

# *Sri Lanka*

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## Overview

### Socioeconomic background

Sri Lanka offers an interesting case study on how a medium-sized developing country is trying to embrace ICTs in an attempt to modernise and to raise the living standards of its people.

The first country in South Asia to liberalise its economy and engage the world in 1977, the island nation has been struggling during the quarter century since to cope with several formidable challenges related to peace, national security, poverty, economic development and the preservation of cultural and natural heritage. On the plus side, it has remained a parliamentary democracy since political independence in 1948 and has increased the per-capita GNP nearly seven times during that period.<sup>1</sup> And thanks to consistent investment in health and education, it has also achieved the best social indicators in South Asia and had a Human Development Index value of 0.735 in 2001.<sup>2</sup> The country's adult literacy rate exceeds 90 percent, which is one of the highest among developing countries in Asia. Over 4.1 million students attended the country's 9,887 government schools in 2001. Its 13 universities could only absorb 16 percent of students who qualified for university admission (Central Bank, 2002).

In spite of this progress, many disparities and problems remain. Economic growth – which has averaged 5 percent in real terms over the last decade – has not kept pace with population growth or rising aspirations. This has resulted in high levels of poverty, unemployment, unrest and crime. The country's development prospects have been retarded by two youth insurgencies<sup>3</sup> and a separatist struggle that evolved into a full-scale civil war lasting two decades. These political struggles, coupled with a residual socialist mentality, a disproportionately large public sector<sup>4</sup> and bureaucratic inertia, have held back Sri Lanka from achieving its full potential to emerge as a dynamic player that can make important contributions regionally and globally. There were renewed signs of hope in 2002 as peace talks to end the conflict made unprecedented progress, but the road to recovery, reconstruction and revival will be long and arduous.

### Telecommunications Infrastructure

Although the telecommunications history of Sri Lanka spans more than 100 years, it was only in the mid-1980s that the ICT infrastructure was established following economic liberalisation and gradual deregulation. The first step in restructuring the telecommunications sector was made in 1980 when the postal service was separated from the then Department of Posts and Telecommunications. But it was only in 1991, after the department was transformed into a government-owned corporation called Sri Lanka Telecom (SLT), that the pace of development accelerated. In 1997, Nippon Telegraph and Telephone Corp. (NTT), the Japanese telecommunications giant, bought 35 percent of SLT shares for US\$225 million and also took over all of SLT's management.

However, the private sector's participation in this sector predated this by several years. In 1989, a private company introduced the country's first mobile phone service, which was also the first in South Asia. In the 1990s, other companies entered the mobile phone market, which expanded rapidly partly because of the long periods of waiting for fixed lines. In the mid-1990s, private companies also introduced wireless local loop (WLL) telephone services, which spurred competition with the fixed-line market (Gunawardene & Wattegama, 2001).

Drastic changes have occurred in the telecommunications sector since 1990. Wireline telephone connections have grown from 121,388 in 1991 to 829,282 in 2001 – an increase of almost 700 percent. Similarly, the number of cellular connections, which stood at 1,800 in 1991, increased to 667,662 in 2001. During 2001, cellular services expanded by 55 percent, raising the ratio of mobile phones to fixed-line telephones to 0.81 (Central Bank, 2002). The overall teledensity was eight telephones (fixed and mobile) for every 100 persons in 2001.<sup>5</sup>

In 2001, there were 9,324 pay-phone booths and 6,535 radio pagers in Sri Lanka. However, PDA usage was still extremely limited. Commercially available satellite phone services were introduced only in early 2002, and the number of users remains very small, mainly because of the high cost of hardware and operations.

## ICT infrastructure

Sri Lanka, although an early starter in computerisation in the late 1960s, has been considerably slow in rising to meet the Internet challenge. A comprehensive IT policy is yet to be announced (Aryasinha, 2002).

The computer population started growing in the late 1980s with the introduction of PCs. The latest available data from ITU shows the total number of PCs as 150,000, which produces a density of 0.79 PCs for every 100 persons. This figure is only a rough estimate as there is no mechanism to track such data.<sup>6</sup>

Although Internet and e-mail facilities had been available in a few selected academic institutions since 1984, Internet access on a commercial basis became available only in April 1995, when a private company, Lanka Internet Services Limited started operations. Sri Lanka was the first country in South Asia to have unrestricted commercial Internet access (Wattegama & Sreekanth, 1998). SLT introduced its own Internet service in August 1995; and in the seven years that followed, several more ISPs have entered the market. By September 2002, 23 companies had obtained licences from the telecommunications regulator to provide Internet services. However, not all these had started Internet services yet, while a few companies are known to offer Internet services without a licence. Because of these irregularities, official statistics provide only a partial picture of Internet services and users in Sri Lanka.

According to the Telecommunications Regulatory Commission of Sri Lanka (TRCSL), the total number of Internet accounts was 61,532 in 2001.<sup>7</sup> ITU data for 2001 gives the total number of Internet users in Sri Lanka as 150,000. However, these figures are based only on the Internet accounts provided by licensed ISPs and not include those provided by corporate servers and unlicensed ISPs. Factoring in all these, the total number of Internet accounts in mid-2002 is estimated to be around 100,000. Using a conservative number of 3 users per account, there are approximately 300,000 regular Internet users in Sri Lanka. Meanwhile, industry data shows that subscribers to Internet and e-mail services grew by 52 percent during 2001 (Central Bank, 2002).

## People's access to technology

The vast majority of telecommunications and Internet users are based in the Greater Colombo area where economic activity is concentrated and where a fifth of the population lives. Similarly, 70 percent of the country's communications infrastructure is concentrated in the Western Province, where Colombo is located. ICT penetration outside Greater Colombo is still limited owing to several reasons, including the high cost of Internet access, lack of English proficiency, computer illiteracy and technical difficulties. Because its low Internet penetration, ISPs have not installed local Internet

## Sri Lanka facts

**Total population:** 18.73 million (2001)<sup>31</sup>

**Rural population as a percentage of total population:** 70% (2001 estimated)<sup>32</sup>

**Key economic sectors (with percentages of GDP):** Agriculture (19.4%), industry (26.5%), services (54.1%)<sup>33</sup>

**Literacy in the national language(s):** 91.4% (1999)<sup>34</sup>

**Literacy in English:** Not officially measured, but believed to be around 3–5%

**Computer ownership per 100 inhabitants:** 0.79 (2001)<sup>35</sup>

**Telephone lines per 100 inhabitants:** 8.0 (fixed and mobile combined) (2001)<sup>36</sup>

**Internet hosts per 10,000 inhabitants:** 1.20 (2001)<sup>37</sup>

**Internet cafés/telecentres per 10,000 inhabitants:** no data available on telecentres, but Internet cafés estimated to be around 0.1 per 10,000

**Internet users per 100 inhabitants:** 0.785 (2001)<sup>38</sup>

**Cell phone subscribers per 100 inhabitants:** 3.6 (2001)<sup>39</sup>

**Number of websites in the national language(s):** Estimated to be around 500 for both Sinhala and Tamil<sup>40</sup>

**Number of websites in English and other languages:** 25,000 (estimated)<sup>41</sup>

### Sources:

See Notes.

servers in areas outside major cities. This means users in such areas have to dial long distance to a server in Colombo each time they access.

Telecommunications and Internet access charges in Sri Lanka are relatively high compared with developed countries. One major factor is the 20 percent value-added tax applicable on telephone charges. An Internet user in Greater Colombo has to pay between US\$1.80 and US\$2.15 per hour (including all taxes) for Internet access; the exact amount depends on the kind of package and the number of hours used. A resident outside Greater Colombo pays between US\$2.45 and \$3.45 per hour. Cyber cafés in Colombo charge US\$1.20–\$1.50 per hour of access (Wattegama, 2002b).

In an attempt to reduce the urban-rural disparity, TRCSL has coordinated the establishment of 41 telecentres in rural areas, each equipped with Internet and e-mail facilities. Parallel to this, commercial operators are encouraged and

provided with incentives to expand payphone services in rural areas (Central Bank, 2002). Meanwhile, a proposed Telecom Development Fund, to be supported by private sector and donor money, will assist telecommunications projects in rural areas, giving subsidies to make up for operators working in uneconomic circumstances and possibly funding common infrastructure in these areas.<sup>8</sup>

Many well-intentioned civil society initiatives aimed at bridging the digital divide have been restricted to the donation of hardware to rural or disadvantaged schools and groups, without addressing content needs or maintenance issues. An exception is the multipurpose community telecentres (MCTs) being tested at the district centres of Sarvodaya, Sri Lanka's largest development-oriented NGO.<sup>9</sup> If rolled out widely, these MCTs could use Sarvodaya's extensive network of 11,400 village centres to provide a variety of ICT services, including Internet access to the community while building local content (Samaranayake & Ratnathican, 2002).

### Quality of Internet access

The quality of Internet access varies in different parts of the island, and comparisons are not possible owing to the lack of research and data. Several factors determine the speed of Internet access. The lack of international bandwidth has been a major issue ever since commercial Internet facilities commenced, and the poor quality of telecommunications facilities is another limiting factor. Although high-speed ADSL (2 MB) and ISDN (64 Kbps) facilities are available in the Colombo city and some suburbs, their high costs prevent wide use. Data transfer speeds on narrowband access, using modems of up to 56 Kbps capacity, vary between 28 and 36 Kbps, while in rural areas this speed is sometimes as low as 14.4 Kbps.

In the absence of an organised consumer group that safeguards user interests, ISPs have been known to offer substandard service. Many ISPs have not expanded their modem pool to match the growth of their customer base, which results in severe difficulties in dial-up access during peak hours. Some ISPs lack adequate back-up systems for complete redundancy; in times of power failures or technical problems, servers have been known to remain out of order for several days, severely inconveniencing users. The lackadaisical attitude of leading ISPs has prompted frustrated subscribers to migrate to new ISPs who promise better service (Gunawardene & Wattegama, 2001).

### Development of indigenous fonts and scripts

The use of Sinhala and Tamil – the two indigenous languages – in the IT environment is still limited, largely because of difficulties in using native language fonts. Both languages have large numbers of characters, which make it difficult to map every character to the 108 keys in the standard QWERTY keyboard.

Another constraint has been the unavailability of standard fonts. Though Unicode maps for both Sinhala and Tamil have been developed by academics, many font developers have ignored them and developed their own standards. Some content developers in Tamil have adopted fonts developed in India, which has a much larger concentration of Tamil speakers. Sinhala, being unique to Sri Lanka, faces additional challenges in font development (Wattegama, 1997).

The lack of a universally standardised Sinhala font set has largely constrained Sinhala content generation online. Currently, visitors to Sinhala websites have to first download fonts and install them in their PCs before perusing the content. Only a few Sri Lankan websites make significant use of either Sinhala or Tamil fonts and content. In spite of Sinhala and Tamil being the official languages of Sri Lanka, most government websites use only English. The dominant native language websites are the web editions of several Sinhala and Tamil daily and weekly newspapers.

Digital Research (Sri Lanka) <<http://www.info.lk>> and Science Land Corporation <<http://www.scienceland.lk>> are the key players in font development of Sinhala and Tamil. Science Land also released the first Sinhala electronic spell-checker and the first Sinhala online dictionary in 2000.

One ISP, Dialog, has recently started offering local language e-mailing through the “phonetic” approach, where a user types from an English keyboard to generate characters in Sinhala or Tamil. This is enabled by software developed by Microimage, a local company.<sup>10</sup>

### Internet user profile

Given the lack of data, it is difficult to map out ICT user profiles in Sri Lanka. The Internet users are largely urban residents and corporations, who can afford the high connection charges and the necessary equipment for access.

One study of 560 Internet users in Sri Lanka (Shrestha & Amarasinghe, 2001) provided the following insights:

- Among the respondents, 71 percent were male and 17 percent female (12 percent did not indicate their gender).
- The largest number of Internet users was aged 26–35 years (23 percent), followed by 36–45 years (21 percent) and 19–25 years (19 percent).
- Nearly 6 percent of the users were 18 years or younger, while users above 56 years accounted for only 8 percent.
- More than a third of the users had completed at least a basic degree; 13 percent were still engaged in full-time studies.

## Content

Sri Lanka produces content in the two local languages and in English in print, broadcast and new media. The 1990s saw the private sector entering radio and television broadcasting, leading to a proliferation of channels and diversification of content. As audited newspaper circulation

data are not available and companies do not disclose their circulation figures, it is the secondary academic sources that provide estimates. In 1999, the aggregate daily circulation of newspapers in all three languages was 524,000, or 2.8 copies per 100 people, which gives a daily readership of 2.6 million people (Gunaratna, 2000).

Given the pace at which new radio and television channels are emerging, statistical compilations are not totally accurate. The state-run Sri Lanka Broadcasting Corporation has a rapidly diminishing share of radio broadcasting, even though it still offers services in all three languages. In 1999, it had seven home, three regional, six community and seven overseas services. Eleven private sector radio-broadcasting services have emerged since the government relaxed its monopoly in 1994, all of them offering FM transmissions on a commercial basis. There are no community radio stations; and even though several non-profit groups have applied for licences, none has been granted.

Television remained a state monopoly until 1992, and the state continues to manage national television broadcaster, Rupavahini (broadcasting over two channels), and ITN Sri Lanka. Four private companies compete by offering a total of seven channels, all of them free-to-air terrestrial channels. In 1999, direct-to-home pay television services were introduced, but they have yet to achieve a significant market share.

## Important local sources of online content

### **Infolanka.com** <<http://www.infolanka.com>>

One of the earliest websites to cater to Sri Lankans worldwide, Infolanka has evolved into a multifaceted portal. It is non-political and showcases information, imagery and updates about the country. The site also offers one of the most popular Sri Lankan chatrooms, a Sri Lankan jokes page, e-cards, classified advertisements and a list of Sri Lankans' personal websites. Visitors can engage in discussions on social and political issues.

### **Daily News** <<http://www.dailynews.lk>>

The first Sri Lankan daily newspaper to go online, *Daily News* has maintained a steady web presence since September 1995. Being the flagship publication of the government-owned and managed Lake House Group, it is perceived as a definitive source of official news, views and announcements, although it has tried to assert greater editorial independence recently. The absence of an archive before August 2001 is a major limitation of this English language site.

### **Central Bank of Sri Lanka**

<<http://www.centralbanklanka.org>>

This is the most authoritative site for economic, financial and banking-related information. Launched in 1997, it has archived the Central Bank annual reports since 1998, its

monthly statistical bulletins and selected publications. The site also offers exchange rates, Sri Lanka interbank borrowing rates and money market rates on a daily basis. This is probably the only government site that gives the e-mail addresses of all its staff members.

### **Community Web Sri Lanka** <<http://www.info.lk>>

Coming close to an unofficial Sri Lankan web portal, this website genuinely tries to cater to Sinhala-, Tamil- and English-speaking Sri Lankans everywhere. Its strength is in numerous links offered to useful and authentic websites. Content and links include news, economics, cricket, statistical data and classified advertising; and the site comes with freely downloadable Sinhala and Tamil fonts to view local language content. Under the same management are Kaputa.com, a Sinhala and English website showcasing the diversity and richness of Sri Lankan life, culture and outlook; and Manthri.com, another Sinhala and English site providing political news and unbiased analysis. Interactive features allow visitors to vote and air views on key political issues of the day.

### **Lanka Business Online**

<<http://www.lankabusinessonline.com>>

A project of the pioneer ISP, Lanka Internet Services, this English language site is probably the best current example of outstanding online journalism in Sri Lanka. Its news and features are investigative, informative and well written. They cover a broad spectrum from macroeconomic and global issues to sectoral ones, including energy, tourism and IT. The site is updated daily, and it often breaks news ahead of the business section of mainstream newspapers. A special section archives all papers presented at the Sri Lanka Development Forum held in June 2002, which brought together all aid donors to Sri Lanka.

### **www.lankacricket.lk** <[http://www-sl.cricket.org/link\\_to\\_database/NATIONAL/SL](http://www-sl.cricket.org/link_to_database/NATIONAL/SL)>

This is among the growing number of specialised sites offering exhaustive information and analysis on cricket the most popular sport in Sri Lanka. Its strength is in numerous links to practically every data source that matters in the cricketing universe, providing everything from live coverage of matches underway and statistical analysis to news, gossip and speculations. All content is in English.

### **The Lanka Academic** <<http://www.theacademic.org>>

This site is managed by the Lanka Academic Network (LAcNet), a non-profit organisation in the USA comprising expatriate Sri Lankans.<sup>11</sup> The all-English website is a collation of international media reports on Sri Lankan politics, sports, culture and economics, reproduced verbatim with links to original sources. Recent attempts to generate original content have largely failed because of the content managers' lack of journalistic experience. This and evident political bias have eroded the site's credibility.

**Tamilnet.com** <<http://www.tamilnet.com>>

Contrary to popular belief, this is not the official website of the Liberation Tigers of Tamil Eelam (LTTE). However, it is frequently visited by both those supporting and opposing the militant group. Its popularity can be attributed to its speed and reliability in presenting news. It was able to present news immediately after various key incidents in the Sri Lankan war. For this reason, journalists in Colombo regularly refer to this site for the latest news. While the general belief is that this site sympathises with LTTE, a closer look reveals it has sometimes carried information not favourable to the group. This site is presented in English and Tamil, and it is one of the few Sri Lankan sites that can be accessed by WAP-enabled mobile phones.

**Lakbima** <<http://www.lakbima.lk>>

The online edition of two Sinhala newspapers, *Lakbima* (daily) and *Irida Lakbima* (Sunday), it largely mirrors the print editions, presenting news, features, interviews, editorial and a special tabloid section. A Sinhala font needs to be downloaded from the site for reading the pages. The site is updated daily and archives the past few weeks' issues.

**Wow.lk** <<http://www.wow.lk>>

This web portal is hosted by Suntel, a leading telecommunications provider, and incorporates a chatroom, currency converter, classifieds, jokes, online games, cricket information and a special section for children. It also allows visitors to send messages free via a short message service (SMS) to cell phones, and also to receive such messages.

**Lankaweb.com** <<http://www.lankaweb.com>>

This Sinhala and English site collates interesting information on Sri Lanka. It is evidently biased towards Sinhala Buddhist ideology and sometimes counter-attacks websites supportive of LTTE. In addition to news, classified advertisements, diary of events and features, the site also offers daily exchange rates, a currency converter and flight schedules of Sri Lankan Airlines.

## Online services

A common characteristic in most Sri Lankan websites is their lack of interactivity. Most organisations – whether government, non-profit or corporate – use the Web mainly as a one-way promotional tool. As a result, none of the online services have so far been developed to their full potential.

### E-government

Despite many promises, pledges and plans over several years, Sri Lanka has yet to achieve a proper and complete e-government in any area. As at mid-2002, there was not a single fully fledged e-government service available from any agency or arm of the government. While many have launched

websites for promotional and information dissemination purposes, none offer a seamless, complete process using ICTs; visits to offices are still necessary, and paper signatures are deemed mandatory.

Many public sector institutions in Sri Lanka have developed their own websites. They include ministries, departments, public corporations and other statutory bodies.<sup>12</sup> However, most of these websites are not interactive; they are no more than electronic brochures, press releases and announcements. Few government forms are available online and none are accepted electronically. Updating of sites is also infrequent, with some government websites listing names of cabinet ministers or officials who have long ceased to hold office.

Some government agencies, especially those dealing with foreign and local entrepreneurs, are trying hard to offer electronic options to their customers to the extent that laws, capacity and in-house technology permit. The Department of Registrar of Companies <<http://www.drc.gov.lk>>, for example, has placed online some – but not all – functions related to registering a new company.

Among the other government institutions that maintain useful websites are:

- Department of Examinations <<http://www.doenets.lk>>, which releases public examination results online
- Central Bank of Sri Lanka <<http://www.centralbank.lanka.org>>, which publishes online exchange rates of major currencies, repo rates, call money rates, etc.
- Sri Lanka Bureau of Foreign Employment <<http://www.slbfe.lk>>, which issues information seeking foreign employment
- Department of Immigration and Emigration <<http://www.immigration.gov.lk>>, which posts information on consular services and visa requirements
- Department of Information <<http://www.news.lk>>, which issues government press releases and statements on a daily basis
- Department of Meteorology <<http://www.meteo.slt.lk>>, which releases daily online weather forecasts in Sinhala and English

As evidenced by the above, there is absolutely no consistency in the naming of government website addresses or URLs. Few of them bother to use the domain “.gov”, and the country domain “.lk” is also missing in some URLs. This illustrates a wider lack of systematic approach to ICTs in the public sector. As Professor R.P. Gunawardane, a former secretary to the Ministry of IT, has commented, IT systems have been developed at the initiative of individual officers, but no well-organised action plan has been initiated by the government to computerise state sector activities and services. Although some departments and ministries have established e-mail, Internet connection, LANs or intranets, and partially computerise certain services, the use of ICTs in the public sector is lagging behind (Gunawardane, 2002).

Sri Lanka's attempts at achieving functional e-government are also constrained by several factors, including the lack of automation, lack of trained IT staff, absence of enabling laws and regulations, and sometimes the absence of a vision to use ICT tools to improve and streamline government interfaces with the public. The low levels of Internet penetration, with English being the dominant language of websites, are further impediments. A vast majority of government websites offer only English content, while a majority of Sri Lankans speak only Sinhala and Tamil.<sup>13</sup>

The public sector's procedure-heavy mentality and worker attitudes will further hinder the realisation of e-government. According to one commentator, the trade unions are likely to object to any e-government system, and fighting the trade unions mentality can be the most critical challenge in launching an e-government system (Wattegama, 2002e).

No government institutions offer an online service that has a direct impact on the lives or livelihoods of the rural people.

### Distance education and e-learning

Although several institutions, including the University of Colombo School of Computing, the Open University of Sri Lanka and Singapore Informatics, have been planning to introduce web-based distance education services, these have yet to become a reality. In the meantime, a small but growing number of wired individuals are pursuing diploma, professional or degree programmes offered by overseas institutions via the Internet.

In 2001, the World Bank assisted the establishment of a Distance Learning Centre. Located at the Sri Lanka Institute of Development Administration, it is part of the Global Development Learning Network <<http://www.gdln.org>> and addresses the training needs of managers. The centre is owned by the government and operates in collaboration with the public and private sectors. It has begun offering short-term courses that involve real-time interactivity between participants in Colombo and tutors or resource persons outside Sri Lanka.

### E-commerce and e-business

Apart from Internet banking, e-commerce has yet to take off in Sri Lanka. The country's first electronic shopping mall is the Avakasa Kade <<http://www.avakasakade.com>>, launched by the Ceylinco Group, a large business conglomerate. This facility, started in early 1999, offers the products and services of more than 150 local companies. Its technology supports online auctions, online membership, dynamic catalogue creation, targeted advertising, site analysis and personalisation. Another indigenous site named Kapruka <<http://www.lanka.info>> offers Sri Lankan books online. Eceylinco <<http://www.eceylinco.com>> offers several

products and services ranging from computers to fast food. However, all these services are still at an early stage of development, and the volume of transactions remains small because of limited promotion and a generally low level of e-commerce activity in Sri Lanka. These pioneering services are likely to gain a market advantage in the long term.

Internet banking is the only area where e-commerce has really taken off. As at mid-2002, six major commercial banks were offering Internet banking services.<sup>14</sup> The range of services offered online by different banks varies, as do the quality and clarity of their service. No local bank has introduced a system where a customer can interface with the bank entirely online. A number of transactions, such as opening a savings or current account, requires the customer to visit the bank to provide an actual signature. Some banks also offer online services through mobile phone networks so that a customer can access them even without a PC. However, a handset with SMS or WAP capability is required (Wattegama, 2002b).

The facilities offered through online banking are limited because of the absence of the necessary legal, financial and technical infrastructures. Transactions are confined to in-house networks within each bank: there are no online transactions or settlement between different commercial banks as there is no common interbank Internet payment system. This has hampered the growth of Internet banking to a large extent. No laws recognising the authenticity of digital signatures have been passed, but the Financial Reform Committee of the government says this is being pursued.

As yet, Internet banking facilities are used only by a small portion of the total banking population in Sri Lanka. The reasons for this include the high cost of Internet access, low computer literacy and/or English proficiency, and an overall lack of awareness and appreciation of the benefits of using Internet-based banking. Unless these broader issues are resolved, this activity will remain confined to a few (Wattegama, 2002b).

A small but growing number of utility and telecommunications companies now offer the facility to settle their bills through the Internet. Again, user rates remain low for the same reasons outlined above.

According to media reports, a national e-commerce gateway was launched in early 2003. It provides fast-track clearance for exporters and importers by shortening turnaround time for ports, customs, freight forwarders and shipping lines. The service promises to minimise documentation, expedite procedures and reduce the cost of processing as well.<sup>15</sup>

### Telemedicine

Automation levels are still low in the Sri Lankan health-care sector, and ICTs are regarded as specialised tools that require high levels of skill, investment and maintenance. However, a few basic telemedicine services have been introduced by private sector companies.

Ceycom Telemedicine Ltd has introduced a low-cost telemedicine service which involves image-transfer technologies. Using these technologies, the requesting physician can send patient information to a specialised clinical service provider of the patient's choice (Gunawardana & Dantanarayana, 2002).

Western Infirmary Hospital Ltd. has introduced emed.lk, which provides medical advice and information – via e-mail, fax or a website – to anyone who poses a health-related query. A multidisciplinary panel of medical experts responds to these queries.<sup>16</sup>

A company named e-Channelling enables people to make appointments online with medical specialists at selected private hospitals. This service is operated through the site <<http://www.echannelling.com>>, as well as through certain telephone networks, bank branches and designated pharmacies.

### E-community

The Lanka Academic Network <<http://www.lacnet.org>> is probably the most visible example of an e-community. Its forerunner, Sri Lanka Net (SLNet), was formed in 1986 as a small electronic mailing list by a group of Sri Lankan graduate students studying at universities overseas. It carried news from Sri Lanka that was not easily available at the time from any other sources. By 1990, both the compilers and users had increased, with hundreds of Sri Lankans joining the mailing list. That year, a Usenet bulletin board named soc.culture-sri-lanka was created to discuss political and other events in Sri Lanka. With the rapid growth of SLNet and the resultant linking of many Sri Lankans of various talents and interests, it was felt that the collective expertise of the membership could be used to support humanitarian and educational projects back in Sri Lanka. In June 1991, a new organisation named the Lanka Academic Network (LAcNet) was registered as a non-profit organisation in the USA. Its objectives are to develop worldwide electronic networks within and outside Sri Lanka; to disseminate information on, and of interest to, Sri Lanka; and to enhance educational facilities and opportunities within and outside Sri Lanka. Office bearers are elected annually, and all members and officers work voluntarily. LAcNet has launched initiatives to bridge the digital divide in rural Sri Lanka and runs the online newspaper *The Lanka Academic* <<http://www.theacademic.org>> (Gunawardene & Wategama, 2001).

## ICT industries and services

### Hardware manufacturing and assembly

Sri Lanka has not developed hardware manufacturing to an appreciable extent. Only a few electronic items and components are manufactured locally. Attempts to manufacture hardware items, such as hard disks and memory

chips, have not been very successful. For example, Fujitsu once operated a branch producing hard disks in the Katunayake Export Promotion Zone but this venture was later abandoned as it was not cost-effective.

The assembly of PCs locally, on the other hand, is widespread. This practice started in the early 1990s as an alternative to the more expensive branded machines. A locally assembled entry-level PC now costs between US\$500 and \$750, while a branded machine with comparable features costs between US\$900 and \$1,000.<sup>17</sup> These PCs have become popular especially among domestic and individual users. An estimated 300 companies are engaged in this trade in Colombo alone.

### Software origination

The Sri Lankan software industry, though still in its infancy, has shown impressive growth over the last five years. Software exports, which stood at around US\$5 million in 1996, increased to US\$58 million in 2000. This figure was expected to hit the US\$75 million mark in 2001, but the global recession had an adverse effect. Notwithstanding this temporary setback, the Sri Lankan software industry has shown an average annual growth rate of around 40 percent during 1996–2001. According to the Board of Investments (BOI), there were around 50 local software development houses with an employee strength of 25 or more. Some of these firms are housed at Colombo's World Trade Centre, the first software park, which was established in 1999 (Wategama, 2002d).

Sri Lanka's strengths in software development include a well-trained labour force that can be employed at relatively low costs, an English-speaking business community and various tax incentives from the government. The security concern that deterred some foreign investors improved considerably during 2002. BOI <<http://www.boisrilanka.org>> has introduced special incentives to encourage companies engaged in software development. A software company that exports more than 70 percent of its output is given an 8 year comprehensive tax holiday, followed by a 12-year 15 percent concessionary tax holiday. A software company that mainly caters to the local market gets a 5 year tax holiday.

### ICT services

Among the services on offer are digitalising services, creation of digital videos, and the development and hosting of websites. However, the volume of business in these ventures has not reached appreciable levels. IT-related consultancy services are also in their early stages, although several management consultancy firms have added IT-related services, such as IT strategy preparation, business process reengineering, post implementation reviews, and business contingency plans.

A new area now being developed is offshore call centres, where Sri Lanka-based staff respond over long distances, to customer enquiries directed at multinational corporations. The first call centre was commissioned in February 2002 and uses voice over Internet phone (VoIP) technology. These centres are serving British and North American-based clients.

## Examples of innovative and key initiatives

The Sri Lankan media, NGOs and the private sector have launched various programmes to expose more people to ICTs and to enable access to disadvantaged communities. Four examples of such programmes aimed at addressing the digital divide follow:

**Wijeya Pariganaka:** This is a monthly Sinhala magazine covering ICTs. It is published by Wijeya Newspapers Ltd. Since its launch in 1997, the magazine has blazed a new trail in nurturing indigenous traditions and talent to meet ICT challenges. Its editorials offer perceptive analysis of ICT policies and practices, while its combination of journalistic and instructional material has helped clarify and demystify the role of ICTs in economic, social and personal development. Because it does not engage in the promotion of individuals or companies, this magazine comes closest to a chronicle of emerging ICT culture in Sri Lanka.

**Antharjalaya Obe Niwasata** (Internet to Your Home): This was a weekly television programme, broadcast live during evening prime time by the national broadcaster, Rupavahini.<sup>18</sup> It took viewers on a guided tour of interesting websites and provided answers to their questions on the Internet and IT. Although targeted at those who had no access to the Web, the programme gained a wide following and was instrumental in popularising the new medium among Sri Lankans. It registered the highest audience ratings for a factual programme during 1999–2000 but was discontinued in 2001. It has since been replaced by IT@Rupavahini, in a different format and reduced to 30 minutes in length.<sup>19</sup>

**Kotmale Internet Radio Project:**<sup>20</sup> This project used a rural transmission of the Sri Lanka Broadcasting Corporation to bring the World Wide Web closer to its listeners. A daily two-hour interactive radio programme allowed listeners to request (live by telephone or through the post) specific information on any topic, which the presenters then sourced from the relevant websites and summarised on air in Sinhala. This helped overcome the twin problems of access and English proficiency.<sup>21</sup> 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. The project ended in 2001 after donor funds ran out.

**VillagePDA:** This is a portable device that provides real-time access to e-mail, contacts, calendar and messaging functions and is an “end-to-end” solution designed to help bridge the digital divide and to address the core communication needs of rural communities. Designed in 2001 by the Sri Lankan company MediaSolv, it is the world’s first Bluetooth-enabled PDA and has all the low-cost, wireless, Internet-ready attributes of ETHERchip, an embedded application for personal area networks developed by the same company. The device costs between US\$25 and \$50 and has already been field-tested in Kenya and Sri Lanka.

Sri Lankan diplomat Ravinatha Aryasinha, who in 2001 studied the development of the Internet and other ICTs in South Asia, notes that such empowerment and innovative projects remain mainly as micro-level exercises. In most cases, sustainability is a major concern given that they run on grants and subsidies and have little potential for replication on a broader scale (Aryasinha, 2002).

At the macro level, most Sri Lankan civil society groups have yet to embrace ICTs meaningfully. This is due to the relatively high initial investment required and a lack of understanding of the potential and limitations of ICTs. Many groups have used ICTs for office automation or to achieve a basic web presence by posting their brochures, papers and news items online. But very few have seized ICTs’ potential for campaigning, lobbying, fundraising and nurturing e-communities around a theme or issue. The thrust for this will probably come from civil society groups that are formed by, or are linked with, expatriate Sri Lankans.

Ironically, one example of a Sri Lankan group effectively using the Web is the Liberation Tigers of Tamil Eelam (LTTE), the militant group that waged an armed struggle against the government from 1980 to 2001. It ran a propaganda campaign over the Internet for many years. The group recently abandoned its struggle for a separate state and entered peace negotiations. In the early 1990s, IT experts among the separatist organisation’s far-flung network of supporters realised the Web’s potential for extending their struggle into the domain of information. They helped launch and manage a number of websites that promoted concepts and causes, such as a Tamil cultural identity, a separate Tamil homeland (Eelam), Tamil interpretations of developments in the conflict, etc. By the time Sri Lanka developed commercial Internet access in 1995, LTTE had already established a strong web presence using its offshore bases.

As senior journalist Lakshman Jayawardene wrote: “There was hardly any opposition to them [LTTE] in the information war. They campaigned quite early on the Internet, and the general information scene, more or less unopposed; and in this way, they built a bank of international sympathy, leading to misinterpretation of facts about Sri Lanka, the government, its armed forces, efforts towards peace, and so on. They gained much political as well as economic advantages assisted by these international links.



## VillagePDA to bridge the digital divide

It would cost a staggering US\$82.6 billion if Africa were to achieve the current level of Internet penetration as North America – assuming an average cost of US\$750 per PC. A joint US-Sri Lankan IT company has proposed a solution that can bring down this figure to US\$5.5 billion. Even if that ambitious goal may not be attainable just yet, the VillagePDA could soon be a formidable tool in global attempts to bridge the digital divide.

Contributing to a PC's costs are many expensive features and applications – yet 90 percent of the time these are not used. The VillagePDA is a no-frills innovation: it is a portable device that provides real-time access to e-mail, contacts, calendar and messaging functions at a fraction of a PC's costs and using only one-twentieth of the bandwidth a PC needs for Internet connectivity. In industry terms, it's an "end-to-end solution" designed to address the core communication needs of rural and remote communities.

Designed in 2001 by MediaSolv <<http://www.mediasolv.com>>, it is the world's first Bluetooth-enabled personal digital assistant (PDA). Bluetooth is a global standard for short-range wireless connectivity – currently up to 10 metres – that can establish links between mobile phones, PCs, laptops, PDAs, digital cameras, etc.

A VillagePDA costs between US\$25 and \$50 – compared to Palm Pilots, pocket PCs

and other portable alternatives to the PC, all costing over US\$200. Yet, the new device contains all the capabilities as well as low-cost, wireless, Internet-ready attributes. It comes armed with the ETHERchip, an embedded application for personal area networks (PANS) developed by the same company. Unlike India's Simputer, the VillagePDA does not require a dedicated telephone link for each unit – instead, it operates in a wireless personal area network using the Bluetooth standard. Up to seven VillagePDAs can share a single phone line or Internet connection at the same time. To save on on-board memory, much of the user data is stored in a central server, which can be accessed upon user name and password authentication.

The VillagePDA has been field-tested in Sri Lanka and Kenya. MediaSolv has teamed up with Inmarsat, Xantic and Dspace to set up a demonstration project in a Kenyan village that is being connected to the world via a VillagePDA and satellite connection. Initially, 50 users will be supported in their communication needs. Instead of mass producing the device itself, MediaSolv encourages global electronic companies to take on the innovation. The Kenyan demonstration will determine the future of this tool.

There are supposed to be about 25 Internet websites spreading false news and misinformation on behalf of the LTTE, whereas, for a long time, any established counter-action was not forthcoming" (Jayawardene, 1997).

The Tamil Eelam homepage at <<http://www.eelam.com>> provides what appears to be official statements of LTTE. It is complemented by other sites, such as Tamil Nation <<http://www.tamilnation.org>> and Tamilnet. The latter is a news and feature service "providing reliable and accurate information on issues concerning Tamil people" (see earlier). Interestingly, none of these sites are managed or hosted from Sri Lanka; they are based mostly in North America or Western Europe. Most sites employ professional webmasters, as evident from the sites' regular updates, visual appeal and interactivity.

The governmental information machinery did not use the Internet until late 1996, and even then the initial responses

were amateurish, uncoordinated and largely ineffective. This scattered and ad hoc approach was both confused and complicated by some expatriate Sri Lankans starting personally managed websites that claimed to support the Colombo government and/or the Sinhala cause.

## Enabling policies

In 2002, Sri Lanka has gone through yet another review and realigning of national policies related to IT and telecommunications. Even though every government has recognised the important role of these sectors to the economy, the absence of clear and consistent policies has hindered their rapid and systematic growth in the country. The current government has declared a vision for Sri Lanka to be the financial and service hub to the South Asian subregion, with connectivity to the rest of the world. It envisions the capital

Colombo as a multifaceted service centre, with five economic zones coordinating development at the provincial level.

With the onset of peace after two decades of internal conflict, the government is hopeful of achieving an initial economic growth rate of 5 percent per year for 2002–2004 and higher annual rates of 8–9 percent thereafter. High expectations are placed on the IT and telecommunications sectors to generate foreign exchange and employment.

Leading politicians and officials have recently made statements that indicate a strategic approach. They have stressed the need for a single point of contact for all approvals, facilitating knowledge transfer and attracting leading-edge and world-class companies. Milinda Moragoda, Minister of Economic Reform, Science and Technology, whose ministry covers the IT sector, told Parliament in April 2002: “Our aim should be to become an IT hub where East meets West. To do so, we might need to create a strategic authority, somewhere along the lines of Malaysia’s Multimedia Development Corporation, which acts as the nodal authority for . . . the multimedia super corridor. However, our authority should be faster, small and more proactive than the MDC” (Moragoda, 2002).

In mid-2002, the World Bank reviewed the country’s IT sector and recommended five action programmes. These cover building implementation capacities and infrastructure, creating world-class IT professionals and human resources, and delivering services to the people. Prime Minister Ranil Wickremasinghe told the World Bank’s expert team that his government would “unshackle the binding constraints in the area of IT”.<sup>22</sup> Minister Moragoda remarked to the same team that many existing regulations were acting as an impediment to the future development of IT.<sup>23</sup>

### Barriers and constraints

Notwithstanding these statements, major institutional, legal and procedural barriers remain. Chief among them is the inadequate legal environment: a draft Computer Crimes Bill has been in the making for over seven years without being tabled in Parliament (see also under Regulatory Environment). Other major barriers include the shortage of manpower, poor infrastructure (particularly telecommunications facilities), small size of the local market, and institutional overlaps and weaknesses (Gunawardane, 2001).

The human resource issue is receiving increasing attention, given that Sri Lanka needs an estimated 25,000 workers in the near future to cater to the growing demand of the IT market. There is a shortage in both the quantity and quality of the IT workforce. Although several excellent courses are available at the basic levels, the overall quality of training is not uniform and there are many unresolved issues in standardisation and certification. Most computer training institutes offer courses in now outdated skills or software, or where market demand and salary levels are low. Very few courses are as yet available in areas such as web-

based technology, multimedia computing, database management, object-oriented technology, networking technology and systems administration. Limited admissions to the state universities, which provide free education, have resulted in many joining training programmes of suspect quality (Samaranayake & Ratnathican, 2002, p.284). The Ministry of Tertiary Education and Training is working on formulating a national policy to rationalise and standardise the public and private sector training programmes on IT (Liyanage, 2002). Meanwhile, some industry watchers are concerned about overestimating the future employment needs of the IT industry and point out that top priority should be given to developing the software industry to be a major revenue and employment generator (Wattegama, 2002a).

The telecommunications system in Sri Lanka is still at an early stage in its modernisation, with serious limitations in the quality and delivery of services, as well as major bandwidth problems. A large part of the telecommunications network is antiquated, and the government has not been able to mobilise resources for an overall upgrade. A decade of partial liberalisation has inspired some market dynamism, but private sector investments are centred in and around metropolitan areas, while the majority of rural areas are underserved or neglected. Along with high telecommunications costs,<sup>24</sup> infrastructure limitations present a real bottleneck for the proliferation and development of ICTs in Sri Lanka. The ending of the state telecommunications monopoly and increasing private sector participation have not led to a reduction in rates.

The multiplicity of government institutions, overlapping of their administrative areas and the lack of coordination among them are also formidable constraints. The demarcation of administrative areas of government ministries has not taken into account the emerging trends in media convergence. While the IT sector comes under the ministry in charge of science and technology, telecommunications has been grouped together with mass media. This separation does not augur well in a country where inter-ministerial sharing and coordination are traditionally weak.

The formidable challenge for the government is to overcome these long-standing and deeply entrenched barriers. As Minister Moragoda has declared, Sri Lanka needs to ensure competition and provide quality services at the lowest prices to encourage maximum penetration (Moragoda, 2002).

In this task, Sri Lanka is relying heavily on both foreign investors and its own diaspora. The increasing dominance of South Asian diasporas in the IT sector is of particular strategic significance. Viewed in the broader context of globalisation, countries in South Asia will increasingly find that decisions at home are influenced, if not conditioned, by forces outside their respective states. Diaspora communities, largely using the Internet as its source, will play a critical role in shaping these events (Aryasinha, 2002). With over a million Sri Lankans working and living overseas,<sup>25</sup> this has

immediate practical implications for the country. The private sector and the government are trying to lure IT professionals among the Sri Lankan diaspora to develop the IT industry and to assist in IT-related human resource development. Academic and research links with overseas centres of excellence are to be promoted to attract such expatriates (Samaranayake, 2002). The Chamber of Commerce and BOI have launched a website dedicated to this purpose <<http://www.returntolanka.com>>.

### Draft new telecommunications policy

Sri Lanka was going through a review and change of its telecommunications policy and regulatory framework at the time of writing. According to the top government official handling media and telecommunications, the partial liberalisation approach adopted thus far has left a number of complicated issues “which thwart the rapid growth of the ICT industry”. Among the concerns he identified are monopoly versus perfect competition; a black market in telecommunications with the presence of illegal operators; marginalisation of the rural economy; market asymmetries; and bandwidth problems (Abeyasinghe, 2002).

A draft new telecommunications policy was published in early 2002, accompanied by an invitation for public comments.<sup>26</sup> The policy recognises the need to create optimal opportunities for all Sri Lankans to participate fully in the interdependent global information economy by:

- creating the conditions for businesses located in Sri Lanka to engage in all forms of e-commerce using state-of-the-art ICTs, thereby creating skilled and rewarding employment to Sri Lankans
- creating the conditions for all citizens, be they resident in Sri Lanka or elsewhere, to support their economic and personal relationships and to communicate with their government through efficient and economical use of ICTs
- using ICTs to improve governance

The draft policy states the government will promote the broad development of a comprehensive Sri Lanka Information Infrastructure (SLII), encompassing all facets of ICTs. It also recognises that “traditional broadcast television and radio technologies are all converging with the telecommunications field” and states that these trends and the evolution of SLII “require that this policy address all aspects of the Sri Lankan ICT industries in an integral manner”.

It is not clear, however, whether this policy will replace or augment the existing National IT Policy, prepared by the Council for Information Technology (CINTEC) in 1999. Although senior government officials have recognised convergence as a reality, the compartmentalised and sectoral approach continues.

A specific policy framework relating to the use of the Internet has yet to be made operational in Sri Lanka (India being the only South Asian country to have done so). The

Internet is being covered within the ambit of the telecommunications policy at the time of writing (Aryasinha, 2002).

### Key agencies

The key agencies involved in overall ICT-related initiatives are the following:

- The Ministry of Economic Reform, Science and Technology <<http://www.most.gov.lk>> leads the government vision that Sri Lanka becomes a scientifically and technologically advanced country by 2020. Two dozen statutory bodies, state corporations and companies come under its purview.
- The Council for Information Technology <<http://www.cintec.lk>>, as the apex national body on IT, provides coordination, facilitation and advice, particularly to the state sector.
- The Telecommunications Regulatory Commission of Sri Lanka <<http://www.trc.gov.lk>>: Provides the policy and regulatory framework for the telecommunications industry, and is increasingly dealing with issues of media convergence.

## Regulatory environment

### Legal framework

The Computer Crimes Bill had not been adopted into law at the time of writing. As a result, Sri Lanka lacked the legal framework for most IT applications. Thus, digital signature is not recognised, and the basis for e-commerce and electronic data interchange does not exist. The country also lacks data protection laws, a key requirement to build public and corporate confidence in a networked environment. These lacunae in law have been recognised by both the Judicial Reforms Commission and the Law Commission of Sri Lanka, but the problem is not simply the absence of enabling legislation. While the new Computer Crimes Bill’s 27 sections are fairly comprehensive, experts have cautioned that its eventual implementation will face procedural and operational difficulties owing to the dearth of police and judicial officials proficient in IT.<sup>27</sup> Thus, even if the bill is passed in the near future, enforcing its provisions will pose formidable challenges.

The absence of cyber laws came under spotlight in May 2001 when a new computer virus emerged, claiming to be Sri Lankan in origin. This Mawanella virus had a code based on the infamous Love Bug virus, which originated from the Philippines, and spread swiftly through networked computers. Without creating lasting damage to a computer, the virus disrupted its operations temporarily to display a political message concerning a violent incident that had taken place in the predominantly Muslim locality of Mawanella in Sri Lanka. This is believed to be the first time that a virus was designed to spread information relating to an ethnically

based incident or community (Aryasinha, 2002). This virus, and the discovery of several pornographic websites believed to be managed from within Sri Lanka and containing explicit information and visuals, exposed inadequacies of both laws and their enforcement in the new, borderless world of ICTs. While everybody has recognised the need for amending or introducing laws, nobody has actually ventured forth to “bell the cat” as yet.

### Regulation and licensing

From the beginning, Sri Lanka has allowed complete freedom of access and content generation vis-à-vis the World Wide Web. Laws and regulations only govern the operation of ISPs and country domain name registration.

TRCSL issues licences for telecommunications service providers, including ISPs. As at 1 October 2002, a total of 23 companies had been granted licences as ISPs, with validity periods varying between five and ten years.<sup>28</sup> The regulator’s decision in 1997 to charge a one-time licence fee of Rs. 3,000,000 (US\$31,580) from all new ISPs has been viewed as excessively high by licensees. ISPs in turn pass on this cost to customers, making Internet services too expensive. At the same time, it has been argued that this high fee will prevent start-up companies from entering the ISP market without adequate resources and commitment.

There are no specific laws or regulations covering the operation of cyber cafés or telecentres.

CINTEC functions as the network information centre and administrator for Sri Lanka’s country domain (“.lk”) registration. On CINTEC’s behalf, registration is handled by the Department of Computer Science and Engineering at the University of Moratuwa. First- and second- level domain names are considered for registration. While the basic policy and procedures of domain name registration are outlined at the registry’s website <<http://www.nic.lk>>, the basis for resolving disputes is not clearly articulated. Some industry sources express concern over the arbitrary nature of name assigning and dispute resolution. As a result, many Sri Lankan companies have opted to obtain more universal URLs with domain names such as “.com”, completely ignoring the country domain name.

Since the state monopoly on radio and television broadcasting ended in 1992, broadcast licensing has been handled by the Ministry. There is no declared or established basis for granting new licences, which is entirely discretionary on the part of the Minister. TRCSL is involved in allocating frequencies as part of its spectrum management responsibilities.

Sri Lanka has well-defined policies and laws related to intellectual property and is also a signatory to key international conventions. The *Code of Intellectual Property Act No. 52 of 1979* embodies legislation relating to copyright, industrial design, patents, trademarks, trade names and unfair competition. Sri Lanka’s *Intellectual Property Law*, which

is based on the WIPO model law for developing countries, has incorporated internationally accepted principles and concepts of intellectual property. All trademarks, designs, patents and copyrights need to be registered with the Registry of Patents and Trade Marks.

In spite of these legal provisions, software piracy is rampant in Sri Lanka. Very few institutions, even within the government use licensed software, and there is little incentive for them to do so as no penalties are imposed on copyright violators. According to BOI, a new legal regime for the protection and management of intellectual property will be introduced shortly, giving due consideration to national requirements and international obligations. The proposed amendments would also streamline the enforcement mechanism.<sup>30</sup>

### Open source movement

The IT roadmap the government is currently working on has identified, as a first step, making Sri Lanka an open source software hub in the region. The Software Exporters Association is trying to capitalise on the interest in open source software. Through a project named the International Home for Open Source Technology, or iHost, it is trying to position Sri Lanka as a top software destination. The iHost Centre would support and maintain ongoing projects while also providing users with troubleshooting facilities and testbeds.

As at mid-2002, the only known user group that promotes the use of open source operating systems is the Lanka Linux User Group (LKLUG), <<http://penguin.lklug.pdn.ac.lk>>. Its main objective is to promote Linux/GNU software in Sri Lanka. It was started during a workshop on Linux for Educational and Commercial Environments in July 1998 and has a core of 40 members and 5 advisors. LKLUG handles Linux installations and lends distribution kits. The Linux mini library contains Linux journals, Linux how-to’s, LaTeX documents, CDs and many other Linux books. Users exchange their experiences through a mailing list.

LKLUG also organises installation workshops and seminars on Linux/GNU/TeX and associated software. The FTP site it uses is that of the University of Peradeniya and contains several Linux software packages. Currently, it is open only for users coming from the “.lk” domain.

### Research into ICTs

Sri Lanka’s R&D base is weak and inadequate. Many companies in the private sector neglected research until recently, but they are now allocating more resources to product development and software origination to remain competitive internationally. The private sector has provided most of the leadership and R&D in indigenous font development and in generating more local content on the Web.

The few universities concerned with ICTs have focused largely on teaching and consultancy work for the industry than on R&D. The University of Moratuwa's Department of Computer Science and Engineering <<http://www.cse.mrt.ac.lk>> provided the infrastructure and leadership for connecting Sri Lanka to the Internet in 1990 through the Lanka Experimental Academic and Research Network (LEARN) and continues to carry out research focusing on computer engineering. At the University of Colombo <<http://www.ucsc.cmb.ac.lk>>, the main research areas include localised natural language interfaces, network performance monitoring, software agents, remote instrumentation and database-user interface. The international standards for Sinhala and Tamil have resulted from the research carried out at this university. It has also developed a popular multilingual software.

## Future trends

It is extremely difficult to predict the future of ICTs in Sri Lanka because the country has yet to recover from the political, social and economic upheavals it has undergone for two decades. The political and social environments are still turbulent, making it impossible to construct scenarios with any degree of certainty.

The biggest limiting factor preventing ICT growth in Sri Lanka since the early 1980s is the armed separatist conflict. The war not only forced the government to incur heavy expenses, thereby diminishing funds available for development, but also discouraged potential foreign investors. As at December 2002, a ceasefire had held for 12 months and the government and LTTE had started negotiations which will hopefully lead to a political solution. However, it is too early to predict the outcome of the peace process.

ICT growth in the country will depend critically on the success (or failure) of peace talks. If they are successful, and a more conducive business environment is achieved, many international companies will want to invest in Sri Lanka, thus revitalising the telecommunications and IT industries. With lasting peace, the country will be able to offer competitive rates and facilities for such investors. If the peace talks fail, it will be very hard for the country to recover from the heavy financial problems it now faces. Past experience shows that annual GDP growth has to be at least 10 percent to ensure a healthy growth in the ICT industries. With lower rates, ICT development either will not show appreciable growth (as happened in the past few years) or might actually decline:

Assuming that lasting peace is achieved, the following development can take place within the next decade:

- The present growth in telecommunication services, both fixed and mobile, will continue. The number of mobile phones will increase more rapidly. Teledensity will go up to at least 25, maybe even 40, per 100 persons by 2010.

- There will be similar growth in the number of Internet users too, with a major part of that occurring in rural areas. More Internet content will become available in local languages.

- Development in e-commerce will still be limited. One reason is the ease of purchasing goods through the traditional ways. However, the Internet will become more widely used for delivering and obtaining different types of financial services. The number of Internet banking accounts will rise by five to ten times.

- The software industry will expand rapidly. With the ready availability of skilled graduates, it will become one of the most lucrative business areas. However, local software companies will find it hard to take on the world market on their own; they will have to form joint ventures and partnerships with global players.

- ICT growth will be rapid and robust in the north and east of Sri Lanka, which are just coming out of the two decades of conflict that left most services and facilities destroyed.

For Sri Lanka to transform itself into a truly ICT-based nation – with not just its economy but the culture and people also adopting ICTs – the people and their leaders will need to shed long-standing myopic and negative perceptions about ICTs in particular and new technologies in general. They can do no better than to heed the pragmatic words of Sir Arthur C. Clarke, the island's most famous foreign resident and noted futurist: "Our response to new communications technologies and new information media should be a mix of pragmatism and caution. It would be futile – even stupid – to bury our heads in the sand and pretend that these rapid developments don't affect us. We should instead explore ways of how we can turn (perceived or real) threats and challenges into opportunities. We must exploit the inevitable". (Clarke & Gunawardene, 1999).

The coming decade will show if Clarke's adopted homeland will rise to this challenge.

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## Notes

1. GNP per capita, which was US\$120 in 1948, had increased to US\$823 by 2001, equivalent to about US\$2,500 on a purchasing power parity basis.
2. In comparison, the South Asian average was 0.564; Australia scored 0.936, Japan 0.928 and New Zealand 0.913 – the three highest-ranking countries in Asia Pacific.
3. In 1971 and 1987–89.
4. Sri Lanka’s public sector employment, taken as a proportion of the total population, is the highest in Asia according to the Central Bank of Sri Lanka.
5. <<http://www.trc.gov.lk/stats.html>>. This represents a tenfold increase within a decade.
6. The Customs Department records the number of imported PCs to Sri Lanka, but this is only a part of the aggregate PC population as a large number of PCs are locally assembled. Of the PCs imported during the past few years, the percentage that is still in use is also unknown.
7. <<http://www.trc.gov.lk/stats.html>>.
8. Calling Rural Folk. News item Lanka Business Online <<http://www.lankabusinessonline.com>> 25 September 2002.
9. <<http://www.sarvodaya.org>>.
10. <<http://www.dialogsl.net>> and <<http://www.microimage.com>>.
11. <<http://www.lacnet.org>>.
12. The inter-ministerial website at <<http://www.gov.lk>> provides links to all government institutions currently online. However, the public sector’s total lack of coordination vis-à-vis its online presence is evidenced by the fact that another website <<http://www.priu.gov.lk>> also presents itself as the “official website of the government of Sri Lanka”.
13. Different estimates suggest that between 5 and 20 percent of Sri Lankans are fluent in English.
14. Union Bank, Commercial Bank of Colombo, Nations Trust Bank, Sampath Bank, Seylan Bank and HSBC Sri Lanka. They make up less than one-quarter of the commercial banks operating in Sri Lanka.
15. <<http://www.eservicelanka.com>>.
16. <<http://www.emed.lk>>.
17. Locally assembled PCs achieve this cost advantage partially by installing pirated copies of the operating system.
18. <<http://www.rupavahini.lk>>.
19. <[http://www.rupavahini.lk/it\\_rupa.htm](http://www.rupavahini.lk/it_rupa.htm)>.
20. <<http://www.kothmale.net>>.
21. <[http://www.unesco.org/webworld/highlightsinternet\\_radio\\_130599.html](http://www.unesco.org/webworld/highlightsinternet_radio_130599.html)>.
22. PM Committed to Remove Constraints on IT. *The Island*, 26 June 2002.

23. Regulations Impediment for IT Development – Milinda.  
*The Island*, 3 July 2002.
24. A ten-minute local call between two subscribers within the same switching centre costs US\$0.40 at peak time and US\$0.14 or \$0.05 at different off-peak times. A similar call between subscribers in two secondary switching centre areas costs US\$0.80 at peak time and US\$0.21 or \$0.05 at off-peak times. These calculations include 20 percent government VAT and are based on Sri Lanka Telecom's rates.
25. One in every 19 Sri Lankans lives outside its borders.
26. <<http://www.trc.gov.lk/ntp.html>>.
27. Proposed Computer Crimes Bill to Help Rapid Development of IT. *Sunday Times*, 9 September 2001.
28. <<http://www.trc.gov.lk/licence.html>>.
29. <[http://www.boisrilanka.org/settingup/registration\\_patents.htm](http://www.boisrilanka.org/settingup/registration_patents.htm)>.
30. Open Codes. News item, Lanka Business Online <<http://www.lankabusinessonline.com>> 12 October 2002.
31. <<http://www.statistics.gov.lk/Documents/census2001/resultindex.htm>>. This number goes up to 19.4 million when all Sri Lankans currently working abroad are also counted.
32. Based on analysis and interpretations of the 2001 census data.
33. Sri Lanka Socioeconomic Data 2002, Central Bank of Sri Lanka, June 2002.
34. Ibid.
35. ITU, 2002.
36. <<http://www.trc.gov.lk/stats.html>>.
37. ITU, 2002.
38. ITU, 2002.
39. <<http://www.trc.gov.lk/stats.html>>.
40. In the absence of any formal estimate, this is the best "guesstimate" by the authors.
41. Authors' estimate in the absence of reliable data.