UNITED NATIONS ESCAP / APCICT

ICT Trends for Government Leaders

United Nations Asian and Pacific Training Centre for Information and Communication Technology for Development (APCICT)

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Summary

A quick succession of technology breakthroughs has revolutionized how we communicate and exchange information. But where did all these technological developments come from and where are they headed? Given the wide array of information and communication techn - ology (ICT) applications, what are the factors to consider when making a selection? The first section of this briefing note provides some insights into some of the key ICT trends to date, and the ways by which they are shaping the present as well as the future. The next section identifies policy considerations relevant to building today's modern communication systems, to the continued development and evolution of the Internet, and to socio-economic advancement and achieving development goals.

This briefing note is drawn from the fourth module of the Academy of ICT Essentials for Govern-ment Leaders (Academy). The Academy is a comprehensive ICT for development training curriculum that aims to equip policymakers with the essential knowledge and skills to fully leverage opportunities presented by ICT to achieve national development goals and bridge the digital divide. More information on the Academy is available at http://www.unapcict.org/academy.

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Module 4 - ICT Trends for Govern-ment Leaders
Provides some perspectives on the technical and policy considerations that should be taken into account when making decisions for ICT development and strategy, in both the local and regional context.

Government officials from the Pacific visit the Tomorrow City Convention Centre during the UN-APCICT/ESCAP organized e-Government Workshop in Incheon, Republic of Korea (October 2009)

The APCICT Briefing Note Series aims to provide at-a-glance information on key information and communication technology for development (ICTD) agendas for high-level policymakers and stakeholders. The series includes: 1) highlights of conventional research papers, assessment and survey reports and publications; 2) policy considerations drawn from the Academy modules; and 3) key challenges and lessons learned based on analyses of best practices and case studies.

1 Introduction

In just a few short decades, the use of information and communications technologies (ICTs) has completely transformed how we live, work, and play. A quick succession of breakthroughs in technology has completely revolutionized how we communicate and exchange information. From the invention of Morse code in 1837, to the invention of the telephone in 1875, to the availability of AM radio stations in the 1910s, followed by television in the 1940s, people have been discovering and learning new ways to communicate and exchange information. The invention of the microprocessor in the 1970s was the start of another era of rapid change, and in just three decades we have arrived at today's modern communications systems, of which the Internet is probably the most pervasive and is fast becoming the primary medium of communication in many instances.

2 Broad Developments

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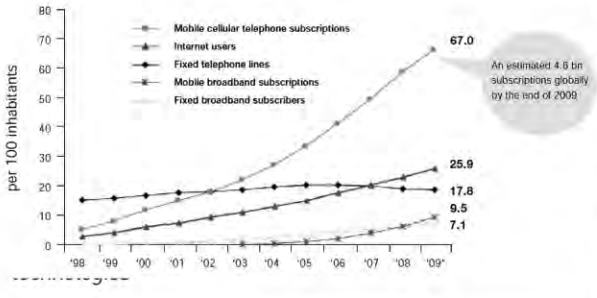
The creation of the World Wide Web

was perhaps an important catalyst in the Internet transitioning from a research project to mass global, public acceptance. Today the Internet and its related technologies drive businesses and economies globally. But the evolution has not stopped there. The Internet is making possible new ways of doing things. The use of the Internet to send and receive voice communication is a prime example. Cloud computing, which is now coming to the fore at a rapid pace, is perhaps the next evolutionary stage in computing for the masses, where low cost access devices are used to access and manipulate information stored and processed within the network.

Current Status

ICTs play an important role in any economy today. Some governments use ICTs to improve administration and management functions. Others use ICTs for health and education. And then there are some economies that have capitalized on the economic returns that ICT-based industries can offer. India's ICT outsourcing sector generated some USD 73 billion in revenues from software and services exports in 2010 and is expected to generate up to USD 225 billion by 2020. This is a prime example of building an industry around ICT.

To compete in an increasingly globalized marketplace, economies need to not only use ICT, but also ensure the availability of ICT to all sectors of the economy. This requires a significant investment in infrastructure and capacity building, and a policy environment that fosters innovation and growth. Infrastructure and capacity building have been long-standing issues in the developing world in particular, and when coupled with a closed and restrictive policy environment, an economy in such a situation is rarely able to fully maximize all the opportunities offered by ICTs.



[Source: ITU World Telecommunication/ICT Indicators Database., The World in 2009: ICT Facts and Figures., 1pg
** Estimates*

http://www.itu.int/net/pressoffice/backgrounders/general/pdf/3.pdf]

Mobile phones represent an important strategy for providing universal access to ICTs and bridging the digital divide in developing countries. Mobile phones have the following advantages:

- Mobile phones are cheap, with some models retailing for less than USD40 in developing countries.
- Mobile phones generally have a long battery life, which is an important factor for their use in settings where electricity may not be readily available.
- Core infrastructure to support mobile phone services is generally already in existence, covering populated areas.
- Most, if not all, mobile phones today have a Web browser of some kind, as well as Short Messaging Service (SMS) and Multimedia Messaging Service (MMS) facilities. Some are converged devices with FM radios and flashlights.
- Various information services are available over the mobile service, as are websites supporting access by mobile phones. This in itself is a business opportunity in-country.
- Prepaid mobile phone services do away with the need for deposits and credit checks. This gives low-income earners the opportunity to connect.
- In community settings, a person (or a group of persons) may be able to set up a 'telecentre' using mobile phones to offer services for a nominal fee. This creates another business opportunity.
- Commercial transactions via mobile phones are available in many markets. These include mobile banking and 'nano-finance' transactions (i.e. low-value transactions such as paying another person electronically by transferring phone credit to his/her mobile phone).
- Learning how to use a mobile phone is also much easier than learning how to use a PC, and there are fewer application software-oriented issues to deal with.

However, for mobile phones to be effective in helping to bridge the digital divide, an appropriate regulatory environment must be in place to ensure that mobile phone services can evolve and adapt to market demand. Second, the service fee structure should encourage wider effective use, including use by low-income earners and economically disadvantaged communities. Governments can play a key role in ensuring that these requirements are met through appropriate policy reform, which may include market liberalization and competition, a review of access cost structures, and ensuring that service providers offer the required services in a way that delivers maximum benefits in terms of technology and affordable access.

3 Key Considerations

Network Building Blocks

Technology evolves, and is embraced, at a rapid pace, particularly in the developed world. This is a challenge for developing countries, where users have to cope with rapid technological changes often without the necessary resources, and they are either forced to adapt to new technology or miss out on it altogether, which further widens the digital divide. Voice-over-Internet-Protocol (VoIP) is one example of this. Video-based websites (such as YouTube) that require significant bandwidth to operate efficiently, are another example.

In order to appreciate the technical challenges in delivering some of today's rapidly evolving technology, it is important that policymakers and decision makers in developing countries understand and take into account the basic building blocks that make up modern communication networks. It is also important to look at approaches that have been successful in other economies and explore how best to adopt and adapt these to suit local conditions. These include:

- Using appropriate technology to 'future-proof' infrastructure - for example, deploying optical fibre networks instead of copper-based networks for critical backbone connections;
- Exploring the possibility of regional and sub-regional cable networks to provide for system redundancy and stability;
- Assessing the benefits that a robust national cable infrastructure can provide, including looking at how this would help build investor confidence, strengthen service delivery, and improve the reliability of service and networks providers, and how all these would translate to providing better services and opportunities to the general public; and
- In situations where terrain and deployment costs hamper service provision, using cable-based systems, wireless

systems and/or satellite-based delivery of services, and putting fair regulatory mechanisms in place to allow feasible delivery of such services.

The Internet

The growth and influence of the Internet in the past decade has been phenomenal, to say the least. At the time of writing, it is estimated that there are some 1.5 billion Internet users in the world, and this is constantly increasing.

Voice communication over the Internet, blogging, Internet radio, Internet television, social networking sites, cloud computing, and Internet-based user applications have all contributed immensely to the rise in popularity and acceptance of the Internet as the primary communication method for many. The Internet has also given rise to many businesses and industries generating billions of dollars in revenue, which makes the Internet an integral part of the global economy.

As such, it is important to ensure that the policymaking process looks at the Internet as an important component of the economy's infrastructure. Indeed, many economies now consider the Internet as part of critical national infrastructure, much like water supply, electricity, and transportation services. The policymaking process needs to ensure that Internet services are reliable and secure, and provide an environment that allows Internet growth and innovation to continue. This process needs to address the following:

- Fostering competition in Internet service provision and ensuring that there is appropriate 'unbundling' of local loop services (i.e. separation of infrastructure from the services that run over it);
- Interconnecting government agencies and institutions using appropriate infrastructure, and promoting commitment to online delivery of as many government services as possible;
- Ensuring security and stability of national Internet infrastructure through such means as domain name system root server mirrors, Internet Exchange Points and international connectivity redundancy;
- Encouraging legislative responses to cyber security (e.g. anti-SPAM legisla-tion and consumer protection on the Internet);
- Providing appropriate regulatory flexibility to ensure the continued evolution of Internet technologies and their use (e.g. liberalization of VoIP and development of broadband Internet from both access and cost perspectives); and
- Building an environment that is conducive to the development of community-based networks, particularly in rural environments where commercial provision of services may not be feasible.

Connecting the Modern Org-anization

Today's modern information technology systems are able to provide improved process control and management, as well as enhanced general operational efficiency. But given the bewildering range of hardware and software available, it is important to ensure that the right choice of hardware and software platforms is made. Factors that need to be considered holistically include the following:

- Ensuring that procurement and purchasing decisions take into account technology trends, as well as the lifespan of the system, including its total cost of ownership;
- Assessing the benefit of adopting free and open source software in terms of economic savings, as well as the potential to localize such software to suit local conditions;
- Using new and emerging application delivery methods that require less in-house technical resources to operate and maintain, such as Software as a Service and Enterprise Resource Planning tools, to provide 'whole of organization' application integration and access;
- Reducing interconnectivity costs by employing virtual private networks to connect remote locations/offices; and
- Implementing intranets as an organizational information resource.

"When I was a student, wireless data transmission meant passing notes in class."

Software as a Service (SaaS) is a software delivery platform over the Internet. Instead of installing 'client applications' on user PCs, SaaS uses the Web browser to provide the user client interface. The actual software is hosted in a data centre that may be operated by the software vendor, or hosted by a third party specializing in hosting such applications. The software is not 'sold' to the user in the traditional sense; rather, the user pays a fee to use the software, much like a subscription. This has some obvious advantages, including not having to pay up-front costs (which are sometimes substantial) for purchasing the software, investing in infrastructure to host and operate the software, and maintaining both the hardware and software.

Enterprise Resource Planning (ERP) systems are based on the concept of integrating various organizational data and processes into one unified system. An ERP system may use various computer application modules with a unified database to store organization-wide data as the key unifying factor. This allows data to be available systemwide, and it reduces the need for constant monitoring and updating between discrete systems. It could also reduce hardware requirements in the sense that multiple applications running on multiple servers could be made to run on one server (or a couple of servers for redundancy and/or scalability). It also reduces cost by doing away with the need for external interfaces between two or more systems to exchange common data. Typical modern ERP systems have modules for financial management, human resources management, supply chain management, and other basic functional requirements of an organization.

Virtual private networks (VPNs) interconnect an organization's multiple, physically separate sites or mobile workers by creating a protected 'tunnel' over a communication network (e.g. the Internet). All of the sites in a VPN work as if they are part of the organization's internal network, even though the data is flowing across a public network. Various authentication and encryption mechanisms are used to protect the 'tunnel' between the sites, and this can be done at the network level using VPN gateways and at the client level using specific software installed on a PC. In essence VPNs can be compared to having leased lines between sites, except at much lower cost because the Internet is used as the communication infrastructure.

Intranets are computer networks that are normally available only to staff within an organization although they may also be

accessed through the public Internet using secure logins or VPNs. An intranet makes use of various Internet protocols and services to facilitate access to organizational information (e.g. reports) and functional areas (e.g. customer data, product data, financial data). Such information can typically be accessed using a Web browser, often over a secure connection. On a Web browser, a secure connection is characterized by a small padlock at the bottom of the page and the address bar being displayed in a different colour and preceded with 'https'. In cases where Internet bandwidth comes at a premium, an organization can set up an intranet and use it to host various information obtained from the public Internet and other sources (e.g. anti-virus software). This saves the organization Internet access costs while also providing quick access to the data.

4 Conclusion

Participants of the Second Regional Training of Trainers Workshop in group discussion during the UN-APCICT/ESCAP organized "Academy of ICT Essentials for Government Leaders", training workshop on ICT Trends for Government Leaders in Seongnam, Republic of Korea (March 2009)

More than ever before, ICTs are being looked at as means to improve socio-economic conditions, and as a tool for achieving the Millennium Development Goals (MDGs).

As technology continues to evolve, it is important to ensure that the policymaking process is thorough and ultimately contributes to socio-economic advancement. The following are some key actions that can contribute to this process:

- Establishing a National ICT Taskforce that considers advances in technology in a critical manner and provides timely and relevant input into the overall national planning process;
- Ensuring that the ICT regulatory and policymaking arm of government is proactive in its approach, engages with stakeholders from all sectors, and has the capacity to research and assess new technology trends so they can be rapidly adopted where appropriate;
- Formulating a national ICT strategy with balanced input from all stakeholders, and taking into account both global technology trends and local needs;
- Collecting national statistics that include an ICT aspect to aid in planning and development;
- Promoting policy reform efforts underpinned by market liberalization and competition, but balanced by access cost structures and service provisioning, to ensure that service providers offer the required services in a reasonable manner;
- Policymaking that explores alternative forms of access and, in particular, the potential of mobile telephony and convergence;
- Adopting new technology and deploying forward-looking strategies for infrastructure development and the use of appropriate technology to maximize the availability and use of information and services; and
- Using open standards in system procurement and deployment to ensure continued interoperability among systems.

The policymaking process needs to carefully explore various options to provide an outcome that is holistic, practical in the local context, and at the same time, aligned with regional and global trends and best practice.

The Philippines' Career Executive Service Board (CESB) utilizes customized "Academy of ICT Essentials for Government Leaders" (Academy) curriculum provided by UN-APCICT/ESCAP to deliver training workshop on ICT Trends for Government Leaders to participants in the Philippines (July 2009)

UN- APCICT / ESCAP

APCICT, a regional institute of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), was established and inaugurated on 16 June 2006 in Incheon, Republic of Korea. The role and mission of APCICT is to strengthen the efforts of the 62 ESCAP member and associate member countries to use ICTs in their socio-economic development through building the human and institutional capacity for ICT. In pursuance of this mandate, APCICT's work is focused on three inter-related pillars - Training, Advisory Services and Research. The Briefing Note Series is part of the research pillar. Also under the research pillar is a Case Study Series that provides analyses and compilations of best practices and case studies on different aspects of ICTD and capacity building in the Asia Pacific region.
http://www.unapcict.org

ESCAP

ESCAP is the regional development arm of the United Nations and serves as the main economic and social development centre for the United Nations in Asia and the Pacific. Its mandate is to foster cooperation between its 53 members and 9 associate members. ESCAP provides the strategic link between global and country-level programmes and issues. It supports Governments of countries in the region in consolidating regional positions and advocates regional approaches to meeting the region's unique socio-economic challenges in a globalizing world. The ESCAP office is located at Bangkok, Thailand.
http://www.unescap.org

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