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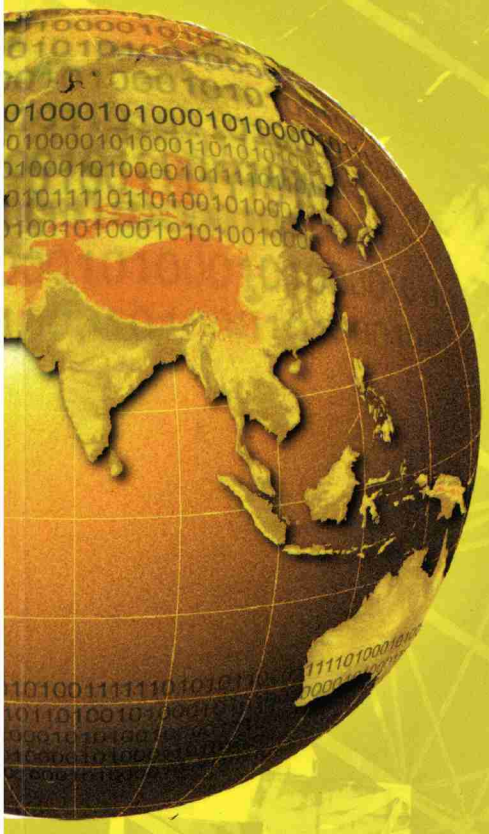

REPORTS ON

31 ECONOMIES
2 SUB-REGIONAL ASSOCIATIONS

- ICT4D in Asia Pacific: An Overview of Emerging Issues
- Mobile and Wireless Technologies for Development in Asia Pacific
- The Role of ICTs in Risk Communication in Asia Pacific
- Localization in Asia Pacific
- Key Policy Issues in Intellectual Property and Technology in Asia Pacific
- State and Evolution of ICTs: A Tale of Two Asias

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This edition of the *Digital Review of Asia Pacific*

is dedicated to the memory of

PROFESSOR VANNIARACHCHIGE KITHSIRI SAMARANAYAKE

whose contribution to ICT institution building

and human capacity development in Sri Lanka was outstanding,

as was his commitment to and engagement with

regional and international ICT4D platforms.

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Issues for the region

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Foreword

The overview of emerging issues in information and communication technologies (ICT) for development in Asia Pacific in this edition of Digital Review of Asia Pacific (DirAP) takes up the question of whether ICT ranks equally in priority with other sectors of development for investing the scarce resources of poor countries. It then takes the position that ignoring ICT will only lead to further excluding poor countries from the circuits of power and prosperity.

Indeed, this is a small world today and ICT is making it even smaller. The list of Impossibles in this world is shrinking. We should not wait too long to cross off a few more items from this list:

- It is impossible to eliminate poverty from this world.
- It is impossible to provide basic education to all.
- It is impossible to ensure necessary health care to the needy.
- It is impossible to make universal access happen.

ICT is quickly changing the world, creating a distance-less, borderless world of instantaneous communication. Increasingly, ICT is becoming less costly. Thus, ICT has much potential to create opportunities for growth and development in the rural areas of Asia. As ICT begins to create income generation activities in rural areas and as it becomes an instrument of rural economic and social activities, it begins to pay back on our hard-earned investments.

The Grameen Bank in Bangladesh, one of the poorest countries of the world, long ago made the choice to invest the present and future of the poor in ICT. ICT is a new opportunity for grassroots innovation. I saw an opportunity for the poor people to change their lives but only if this technology could be brought to them to meet their needs.

Towards this vision, we created Grameen Phone and we provided loans to poor women to buy phones to sell mobile phone services in the villages where they live. In this endeavour, we see the linkage between microcredit, our established strategy, and ICT, our newer strategy. Today, Grameen Phone is the largest phone company in Bangladesh and serves more than 12 million subscribers.

Social businesses such as Grameen Phone can play a significant role in creating opportunities that will help societies and their members to continue in the path of progress. Social business is a very important concept to me and very close to my heart. I define social businesses as a non-loss, non-dividend company, dedicated to achieving social objectives. Investors can take back their investment money, but they cannot get any dividend beyond that. Promoters of social businesses are the catalyst for positive change in a society.

Today, I would like to challenge our intellectuals, innovators, business leaders, corporations and institutions to help identify ways and means to help create social ICT businesses locally, nationally and internationally. Social business is a promising concept that I would like to bring into the ICT world, for we are applying it in earnest to our work with the poor in the villages of Bangladesh. I would like to emphasize that my challenge to our thought leaders is not only to create social business ideas in the ICT arena, but also to develop replicable designs that will help others in non-ICT sectors to be innovators of social ideas and social businesses.

In the future, I look to DirAP to document the stories of grassroots ICT innovation and learning for the Asia Pacific region, in technology deployment and research, as well as in innovative systems of delivery that bring useable ICT in a sustained manner to the doorstep of the poor.

Muhammad Yunus
Founder, Grameen Bank
Nobel Laureate, 2006

Preface

Information and communication technology for development in the Asia Pacific region: Encountering Rashomon's diversity of perspectives

The *Digital Review of Asia Pacific* (DirAP) has the mission of generating new descriptive, analytical and predictive knowledge about the field of ICT for development in the Asia Pacific region. It attempts to provide in-depth analyses and syntheses of ICT policy, developments and applications, and issues and debates concerning the significance of policy and technology enabling environments for national and regional socio-economic development. DirAP targets both regional and global audiences, especially decision and policymakers and practitioners from both government and NGOs.

From our perspective as publishers, DirAP's key contributions to the state-of-practice and state-of-the-art in ICT and ICT for development in Asia Pacific may be summarized as follows:

1. It adds a major source of research-based data and information to a field that is growing into a discipline with as yet relatively little research literature especially relating to Asia Pacific.
2. It gives ICT stakeholders in Asia Pacific opportunities to develop skills in research methods, research processes and research documentation.
3. It draws together a large number of leading ICT players from both developed and developing countries in Asia to reflect on platforms they identify as important for engagement to influence change.
4. It permits a time series narrative macro view of how total project investments by all parties aggregate into national syntheses on both country-level performance and issues-based performance.
5. It harnesses the intellectual contribution of a sizable community of practitioners and researchers from a multitude of disciplines from most of the developing countries of the region.

The voices of DirAP are independent and if they are ideological at all, they are the voices of these writers who are the key movers and shakers in the ICT for development arena in the region. We believe that this multiplicity of voices, which includes those of policymakers, professionals from the private sector and senior scholars, offers a unique opportunity to access the richness and the complexity of the debates, of the choices being made and to be made, and of the major issues faced in the interface between communication and development. And we strongly believe in the importance of this complementarity and diversity of voices, ensuring that, as in Kurozawa's *Rashomon*, the perspectives of the different actors are represented but also debated through research and statistical evidence.

The previous editions of DirAP were launched at the UN World Summit on the Information Society in Geneva (December 2003) and Tunis (November 2005) in both English and French versions, and they were extremely well received. We hope that this edition will provide you with an important source of perspectives about the major achievements in the midst of constraints as well as the challenges ahead, in your respective working environments within Asia Pacific. And we hope that this edition will provide a well-deserved visibility to the different types of ongoing experiments in the region to stakeholders in other parts of the world, on the different lanes of the Information Highway towards knowledge societies.

Claude-Yves Charron
The Network of UNESCO Chairs in Communications,
ORBICOM
Maria Ng Lee Hoon
International Development Research Centre

Introduction

In his Nobel lecture and in his Foreword to this edition of the *Digital Review of Asia Pacific* (DirAP), 2006 Nobel Laureate Muhammad Yunus, founder of Grameen Bank in Bangladesh, observed that information and communication technology (ICT) is transforming the world into a 'distanceless, borderless world of instantaneous communications' and that poor people can change their lives if they had access to and can use ICT to meet their needs.

For Muhammad Yunus, the first step in bringing ICT to the poor in Bangladesh was the creation of a mobile phone company called the Grameen Telecom of Bangladesh, a part of Grameen Communications, which was undertaken jointly with Telenor of Norway. Grameen Bank provided loans to the poor women of rural Bangladesh to purchase their own mobile phones and to sell mobile phones to villagers. The mobile phone business proved to be a brisk one and today there are almost 300,000 women engaged in the mobile phone business serving 10 million subscribers to Grameen Telecom of Bangladesh.

The operations of Grameen Communications are anchored on the basic principle that 'empowerment of disadvantaged individuals and groups can be accelerated through access to information'. In the Grameen Digital Center website, it is reported that because 'information regarding government, community, health, education, agriculture, environment, etc., is not available to all people, specially to rural people', the rural areas 'suffer considerably from lack of adequate information services' and the rural areas of Bangladesh have 'become distant centres of poverty and hunger due to the lack of communication and other support facilities'. By providing computer, Internet and mobile phone services in the rural areas, therefore, Grameen Communications is 'creating opportunities for addressing poverty and hunger through technological intervention'.

Indeed, there is growing recognition of the role that the new digital technologies can play in fostering human development. In 2002, former UN Secretary General Kofi Annan issued this 'challenge to Silicon Valley':

> The new information and communications technologies are among the driving forces of globalization. They are bringing people together and bringing decision-makers unprecedented new tools for development. At the same time, however, the gap between information 'haves' and 'have-nots' is widening, and there is a real danger that the world's poor will be excluded from the emerging knowledge-based global economy.

Also in 2002, the United Nations adopted the Millennium Declaration, considered a landmark document reflecting the aspirations and concerns of peoples worldwide, setting specific targets to reduce poverty, and calling for 'concerted action to fight injustice and inequality and to protect our common heritage, the earth, for future generations'. One of the many commitments made in that document is to 'ensure that the benefits of new technologies, especially information and communication technologies, are available to all'.

Between 2002 and 2006, several documents on ICTs and their role in people empowerment, poverty alleviation and development have found print. Moreover, a number of conferences have been held by governments and by international organizations, including the World Summit on the Information Society in 2003 and 2005. Two major recent initiatives are the Global Alliance for Information and Communication Technologies in Development (GAID), which was convened the second time in Kuala Lumpur on 19–20 June 2006, and the First Meeting of the Internet Governance Forum convened in Athens from 30 October to 2 November 2006. A key message from the Internet Governance Forum is that the Internet must be 'accessible, usable and safe for all'.

The DirAP seeks to contribute to the ongoing discussion of how best to put ICTs in the service of human development. DirAP is a biennial publication that aims to provide descriptive, analytical and reflective analysis of current initiatives and issues in ICTs for development (ICT4D) in the region. Given the diversity of concerns of more than 30 countries, economies and sub-regional organizations in the region, providing a descriptive analysis is not an easy task. However, the intention is not to focus on a specific direction that growth and development of ICT4D might take in the region, but to highlight some possibilities in light of current developments and the efforts of governments and institutions in the region.

In its 2003/2004 edition, DirAP reported on the status of ICT4D initiatives in 23 countries and economies, and provided an overview of issues on governance, open source and Internet politics in Asia Pacific. In the 2005/2006 edition, the qualitative analysis of the state of ICTs in 29 countries was complemented

by a quantitative analysis that also provided a visual representation which revealed the wide gaps in the growth and development of ICTs across countries in the region. The 2005–2006 edition also included reviews of two sub-regional groups, ASEAN and APEC, and thematic chapters on: (a) bridging the digital divide in Asia Pacific, (b) Internet governance, (c) the social, political and cultural aspects of ICT, and (d) appropriate ICT for Asia Pacific.

This edition (2007/2008) continues the tradition of providing an analytical overview of the state of ICT4D in Asia Pacific. It covers 31 countries and economies, including North Korea for the first time. Each country chapter is an attempt to provide a relatively comprehensive coverage of the various aspects of ICT4D in each of the countries at the time that the chapter was written (in 2006). To provide a broad perspective of the issues covered, the chapters are written by a team of authors representing different sectors, such as government, academe, industry and civil society. There are also five thematic chapters providing a synthesis of some of the key issues in ICT4D in Asia Pacific today.

The banner thematic chapter titled 'ICT4D in Asia Pacific—An Overview of Emerging Issues' by Danny Butt, Rajesh Sreenivasan and Abhishek Singh analyzes current and emerging concerns regarding the growth and development of ICT4D in Asia Pacific, including the impact of ICTs on economic inequality, the environment, culture and content, and policy concerns with reference to Internet governance, e-Governance, regulation, and competition and security. The authors note that the dominant approach to ICT4D in Asia Pacific tends to be patterned after the approach adopted by advanced economies, with its focus on new technologies that might make older structures obsolete, limited discussion of potential risks or unexpected consequences, and little attention to cultural and social issues that are critical to project success. Rather than accepting a one-size-fits-all philosophy, governments in the region should 'formulate a strategy of engagement that suits their particular situation' while also 'foster[ing] networks where we can learn from the experiences of others in similar situations'.

In the area of regulation, for example, Butt, Sreenivasan and Singh note that because countries in the region differ greatly in terms of level of development, 'each country needs to develop its own set of culturally sensitive and national priority-consistent policies'. In so doing, countries must consider the need for regular and effective cooperation and coordination among ICT regulators and industry, a holistic view of the national and regional landscape, and focused and coordinated implementation. In general, governments must not forget that the non-ICT components of development are equally important, and that political will is necessary to ensure success.

In 'Mobile and Wireless Technologies for Development in Asia Pacific', Tan Geok Leng and Suranart Tanvejsilp discuss key technological developments—mobile phones, Wi-Fi, WiMax and meshed wireless networks—that bode well for ensuring universal access to the knowledge economy. The chapter highlights some highly innovative applications, especially of mobile phones, in Asia Pacific, including distance education via SMS, small-value transactions and e-governance. The chapter also discusses the barriers to use of mobile and wireless technologies in many parts of Asia Pacific that are caused by language and literacy, as well as some efforts to overcome them. The chapter concludes with 'a discussion of "development-friendly" policies that policymakers can adopt to expedite the rollout of [mobile and wireless] communication infrastructure and spur greater take-up of services and applications'.

An important application of mobile and wireless technologies in the Asia Pacific region is in risk communication and disaster management. In the thematic chapter titled 'The Role of ICTs in Risk Communication in Asia Pacific', Krishnamurthy Sriramesh, Chanuka Wattegama and Frederick John Abo provide a comprehensive analysis of experiences in the use of ICTs in dealing with serious public health emergencies such as the SARS and avian flu outbreaks and natural disasters such as the Asian Tsunami, volcanic eruptions, typhoons and other natural disasters that have recently occurred in the region with dramatic and tragic dimensions. The chapter highlights the importance of effective risk communication in disaster management in particular and in development efforts in general. Key regional and international programmes harnessing ICTs in risk communication during all phases of disaster management are described and a number of recommendations for policymaking in Asia Pacific countries are given. The recommendations include not only establishing the necessary ICT infrastructure that will enable the use of ICTs as tools in disaster management but also promoting 'risk communication in local languages, given that English is spoken by a mere fraction of the close to three billion people who live in the Asia Pacific region', harnessing the power of mass media and promoting coordination among them during disaster situations, including risk communication 'as one of the dimensions of the activities of telecentres, which are found in many rural Asian societies today', and participating in regional efforts.

Taking up the challenge of localization in Asia Pacific is the focus of the thematic chapter by Sarmad Hussain and Ram Mohan. Localization, defined as the 'process of developing, tailoring and/or enhancing the capability of hardware and software to input, process and output information in the language, norms and metaphors used by a community', is of utmost importance in a region where more than half of the world's 6,800 languages is spoken, including 21 of the 30 most spoken languages in the world, but where only about 10 per cent of

the population is reached by the Internet. According to Hussain and Mohan, 'Asia Pacific is lagging behind in the use of ICTs not only because of the unavailability of affordable hardware and connectivity, but also because computing is still primarily in non-Asian languages', in particular, English.

Because of the 'great linguistic diversity of the region', localization is a complex undertaking for which there are no easy or short-term solutions. Hussain and Mohan point out that for policymakers, the decision to embark on localization projects involves striking a balance between the requirements of majority and minority languages and between basic and advanced localization, developing the necessary linguistic and technical expertise, generating resources, choosing the appropriate licensing option and computing platforms, and participating in regional and international standardization activities. They conclude that although it is challenging, the task of localization must be understood as 'an opening for Asia Pacific to revitalize its IT industry and to develop its knowledge economy'.

The intersection between intellectual property (IP) and technology is the focus of the thematic chapter written by Elizabeth Cardoza and Lawrence Liang. The chapter discusses key issues in IP policy for countries in Asia Pacific, particularly in light of increasing pressure from developed countries to impose IP regimes that fail to take into account the socio-economic, cultural and technological needs of developing countries. The key issues include copyright and its impact on access to knowledge and technology; emerging practices in IP protection that are likely to impact on technological development and innovation, such as digital rights management; and the implications of IP provisions in bilateral free trade agreements that go beyond the minimum requirements of the World Trade Organization (WTO) Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS).

In the light of the possible trade-offs between stronger IP enforcement and technological and economic development in developing countries, Cardoza and Liang highlight the need for policymakers in Asia Pacific to make use of available flexibilities and exceptions under TRIPS and to adopt non-proprietary models of knowledge production and exchange such as free and open source software (OSS) and open content. In negotiating bilateral free trade agreements, countries need to take the initiative of proposing 'novel rules, related incentives and alternative mechanisms on policy areas where there are clear and significant interests' such as proposals relating to data protection and cultural heritage/traditional knowledge. They also need to ensure transparency in negotiations, foster better public awareness of what the stakes are, and weigh the impact of stronger enforcement of IP rights on other development priorities. Cardoza and Liang also recommend a regional or multilateral approach to negotiating trade agreements with powerful countries as this is more 'likely to result in commitments that are of general value and impact' and will thus help them avoid decisions that might jeopardize national socio-economic development goals.

DirAP's mission is to generate new descriptive, analytical and predictive knowledge about the field of ICT for development in the Asia Pacific region. It attempts to provide in-depth syntheses and analyses of ICT-related policies, developments and applications, and issues and debates that meet the needs of policymakers, academics, scholars and practitioners from government, the private sector and civil society. It is hoped that this edition of DirAP fulfills its mission.

Felix Librero
Chief Editor

Acronyms

3G 3rd Generation wireless networks
4G 4th Generation wireless networks
A2K Access to Knowledge
ACE ASCII Compatible Encoding
ADB Asian Development Bank
ADSL Asymmetric Digital Subscriber Line
AiDA Accessible Information on Development Activities
AP Access Point
APT Advanced Packaging Tool
ASCII American Standard Code for Information Interchange
ASEAN Association of Southeast Asian Nations
ASR Automatic Speech Recognition
ATM Automatic Teller Machine
AUSFTA Australia-US Free Trade Agreement
B2B Business-to-Business
B2C Business-to-Consumer
B2G Business-to-Government
BcN Broadband Convergence Network
BPO Business Process Outsourcing
BTS Base Transceiver Station
BWA Broadband Wireless Access
ccTLD Country-Code Top-Level Domain
CDMA Code Division Multiple Access
CD-ROM Compact Disc Read-Only Memory
CIT Cheque Imaging & Truncation
CPP Caller-Party-Pay
CPU Central Processing Unit
DAB Digital Audio Broadcasting
DLT Distance Learning Technology
DMB Digital Multimedia Broadcasting
DNS Domain Name System
DRM Digital Rights Management
DSL Digital Subscriber Line
DTT Digital Terrestrial Television
DVB Digital Video Broadcasting
DWDM Dense Wavelength Division Multiplexing
EDGE Enhanced Data Rates for GSM Evolution
FDI Foreign Direct Investment
FLOSS Free/Libre and Open Source Software
FOSS Free and Open Source Software
FTA Free Trade Agreement
FTTH Fibre-to-the-Home
FWA Fixed Wireless Access
Gbps Gigabits per second
GDP Gross Domestic Product
GPLv-3 General Public License of the Free Software Foundation (FSF)
GPRS General Packet Radio Service
GSM Global System for Mobile Communications
GSMA GSM Association
gTLD Generic Top-Level Domain
HDD Hard Disk Drive
HDSL High bit-rate Digital Subscriber Line
HDTV High Definition TV
HSDPA High-Speed Downlink Packet Access
HTML Hyper Text Mark-up Language
iB3G Integrated Beyond 3rd Generation
IC Integrated Circuit
ICANN Internet Corporation for Assigned Names and Numbers
ICDL International Computer Driving License
ICP Internet Connection Provider
ICT Information and Communication Technology
ICT4D Information and Communication Technology for Development
IDM Interactive and Digital Media
IDN Internationalized Domain Name
IDRC International Development Research Centre
IEEE Institute of Electrical and Electronics Engineers
IETF Internet Engineering Task Force
IOSN International Open Source Network
IP-DC Internet Protocol Datacasting
IPR Intellectual Property Rights
IPTV Internet Protocol TV
IPv4 Internet Protocol version 4
IPv6 Internet Protocol version 6
IR Information Retrieval
ISDN Integrated Services Digital Network
ISM Industrial, Scientific and Medical
ISO International Standards Organization
ISP Internet Service Provider
IT Information Technology
ITES Information Technology Enabled Services
ITU International Telecommunications Union
IVR Interactive Voice Response
IXP Internet Exchange Point

Kbps Kilobits per second
LAN Local Area Network
LCD Liquid Crystal Display
LDC Least Developed Country
LF Low Frequency
Mbps Megabits per second
MHP Multimedia Home Platform
MMS Multimedia Messaging Service
MPEG Moving Picture Expert Group
NAP Network Access Provider
NGN Next Generation Network
NGO Non-Governmental Organization
OA Open Access
OCR Optical Character Recognition
OECD Organization for Economic Co-operation and Development
OPGW Optical Ground Wire
OSS Open Source Software
P2P Peer-to-Peer
PBS Public Broadcasting Service
PC Personal Computer
PDA Personal Digital Assistant
PHS Personal Handy Phone System
PLC Power Line Communications
POP Point of Presence
PPP Public–Private Partnership
PSTN Public Switched Telephone Network
PTT Post, Telegraph and Telephone
PWLAN Public Wireless Local Area Network
R&D Research and Development
RFID Radio Frequency Identification
RIO Reference Interconnect Offers
SAARC South Asian Association for Regional Cooperation
SARS Severe Acute Respiratory Syndrome
SCPC Single Channel Per Carrier
SDH Synchronous Digital Hierarchy
SIM Subscriber Identification Module
SME Small and Medium-sized Enterprises
SMP Significant Market Power
SMS Short Message Service
SSML Speech Synthesis Mark-up Language
S&T Science and Technology
STM Synchronous Transport Module
TDM Time Division Multiplexing
TD-SCDMA Time Division Synchronous Code Division Multiple Access
TLD Top-Level Domain
TPM Technological Protection Measures
TRIPS Agreement on Trade-Related Aspects of Intellectual Property Rights
TTS Text-to-Speech synthesizer
TVRO Television Receive Only
UHF Ultra High Frequency
UNDP United Nations Development Programme
UNESCO United Nations Educational, Scientific and Cultural Organization
UPS Uninterruptible Power Supply
URL Uniform Resource Locator
USP Universal Service Provision
UTF Unicode Transformation Format
VAS Value-Added Service
VoiceML Voice Mark-up Language
VoIP Voice over Internet Protocol
VSAT Very Small Aperture Terminal
W3C World Wide Web Consortium
WAN Wide Area Network
W-CDMA Wideband CDMA
WGIG Working Group on Internet Governance
WiBro Wireless Broadband
Wi-Fi 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