and some of the most remote areas of the world – Nepal, many small villages in rural India, Mongolia, Laos and Alaska – have begun to reap the benefits of using ICT in national development. The Pacific island countries simply cannot sit back and wait but must find ways to catch up. Or they will risk being left behind even further, perhaps by a minimum of 50 years, with their people perpetually ICT-illiterate and their economy restrained by a Third World straitjacket.

ICT and telecommunications are already providing a solution to isolation and development in the Pacific region, particularly in the area of education and health. There is promise of development in e-commerce, trade, poverty alleviation, new industries and job creation. The region now
has a regional ICT policy approved by its leaders in 2002. In 2002 and 2003, some countries have advanced further to developing their own national ICT policy, with action and implementation plans finalised in Samoa, French Polynesia, Palau and Tonga. Others have plans that are in the discussion stage, as in Fiji, Papua New Guinea, Cook Islands and Vanuatu. The remaining countries are attempting to get a draft policy together. There is no doubt that the integrated planning and policy framework adopted by the region has been successful with both bilateral and multilateral development partners all taking an active part and interest in the developments. There is also no doubt that by 2004 many countries would have finalised their respective national ICT policies.

The rest of this chapter will address these developments. It should be noted that because the region is so large and the 22 island states being at different stages of development, compounded by the difficulties faced in obtaining information and data on ICT, it will not be possible to address each issue fully and give each country the attention needed.

Local online content

There has been tremendous development in local online content in many of the countries of the region. The main language of communication in many of the nations being English and/or French has enabled numerous organisations, institutions, industries and individuals to develop local online content.

Significant advancement has been made in the education sector. The University of the South Pacific (USP) is the leader in this area. Since distance education and e-learning are extensive in the Pacific with USP offering over 250 courses by distance to over 15,000 students in 12 countries scattered throughout the Pacific, local content development by the university is tremendous. In addition, its website has continued to grow and is made accessible to all its students and users in the region.

A number of countries have online content with a substantial local focus posted on the websites of local governments and regional organisations to enhance communication and efficiency. The challenge faced here is keeping the content current and maintaining local capacity to do that task. The media have also developed their own websites to provide useful local content which is updated daily. Examples include Fiji Live, Fiji Times, Fiji Sun, Fiji Post, Samoa Times and the Pacific Islands News Association’s online news. These websites often host debates and discussions on government and public issues and report on consensus reached. Businesses in various industries have also developed their own websites to facilitate e-commerce and the marketing and sale of their local products. The tourism sector in a number of countries has yet to take full advantage of online opportunities.

Because the Pacific island countries are connected in some ways to Australia, New Zealand, Britain, the USA and France, close links with these countries may be found on local and overseas websites. Furthermore, organisations and individuals in the region can obtain assistance from any of these countries in developing their own websites and also in providing training. In this way, content continues to be created in different but specific areas of need, especially education, health, marketing and business. At the same time, skills, expertise and networking are being developed among individuals and within local teams in content creation.

Online services

While development in local online content has been achieved widely, access to online services has been uneven across the region: limited and slow in some countries and extensive in others. Countries such as Samoa, Tonga, Papua New Guinea, Niue and the French territories have tapped the full potential offered by ICT and telecommunications.

In the use of telephones and land lines, all the countries in the region show high penetration rates in urban areas and poor services in rural areas. Teledensity in urban areas ranges from 20 to 60 per 100 people, which is considered low by global standards but high by the size of Pacific households. When social patterns are taken into consideration, it may be concluded that nearly all urban residents have access to telecommunications services. By comparison, rural teledensity ranges from one-half to one-tenth of that in urban areas.

About 25 percent of Pacific islanders have regular direct access to ICT. Many of these people reside in urban areas. Access is mainly through workplaces, a few tertiary institutions, secondary schools, a few public centres and libraries, and Internet cafés. The number of Internet subscribers ranges from 1 in 5 in Niue, where the service is free, to 1 in 1,000 in the Solomon Islands. In 2003, users in only three countries – Papua New Guinea, Samoa and Tonga – had a choice of ISPs. Others were served by monopoly ISPs.

The distribution of privately operated Internet cafés in some countries is revealing. Samoa has 6, Tonga 4, Fiji about 50, Cook Islands 2, Palau 5 in the urban area, and Solomon Islands 2. Niue is the only country in the Pacific that offers free Internet services to its citizens. Governments in Palau, American Samoa and FSM provide selected schools and public community facilities with Internet access. Fiji is considering the same service but is weighing the costs against services it should provide. Samoa, Tonga, Vanuatu and New Caledonia are considering the option of providing free Internet access to schools and community centres.

If we look at the three distinct groups within which countries have been categorised earlier, those countries that have an open telecommunications market and receive government support for ICT development have witnessed growth in Internet access and in the number of service providers. In Samoa, Tonga, Palau and Marshall Islands,
Internet cafés and their customers have risen in number. While the cost of access is relatively high when compared with small islands states in other regions, such as Maldives and Mauritius, the fact that Internet access has been made possible over a relatively short period of time is encouraging.

In countries such as Fiji, Solomon Islands, FSM and New Caledonia, where the number of Internet cafés has also grown, the closed market and the higher costs limit the number of users. In almost all the islands, the main complaint is that the speed of access is slow. This, coupled with the high costs (5.4 to 10 US cents a minute), discourages use in many states.

The slow speed is understandable in countries that have inadequate infrastructure, such as Kiribati, Tuvalu and Cook Islands, but in countries such as Fiji, which boasts one of the best telecommunications infrastructures in the Pacific with the Southern Cross Cable (which has 120 Gbps of fully protected capacity) passing its shores, there is little excuse not to take advantage of the great capacity available in bandwidth.

Overall, Internet and online services development is still in the early stages in all the countries of the region. However, with the introduction of broadband and low-cost Internet access, demand for reliable and efficient services will increase. This will happen in tandem with growth in online educational, commercial, health, gaming, advertising and tourism services.

**Industries**

Countries of the Pacific are largely agriculture based. They also share characteristics of a small market, small resource base and low-density population. These do not provide a promising basis for the development of ICT industries. Yet, Telikom Papua New Guinea earned an average of 63 million kinas (US$32 million) annually from 2000–2003 and Telecom Fiji earned an average of over 69 million Fiji dollars (US$35 million) during 2002 and 2003. The telecommunications monopoly in Papua New Guinea was terminated on 22 December 2001, while Fiji’s does not terminate until 22 December 2014. While data cannot be obtained for other countries, it should follow that Pacific island countries with monopolistic policies do reasonably well financially in the current environment.

A small market size is often used as an argument for the maintenance of a telecommunications monopoly. The reasoning is that the market is too small to attract investors. But a review of the situation in a number of small island states in other regions with populations lower than in Fiji and the Solomon Islands makes this argument less tenable.

As far as advanced ICT application is concerned, a number of countries are investing in new-technology ventures such as call centres, back-office operations, data warehousing, virtual industries such as virtual security, and software programming. In Fiji, two companies have established back-office operations and five more are in the pipeline. In Samoa and Tonga, similar opportunities are being explored. Fiji’s attraction lies in a good transport system, cheap labour and tax-free incentives for businesses that are among the best in the world, despite the high cost of telecommunications at this point in time. In Papua New Guinea, there are seven major ICT businesses providing equipment, services and maintenance.

Investors will be encouraged to set up businesses in the islands if a number of enabling factors are present: low...
Internet charges, availability of skilled IT professionals, efficient and reliable telecommunications, and stable political conditions. The governments in a number of Pacific island countries are undertaking initiatives to ensure that these factors are nurtured and made available to investors.

Key regional initiatives

The application of ICT for development has great potential in the Pacific. Regional initiatives are being directed towards realising the potential of these new technologies. The development of ICT-related industries has begun in some of the islands. These industries include call centres, back-office operations, software programming, ICT equipment retailing, data warehousing, online education, telehealth, videoconferencing, and other teleservices such as virtual security guards. However, the success of these new industries will depend on a number of factors: the policies and the regulatory environment which the government and the private sector will promote, the government’s commitment to supporting enabling ICT policies, productive public–private sector relationship, skilled human resources, community awareness, an affordable and efficient ICT infrastructure, a liberal and supportive attitude to the adoption of new technologies, and a competitive, deregulated market. These are policy issues that need to be addressed by regional governments, associations and businesses.

A number of aid agencies are actively funding new ICT initiatives in the region. The Japanese Overseas Development Assistance (ODA) has supported initiatives on ICT capacity building at USP and in Samoa and the Micronesian states. Australian Aid (AusAID), New Zealand Aid (NZAID) and UNDP have also been active in supporting new initiatives in ICT.

The areas that have been identified for growth are telehealth, distance and online education, human resource development, universal access, e-commerce and e-government. A number of requirements must be met if countries in the region wish to take advantage of ICT for development, including the following:

- The government must take a leadership role and organise a coordinated effort on the use of ICT for development. This is evident in Samoa, Tonga, Palau, Marshall Islands, Vanuatu and Papua New Guinea.
- The government should understand and believe in ICT for development.
- The government must assist in the building of an enabling infrastructure and training of human resources.
- Support should be given to those organisations that can provide their own backbone and last-mile facilities at their own costs, and licences should be issued to them for offering new services.
- Good service and affordability for consumers must be insisted upon.
- Pro-competitive policies for greater and affordable access to mobile phones and the Internet should be implemented.
- Pro-competitive policies for broadband services are needed in order to stimulate local and international e-commerce.
- The government should support universal broadband access for education and technology training.

Enabling policies

The regional ICT policy and vision endorsed by the leaders in the region in 2002 calls for “ICT for every Pacific islander”. National policies should reflect this vision as well. A number of countries are developing their own policies, but it will take time to finalise and implement them. The policies aim at ensuring that national frameworks are set in place for developing a Pacific information economy. At the national level, the policies aim at responding to the new technological environment in an appropriate, sustainable and effective way using resources that are available locally. Guiding principles have been drawn up for all the countries to follow. They cover human resource development, infrastructure building, development of cooperation among stakeholders, promotion of relations between the private and the public sectors, and responsiveness to people’s needs and sensitivity to culture.

Interestingly, the idea of using ICT to raise productivity, create jobs, reduce poverty, generate income and preserve culture has emerged as an important consideration in the region. As new technologies emerge, and as communities and users become more adept at using ICT, people are also becoming aware of the constraints and the regulatory environment that exist. Many users are now advocating for the opening up of the market so that they can make use of the opportunities afforded by ICT to establish new businesses, provide better communication, and improve facilities for e-learning. This is particularly evident in Fiji.

The Pacific islands are unique in that they have a very distinct and workable framework for policy-making in spite of the small population. The total population in the region is just over seven million people. Getting their ICT policies and plans to work will not be easy. Governments need to muster the political will and resources essential for making these policies and plans work. The Pacific island countries have collectively identified their priorities. They have all agreed to prepare their national ICT action plans. Some countries have gone full speed ahead and put in place frameworks that will ensure the plans are implemented. These include Samoa, Palau, French Polynesia and Tonga. Others have not progressed very much apart from paying lip service to the importance of ICT. Fiji is seriously looking at ways to effectively use ICT for development and has assembled a high-level local IT Advisory Group for this purpose. Palau has made great strides in setting up a Communications Information and Technical Advisory
Group, which has established a five-year planning horizon and a technology and human resource development plan. The ICT plan creates a framework for the cooperation of stakeholders in addressing ICT-related issues in Palau.

The policy objectives for many of the countries include the reduction of telecommunications rates, increased coverage of telecommunications services, liberalisation of the telecommunications sector, legal frameworks to promote ICT development, alignment of ICT training with the requirements of the employment market, and development of e-government.

FSM, Marshall Islands, Kiribati, Tuvalu, New Caledonia, Cook Islands, Vanuatu, Niue and Nauru have yet to finalise their plans and are consulting with their stakeholders.

**Regulatory environment**

Almost all the island states have a telecommunications regulator, which is empowered by legislation. However, the environment in which each works differs greatly. For instance, the regulators in Samoa and Tonga have been able to open up the telecommunications market. Papua New Guinea has a strong independent regulator. The regulatory environment in Fiji seems a little uncertain and unfavourable for business. A draft telecommunications bill has been released for public consultation and is receiving a mixed reaction. The situation is better in Palau, where there is an open environment for policy formulation.

A number of telecommunications monopolies still operate in the region. They are viewed as generally unfavourable for the consumer and for the growth of the ICT sector. The quality of service provided by these monopolies varies, and they are widely perceived as not having improved their services nor reduced their prices. In fact, they are seen as hindering growth. But if the monopoly has to stay, then the government must deregulate new services that are not included in the existing licences of the monopoly and encourage other companies to participate. The monopoly must, at the same time, be independently benchmarked on its service level and prices. Key performance indicators must also be independently monitored to ensure that service gaps are bridged and productivity is continuously improved.

**Open source movement**

The Pacific island countries face the same problems as many developing countries of high cost of software and limited access to ICT. This challenge may be partly solved through the adoption of open source solutions. The open source movement is very new in the Pacific region. Only a few island states are aware of open source, and some of those who do have continued to support off-the-shelf products, especially those that they are familiar with. USP is spearheading a programme that offers courses in Linux and the application of open source software.

The International Open Source Network (IOSN), an initiative of UNDP undertaken through its Asia-Pacific Development Information Programme, together with USP launched a USP–IOSN Free/Open Source Software Microgrant Programme for Pacific island countries in July 2004. The programme is a competitive grant scheme available to individual students or teams of students. The grant is awarded for designing open source software in different areas, focusing on various aspects of development including education and training.

**Research and development**

Very few surveys of needs and infrastructure have been undertaken on ICT in the region. The University of Hawaii, USP and the University of Guam have been in the forefront of research in this area. The research has tended to concentrate on distance education, telehealth, e-community, e-commerce, e-government, human capacity development, international and regional agreements, and rural telecommunications needs for bridging the digital divide.

USP’s research into ICT has largely been supported and funded by the Japan International Cooperation Agency’s ICT Capacity Building @ USP Project, which focuses mainly on using ICT to promote economic and social development.

The Japanese ODA and the Sasakawa Pacific Island Nations Fund recently completed studies of the telecommunications infrastructure and needs in Palau, FSM and the Marshall Islands. The studies reviewed national economic development plans, national IT strategies or plans, the UNDP IT policy-making workshop, the status of telecommunications carriers, submarine optical fibre cable plans, educational network plans and distance education, and health network improvement plans. These studies found that the disparity in access to the domestic information infrastructure is more pronounced in developing nations than in developed countries, that huge amounts of investment are needed in providing telecommunications services to rural areas, and that private sector investors are not attracted to the region because of a lack of commercial viability. There are no simple solutions to the challenges identified.

A number of recommendations made by these studies have been forwarded to the various aid agencies, particularly the Japanese ODA, AusAID, NZAID and the Sasakawa Pacific Island Nations Fund, as well as to member governments. The recommendations include the need to establish an IT fund for educational institutions; to provide human resource training courses at all levels; to provide training for computer lab instructors; to network projects on health, commerce, the environment and tourism; and to establish remote island telecentres.

A great deal of work has been undertaken in telehealth at the University of Hawaii and the University of Guam, and in distance education at USP. A study of ICT needs was conducted recently, and it highlights the need for more
bandwidth along with efficient and low-cost ICT services. The solutions proposed include VSAT, cellular services and telecentres.

**Trends**

Closing the digital divide between developed and developing countries will continue to be a concern and commitment of many leaders, particularly those from the Group of Eight (G8). Access to and use of ICT by the government, industry, education and healthcare providers, NGOs, individuals and the community is essential for the economic and social development of the Pacific region. However, full participation of the countries in development and harnessing of the full potential of ICT will not be possible if the region is plagued by unreliable and inefficient services, high costs and monopolistic practices. Unless these issues are addressed, and measures taken to eliminate the difficulties and prohibiting factors that retard growth, the digital divide will continue to widen because the region will not be able to catch up with others in the application of the new technologies.

In a number of Pacific island countries, ICT is seen as the foundation on which to build distance learning, telehealth, e-commerce and emergency management programmes. However, in many of these countries, the local infrastructure has to be upgraded to meet the telecommunications needs. Low bandwidth and costly international telecommunications connections are other obstacles. Running in parallel with infrastructure upgrading should be the development of human resources trained in ICT.

The two most significant growth areas in the region are mobile phones and email. Almost all the countries in the region now have access to mobile phone services, and in some countries mobile users have outnumbered land-line users. For example, in Fiji there are now over 120,000 mobile users against 102,000 land-line subscribers, and in Samoa the number of users is growing rapidly since mobile phones were introduced in 2003.

With regard to email and Internet access, Tonga saw a second ISP commencing operations in 2002. In 1995, email was new in Fiji, as well as in the other 11 countries covered by USP’s wide area network, USPNet. Today, access to email is widespread in urban areas – in educational institutions, organisations, Internet cafés and many homes. Except for Tonga, other countries in the region still do not offer broadband services. Fiji is served by the Southern Cross Cable Network and good satellite links and has the capacity and technology to offer broadband services, but it does not because of the exclusive licence agreement the government has with FINTEL (in which Cable and Wireless has a 49 percent share and the government through Telecom Fiji 51 percent). Papua New Guinea is the other Pacific island nation with access to submarine cable links. Fiji and many of the other countries still rely on dial-up services via the conventional telephone system.

The trends in the region indicate that the ICT sector is growing fast in a number of areas, but the challenges and constraints that have been identified need to be addressed in order that rapid growth will continue.

Services which are forecasted to be in demand in the future include video distribution, digital broadcast, Internet and broadband, multimedia database, and data warehousing.

Despite the many constraints confronting the Pacific islands, the interesting point to note is that in under a decade a large part of the islands’ population has become aware of ICT and is using the new technologies frequently and with ease. Many individuals now have mobile phones and computers, and even more are accessible by email. As many islanders are working abroad, ICT, particularly telecommunications, has become essential for staying in touch with loved ones. Email also allows students to participate in online education. Everyone wants a piece of the action and will do whatever it takes to acquire a computer or mobile phone and learn how to use these technologies. What remains now for the Pacific islands is to ensure that the disparity in access within their countries is eliminated.

**Notes**

1. The countries that make up the official Pacific region as covered by the Pacific Community include American Samoa, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Guam, Kiribati, Nauru, New Caledonia, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Pitcairn Islands, Republic of the Marshall Islands, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, and Wallis and Futuna.

2. The organisations are the University of the South Pacific attending to education; the South Pacific Commission looking after agriculture and health; the Forum Fisheries Agency managing fisheries; the South Pacific Geosciences Commission covering energy; the South Pacific Regional Environment Programme overseeing the environment; and the Pacific Islands Forum embracing overall economic, political and development issues in the region.

3. The island nations are scattered over a huge span of ocean area covering 33 million square kilometres and a total land area the size of Denmark with populations varying from 5.1 million in Papua New Guinea to 1,000 in Tokelau, about 65 percent of the people still living in rural areas with the Solomon Islands recording the highest of about 90 percent, per-capita GDP ranging from US$340 in Solomon Islands to over US$8,000 in Palau, literacy rates ranging from a high 100 percent in Cook Islands and Tonga to 59 percent in the Solomon Islands, and all maintaining their own distinct languages, traditions and cultures with strong national and regional identities. This diversity makes for a very rich region where all the countries are proud of their heritage. The main economic base of these small island nations is agriculture, fisheries and marine resources with more countries having tourism as a growing and sustainable industry for the future.
4. These were the views of a number of people interviewed by the author in 2003 while studying telecommunications reforms in the Pacific and evaluating the computer science/IT curriculum in secondary schools in Fiji.

5. The countries are Cook Islands, Fiji, Kiribati, Republic of the Marshall Islands, Nauru, Niue, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu and Vanuatu.


9. This three-year project (2002–2005) includes studies on the computer science/IT curriculum in Fiji secondary schools, e-commerce and ICT application for small and medium enterprises focusing on tourism, the adoption of new technologies for distance learning by students and lecturers, social and economic impact of the People’s First Network (PFNET), multimedia and learning, online learning in the region, reform of the telecommunications environment for economic and social development in the region, and others.

10. Since 1995, and more so recently, G8 leaders (USA, UK, Japan, France, Germany, Italy, Canada, Russia) have had ICT on their summit agenda. In 2000, a Digital Opportunity Task Force (DOT Force) was established by them at the Kyushu–Okinawa summit to identify how everyone can benefit from the digital revolution, especially the poorest people in the world. In 2003, the business community was invited to provide their solutions to tackling the growing divide.

References


ICT: Opportunities and challenges for ASEAN

The digital divide is a recognised reality not merely between but also within member states of the Association of Southeast Asian Nations (ASEAN). Estimates in 1999 indicated that the aggregate number of individual Internet users in Indonesia, Malaysia, the Philippines, Thailand and Singapore was only 3.74 million or 1 percent of the total population of these countries combined. ASEAN has formulated various policy pronouncements in recognition of the opportunities as well as challenges posed by ICT. The leaders of ASEAN nations have agreed to promote collective efforts to implement national development strategies in the ICT sector. They have also agreed to provide essential legal and policy frameworks, develop skills, and encourage the use of the new technologies in business, society and government.

This chapter surveys the policy initiatives of ASEAN in response to the opportunities and challenges raised by developments in ICT. It also looks at how the regional grouping is working towards bridging the digital divide that is markedly present in the region. The chapter is organised in two major parts. The first section reviews the main policy announcements and regional initiatives launched by ASEAN. It focuses on the e-ASEAN Initiative, the e-ASEAN Framework Agreement, the programmes that grew out of these initiatives, and the institutional bodies responsible for the achievement of the e-ASEAN goals. The second section considers what some member countries have done thus far as a result of, or in the context of, these regional initiatives. It also looks at the pilot projects and other regional programmes launched in response to the e-ASEAN Initiative. Finally, the chapter concludes with a brief assessment of the progress of these regional initiatives and provides some recommendations.

ICT policy announcements and regional initiatives

Hanoi Plan of Action

The first time ASEAN heads of state and governments acknowledged the need to continue to cooperate and strengthen ASEAN’s capacity in science and technology, particularly in IT, and also the need to develop an ASEAN information infrastructure (AII) was in December 1998 via the Hanoi Declaration.1 The declaration was accompanied by the Hanoi Plan of Action, which enumerated eight goals for promoting science and technology and developing IT infrastructure:2

1. To forge agreement among member countries on the design, standardisation, interconnection and interoperability of IT systems by 2001, as well as to ensure the protection of intellectual property rights and consumer rights.
2. To develop the information content of the AII by 2004.
3. To establish networks of science and technology centres of excellence and academic institutions by 2001.
4. To intensify R&D in the application of strategic and enabling technologies.
5. To establish a technology scan mechanism and institutionalise a system of science and technology indicators by 2001.
6. To develop innovative systems for programme management and revenue generation to support ASEAN science and technology.
7. To promote greater public and private sector collaboration in science and technology, particularly in IT.
8. To undertake studies on the evolution of new working conditions and living environments resulting from widespread use of IT by 2001.
The e-ASEAN Task Force was a joint public–private sector group set up to serve as an advisory body to ASEAN leaders, assisting ASEAN economic ministers in all matters relating to the implementation of the e-ASEAN Initiative, recommending ways to expedite or improve the initiative, and providing guidance to the e-ASEAN Working Group. It was also tasked to determine the policy, legal and regulatory frameworks that would favour the development of the AII and to recommend policies on the social and cultural aspects of e-ASEAN. The group reviewed and consolidated the recommendations of the Working Group on AII and the IT Private Sector Core Group. The active and central participation of the private sector in the task force demonstrated that the significant role of the private sector in developing the ICT industry in the region was recognised. The task force provided a venue for the private and public sectors to bring together their experiences and knowledge and cooperate to ensure that the task force’s policy advice was responsive to the needs of the market.

During the three years of its existence from 1999 to 2002, the task force identified projects to jumpstart the AII and to demonstrate the immediate benefits of using ICT by ordinary people. It also collated a manual on best practices in human resource development and education and promoted e-ASEAN to the people, corporations and governments of ASEAN as well as to other relevant communities outside the region. Its other tasks included drawing up guidelines to clarify policy issues related to e-commerce, devising prescriptive measures to narrow the digital divide, and fostering the growth of indigenous content and services. When the task force was dissolved, its functions were passed on to AEM, TELSOM and TELMIN (discussed later).

e-ASEAN Framework Agreement

ASEAN leaders signed the e-ASEAN Framework Agreement at the Fourth ASEAN Informal Summit in Singapore in November 2000. The agreement committed ASEAN members to an implementation schedule “to achieve digital readiness for the region in order to develop the basis for ASEAN’s competitiveness into the future, better the lives of their citizens through the application of information and communication technologies, and foster the spirit of ASEAN community.” The agreement shows ASEAN governments’ commitment to promoting collective efforts that complement national ICT strategies to achieve regional connectivity. The agreement has four overarching goals:

1. To develop, strengthen and enhance the competitiveness of the ICT sector in ASEAN.
2. To reduce the digital divide within and among ASEAN members.
3. To strengthen cooperation between the public and private sectors in realising e-ASEAN.
4. To liberalise trade in ICT products, services and investments to support e-ASEAN initiatives.
To achieve these goals, the agreement specifies several areas that will be developed or promoted, including an AII, e-commerce, liberalisation of trade and investment in ICT, e-society, IT capacity building, and e-government. A total of 42 pilot projects were launched in these areas following the signing of the agreement.

Two major institutional responses grew out of the e-ASEAN Initiative: the annual ASEAN Telecommunications Senior Officials Meeting and ASEAN Telecommunications Ministers Meeting.

ASEAN Telecommunications Senior Officials Meeting (TELSOM)

The First TELSOM was convened in Brunei, in conjunction with the launch of the e-ASEAN Initiative in October 2000. The meeting followed the Sixth ASEAN Telecommunications Regulators Council Meeting, where a Sectoral Mutual Recognition Arrangement was adopted. This agreement, which took effect in July 2001, put in place region-wide recognition of conformity assessment procedures for telecommunications equipment.

At the First TELSOM, the senior officials agreed to intensify the role of the ASEAN telecommunications and IT sector in enhancing regional cohesion and competitiveness, to undertake capacity-building programmes, to address universal access and the digital divide, and to enhance intra-ASEAN trade and investment in the telecommunications and IT sector. TELSOM also agreed to cooperate with the e-ASEAN Task Force and the AII Working Group to develop the AII, introduce capacity-building programmes, and launch activities to address telecommunications and IT issues.

ASEAN Telecommunications Ministers Meeting (TELMIN)

The first annual TELMIN was held in Kuala Lumpur in July 2001. During this and subsequent meetings, the ministers discussed collaborative efforts in numerous areas towards, generally, closing the digital divide in the region and facilitating trade and investment within ASEAN. These efforts include advancing e-ASEAN, particularly the early realisation of the AII; coordinating and harmonising policies and programmes; strengthening cooperation and joint approaches in addressing international and regional telecommunications and IT issues; promoting efficient e-government; and fostering the development of indigenous content.

At the First TELMIN, it was agreed to create working groups under TELSOM that would be led by different member countries to oversee the development in the following areas: (1) AII: led by the Philippines and Singapore; (2) capacity building: led by Thailand, Cambodia, Laos, Myanmar and Vietnam; (3) universal access and digital divide: led by Malaysia, Vietnam and Indonesia; (4) trade and investment facilitation: led by Indonesia and Singapore; and (5) positive use of the Internet: led by Malaysia and Thailand. These working groups would focus on creating technical and policy frameworks for the AII to ensure regional interconnectivity and interoperability, developing high-speed direct connections or broadband access for the AII backbone, improving universal access and narrowing the digital divide in the least connected member countries, and introducing capacity building and human resource development programmes.

During the 34th AEM in September 2002, a decision was made to restructure the e-ASEAN Working Group and its role in the implementation of the e-ASEAN Initiative. The implementation of the technical, non-liberalisation elements of the initiative would be transferred to TELSOM and TELMIN, while the e-commerce and liberalisation elements as well as the e-ASEAN Working Group would remain under the purview of SEOM and AEM.

The digital divide concern in ASEAN is being addressed through collaborative efforts that include capacity building and human resource development, enabling universal and affordable access to ICT, promoting e-community and e-learning, building a network of ICT skills competency agencies, and training small and medium enterprises to deploy ICT applications in their operations. An ASEAN digital divide database has been established to promote understanding of the ASEAN digital divide, exchange of information on universal service obligation schemes, and development of joint studies and projects. The database, ASEANconnect, houses key statistics and measurements of ICT indicators.

Intra-ASEAN trade and investment in ICT is being enhanced through identifying and removing barriers, fostering pro-business policies, and establishing transparent, predictable and non-discriminatory regulatory systems. A list of ICT products and the tariff reduction schedule for these products have been drawn up and are updated regularly. The creation of a database of trade and investment policy and regulatory practices is under consideration.

ASEAN cooperation on ICT issues has been strengthened through the establishment of regional ICT centres of excellence for joint R&D in software and content development. Also being considered are the creation of an ASEAN ICT centre and strengthening of the ICT unit in the ASEAN Secretariat.

Encouraging private sector participation as well as public–private sector collaboration in regional programmes and activities is another important item on TELMIN’s agenda. Conducive and competitive policy and regulatory environments are essential for attracting investments in infrastructure and technology development. An e-ASEAN Business Council has been established to facilitate dialogue with the private sector on infrastructure and e-learning accreditation. Additionally, TELMIN has urged industry involvement in negotiations for sustainable and fair international charging arrangements for Internet services.

Besides widening linkages with industry, it is also to ASEAN’s advantage to engage with global forums such as
the World Summit on Information Society (WSIS). At the Third TELMIN held in Singapore in September 2003, ASEAN agreed to submit a joint statement to the Geneva WSIS meeting held in December that year. The statement advocated a global strategy to realize the information society based on concrete milestones rather than broad visions; a plan of action adapted to each region's unique and diverse needs; and the recognition of existing regional initiatives such as e-ASEAN in implementing ICT programmes.12

In the light of frequent and widely damaging attacks on the Internet, TELMIN proposed setting up an ASEAN network security coordinating council and establishing national Computer Emergency Response Teams (CERTs) in all member countries to combat cyber threats. An ASEAN cyber security virtual forum was also proposed with the goal of developing a common framework as well as coordinating information exchange, establishing standards, and guiding cooperation among national enforcement agencies.

By the Fourth TELMIN held in Bangkok in August 2004, much progress has been made. The information infrastructures in ASEAN had been strengthened through the establishment of CERTs and the development of a standard operating procedure for information sharing among ASEAN members as a minimum requirement for CERTs to respond to cyber threats. In terms of the implementation of the Sectoral Mutual Recognition Arrangement (MRA) on conformity assessment for telecommunications equipment, Singapore would implement bilateral MRAs with Brunei, with Indonesia, and with Malaysia by end 2004. Meanwhile, bilateral MRAs between Malaysia and Brunei were being negotiated. These MRAs will benefit end-users as telecommunications equipment becomes more accessible and affordable within member countries.

One of the most important outcomes of the fourth meeting was the establishment of an ASEAN ICT Fund, with a seed fund of US$5 million. All members made equal contributions to the fund. It will be used to accelerate the implementation of ASEAN ICT projects.

Another significant milestone achieved at the meeting was the start of ASEAN's dialogues with its Asian neighbours on ICT issues, with the first ASEAN +3 (China, Japan and South Korea) and ASEAN–India meetings being held.13 In view of the many common issues, cooperation is beneficial to both ASEAN and its partners. Key areas identified for cooperation are broadband deployment, capacity building in cyber security, ICT for the disabled and the elderly, a network for the disabled, radio frequency identification technology, developing network software in local languages, and e-learning initiatives.14

**Intellectual property initiatives**

ASEAN has institutionalised consultation with WIPO, through regular dialogues between WIPO and ASEAN ambassadors posted in Geneva, as early as 1993. These consultations provide a venue for discussions to identify areas of cooperation, institution strengthening and capacity building, legislative assistance, as well as human resource development and training. The most recent WIPO–ASEAN consultation meeting was held in May 2003, when the main topic of discussion was how to use intellectual property as a tool for promoting economic growth and the possibility of establishing an ASEAN regional collective copyright management system. ASEAN has established a Working Group on Intellectual Property Cooperation to look into these issues.15

Another ASEAN engagement on intellectual property issues is its cooperation with the European Union, which also began in 1993. The European Community–ASEAN Intellectual Property Rights Co-operation Programme provides European expertise to ASEAN member states on how to protect and enforce intellectual property rights, such as patents and industrial designs, trademarks, copyrights and related rights, geographical indications, layout designs of integrated circuits, and protection of undisclosed information.16

**e-ASEAN pilot projects and initiatives**

This section considers two themes. Firstly, it highlights what some member countries have done thus far in the context of the regional initiatives on ICT. Secondly, it considers the pilot projects and other initiatives launched in response to the e-ASEAN Initiative.

**CLMV initiatives**

A positive outcome of the e-ASEAN Framework Agreement is the setting up of an ICT department or an ICT commission within an existing government department in all the ASEAN states. We will highlight the efforts Cambodia, Myanmar and Vietnam have made in developing their nation’s ICT capacity.

Cambodia set up its own e-ASEAN working group after the 34th AEM in 2002. It also has a National ICT Development Authority, which was established in 2001 and is headed by the prime minister. The agency is tasked to draft Cambodia’s ICT master plan and to establish the Government Administration Information System. The ICT master plan identifies four key areas as its focus: e-government, e-residence, e-real estate and e-development. The main challenge facing Cambodia is its people’s low level of technical skills and know-how.

In Myanmar, the government recognizes that ICT is key to the country’s economic and social development and thus has committed itself to developing its ICT sector. It set up an Internet task force, established an ICT park to centralise ICT-related infrastructures in one place, and is in the process of formulating e-commerce laws. Myanmar needs technical assistance on drafting these laws. As with Cambodia, the
lack of skills and expertise in ICT is a major obstacle.

In Vietnam, the government has launched an IT master plan, which identifies five key areas for development: (1) ICT human resources, (2) ICT infrastructure, (3) software industry, (4) hardware industry, and (5) accelerating the deployment and development of ICT. In order to attract foreign investment in the ICT sector, incentives are provided to investors, such as tax preferences. One of the challenges for the future is how to develop the ICT sector in the country, particularly its human resources. Its current university graduates cannot meet the high demand of industry for ICT-trained personnel. The other challenge is the prohibitive cost of Internet access, which leads to low utilisation.

The preceding discussion on these three transitional economies is especially significant in the light of the Vientiane meeting of ASEAN leaders in November 2004 when the ASEAN-6 Assistance to CLMV Countries (Cambodia, Laos, Myanmar and Vietnam) programme under the rubric of the Initiative for ASEAN Integration (IAI) was launched. Under this new programme, which aims to bridge the development gap within ASEAN, members of ASEAN-6 commit themselves to helping CLMV countries develop by focusing on four priority areas, one of which is the development of the ICT sector. With respect to ICT, and in line with the e-ASEAN Initiative, the CLMV countries will be given assistance to put into place the necessary policy, institutional, legal and regulatory frameworks for developing and deploying ICT.

Pilot projects

The 42 pilot projects endorsed since the signing of the e-ASEAN Framework Agreement in November 2000 were launched under the management of the e-ASEAN Task Force. All the projects went through an initial phase of development involving the project initiator and at least two other ASEAN member countries. The second phase involves the rollout of the project to all members of ASEAN. Of the 42 pilot projects, 19 are currently ongoing or have been completed. These 19 projects, most of which have an online presence, are as follows:

2. GM SupplyPower: A portal for current suppliers of General Motors in Southeast Asia to conduct their business online (http://www.gm.com.sg)
3. WeASEAN.com: A portal for small and medium enterprises in ASEAN to engage in B2B commerce (http://www.weasean.com)
4. Sesami.com: An e-commerce exchange for organisations of all sizes to conduct B2B transactions (http://www.sesami.com)
5. ASEAN auction portal: An online auction marketplace for the ASEAN region (http://www.lelong.com.my)
6. ASEAN trade and business directory: A portal that provides business and trade information for small and medium enterprises worldwide (http://www.tradesearch.com)
7. Accelerating e-learning in ASEAN schools (I-Tutoring Online): An e-learning solution that enables primary schools and their teachers to interact online (http://www.i-tutor.com)
8. ASEAN Institute of Business Technology: A collaboration between ASEAN and international partners whereby academics from established and recognised educational institutions throughout the region share their professional knowledge (http://www.multiversity-digital.com.au)
9. ASEAN Training Network: A virtual network that brings together human resource professionals to provide training at all levels (http://www.aseantraining.net)
10. Knowledge Worker Exchange (KWX): An exchange that provides recruitment services, career and job market guidance and other related services (http://www.kwxasean.com)
11. ArtPostAsia: A portal that seeks to create a broader and more active audience for Southeast Asian art (http://www.artpostasia.com/web)
12. VirtualMalaysia.com: A tourism portal that provides information for tourists to Malaysia (http://www.virtualmalaysia.com)
13. ASEAN service access platform: A pan-ASEAN infrastructure for member countries to launch services that other countries can leverage on to build even more complex services (http://www.ecquaria.com)
15. Alpha Investment Bank: A portal that consolidates government networks and information services to promote the development of entrepreneurs, the venture capitalist industry, science and technology, foreign investment and technology exports (http://www.alphainvestmentbank.com)
16. Lanabiz: An e-commerce infrastructure and software technology solution provider that provides services to corporations (http://www.lanabiz.com)
17. E-entrepreneurship training programme: A programme (not online) that aims to build a critical mass of ICT-empowered entrepreneurs, particularly in CLMV countries
18. ASEAN incubator network: Completed in 2002, an initiative designed to help ASEAN countries kick-start entrepreneurial activities by providing participating companies networking opportunities, conducting training seminars, and giving start-ups the chance to market their products and services and to build their brand profile
19. Cyber law training workshop: Completed in 2002, a physical workshop held to provide legislators, government counsels, and judges of CLMV countries an overview of the issues, and proposed solutions, posed by e-commerce and the advent of the information industry

E-government initiatives

In addition to the above pilot projects, a number of key initiatives in e-government and human capacity development were implemented by ASEAN in 2002. One of them was an in-country seminar on e-government opportunities and challenges, which was aimed at impressing upon government officials the benefits of using ICT in administration and in the delivery of public services. Another was an e-government strategic planning workshop organised for government officials of CLMV countries to equip them with a clear understanding of how the proper use of ICT and the Internet can improve efficiency, increase productivity and transform public service delivery. Another activity, the ASEAN executive seminar on e-government, was targeted at senior government officials with decision-making power that would allow them to implement e-government initiatives within their respective ministries or departments as e-government “champions”.

Conclusion

ASEAN has launched numerous initiatives since 1998 in response to the opportunities and challenges presented by ICT. The grouping adopted the e-ASEAN Initiative in 1999 and formalised the e-ASEAN Framework Agreement in 2000. It launched 42 pilot projects to demonstrate the benefits that can be reaped from the use of ICT. The creation of an e-ASEAN ICT Fund is an important step towards accelerating the ICT sector’s development in the region.

The e-ASEAN Task Force was established as an advisory group and the e-ASEAN Working Group as the implementing body under the purview of SEOM/AEM to oversee the achievement of the e-ASEAN goals. Along with this, annual meetings of ASEAN telecommunications ministers (TELMIN) and senior officials (TELSOM) were commenced as institutions responsible for the achievement of the technological and infrastructural goals of e-ASEAN. Meanwhile, AEM is responsible for trade and intellectual property rights issues. Much of the achievement thus far has been at the level of policy dialogues between and among top-level officials and the private sector of member states. The dialogues signal increased cooperation, consultation, and standardisation of approaches to ICT development within the region. They have resulted in the development of the necessary policy and regulatory frameworks for ICT. A clearly positive development is the creation of a new ICT department or an ICT commission within an existing department in member countries. This is proof of recognition that ICT is vital for a country’s development. In addition, ASEAN has actively pursued negotiations with its East and South Asian neighbours on ICT issues of common interest and mutual benefit. It also engages with WSIS, WIPO and the European Union.

The work on achieving the goals of the e-ASEAN Framework Agreement is divided between TELMIN for infrastructure and technology issues and AEM for trade-related issues. While such specialisation and division of labour makes sense at one level, viewing ICT issues in such a bifurcated manner leads to a lopsided focus on trade while downplaying infrastructure and access issues. In particular, the digital divide issue risks playing second fiddle to trade-related issues.

One concrete way to further solidify ASEAN’s commitment to ICT development in the region is to create a permanent ASEAN body that deals with ICT. Such a move will highlight ASEAN’s commitment by creating a clear line of institutional responsibility. Such a body could also be tasked with assessing, benchmarking and monitoring the progress of the ICT initiatives of ASEAN members, individually and collectively, in order to know where exactly efforts are succeeding and where more needs to be done. Also, a review of the e-ASEAN Framework Agreement is essential to ensure its continued relevance.

ASEAN needs to improve the documentation and assessment of the progress of its ICT pilot projects. A depository of all documents and information on the progress of the e-ASEAN Initiative and the e-ASEAN Framework Agreement should be established. The depository can be housed at the ASEAN Secretariat website or at the website of a permanent ICT body. The depository should also contain records of the activities of the e-ASEAN Working Group, AEM, TELMIN and TELSOM as well as the progress of the activities and programmes of the former e-ASEAN Task Force.

Much has been done in the past few years. But more remains to be carried out by ASEAN and its member states to fully seize the opportunities offered by ICT for the benefit of their people. The ICT sector is highly dynamic, so ASEAN is faced with the challenge of being flexible and with the need to constantly cope with the changes and the accompanying perils and opportunities. The leaders of ASEAN have already stated their political commitment to ICT development. Hopefully, the commitment would enable the region to cope with the challenges it faces.

Notes

2. See http://www.aseansec.org/687.htm. The goals stated for the telecommunications sector were: (1) to achieve interoperability and interconnectivity of the national information infrastructures of member states by 2010; (2) to develop and implement an ASEAN plan of action on regional broadband interconnectivity.
by 2000; and (3) to intensify cooperation in ensuring seamless wireless communication within the region as well as in facilitating intra-ASEAN trade in telecommunications equipment and services.


4. At this meeting, ASEAN leaders were also presented with a white paper Building the Bridge to the Future prepared by the IT Private Sector Core Group, which analysed the readiness of countries in the region for the digital economy. The white paper also provided policy and regulatory recommendations as well as concrete pilot project proposals to make the region competitive in the “new digital age”. See the white paper at http://www.fit-ed.org/easean/aii/all.php.

5. Roberto R. Romulo, former Foreign Affairs Secretary of the Philippines, served as chairman of the task force. In addition, ASEAN leaders appointed representatives from the private and the public sectors to the task force. The remaining members were the head of the e-ASEAN Working Group and a representative from the ASEAN Secretariat. The task force met quarterly, with the first meeting held during the first quarter of 2000.

6. Among the task force’s early pilot projects was the establishment of an ASEAN SchoolNet to link students, teachers, researchers and education administrators within ASEAN and to their counterparts worldwide. For a summary of the task force’s projects, see http://www.aseansec.org/14467.htm.


8. The council was established in 1994 in recognition of the importance of telecommunications as a fundamental infrastructure for the development of the ASEAN Free Trade Area. It meets to harmonise ASEAN’s regulatory policies on spectrum management as well as type-approval standards and processes, to intensify cooperation among ASEAN members to develop common positions at international forums such as ITU and the Asia-Pacific Telecommunity, to promote interconnection and interoperability of ASEAN national information infrastructures, and to develop ASEAN human resources.

9. The chairmanship of TELMIN is rotated annually in alphabetical order among the member states. TELSOM is mandated to act as the operating arm of TELMIN to supervise, coordinate and implement programmes and policy directions set by ASEAN telecommunications ministers.


14. An earlier meeting with China in 2003 led to the signing of a memorandum of understanding with China on cooperation in ICT. The areas of cooperation are human resources, information infrastructure, technology, ICT application, e-ASEAN project implementation, exchange of information, and an ASEAN–China ICT seminar. See http://www.aseansec.org/15147.htm.


17. At the time of research for this chapter, it was unfortunate that no data on Laos were accessible and so Laos is not included in the discussion. For information on the IAI, see http://www.aseansec.org/14683.htm.

18. The other three priority areas are infrastructure development, human resource development, and promoting regional economic integration.

19. This does not mean that the other projects no longer exist. Further research and documentation of all the pilot projects is needed. One of the main reasons for the discontinuation of some of the projects after the pilot phase was a lack of financial support.

20. One of the suggestions broached during the e-ASEAN Working Group Strategic Meeting in July 2002 was to set up an ASEAN centre for ICT patterned after the ASEAN Centre for Energy.
Asia-Pacific Economic Cooperation
Lorraine Carlos Salazar and Shelah D. Lardizabal

APEC and its response to the ICT promise

The Asia-Pacific Economic Cooperation (APEC) is a forum working towards facilitating economic growth, cooperation, trade and investment among a select group of economies in the Asia-Pacific region. The organisation has 21 members: Australia, Brunei, Canada, Chile, China, Hong Kong, Indonesia, Japan, South Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, Philippines, Russian Federation, Singapore, Taiwan, Thailand, USA and Vietnam.

APEC prides itself on being the only intergovernmental group that operates on the basis of non-binding commitments, open dialogue, and equal respect for the views of all participants. In contrast to WTO or other multilateral trade bodies, APEC does not impose treaty obligations on its members. Instead, decisions are reached by consensus and commitments are undertaken on a voluntary basis.

APEC’s vision of “free and open trade and investment in the Asia-Pacific by 2010 for industrialised economies and 2020 for developing economies” is articulated in the Bogor Goals. The grouping has worked to reduce tariffs and other trade barriers across the region since its establishment in 1989. It has launched a number of initiatives since the 1990s to respond to both the prospects and the challenges offered by the rapid growth of the ICT sector.

This chapter reviews APEC’s ICT policies and initiatives, focusing on three areas. First, we look at APEC’s ICT policy pronouncements and initiatives. Then we survey APEC’s institutional mechanisms set up to help it achieve its ICT goals. Finally, we consider the progress made thus far in achieving the goals of the e-APEC Strategy, APEC’s central ICT policy.

ICT initiatives and policy announcements

This section examines the ICT policies of APEC, ranging from broad policy pronouncements to specific initiatives that it has launched for the APEC region.

e-APEC Strategy

The centrepiece of APEC’s ICT initiatives is the e-APEC Strategy launched in 2001 at the 13th APEC Economic Leaders’ Meeting in Shanghai. The strategy is very comprehensive and action oriented. It signals APEC leaders’ appreciation of the revolutionary impact of ICT and the enormous potential of the new technologies, when properly harnessed, for improving people’s standard of living. The e-APEC Strategy identifies the necessary policy environment and specifies appropriate goals and actions to take to maximise the benefits of the ICT revolution, address the digital divide, and thus reap the benefits that can be derived from the opportunities presented by the emerging “new economy”. The strategy provides a forward-looking, long-term and action-oriented plan with three major prongs of action:

1. Creating an environment for strengthening market structures and institutions
2. Creating an environment for infrastructure investment and technology development
3. Enhancing human capacity building and promoting entrepreneurship

The following are the goals stated for the first prong of creating an environment for strengthening market structures and institutions:

• Promoting economic growth with a sound macroeconomic framework
• Introducing structural reform to promote investment and trade liberalisation
• Accelerating market-oriented regulatory reforms
• Ensuring well-functioning financial markets and good corporate governance
• Adopting policies that reduce barriers to competition and maintaining an open policy stance for international trade and investment so as to reduce the costs of hardware, software and services, improve international standards and promote e-commerce
• Encouraging the growth of venture capital markets
• Protecting intellectual property rights by encouraging APEC-wide implementation of the provisions of the WIPO Copyright Treaty, the WIPO Performances and Phonograms Treaty, the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement, the Berne Convention and the Rome Convention
• Introducing policies that reduce uncertainty and enhance the efficiency of the price mechanism in allocating resources

The second prong of action, aimed at facilitating a supportive environment for infrastructure investment and technology development, concentrates on the following objectives:

• Creating an appropriate legal and regulatory environment, such as enacting electronic transaction laws based on UNCITRAL models; establishing authentication mechanisms such as electronic signatures; ensuring information and infrastructure security as well as personal data protection to build consumer trust; ensuring access to digital information; and encouraging the development of standards that are flexible enough to encourage innovation
• Ensuring the presence of basic information and communication infrastructure that is accessible as well as efficient value chain services such as transportation, customs, express delivery, and banking and payment systems

Finally, under the third prong of enhancing human capacity and promoting entrepreneurship, the following are identified as central areas of concern:

• Addressing the digital divide by fully implementing and adopting APEC’s Digital Divide Blueprint for Action (discussed later) to tackle issues identified at the APEC Summit in Brunei
• Building people’s capacities by providing access to high-quality education as well as lifelong learning and training through strong partnerships between the government, the academia and the business community
• Strengthening technology cooperation and information exchange
• Encouraging and supporting entrepreneurship and the development of small and medium enterprises
• Ensuring effective and extensive utilisation of ICT applications

APEC economies were urged to take concrete actions to turn the e-APEC goals into reality, which would help to spread the benefits of the new economy, speed up economic development, and revitalise not only the regional but also the global economy. Member economies and relevant APEC forums were also encouraged to implement the e-APEC Strategy through broad cooperation and collaboration.

In June 2004, the First High Level Symposium on e-Commerce and the First APEC Business Alliance Forum were held in China, where the report Implementing the e-APEC Strategy: Progress and Recommendations for Further Action was released. The report assessed the progress made by APEC economies to date and recommended further actions needed in implementing the strategy. Eight important findings were made by the study:

• The e-APEC Strategy is growing in importance.
• The Brunei Goals remain a fundamental cornerstone of the strategy.
• APEC will double, rather than triple, Internet access by 2005.
• Member economies have made significant improvements in e-infrastructure.
• Increased competition and market-oriented policies have helped innovation and investment.
• APEC economies are leading the world in areas such as broadband, e-government services and mobile services, but some members are falling behind.
• APEC’s goals and targets and the work of APEC forums are key elements for advancing the e-APEC Strategy.
• Building skills and capacity is the most pressing need for APEC economies.

These findings will be considered in detail later in the chapter.

Policies on trade and the digital economy

A second important and far-reaching initiative on ICT is the Leaders’ Declaration to Implement APEC Policies on Trade and the Digital Economy as a pathfinder activity3 in 2002. Sixteen economies voluntarily participated in the initiative, which focuses on efforts to liberalise the trading environment for the digital economy so that products and services can be exchanged over electronic networks free of tariffs and other barriers.4 The declaration is based on five general objectives. First, the digital economy should continue to flourish in a liberal and open trade environment, which is expected to lead to greater development of e-commerce and thus economic growth. Second, commitments to market access and national treatment across a broad range of relevant sectors will promote trade in products and services over electronic networks. Third, where legitimate policy objectives require domestic regulations that affect trade over electronic networks, such regulations should be transparent, non-discriminatory, and least restrictive on trade. Fourth, in view of the importance of liberalisation of digital trade, member economies support a long-term moratorium on
APEC ministers agreed on the need to draw up an APEC comprehensive strategy on intellectual property rights in 2005 which will aim to reduce piracy, trade in counterfeit goods and online piracy, as well as to increase cooperation and capacity building in this area. A proposal has been made to survey member economies’ best practices for combating optical disc piracy, and members are encouraged to implement the APEC effective practices for regulation related to optical disc production. The IPR policy progress mapping project is another measure to strengthen business confidence in the APEC region. The establishment of IPR service centres has begun in some member economies, and other members are encouraged to follow suit. Member economies are also encouraged to hold training seminars on IPR enforcement based on the guidelines set out in the comprehensive strategy. China will host a high-level symposium on IPR in 2005.

Recognising that the development of effective privacy protection mechanisms, which must at the same time avoid restricting information flows, is important to continued trade and economic growth, APEC ministers endorsed the APEC privacy framework and the future work agenda on international implementation of the APEC privacy framework. They also endorsed APEC’s strategies and actions towards a cross-border paperless trading environment.

Acknowledging the importance of the world summit on the information society (WSIS) for the continuous development of the global information society, APEC will formulate its input to the second phase of WSIS, which will be held in Tunis in November 2005.

Strategies to promote e-commerce

APEC first acknowledged the vital role of ICT in the growth and development of its member economies in 1994 at ITU’s launch of the concept of a global information infrastructure. APEC’s working group on telecommunications and information (APEC TEL) led studies on how an APEC information infrastructure could be constructed.

In 1997, APEC leaders signed the multilateral information technology agreement. The agreement arose from recognition of the huge potential for economic growth through the promotion of e-commerce, which can help to reduce cost, increase efficiency, improve the quality of life, and facilitate the greater involvement of small and medium enterprises in the global economy.

In 1998, APEC launched its blueprint for action on electronic commerce. Recognising that its members were at different stages of development and had different regulatory, social, economic and cultural frameworks, APEC leaders agreed to cooperate to ensure that all member economies benefit from e-commerce. Four principles govern APEC’s e-commerce development agenda:
1. The private sector should take the lead role as innovators and developers of e-commerce technology, applications, practices and services.

2. The government’s role is twofold: to promote and facilitate the use of e-commerce as a lead user and to create a favourable regulatory environment that is predictable, transparent and consistent.

3. While recognising that some degree of government regulation may be necessary, technology-neutral, competitive market-based solutions that are safeguarded by competition policy and effective industry self-regulation are preferred.

4. The government and the business sector should cooperate to develop technologies as well as policies that enhance trust and confidence by addressing relevant issues such as reliability, privacy, authentication and consumer protection.

Action agenda for the new economy

At the APEC Summit in Brunei in 2000, the Action Agenda for the New Economy was launched with the aim of maximising the benefits of the emerging new economy for all APEC economies. In line with this, a Digital Divide Blueprint for Action was issued in November 2000. The blueprint’s highlight is the goal of enabling members of urban, provincial and rural communities in every member economy to have individual or community-based access to information and services via the Internet by 2010. A first step towards this goal is the target of tripling the number of people in the APEC region with individual or community-based access to the Internet by the year 2005. Additionally, APEC launched a number of initiatives such as e-commerce readiness assessment, paperless trading, electronic individual action plans, and capacity building of institutions and human capital in areas related to e-commerce.

APEC also initiated a knowledge-based economy (KBE) strategy (APEC 2000 Year KBE Strategy) that aims to maximise the potentials of ICT, develop human resources, and establish a facilitating legal and regulatory framework to boost member economies’ abilities to engage in broader trade and investment liberalisation.

Initiatives to protect the security of infrastructures

Another landmark policy on ICT was launched in May 2002 at the Fifth APEC Ministerial Meeting on the Telecommunications and Information Industry in Shanghai in the form of the Statement on the Security of Information and Communications Infrastructures, which embodies recommendations from the UN General Assembly Resolution 55/63 on Combating the Criminal Misuse of Information Technologies. In order to implement the recommendations in the statement, APEC TEL disseminated a compendium of IT security standards and undertook a survey of cyber-crime legislation. It is also strengthening the capacity of institutions through the Cybercrime Legislation and Enforcement Capacity Building and the CERTs Awareness Raising and Capacity Building projects. It has supported the production of a simple guide to educate Internet users on potential problems such as viruses, Trojan horses, spyware and invasion of privacy.

A year later, in 2003, APEC TEL concentrated its efforts on addressing the issue of cyber crime with the launch of an APEC Cybersecurity Strategy. The Cybercrime Legislation and Enforcement Capacity Building Project also held its first meeting in Thailand, where member economies were encouraged to further work on developing laws and procedures to facilitate the investigation and prosecution of cases of cross-jurisdictional cyber crime. APEC also promoted the development of an international network of Computer Emergency Response Teams (CERTs).

Efforts to build human capacity

Acknowledging that building ICT skills and capacity is the most pressing need for APEC economies in order for them to reduce the digital divide and to facilitate trade, in 2003 APEC released its Five-Year Strategic Plan for e-Learning. The plan contains recommendations for improving students’ and teachers’ access to the Internet, the availability of innovative educational content over the Internet, and teachers’ capacity to use technology. It also addresses policy issues raised in implementing e-learning efforts across the APEC region.

In addition, a special coordinating group of human resource specialists was established to work towards improving the coordination and the efficiency of APEC’s efforts in human capacity building. Two organisations are notable for their work in capacity building. The APEC Education Foundation undertakes initiatives to enhance the ICT capacity of small and micro enterprises, while the Consortium for APEC Cyber Education Cooperation works to reduce the digital divide in the APEC region by creating a wide learning community of teachers, learners, researchers and administrators.

Key implementers of the e-APEC Strategy

Five main groups are in charge of implementing the e-APEC Strategy and other related plans. Other committees or bodies are also involved in the process from time to time. The five groups are briefly described below.
APEC Telecommunications and Information Working Group (APEC TEL)

APEC TEL endeavours towards improving the telecommunications and information infrastructure in the APEC region and facilitating effective cooperation, free trade and investment, and sustainable development. Its programme of action covers the implementation of the e-APEC Strategy and the Digital Divide Blueprint for Action, the promotion of policy and regulatory measures to liberalise the telecommunications and information sector, e-security, e-government, mutual recognition arrangements for the conformity assessment of telecommunications equipment, human capacity building, and active dialogue with the business community.

Established in 1990, and like other APEC working groups, TEL is made up of experts from each APEC member economy and works according to the directions of APEC leaders, ministers and senior officials. Four steering groups working on liberalisation, business facilitation, development cooperation, and human resource development propose, implement and monitor projects and activities to advance the overall goals of APEC. The private sector is actively involved in TEL activities, including in all four TEL steering groups. Many projects are initiated and driven solely by the business community or in cooperation with the public sector.

TEL recently launched its own website at http://www.apectelwg.org, which is very well organised, easy to navigate and user-friendly. The site contains vital information, both current and historical, on the working group’s history, policies, research and activities.

Electronic Commerce Steering Group (ECSG)

ECSG is responsible for ensuring that the benefits of e-commerce are maximised in the APEC region by promoting and facilitating the development and use of e-commerce through creating legal, regulatory and policy environments that are predictable, transparent and consistent. Its job also covers data privacy, consumer protection, cyber security, paperless trading, trade facilitation and spam. Member economies recently approved a revised structure for the group and agreed to increase cooperation with OECD and the Global Business Dialogue on Electronic Commerce.

The group was established in February 1999 by the Senior Officials Meeting following the launch in 1998 of the Blueprint for Action on Electronic Commerce. Its mandate was extended to February 2005.

At the ECSG’s ninth meeting in Santiago, Chile, in February 2004, approval was given for the establishment of the APEC Public–Private Partnership Dialogue on Paperless Trading to assist in the development of the APEC Paperless Trading Agenda.

e-APEC Task Force

This task force was formed to coordinate initiatives to develop and expand the Action Agenda for the New Economy. To fulfil this mandate, the task force developed a strategy that identifies the necessary policy environment and specifies appropriate goals and actions, drawing upon existing efforts and ongoing works within APEC.

As a special task group established to explore a topical issue and make recommendations about important areas for APEC’s consideration, the task force was dissolved after it had drawn up the e-APEC Strategy. The work of achieving the goals became the responsibility of existing committees and workgroups.

Committee on Trade and Investment

This committee was established in November 1993 through the Declaration of an APEC Trade and Investment Framework. It works towards the reduction of impediments to business activities in 15 key areas outlined in the Osaka Action Agenda, namely: tariffs, non-tariff measures, services, investment, standards and conformance, customs procedures, intellectual property, competition policy, government procurement, deregulation/regulatory review, rules of origin, dispute mediation, mobility of business people, information gathering and analysis, and implementation of WTO obligations. These areas are considered a key part of the e-APEC Strategy. The committee also works on trade facilitation and secure trade as well as addresses issues related to the Paperless Trading Agenda. The committee meets three times a year and provides a forum for APEC economies to discuss trade and policy issues. In 2004, it adopted a short list of five priorities on which it will be focusing its efforts; IPR is one of them.

Economic Committee

This committee was established at the Sixth APEC Ministerial Meeting in Jakarta, Indonesia, in November 1994. It conducts research on economic trends and issues in the APEC region in support of the grouping’s priority agendas. It also serves as a forum for APEC economies to discuss economic trends and issues. The committee has carried out extensive work on the new economy and KBE issues, such as the patterns and prospects of technological progress in the APEC region and the development of industrial clusters towards a KBE. It has published an extensive report on these issues, entitled The Drivers of the New Economy: Innovation and Organizational Practices.
The introduction of market-oriented policies has led to increased competition and investment.

According to the PECC study, increased competition and investment are foreseen to play a key role in helping APEC achieve the Brunei Goals.

Internet access will double, not triple

An important target of the e-APEC Strategy is the Brunei Goal of tripling the number of people who are able to access the Internet by the year 2005. According to the PECC study, APEC will likely double rather than triple the level of Internet access by that year. The shortfall comes from developing economies, where the increase in access is still relatively slow. Two major factors behind this sluggish growth are the slow expansion of fixed-line access and the high cost of telephone services and Internet access relative to per-capita income. A prescribed solution is to roll out affordable new-generation technologies such as wireless and satellite communications. It is worthwhile to note that China and Peru have been outstanding performers in terms of Internet penetration.

Improvement in e-infrastructure

As regards the development of e-infrastructure, APEC economies have made significant improvement due to a large extent to the fast-expanding mobile phone sector, which led to rapid increases in teledensity and telephone coverage across the region. The introduction of broadband has also given consumers more efficient access to the Internet. South Korea has become a world leader in the deployment of broadband, while other APEC economies are also expanding broadband services through the use of cable and DSL technology. Mobile and wireless communications are foreseen to play a key role in helping APEC achieve the Brunei Goals.

Increase in competition and investment

According to the PECC study, increased competition and the introduction of market-oriented policies have led to innovation and further investment in e-infrastructure in the APEC region. Most APEC economies have become more open to international competition and as a result have gained benefits through improved teledensity and better services. APEC sees the continuation of market-oriented and pro-competitive policies as crucial for further infrastructure investment, since there is a consensus among its member economies that infrastructure should largely be built by the private sector. Thus, government policies should focus on establishing appropriate regulatory regimes that are sufficiently flexible to adapt to industry changes. In the APEC region, Hong Kong and Singapore led the way in opening up markets between 1998 and 2003, while Chile currently has the most accessible market.

APEC has also adopted the WTO Reference Paper on Basic Telecommunication as the basic template for establishing telecommunications regulatory regimes. However, more subtle and operational practices may be needed for transitional APEC economies. APEC TEL is working on improving understanding of telecommunications issues as well as sharing information on regulatory changes during its biannual meetings. It has also embarked on developing best practices based on the WTO reference paper, which will help to enhance regulatory performance in the region.

Facilitating seamless trade

APEC is now benefiting from the application of e-strategies in facilitating and securing trade. Significant progress has been made in the area of paperless trading, with APEC setting the target of reducing or eliminating the requirement for paper documentation and communications in cross-border trade by 2005 for developed economies and 2010 for developing economies. As of 2004, 15 APEC economies had prepared unambiguous individual action plans for achieving the goal. APEC has also begun its pathfinder initiatives for electronic sanitary and phytosanitary certificates and electronic certificates. Electronic data interchange systems have been developed so that business users can interface readily with customs and other authorities. Also, cooperation is underway to develop a “single window” approach for all relevant transactions. In November 2004 at the 16th APEC Ministerial Meeting, the Strategies and Actions towards a Cross-Border Paperless Trading Environment was endorsed. This agreement is a comprehensive strategic plan that aims to provide a paperless trading environment and enable the electronic transmission of trade-related information across the APEC region within the timetable of the Bogor Goals.

In addition, the Secure Trade in the APEC Region Initiative was launched to guard against terrorist attacks on trading systems. Following the September 11, 2001 attacks on the USA, APEC economies are now cooperating in
several international and APEC-led initiatives such as the US-led Customs—Trade Partnership Against Terrorism, the Container Security Initiative, and the 24-Hour Advance Cargo Manifest Rule, which applies to cargoes entering North American ports.

Building a supportive e-commerce environment

Increased adoption of e-commerce largely depends on the integrity and security of the e-commerce system as well as ready access to the Internet. APEC is working at the country level with the business sector and with OECD to ensure that local, regional and international efforts on e-commerce are coordinated. A major focus is on the protection of the personal information of consumers. APEC is also developing a set of privacy principles and implementation mechanisms to facilitate information exchange while protecting data privacy within individual economies.

The grouping is also involved in capacity-building efforts to assist member economies implement the Voluntary Consumer Protection Guidelines for the On-line Environment agreed upon by APEC ministers in 2002. It has also initiated a survey on the problem of spam throughout the APEC region to determine the adequacy of national enforcement laws and agencies.

Integrating e-government services

Some APEC members are world leaders in e-government, while other members are in the midst of establishing their own comprehensive e-government action plan. Member economies are urged to implement the recommendations in the Strategy Report on Promoting e-Government in APEC, which was adopted at the APEC High Level Symposium on e-Government held in South Korea in July 2002.¹⁹

Conclusion

The PECC study argues that it is important for APEC to become more decisive in its choice of pilot projects to pursue by making selections based on a project’s strategic value, especially on prioritising skills development and cooperation between APEC groups. While APEC has a valuable and vast range of initiatives, projects, seminars and meetings on issues that relate to the e-APEC Strategy, many are developed and executed in an ad hoc manner with outcomes that only benefit those who take part directly in the activities. APEC itself has relatively scarce resources, so project initiators should constantly give thought to how these projects might add to a more strategic approach within APEC.

APEC has launched many ICT initiatives to promote economic development and integration. As an organisation that promotes trade facilitation and liberalisation, APEC is stressing the adoption of market-based policies that emphasize the facilitation and liberalisation of trade. APEC economies are among the world leaders in broadband, e-government and mobile services. They are also actively developing national strategies to utilise ICT for economic development and regional integration. However, some member economies are lagging behind. This situation suggests that the digital divide among member economies is real and has yet to be fully resolved.

To resolve this divide, APEC has provided its member economies with targets as well as measures for attaining the goals of the e-APEC Strategy. The agreement of member economies to share information on best practices and to collaborate on capacity building is a right step towards this goal.

Notes

3. APEC introduced the pathfinder initiatives to enable member economies to pilot the implementation of cooperative initiatives prior to their adoption by other members. This approach allows member economies that are ready and willing to commit to faster development in specific areas to do so and is seen as a way to invigorate progress towards the free trade and investment goals.
4. http://www.apec.org/apec/leaders__declarations/2002/statement_to_implement.html. The 16 participating economies are Brunei, Hong Kong, Indonesia, Japan, South Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, Philippines, Singapore, Taiwan, Thailand, USA and Vietnam. In 2004, Australia, Canada and China also joined in.
5. These are multi-chip integrated circuits, digital multifunctional machines, and modems.

According to APEC’s Economic Committee Report published in 2000, there are four elements to the new economy: (1) an effective innovative system, (2) human resource development, (3) efficient IT infrastructure, and (4) a business environment that is supportive of enterprise and innovation.


17. This section draws a great deal from the study’s report, Implementing the e-APEC Strategy: Progress and Recommendations for Further Action, published in November 2004. The report is available at http://www.pecc.org or http://www.apectelwg.org. Established in 1980, PECC is a tripartite partnership with representatives from business, government and academic circles who participate in their private capacity to discuss current policy issues in the Asia-Pacific region. PECC became the first non-governmental official observer of APEC in 1989.


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