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## **NATIONAL INFOCOMM STRATEGY AND POLICY: SINGAPORE'S EXPERIENCE**

**William Hioe**  
**Singapore**

### **Background and Context**

Singapore, with a land area of approximately 650 square kilometres, has very little natural resources. Most of the food we consume, and even the water we drink, have to be imported from neighbouring countries. One of the few tangible assets we have is human resource - the descendants of immigrants from the surrounding region, China, India and Europe. And even that we do not have too many of – a population of slightly over 4 million today.

In the late 1970s, the government of Singapore realised that the island nation could no longer afford to compete with the much larger regional countries in labour-intensive industries. The only viable alternative for Singapore would be to move up the value chain and focus on capital-intensive and technology-intensive activities. Information technology (IT) was identified as one key technology that would help improve Singapore's economic performance by doing more with less – increasing labour productivity, making processes leaner and more efficient, and delivering better services to customers.

**National Computerisation Plan**

**iDA** SINGAPORE Fig. 1 - 20 years of Systematic Evolution ... 1980-1985



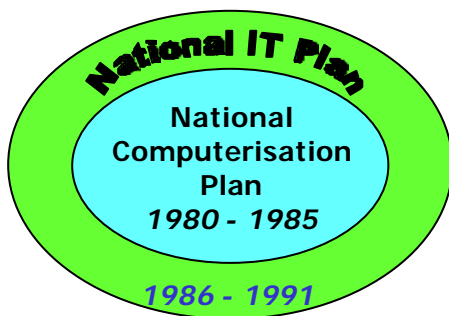
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A Committee for National Computerisation (CNC), led by a Cabinet minister, was then formed to map out the national-level strategy and policy for IT development in Singapore. The CNC came up with a five-year National Computerisation Plan in 1980 with primary focus in three areas: (1) Embark on a Civil Service Computerisation Programme (CSCP) to computerise the major functions in every government ministry, (2) Facilitate the development and growth of the local IT industry, and (3) Develop a pool of IT manpower to meet the future needs of the industry. The CNC also recommended the setting up of a National Computer Board (NCB) within the government to implement the National Computerisation Plan, including the provision of manpower services to develop and deploy computerised systems under the CSCP.

**National IT Plan**

**iDA** SINGAPORE Fig. 2 - 20 years of Systematic Evolution ... 1986-1991



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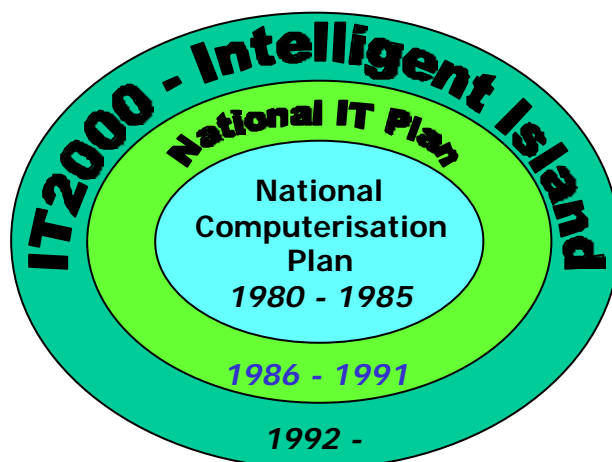
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With the successful implementation of the National Computerisation Plan, Singapore formulated a second five-year plan called the National IT Plan in 1986. This second plan built upon the foundations laid by the first plan to enhance the CSCP further, leveraging on networking technologies of the mid-1980s that brought about the integration of computing and communications. A number of computerised systems of the government were extended to private sector companies, businessmen and professionals through electronic data interchange (EDI) networks. Three of the more outstanding ones were TradeNet for the trading, shipping and freight forwarding community, LawNet for the legal community and MediNet for the healthcare community. TradeNet, in particular, brought about significant improvements in efficiency and turnaround time for the processing of trade documentation and the approval of applications submitted by shippers and freight forwarders. What used to take months could now be done within days. Also, during the span of the second plan, expert systems were developed to boost the productivity of Singapore's port operations, such as optimising the time needed to load and unload whole container ships. These expert systems were put to good use and turned the port of Singapore into one of the most efficient and most competitive in the world.

## IT2000



Fig. 3 - 20 years of Systematic Evolution ... 1992 - Present



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Riding on the successes of the first two five-year plans, Singapore became more ambitious and launched IT2000 in 1992, with the grand vision to transform Singapore into an Intelligent Island in 10-15 years. An Intelligent Island as envisaged will be where IT is pervasive in every sector and sphere of economic and social activity, and where IT services are readily accessible by every Singaporean at any time and at any place. In the larger context, IT2000 aims to make Singapore more competitive economically, with Singaporeans enjoying a better quality of life.

Today, almost a decade later, the major building blocks of IT2000 are largely in place. The national information infrastructure, as manifested in Singapore ONE (One Network for

Everyone) - the first nationwide broadband network in the world - has reached nearly 100% of households, all schools, most public libraries and community centres, and major commercial buildings. There are more than 200 broadband applications available on Singapore ONE, covering areas such as online learning, online shopping, online banking, e-government services, video-on-demand and music-on-demand. The number of broadband users has exceeded 300,000.

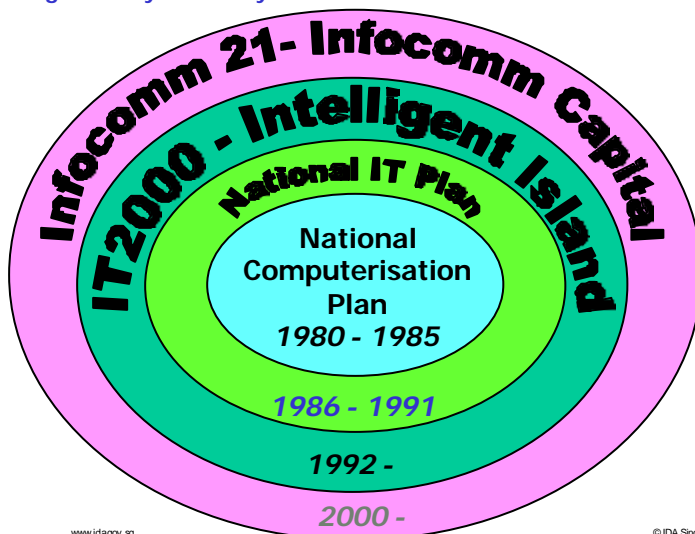
Today, Singapore is among the top few countries in the world in terms of PC and Internet penetrations - more than half of the households own PCs and subscribe to the Internet. In the schools, there is already one notebook computer to every two teachers and the target is to have one PC to every two students by 2002. Mobile cellular phone penetration, at more than 60% of the population, has exceeded fixed phone line penetration.

Under IT2000, IT and communications technologies have also been harnessed in a number of specific applications catering to different user communities and industry sectors. A nationwide digital library system that links up the library catalogues and resource materials of the major libraries in Singapore has been successfully implemented. An automated immigration clearance system using smart cards and biometrics has been deployed at the key immigration checkpoints in Singapore. In other areas, pilot applications have been developed and tested for the automated checking of building plans, wireless data links between hospitals and ambulances on the move, and the transmission of X-ray images over networks.

The success of IT2000 is not due to the sole effort of the government, but through a close partnership among government agencies, private industry, academia, research institutes, community groups, and civic and voluntary organisations. Each of these players has an important contributory role towards developing the initial concept of IT2000, refining the strategies and plans, and playing a critical part in realising the vision. In fact, the initial formulation of the IT2000 plan was the collective effort of more than 200 people drawn from these various groups.

**Infocomm 21**

**iDA** Singapore Fig. 4 - 20 years of Systematic Evolution ... 2000 - Present



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As IT2000 was being implemented progressively in stages, the global technological and economic landscapes went through massive changes, such as the globalisation of businesses, liberalisation of markets, emergence of e-commerce and e-business, proliferation of the Internet, broadband and wireless technologies, and convergence of IT, telecommunications and broadcasting technologies and markets. These changes have caused paradigm shifts that, in some sense, have rendered portions of the IT2000 plan no longer relevant. To ensure that Singapore is consistently at the early adoption phase of the technology curves to stay ahead competitively, the government decided to embark on developing a fourth strategic plan – Infocomm 21 (Information and Communications Technology for the 21<sup>st</sup> Century) – in 1999. A new statutory board, the Infocomm Development Authority of Singapore (IDA), was formed from the merger of the NCB and the Telecommunications Authority of Singapore (TAS) on 1<sup>st</sup> December 1999 to spearhead the development of Infocomm 21. The rationale for setting up IDA was due in part to the government’s strategic response to the converging IT and telecommunications markets and industries - a single agency is required to provide the integrated focus on strategy and policy for infocomm development in Singapore.

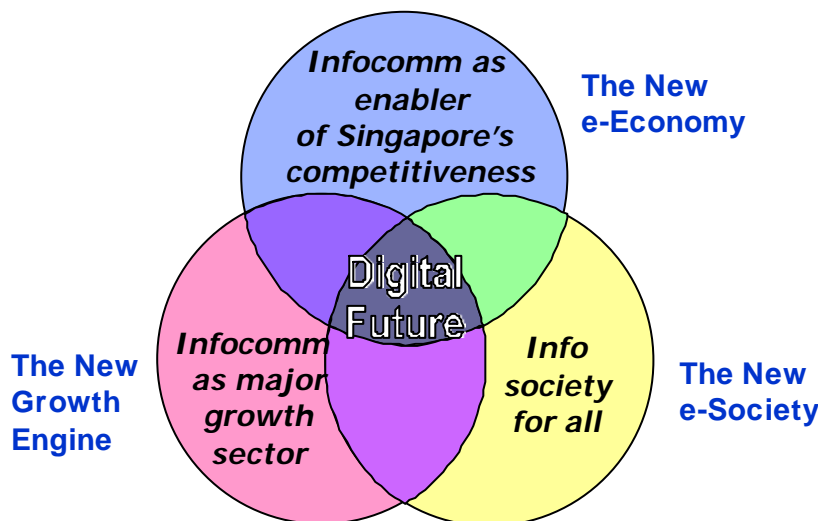
**Infocomm 21 Vision, Strategic Objectives and Key Thrusts**

With the final report released publicly in December 2000, Infocomm 21 envisions Singapore as *a dynamic and vibrant global Infocomm Capital with a thriving and prosperous e-Economy and a pervasive and infocomm-savvy e-Society*. The Infocomm Capital will be linked to the major infocomm, business, financial, manufacturing and logistics, and education and research centres of the world through the global information infrastructure. This is essential for Singapore to plug into and contribute to the larger global economy and to leverage on the abundant resources and talents of the world.

Three strategic objectives define what Singapore wants to achieve under Infocomm 21. These are:



**Fig. 5 - Infocomm 21 : The Strategic Objectives**



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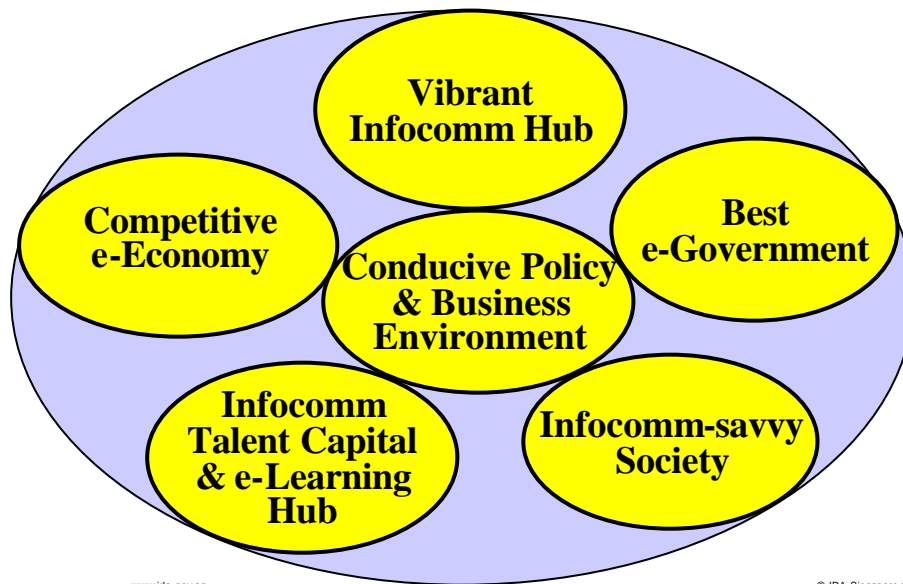
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- A dynamic and vibrant infocomm sector that is a strong contributor to Singapore's economic performance and growth;
- A competitive e-economy where every sector harnesses infocomm technologies to generate and deliver innovative products and services;
- A lively e-society where everyone lives the e-lifestyle and there is no problem of the digital divide.

Supporting these three objectives are six key thrusts to:



**Fig. 6 - Infocomm 21 : The Key Thrusts**

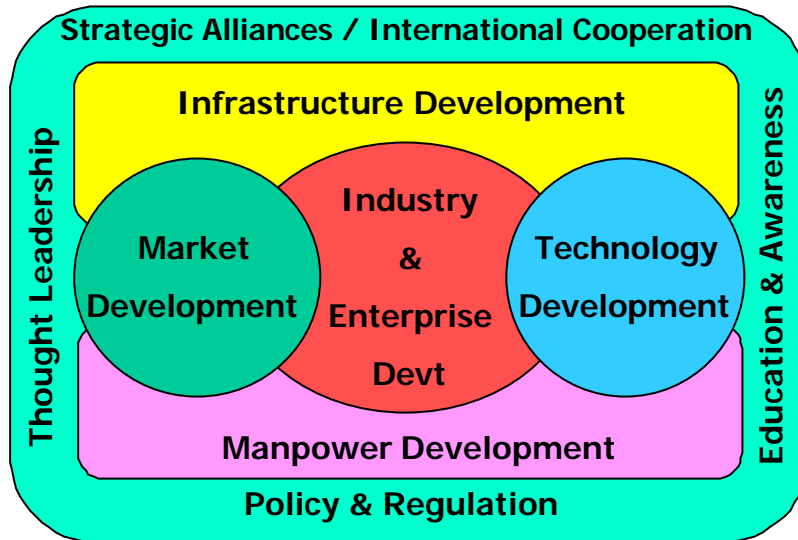


- Position Singapore as a premier infocomm hub in the Asia-Pacific;
- Develop a competitive e-economy, or *e-Powering the Private Sector*;
- Evolve the best e-government, or *e-Powering the Public Sector*;
- Nurture an infocomm-savvy e-society, or *e-Powering the People Sector*;
- Make Singapore an infocomm talent capital and a hub for e-learning;
- Create a conducive pro-business and pro-consumer policy and regulatory environment.

In implementing Infocomm 21, the Singapore government adopts a holistic and integrated approach to defining the various building blocks to ensure that all necessary inter-relationships among the components are considered. These building blocks include industry and enterprise development, technology development, market development, infrastructure development, manpower development, policy and regulation, thought leadership, education and awareness, strategic alliances and international cooperation.



**Fig. 7 - A Holistic & Integrated Approach**



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As no single government agency possesses all the know-how to oversee the breadth of focus which the implementation of Infocomm 21 requires, inter-agency teams and task forces are formed to address each specific area. In most instances, active participation from the private sector and grassroots organisations and community groups is an integral part of the workings of these teams and task forces.

The government strongly believes that the successful implementation of Infocomm 21 depends heavily on the entrepreneurship and innovativeness of the private sector, as has been amply demonstrated by the number of start-up companies in this Internet era. Thus it is important that the private sector takes the lead in coming up with projects and enterprises to realise the vision and objectives of Infocomm 21 with the government assisting as a facilitator and a catalyst. Where there are policy or regulatory impediments that get in the way of private sector initiatives, the government will review them to see whether these can be amended to keep up with the times. The government will also actively help to attract new international players in the infocomm marketplace to invest in and set up operations in Singapore. Concurrently, the government will help local enterprises to regionalise and globalise through opening doors for them to new markets and facilitating trade and investments in foreign countries. This can take the form of government-to-government trade and investment liberalisation agreements, international cooperation programmes and strategic alliances.

**Infocomm 21 Programmes**

A number of programmes have been defined to set the implementation of Infocomm 21 in motion, the key ones are as described in the following paragraphs.

***Telecom Liberalisation***

One of the toughest decisions the government had to take in order for Singapore to develop into a premier infocomm hub was to fully liberalise the telecommunications market on 1 April 2000, two years ahead of the original target date of 1 April 2002. This so-called 'big bang' approach, as termed by the industry, is to open up the telecom marketplace for open and full competition so that telecom charges and services in Singapore become more competitive relative to the regional countries. This aggressive move to secure the first-mover advantage for Singapore in an increasingly competitive telecom marketplace in the region is accompanied by huge government compensation to the incumbent telecom operators for the potential loss of market share.

In the new operating environment, there is no more restriction on the number of telecom licences to be issued by the Singapore government and the cap on foreign ownership of telecom companies is also lifted. Through free and open competition, it is hoped that competitive forces will drive down prices and drive up investments in new technology and infrastructure and innovative services. The response from the industry to this liberalisation move has been beyond expectations. Within nine months the government has issued close to 200 new licences to both local and foreign operators. Telecom charges, especially IDD rates to popular destinations around the world, have come down substantially as a result of increased competition, benefiting both businesses and consumers.

### ***Broadband and Wireless Infrastructure***

Singapore took a quantum leap of faith in 1997 to invest in the Singapore ONE broadband infrastructure ahead of demand, even before the Internet had gained mass acceptance in Singapore. We were able to do that because a fibre-optics telecommunications backbone had already been laid a couple of years earlier, and there was already an ambitious plan to roll-out cable TV networks to every household. Today, the government is encouraging broadband infrastructure providers and property owners to extend the broadband reach to different types of commercial buildings, hotels and industrial parks.

The government is also wasting no time to ensure that Singapore-based telecom companies exploit the latest wireless technologies early and build infrastructure in anticipation of future demand. Just recently, three 3G (third generation) broadband wireless licences were issued to three telecom operators, ahead of most countries in the region. Other wireless technologies are being studied for their feasible deployment in Singapore in the near future.

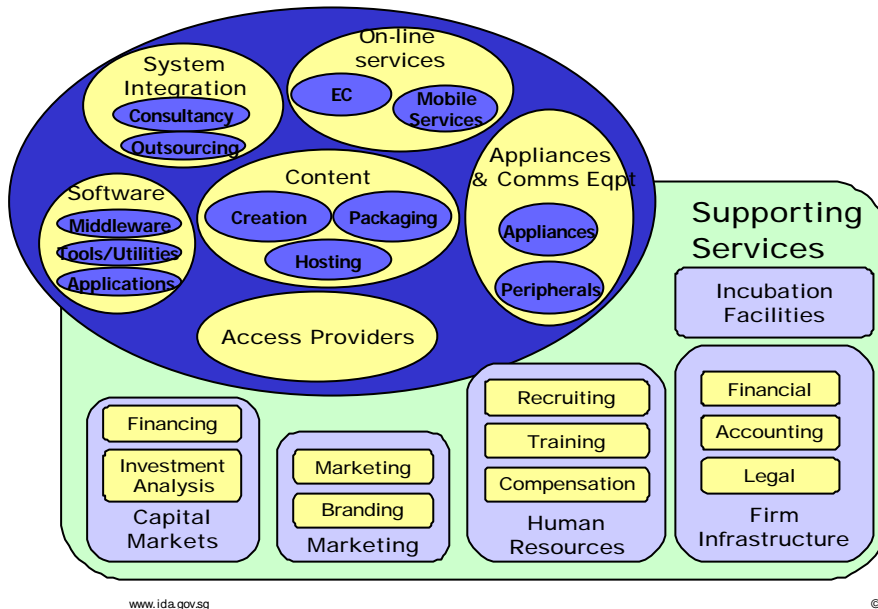
### ***New Infocomm Cluster***

In developing the new infocomm industry cluster as a major growth sector and strong contributor to Singapore's GDP and GNP, the focus is on three main areas, namely interactive broadband multimedia, wireless technology, and Internet and e-business software and services. This will be complemented by supporting services such as incubation facilities, venture capital markets, and business and legal services to help entrepreneurial start-ups.





**Fig. 8 - Develop New Infocomm Cluster**



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The government has also implemented a number of schemes to help local enterprises upgrade their capabilities through technology transfer tie-ups with leading infocomm companies of the world.

**Content Hubbing**

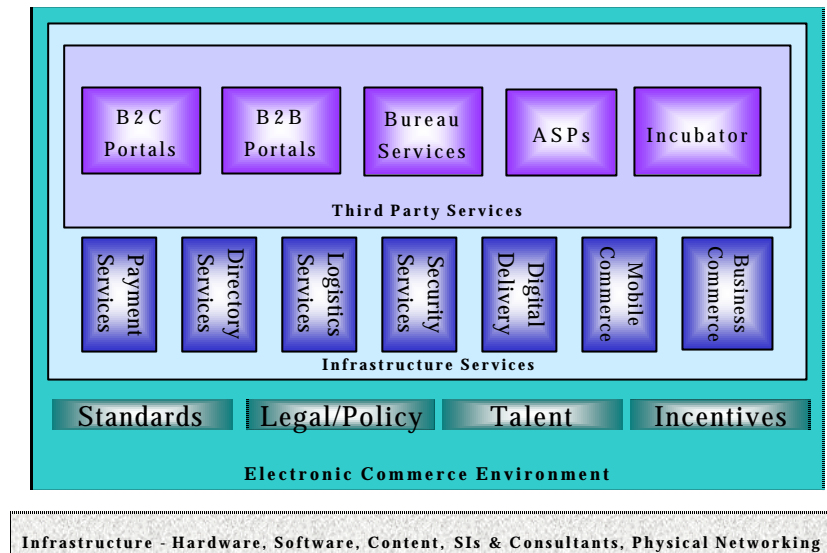
Singapore is one of the most well-connected cities in the region. Coupled with a reliable and efficient infrastructure, pro-business environment and good intellectual property protection, we have a strong value proposition to attract global players to hub their online content, applications and services in Singapore with extended reach to the vast markets in the region. A multi-million dollar package has been set up to stimulate the demand for and supply of interactive broadband multimedia content and services. Part of this package includes the co-sharing of risks between the government and start-up companies, and the provision of testbed facilities for companies to test their new products and services before they are deployed commercially.

**Trusted e-Business Hub**

Singapore has had a head start in building up a secure infrastructure for e-commerce beginning in 1996. This included the establishment of facilities and standards for secure identification and authentication of transacting parties on the network, and different modes of secure payment. A new Electronic Transactions Act was enacted in 1998 to give legal recognition to electronic transactions, electronic signatures and electronic documents. With these strong foundations, we are able to introduce other services and mechanisms to develop Singapore into a secure and trusted e-business hub. These include online alternative dispute resolution mechanisms, and the use of recognised trustmarks on the websites of online merchants to give online shoppers the trust and confidence in transacting with these merchants.



**Fig. 9 - Electronic Commerce Framework**



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There is strong emphasis by the government to encourage and help companies and businesses reinvent themselves through exploiting the capabilities of the Internet, broadband and wireless technologies. There will also be incentives to help companies, especially the small and medium enterprises, get on the e-commerce bandwagon. Focus will be on key high value-added sectors such as trading, manufacturing, logistics and financial services.

**e-Government**

With two decades of government computerisation experience behind Singapore, it is relatively easy to create more innovative and better e-government services for the general public. Already, a number of e-government services are available on the Internet, and some of them have been implemented on Singapore ONE. The government will continue to push the envelope of electronic service delivery to make life more convenient for the citizens to access e-government services from the comfort of home or workplace at any time. One major effort is the e-Citizen Centre, which offers a suite of citizen-centric services from ‘cradle to grave’ that integrates related processes across a number of government agencies.



**Fig. 10 - e-Citizen Centre**



The man-in-the-street can now have one-stop convenient access to services of his choice instead of having to approach a number of government departments or to navigate through the intricacies of the government bureaucracy.

### ***Bridging Digital Divide***

A multi-pronged approach is being adopted to ensure that segments of the population do not fall on the wrong side of the digital divide. Programmes are targeted at ensuring infocomm services are accessible to and affordable by the masses, and everyone is trained to some degree in infocomm literacy. There will also be different programmes for early and late adopters to cater to their pace and comfort levels, and specialised programmes aimed at the older folks, the non-English-educated and the handicapped. There are already in place national-level programmes aimed at making available content in the languages of the three main non-English-speaking ethnic groups of Singapore. Assistive technology is being introduced to help the handicapped make use of the PC and Internet with confidence.

### ***Infocomm Manpower Development***

Given the overall shortage of infocomm talents around the world, the challenge for Singapore is how to build up a pool of high-calibre infocomm manpower to cater to present and future demands. Our manpower development strategies include providing world-class infocomm education, attracting and retaining foreign talents, and nurturing an infocomm-savvy workforce through reskilling and retraining. University curriculum is being revised to allow students across all faculties to be exposed to infocomm courses so that they have a better understanding of infocomm technologies when they enter the workforce. The Strategic Manpower Conversion Programme for Infocomm is set up to retrain non-infocomm professionals to pursue new careers in the infocomm sector. Similarly, the Skills Redevelopment Programme for Infocomm is aimed at retraining non-infocomm workers for technician-level infocomm jobs.

***Policy and Regulatory Framework***

Singapore's policy and regulatory framework for infocomm is aimed at creating a pro-business and pro-consumer environment to facilitate the development and growth of the infocomm industry and online businesses, and to ensure that the interests of consumers are protected. International laws and frameworks will be adopted as far as possible to ensure interoperability. A new "Code of Practice for Competition in the Provision of Telecommunications Services" has been implemented to foster fair, effective and sustainable competition in the fully-liberalised telecom environment. New regulations in other areas such as convergence, data privacy and protection are being studied and international developments monitored.

One tough decision the government has had to make is to commit to reviewing all existing legislation, rules and regulations to ensure that they are adequate and relevant for the new e-economy and e-society. Archaic laws will either be retired or revised, so that they do not unnecessarily become impediments to progress. Examples are licensing rules and content regulations for the physical world that are not directly applicable to the cyber world. Along with the review is the need for mindset change among legislators and regulators to treat electronic transactions, electronic documents and electronic signatures as legal, in the same manner as the paper equivalents.

**Conclusion**

Singapore has got to where it is today – one of the leading nations in infocomm development and usage in the region – after a journey of two decades. The journey has not been all plain sailing, with a fair share of successes and near failures. The lessons learned have been most invaluable in spurring us to attain greater heights from one strategic plan to another. As we embark on implementing our fourth plan, Infocomm 21, we face a lot of challenges and uncertainties ahead. With the close partnership among the public, private and people sectors we are confident that we will succeed.