# DIGITAL REACH

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Tudor Rose

**STATEMENT BY THE SECRETARY-GENERAL**

We are going through a historic transformation in the way we live, learn, work, communicate and do business. We must do so not passively, but as makers of our own destiny. Technology has made the information age possible. Now it is up to all of us to build an Information Society.

We are all familiar with the extraordinary power of information and communication technology (ICT). From trade to telemedicine, from education to environmental protection, we have in our hands, on our desktops and in the skies above, the ability to improve standards of living for millions of people.

Information and communication technology is not a panacea or magic formula. Rather, it provides tools in our quest to achieve the Millennium Development Goals, advance the cause of freedom and democracy, and propagate knowledge and mutual understanding. Our challenge is how to make the most of this potential.

At the 2005 World Summit at the United Nations in September, world leaders reaffirmed the importance of information and communication technologies. They reiterated commitments made at the first phase of the World Summit on the Information Society two years ago in Geneva. And they agreed to continue efforts to build an inclusive, people-centred Information Society. The second phase of the Summit, in Tunis, will continue our efforts to create more digital opportunities and put the potential of information and communication technologies at the service of development.

Governments cannot bridge the digital divide by themselves. The business sector, civil society, the media and others all have essential roles to play. Partnerships among all Information Society stakeholders will be crucial as we continue our efforts to extend the benefits of the communications revolution to all. *Digital Reach* includes contributions from many of those stakeholders, and I commend this publication to a wide global audience and appeal to all involved to make the vision of the Information Society a reality.

Kofi Annan
Secretary-General of the United Nations

# Acknowledgements

# Foreword

Great civilizations have thrived on the fruits of information and knowledge. While the digital revolution in information and communication technologies has rapidly extended the frontiers of our global village, the vast majority of the world remains unconnected to this phenomenon. The chasm between knowledge and ignorance, between the rich and the poor among and within countries, has increased. Without access, the underprivileged have been relegated to the margins of civilization, vulnerable to pestilence, disease and hunger. Bridging this digital and knowledge divide and avoiding the inequities of the past has now taken on unprecedented urgency.

The World Summit on the Information Society has succeeded in bringing these concerns to the forefront of global attention. During the first phase in Geneva, we laid the foundations of the Information Society by collectively enunciating a shared vision along with a concrete plan of action to make it a reality. The second phase in Tunis has been widely acclaimed as the "Summit of Solutions" as it set out to transform the digital divide into digital opportunities to promote peace, sustainable development, democracy, transparency and good governance.

The Tunis Summit is not the end. It is the beginning of a new journey, a voyage that will carry us on the tide of our collective effort and commitment to the shores of the Information Society. By empowering people through access to knowledge and information, the stage has been set to accelerate the pace of development and to give a voice to all, especially the weak and the vulnerable who have been silent for too long.

The task of building the Information Society is not about technology; it is about the end results of technology. It is about people and their social, cultural and economic aspirations. It is about eradicating poverty and improving livelihoods, conserving the environment, improving health care and increasing food supply. It is about preventing child mortality, and increasing the capacity of every child that we raise. It is about using the full potential of our digital reach to make the world a better place.

This Summit has pioneered many innovations. By bringing together the hearts and minds of the world's people – government leaders and civil servants, technological experts and innovators, small entrepreneurs and corporate giants, grassroots workers and social activists — we have succeeded in creating ownership among all stakeholders of the Information Society.

As we embark on the task of implementing the Action Plan, I am convinced that the process will benefit immensely with the participation of all stakeholders. In fact, the task cannot be achieved without all hands coming together. In order to reach our destination, we have to marshal all our resources in the most efficient ways. We have to use our collective experience, our capacity and our expertise, but without duplicating efforts.

The International Telecommunications Union (ITU) is a relatively small organization. Yet, we have faced up to the challenges of organizing two major gatherings of world leaders and steering the Summit towards its historic conclusion. As we now embark on forging partnerships to connect the world, the ITU is well prepared to guide and coordinate these efforts on the road ahead. I am convinced that we will together succeed in nurturing a more equitable, sustainable and just Information Society for the benefit of humanity.

Yoshio Utsumi
Secretary-General of the International Telecommunication Union
Secretary-General of the World Summit on the Information Society

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## STATEMENT FROM H.E. SAMUEL SCHMID, PRESIDENT OF THE SWISS CONFEDERATION

Switzerland was proud to be chosen as the host country of the first phase of the World Summit on the Information Society, which was held in Geneva from 10-12 December 2003. The objective of the Summit was to create a framework for an inclusive Information Society. The Summit explored the links between technology, communication, information, knowledge, culture and human welfare in a worldwide Information Society.

The outcome of the first phase of WSIS in Geneva reflected the quality of the process, the diversity of the participants, and the growing awareness of the importance of information and communication in the context of the Millennium Declaration and Millennium Development Goals. The Geneva Declaration of Principles and Plan of Action, adopted in December 2003, charts the way forward, showing how information and communication technology (ICT) can be used to improve societies for all.

The hallmark of an Information Society is that it be inclusive: access to knowledge and communication means is essential; our challenge is now to transform the digital divide into a digital opportunity.

At the start of the 21st century, we all face not only the social and economic challenge of a divide between rich and poor countries and regions, but also the security challenge of a world in which many regions are the prey of violent conflict.

Natural disasters like the tsunami of December 2004 and Hurricane Katrina in August 2005 teach us that we are all interdependent: our security depends on the security of others. Human security and state sovereignty are also linked: individuals can only be secure when they are protected by the state, but a state can only be legitimate and sovereign if it cares for all its residents, upholds their human rights, and responds to their demands. Clearly, traditional military strategies are insufficient.

Information and communication are crucial to understanding and transforming conflicts. ICT can help human security and peace by allowing peaceful solutions to conflicts through communication and negotiation.

The Swiss government has supported several programmes which involve ICT use for peace. In 2004, for example, Switzerland started the ICT4Peace project to thoroughly investigate the potential of ICT use for peace.

ICT4Peace has inventoried many areas in which ICT is used: identifying potential outbreaks of armed conflicts through early warning, facilitating the adoption of preventative measures, promoting peaceful resolutions, mitigating the consequences of conflicts and supporting humanitarian action and peacekeeping missions, and assisting post-conflict peace-building and reconstruction.

It is my hope that WSIS will be remembered not only for making ICT central to sustainable development, but also for emphasizing that communication and understanding are central to a peaceful future for all.

Samuel Schmid
President of the Swiss Confederation

**STATEMENT FROM DR AHMED NAZIF, PRIME MINISTER OF THE ARAB REPUBLIC OF EGYPT**

I am happy to address you in this commemorative publication of the World Summit on the Information Society. As an Egyptian, Arab and African citizen, and most importantly as a citizen of the global community, I would like to express my appreciation for the United Nations, for the International Telecommunication Union, as well as for the Swiss and Tunisian governments, for this ambitious effort to hold a Summit in two phases. I believe this Summit has been a ground breaker on several fronts, to better prepare ourselves for the coming period.

To start with, the Summit process has engaged the information and communication technology (ICT) sector irrevocably in the implementation of the Millennium Development Goals. These goals should be looked at not merely as one more document, but as actual targets to be realized. ICT has been dubbed as a catalyst for positive change in both developed and developing countries; a challenge that requires new and practical means for its achievement.

By examining the roles of the different stakeholders, the Summit process has spread a new culture of interdependence between the concerned parties, that focuses on complementarity and calls for capitalizing on expertise wherever it exists. We have been probing into new areas where ICT could be instrumental, learning from each other and examining different possibilities from across the whole world.

Through the depth and regularity of meetings for the Summit process on the local, regional and international levels, the international community has succeeded in opening up dialogues on contentious issues and removed the stigmas associated with a number of concerns for more balanced, future oriented and transparent solutions.

By hosting the second phase of the summit in Tunisia, the United Nations and world community have rightfully re-engaged the developing countries as full partners in multilateral negotiations and acknowledged the ability of this part of the world to play its global role on the same footing as the developed world.

Therefore, I am looking forward to the day when our societies will put into practice the Summit's recommendations and build on the momentum generated by its process. To achieve this, we are in dire need to explore the potential of all stakeholders in using ICT for development through concerted international efforts.

But as the Summit introduced ICT in the modern development debate, Egypt and its partners in different parts of the world are facing the dual challenge of how to develop the ICT industry, and transform our societies into major innovators of ICT, on the one hand, while disseminating ICT in our societies and incorporating it in our developmental schemes.

In our persistent quest for entrenching the fundamentals of the contemporary Egyptian society, we launched an array of initiatives to transform it into a knowledge based society resting on three key concepts. The first component is liberalization; or the creation of a liberal and transparent economic and legal environment as a pre-requisite to developing a vibrant ICT sector. The second is a comprehensive multi-stakeholder partnership for development among all agents of change to ensure that the potential of ICT is realized. The third is turning the welfare function of the state to 'the social investment state' by investing in human capital. In Egypt, we have made large strides in the introduction of competitiveness in our markets, in telecommunication services, in e-government services, and in e-learning, as well as other value added services thanks to the implementation of these three concepts.

Finally, I would like to encourage the world community and financial institutions to adopt a bolder spirit of entrepreneurship in the ITC sector, especially in developing countries. I also wish to call upon decision makers to be persistent in clarifying the value-add of ITC in the developmental agenda. Indeed, the successful implementation of the Summit's resolutions will largely depend on both pillars. Most importantly, the success of the post-Summit phase will depend on our ability to strike an equitable partnership between the developing and developed countries.



Ahmed Nazif
Prime Minister of The Arab Republic of Egypt

**H.E. P.J. PATTERSON, MP, PRIME MINISTER OF JAMAICA**

Five years ago, governments and people the world over reacted with justified optimism, hope and great expectation to the Millennium Development Goals which set a clear timetable for, among other things, the halving of poverty by the year 2015. Today, there is growing frustration, dashed hopes and painful resignation in many parts of the developing world. The *Human Development Report* (HDR 2005) states that 18 countries have registered lower scores in the 2003 Human Development Index (HDI) than in 1990, a situation it calls "an unprecedented reversal" (HDR 2005, page 3). While the global economy prospers, more than one billion of our neighbours live in squalor and extreme poverty. Over 220 million of these poor live in Caribbean and Latin American countries.

As we search for ways to reverse the fortunes of the world's poor, both developed and developing countries must view information and communication technology as the great equalizer in an increasingly unequal world. The result of this re-think should be fundamental changes in public policy and attitude that would re-position technology from the margins or periphery to the centre of our social and economic policy spaces.

The developed world has an indispensable role to play in helping the developing world to strengthen their scientific and technological infrastructure. The Declaration of Principles developed at the first phase of the World Summit on the Information Society in Geneva in 2003 must be transformed into discernable outcomes for the poor and powerless around the world.

If we can harness the great potential of information and communication technology, the world can make significant strides toward the 2015 deadline of halving poverty and to meet the other Millennium Development Goals that are eluding many countries of the world.

Closing the digital divide will also close the gaps between the rich and poor within national borders and incomes between people in developed and developing countries. An Information Society is the certain route to the eradication of poverty and the sure foundation for sustainable development.

This second phase of the World Summit on the Information Society must therefore seek to help world leaders revive the lost hope of hundreds of millions of people and replace their growing pessimism with optimism and renew their expectations of a brighter tomorrow.

The world must remain united and focused on the singular quest for a decent life for all human beings. It is the only route to the achievement of world peace, stability, freedom and democracy.

I look forward to the outcomes of this second phase of the World Summit on the Information Society and for the practical recommendations that will move us closer to achieving the goals contained in the Johannesburg Declaration and Plan of Implementation, the Monterrey Consensus, and other United Nations summits.

P.J. Patterson
Prime Minister of Jamaica

## HILARY BENN, SECRETARY OF STATE FOR INTERNATIONAL DEVELOPMENT, UK GOVERNMENT, UK PRESIDENCY OF THE EU

The year 2005 has been one of development. The Commission for Africa report, the G8 Summit, the Millennium Review Summit and the World Summit on the Information Society all highlight the important role that information and communication technology (ICT) plays in development.

The European Union (EU) is the world's largest donor. EU overseas development funding has been increasing since 2000 and it has committed to doubling its aid budget by 2010. A growing proportion of this aid goes to developing country governments directly to support their own development plans and budgets. They choose how much to allocate to ICT. Priorities are set locally and EU donors respond to these priorities.

Most developing countries see ICT not as an end in itself, but as a means to an end. So they include ICT as an increasingly important and integral part of development activities in areas such as governance and public administration, health, economic growth, education, natural resource management and disaster prevention. For example, ICT is playing a major role in the fight against HIV and Aids through activities like the popular South African educational soap opera *Soul City*. Most EU donors share this approach and consequently ICT forms an integral part of many EU-funded programmes.

Both traditional ICT (telephone, radio, TV and print media) and new ICT (mobile phones, Internet) are increasingly recognized as crucial in many ways for development and poverty reduction. The benefits of ICT are far-reaching: connecting schools to the Internet; enabling remote rural communities to get urgent medical advice by phone; giving farmers access to market price information; and potentially halving the costs of sending remittances. Mobile phones are already being used in developing countries to transfer cash virtually, bringing micro-credit and banking services to previously excluded poorer communities. ICT can enable people to discuss issues, to make their concerns known, to hold their governments accountable and to participate more effectively in political processes. Thus ICT is an essential component of the participation, transparency, and good governance that are increasingly seen (for instance by the Africa Commission) as the crucial basis for development and poverty reduction.

Many developing countries have seen the private sector play a major role in increasing access to ICT, not least through the explosive growth of mobile phones. But governments, with donor support, still have an important role to play: in creating an environment to attract investors; ensuring that the communication needs of the poorest and most marginalised people are met, often through innovative public-private partnerships; and introducing ICT into government functions and services.

The Africa Regional ICT Infrastructure Plan prepared by Africa Union and The New Partnership for African Development is a good example of what could be achieved if governments, the development community and the private sector each play their part — a good litmus test, perhaps, of whether all the positive words spoken at summits such as this actually translate into real action on the ground. The EU will play its part under the new Infrastructure Partnership with Africa. Let's make it happen.



Hilary Benn
Secretary of State for International Development
UK Government, UK Presidency of the EU

# I

## WSIS: SUMMIT OF SOLUTIONS

# Beyond WSIS: building a global Information Society

*Yoshio Utsumi, Secretary-General of the International Telecommunication Union,*
*Secretary-General of the World Summit on the Information Society*

THE DIGITAL REVOLUTION in information and communication technology (ICT) is having a profound impact on how the world functions and interacts, and will continue to play a major role in shaping our global future.

Unfortunately, access to the benefits of ICT has not been even, among and within countries, between urban and rural areas, between the rich and the poor, between the educated and the illiterate, between men and women. The need to avoid perpetuating the inequities of the past has now taken on a real urgency, with the emergence of the Information Society, which is why many of the world's key players in ICT are now taking active steps to bridge this information and knowledge divide and bring the benefits of ICT to all.

In addressing these challenges of our times, the International Telecommunication Union (ITU), which has helped governments and the private sector in coordinating global telecommunications for the past 140 years, is once again pioneering a new path by laying the foundations for a global Information Society that seeks to provide universal and equitable access to information and knowledge through widespread use of ICT.

Building the Information Society is not just about technology; it is about what technology can achieve. The Information Society is about people and their pressing needs. It is about eradicating the misery of poverty and hunger and the hardships caused by the destruction of our environment. It is about leaving a healthy legacy for future generations. It is about increasing the capacity of our children and about giving a voice to all those who have been silent too long.

Since 2001, mandated by the UN General Assembly, ITU has taken the lead role in organizing the World Summit on the Information Society (WSIS). The first phase of this top-level Summit concluded in Geneva in December 2003 with global leaders from over 175 countries, including some 50 Heads of State/Government and Vice Presidents, agreeing on a shared vision of the Information Society and setting out a concrete Action Plan for its realization.

Specifically, WSIS is about "building a people-centred, inclusive and development-oriented Information Society, where everyone can create, access, utilize and share information and knowledge, enabling individuals, communities and peoples to achieve their full potential in promoting sustainable development and improving their quality of life." These goals of WSIS were also endorsed by one of the largest gathering of world leaders at the UN Summit in September 2005.

Unique in the history of global summits, WSIS was envisaged from the start as a Summit in two phases with a built-in follow-up mechanism to continue the momentum and to ensure that the goals and principles adopted at the first phase would be achieved. The Tunis Summit, 16-18 November 2005, sets out to build on the commitments made in Geneva and chart the future course of the Information Society by looking at operational details. The focus has been on ensuring that ICT is made globally accessible and devising strategies to use ICT for achieving the development goals enshrined in the UN Millennium Declaration. Difficult political issues have been addressed on Internet governance and financial mechanisms to bridge the digital divide as well as on implementation and follow-up after the Tunis Summit.

### "Summit of Solutions"

Better access to information can help dispel ignorance and empower people to reach their personal aspirations. It has the power to bind communities on a global scale and to spread the common ideals of peace and tolerance, growth and development. ICT provides increasingly important tools in accelerating the pace



Photo: International Telecommunication Union (ITU)

Aerial view of the three ITU buildings, Geneva

of social and economic development. As a result, WSIS has been globally recognized as the "Summit of Solutions".

ICT targets for the year 2015 include connecting all villages around the world and bringing ICT to all universities, colleges, secondary and primary schools, scientific and research centres, public libraries, cultural centres, museums, post offices and archives, health centres and hospitals. Local and central government departments should also be connected, and have their own websites and e-mail addresses. By the same date, all primary and secondary school curricula should have been adapted to incorporate ICT in the study programme, to equip young people around the world to meet the future challenges of the Information Society.

**Looking ahead**

The Summit's successes have provided the necessary momentum to address effectively many pressing global issues, particularly in the area of improved ICT for development. WSIS pioneered an inclusive multi-stakeholder approach engaging effectively with not just governments, but with civil society and the business sector as well as other organizations within the United Nations system. It is now quite obvious that in future, all stakeholders of the Information Society will need to put their resources together to build on the foundations laid by WSIS.

Forging partnerships to bring the benefits of ICT to all is one of the Millennium Development Goals. In keeping with this goal, ITU launched the *Connect the World* initiative, a partnership that brings together the most innovative minds and resources and includes experts from government, business, civil society and international organizations. They have brought to the table their commitment to use technology and resources to help people communicate, foster the flow of information and knowledge and accelerate the pace of development. This initiative will spearhead ITU's commitment to transform vision to reality, to convert the digital divide into digital opportunities to promote peace, sustainable development, democracy, transparency and good governance.

ITU, with its long experience in developing the technical and regulatory frameworks and standards that allow the world to communicate, is committed to providing the necessary expertise and tools needed to implement the WSIS Plan of Action in partnership and coordination with all players. In view of the many constraints presented by these somewhat difficult times, paving the road ahead will be an arduous task, so it will be crucial to make the most efficient use of existing resources and avoid wasteful duplication of effort. Having received the mandate from its Council Members to build on the WSIS framework, ITU is ready to to take on the challenge.

The challenges faced are multifaceted. They include how to improve the current Internet international coordination arrangements without undermining the stability and reliability of the Internet, how to provide affordable access to all without jeopardizing existing financial mechanisms that prove effective, how to ensure network and information security without affecting people's human rights and their right to privacy, and more. Clearly, these challenges will require a new commitment to work together if we are all to realize the full benefits of the Information Society. Looking ahead beyond Tunis, we must remember that ensuring the fruits of today's powerful knowledge-based tools are within reach of people living in even the most impoverished economies will be the true test of an engaged, empowered and egalitarian Information Society. Communication and information must be freely and readily available to all humanity, not just the privileged few.
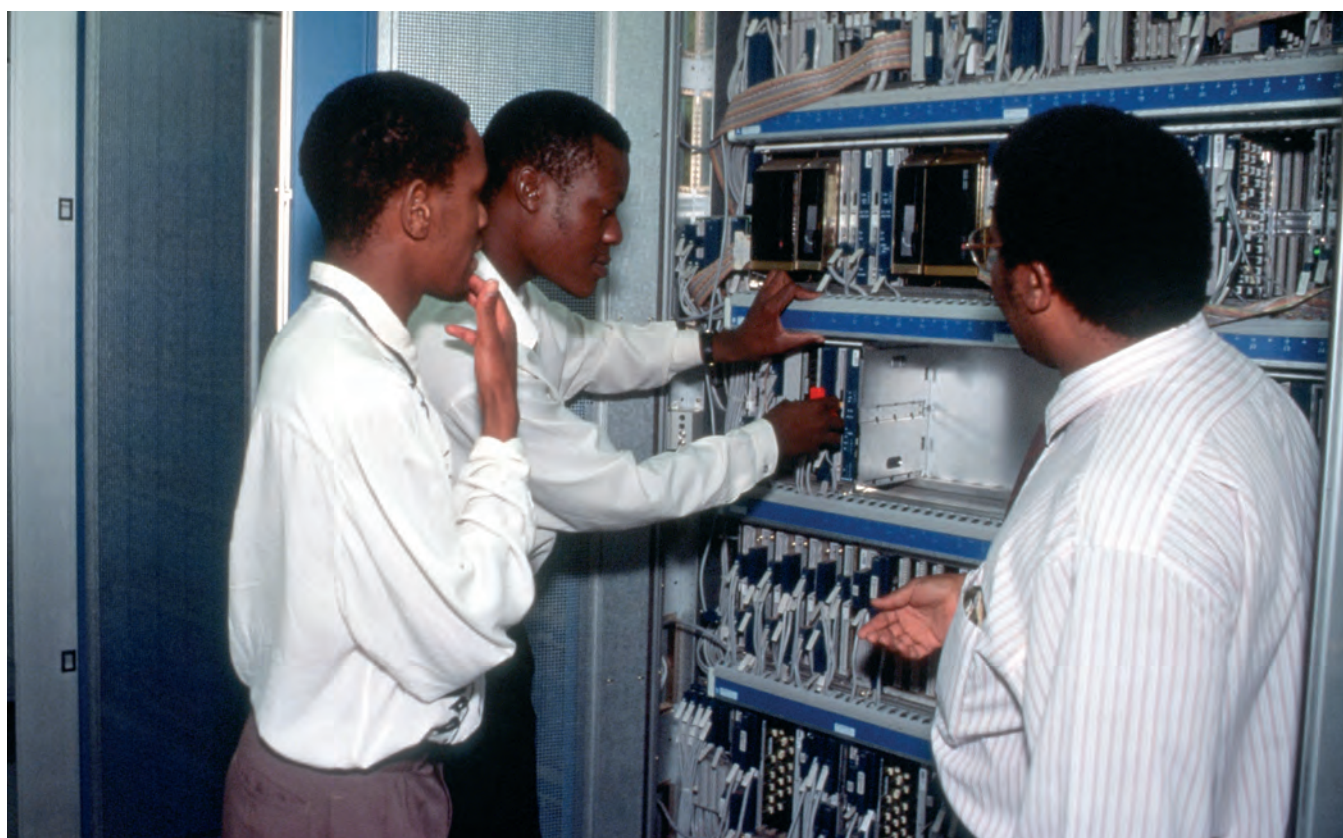


South Africa Training Centre

# WSIS and the growth of the Information Society: multi-stakeholder process

*Janis Karklins, permanent representative of Latvia to United Nations office at Geneva and President of the WSIS Preparatory Commitee, Tunis phase*

THE UNIQUE NATURE of the World Summit on the Information Society (WSIS), structured in two phases, has facilitated dialogue and partnership, enabling the international community to address questions about the Information Society in a comprehensive and inclusive manner. The preparatory process of WSIS has provided a variety of venues and vehicles for all stakeholders to fully participate at the global, regional and local levels. The involvement of stakeholders in the WSIS discussions has been unprecedented in the United Nations system, particularly in the consultative process on Internet governance issues.

WSIS covers many broad and cross-cutting issues. The subject matter impacts everyone, whether public sector, private sector or civil society. However, the growth of the Information Society has been, to a large extent, private sector driven. The involvement and participation, therefore, of the private sector as well as civil society in the WSIS process has been important as well as a natural evolution.

The UN itself is at a crossroads. In September 2005, the High-Level Plenary Meeting of the UN General Assembly discussed and committed to an agenda of UN reform. In an increasingly globalized world, in which national borders are eroding more and more, the participation of other stakeholders in intergovernmental processes will be an increasing phenomenon.

## Regional and thematic meetings

Throughout both phases of WSIS, a series of regional and thematic meetings have taken place, providing platforms for discussion on implementation, best practice and exchange of information. These meetings have broadened the inclusion of stakeholders, provided input from the regional and local levels and built a base of support for implementation. The regional meetings have provided platforms for discussing challenges and opportunities facing specific areas of the world. Thematic meetings have provided intellectual laboratories on specific topics in which new and practical measures have been discussed and innovative solutions developed.

As during the preparations for the Geneva phase, the regional and thematic meetings have played a key role in assessing the issues from a local perspective, as well as providing critical input into the preparations for the Tunis phase. These meetings have helped to generate interest and commitment at the local level, and to ensure that more voices and perspectives are incorporated into the WSIS process and its outcome documents.

## Key issues addressed in Phase II

Following the Geneva Summit in 2003, there were two issues which required further discussion in the Preparatory Process for the Tunis Summit (Phase II): financial mechanisms and Internet governance. The UN Secretary General mandated two groups — the Task Force on Financial Mechanisms (TFFM) and the Working Group on Internet Governance (WGIG) — to delve into both of these issues in further detail and to make recommendations in preparation for the Tunis Summit.

During the examination of the report of the TFFM, the Member States agreed on an outstanding political issue from the Geneva Summit, the Digital Solidarity Fund (DSF). It was agreed that the DSF should be a fund of a voluntary nature, which would complement existing financial mechanisms and develop innovative approaches in terms of identifying sources of its own funding. The official launch of the voluntary DSF took place in Geneva in March 2005. The fund seeks to carry out projects that can make a real difference on the ground. We expect to hear announcements about some of these new projects during the Tunis Summit.

The WGIG presented its findings during the third preparatory meeting in Geneva in September 2005. The process and discussion on Internet governance revealed two underlying issues. First, the WSIS WGIG process was an attempt to further codify or develop relations between two systems of international law: public and private. For many centuries, intergovernmental relations have been regulated by a system of international public law, which provides an absolute state sovereignty over state borders. The Internet, which was developed as an academic and research network, has become a global system (even a global 'good') which does not recognize state borders and whose 'owners' do not necessarily recognize the notion of state sovereignty. The Internet in most cases is governed according to a system of international private law. Today there are very few examples of interaction between these two systems of law. The WSIS WGIG process was clearly breaking new ground.

Following the Geneva Summit, awareness of the importance of the Information Society grew, resulting in many practical efforts and projects related to infrastructure development, including an East African underwater optical cable, as well as some other unique projects such as the development of a USD100 laptop for distribution to millions of children in developing countries throughout the world.

## The road ahead

The key challenge following the Tunis Summit will be to keep WSIS on the international agenda and to make sure that the work and recommendations of WSIS are implemented. Finding appropriate implementation mechanisms is not easy. No single UN

agency addresses WSIS issues. These issues are cross-cutting and covered by many different UN agencies and other international bodies as well as by the private sector and civil society. The creation of efficient and effective implementation mechanisms, including all stakeholders and providing an efficient cooperation framework, has therefore been a major challenge for the Preparatory Committee.

There are a number of references to the internationally agreed Millenium Development Goals (MDGs) in the WSIS documents and we actively worked on integrating WSIS issues into the MDG review process. The report of the UN Secretary-General addressed the role of information and communication technology (ICT) and emphasized the important role they play as enablers of development. Our goal was to make sure that WSIS, and more specifically the issues related to the work of WSIS, were mentioned in the documents adopted in September 2005 by the UN high-level meeting as they review progress on the MDGs. This was achieved.

Over the past couple of years, there have been significant ICT developments all over the world, in particular in developing countries. The number of mobile telephone users has doubled and Internet users exceed one billion. While these achievements were certainly not a direct result of WSIS, they illustrate that many players are responsible for implementing ICT strategies. The role of government is to facilitate and create the environment to allow for the growth and use of ICT as a tool for development.

Governments need to take decisions on the place of ICT in their development policies. Based on that, international organizations can help governments implement their policies in collaboration with the private sector and civil society. In this context, it is important to encourage the cooperation of all players so that they complement the activities and efforts of each other, rather than competing. There is much to be done, providing innumerable opportunities for all players to make a difference. Joint efforts can maximize the impact and efforts of all.

Achieving successful results will continue to require a concerted effort by governments, international organizations, companies and civil society, working together to provide an improved environment for the information society in both developing and developed countries around the world as well as within and between populations of people. The decisions taken through the WSIS process should be integrated into other activities and bodies working on related issues to maximize the impact of the important work that has been conducted, and for the benefit of all stakeholders.

The WSIS process has been a catalyst. It has served to raise awareness and provide a direction to follow regarding the facilitation of the Information Society. However, a difference can only be made if the ideas are implemented. This will require commitment and action on the part of local, regional and national governments, the private sector and civil society with the assistance of regional and international organizations.

# On Internet governance[1]

*Nitin Desai, Special Adviser to the United Nations Secretary-General on WSIS and Chairman of the Working Group on Internet Governence*

THE IMPACT OF rapid advances in information and communication technology has been captured in a variety of phrases. Those who focus on the remote control functions that these technologies can facilitate, talk of cyber-society. Those who believe that the greatest impact is on the vastly increased possibilities for sharing information and knowledge, speak of an Information Society or a knowledge society. Yet others who see the greatest change in the enhanced possibility of communication and collaboration amongst geographically separated individuals, speak of a network society. All of these terms reflect a part of the truth. But one thing that is common to all of them is their dependence on the Internet.

The Geneva phase of the WSIS dealt mainly with the impact of information technology on the economy and society. It shifted the focus from technology to the use that is made of it to change people's lives for the better. The ten goals and the 11 principles that it enunciated provide a good structure for policy development and operational work. The link with human rights, freedom of expression, media freedom and access to information was hotly debated and, in the end, clearly endorsed. The more practical outcome, in the form of announcements of support, sought to take innovative experiments to scale and to promote partnerships.

The central role of the Internet was recognized and the issue of how it should be managed or governed was discussed at Geneva, though crucial decisions were left for the Tunis phase of WSIS.

The global Internet today is managed quite efficiently by a set of private institutions, namely the Internet Corporation on Assigned Names and Numbers (ICANN) and a host of others. Some of the key resources are managed by ICANN, and some by other private corporations that have a contractual relationship with the US Government. This is a product of the history of the Internet that started as a US Government-led initiative and was developed mainly by US technologists. There is widespread appreciation of the role played by the US Government in the development of the Internet and general, if not universal, recognition that the US Government has exercised its authority fairly and responsibly.

The Internet today has become an essential part of the national and global infrastructure. Many governments depend on its availability and reliability. In developing countries in particular, the Internet is used more for public service applications, and hence there is an even greater desire for engagement among their governments. This is why the central issue is the way in which the management of the Internet can be internationalized and how governments can engage more effectively in public policy issues that arise. Apart from the management of core resources to ensure safety, security and fairness in access to them, there are other public policy issues that concern governments like spam, cyber-security and cyber-crime.

The Geneva phase of the Summit agreed: "The international management of the Internet should be multilateral, transparent and democratic, with the full involvement of governments, the private sector, civil society and international organizations. It should ensure an equitable distribution of resources, facilitate access for all and ensure a stable and secure functioning of the Internet, taking into account multilingualism."[2]

When it came to roles and responsibilities, the Geneva phase of the summit agreed: "The management of the Internet encompasses both technical and public policy issues and should involve all stakeholders and relevant intergovernmental and international organizations." In this respect it is recognized that:

- Policy authority for Internet-related public policy issues is the sovereign right of States. They have rights and responsibilities for international Internet-related public policy issues
- The private sector has had and should continue to have an important role in the development of the Internet, both in the technical and economic fields
- Civil society has also played an important role on Internet matters, especially at community level, and should continue to play such a role
- Intergovernmental organizations have had and should continue to have a facilitating role in the coordination of Internet-related public policy issues
- International organizations have also had and should continue to have an important role in the development of Internet-related technical standards and relevant policies.[3]

But when it came to organizational modalities, the issue was referred to the Tunis phase of the Summit and the Secretary-General was asked to set up a working group "to investigate and make proposals for action, as appropriate, on the governance of the Internet". Towards that end, the working group was asked to:

- Develop a working definition of Internet governance
- Identify the public policy issues that are relevant to Internet governance
- Develop a common understanding of the respective roles and responsibilities of governments, existing intergovernmental and international organizations and other forums, as well as the private sector and civil society, from both developing and developed countries.[4]

Most western countries and their Internet professionals wanted a small group process, while the developing countries wanted something more open-ended with significant governmental involvement. The central challenge was to devise a process that would retain the engagement of three key groups — the Internet community of technologists and civil society organizations, the Organization for Economic Cooperation and Development countries, particularly the US, and developing countries.

The working group succeeded in preparing a unanimous report, with full agreement in some areas and an agreement to present a range of options in the crucial area of policy oversight. The process worked because the Working Group on Internet Governance (WGIG) was a multi-stakeholder process where people talked with one another rather than at one another. Secondly, the group met with all stakeholders in open consultations at every meeting and members participated in a large number of outreach events. Finally, the WGIG was not a negotiating group trying to fashion a compromise amongst different points of view. The aim was more to understand one another and present a range of options that need to be looked at during the preparatory process.

The report of the WGIG contains a working definition of Internet governance: "Internet governance is the development and application by governments, the private sector and civil society, in their respective roles, of shared principles, norms, rules, decision-making procedures, and programmes that shape the evolution and use of the Internet".

A substantial part of the work of the group was a careful mapping of the existing system of Internet governance and management, with an assessment of strengths and weaknesses. The group focused on public policy issues and its report presents not just a listing of these, but also some notion of the most important ones that need to be tackled in whatever process we have for Internet governance.

The WGIG proposals for the reform of Internet governance structures are built on the foundation of three basic agreements. Firstly, the idea of a multi-stakeholder forum to provide a space for a dialogue amongst different stakeholders on Internet public policy issues. Secondly, the feeling that oversight arrangements as presently exercised need to be modified. Third, that oversight or governance arrangements should be concerned with certain public policy functions and not with the technical and operational management of the Internet. The nature of the change proposed to reflect these three basic points of agreement varies in the four options presented by WGIG.

Each of the four options proposed for global public policy and oversight require a change in the status quo. To summarize, the four options are:

- An intergovernmental global Internet council is proposed for securing coordinated action by governments on public policy issues. ICANN would continue with its role providing technical and operational support
- No specific new oversight body is proposed, but the strengthening of ICANN's Governmental Advisory Committee (GAC) is suggested in order to meet specific governmental needs, and ad hoc problem solving groups are to be set up as necessary
- An International Internet Council of government agencies is to be set up, with advisory seats for the private sector and civil society, working alongside the technical bodies of ICANN and Internet Assigned Numbers Authority (IANA)
- Three new coordinating organizations are proposed: The Global Internet Policy Council run by government entities; an internationalized 'World ICANN' to continue its current role as the technical and operational body; and the multi-stakeholder Global Internet Governance Forum to discuss related public policy issues.

The working group agreed unanimously on a proposal for a global forum of all stakeholders, essentially as a space for voicing concerns and stimulating cooperation. This forum would make recommendations, but would not take decisions.



Photo: ITU/Sanjay Acharya

Delegates in the plenary hall at the opening of PrepCom-2 (Tunis phase) at the Palais des Nations, Geneva

The Report of WGIG provides a structured basis for dialogue and negotiation. An amicable resolution of the Internet governance issue is in the interests of all countries. The real challenge is to recognize the global nature of the Internet and engage all countries in ensuring its safety, security and openness. The cooperation of all countries is necessary to cope with issues like spam, cyber-crime, cyber-security, privacy and so on. Those who are the key custodians of the Internet today can show leadership by responding to what is now a widespread demand from developing and developed countries for governmental engagement on public policy issues. Equally, those who are asking for change must ensure that the smooth functioning of the Internet, its end-to-end character and its openness are not compromised by a politicization of technical and managerial decisions.

In the long run, the UN has to address the broader issue of how best to tackle the range of policy development challenges posed by the Information Society. These include Internet governance, e-commerce/e-finance across national boundaries, transactions in Internet enabled services, frameworks and guidelines for operational activities on e-government, e-education, etc., issues relating to electronic media and freedom of the press and cyber-security and privacy, to list but a few.

# II

## CREATING DIGITAL
## OPPORTUNITIES

# Building knowledge societies

*United Nations Educational, Scientific and Cultural Organization*[1]

OVER THE PAST decade, Information and Communication Technology (ICT) has transformed much of our world. The changes go far beyond evolution, to revolution. From e-mail and the Internet, to mobile telephones and digital media, everyday activities have undergone major changes. Conventional media of mass communication such as print, radio, television and films have also undergone major changes. This is the case for many of us — but not for all. This is why the two meetings of the World Summit on the Information Society (WSIS) are landmark events.

The WSIS Declaration of Principles and Plan of Action at the Geneva Summit meeting in 2003 committed nations to taking action to narrow the digital divide and work towards international development goals. But work is urgently needed if this rapid technological progress is to be distributed more fairly.

To this end, United Nations Educational, Scientific and Cultural Organization (UNESCO) is driving a shift in focus. At this year's second Summit meeting in Tunis, UNESCO continued to advocate broadening the concept of the 'Information Society' to the more inclusive concept of building 'knowledge societies'. This new definition is founded on four principles that are central to the Organization's mandate: freedom of expression, respect for human dignity and cultural and linguistic diversity, universal access to information and knowledge, and quality education for all.

In order to build knowledge societies, we have a powerful tool at our disposal — and that is (ICT). It is a means to development rather than to an end, where information is an opportunity with the potential to benefit people in all areas of their lives — social, political, cultural and economic. The following practical examples illustrate how UNESCO is actively fulfilling its commitments under the WSIS Action Lines, particularly under access to information and knowledge; capacity building; cultural diversity and identity; linguistic diversity and local content; and media. The examples range from putting ICT in the hands of impoverished rural women, building Community Multimedia Centres (CMCs) to developing local content and innovative software applications.

### Putting ICT in the hands of the poor

A group of 45 impoverished rural women from the remote Baduria district in the Indian state of West Bengal are brought together to form a network as part of a UNESCO research program. They call it 'Nabanna' — a Bengali word meaning 'first rice'. The women meet regularly in ICT centres, are taught basic computer and research skills, and publish a community newsletter to share their experiences with other local women. The newsletter is widely read, reaching 450 local women from four distinct geographical areas.

The women learn skills, gain confidence, and share information on agriculture, the environment, health, sanitation, family planning, education, literacy and law. Questions are answered with the help of Internet access and re-circulated in the publication.

In one example, a meeting on polio vaccine awareness was organized whereas before local health workers had been struggling to gain community interest.

Within a year, a project researcher noted Nabanna project's dramatic effect on the community: "Now they have a say in their family. Their parents, husbands, in-laws and of course their siblings feel proud as they see them use the most sophisticated technical device. They are also admired because they are coming out of home to know good things and exchanging information with others. Some of them are now part of the decision-making unit in their family. They realized that women have the right to speak."

Since 2002, the UNESCO project 'ICT in the hands of the poor', has investigated the links between improved access to ICT and poverty reduction. From nine project sites across South Asia, researchers have taken a grassroots approach, looking for the most effective interventions and the key barriers to ICT usage.

A key finding of the research is that ICT enhances the capacity for poor people to interact with others through developed social networks, help them articulate their problems and try to find solutions. However, ICT must be tailored to community needs rather than follow one-size-fits-all development models. Above all, the community should be empowered to decide not only which tools are most relevant to their needs, but which media mixes best serve the distribution of their knowledge.

### The CMC: A gateway to the global knowledge society

UNESCO gives high priority to providing and strengthening communication and information facilities at the level of some of the poorest communities of the developing world.



A woman learns audiovisual editing at a CMC

UNESCO's International Initiative for (CMC), launched in 2001, promotes community empowerment and addresses the digital divide by combining community broadcasting with the Internet and related technologies.

The CMC programme offers a global strategy for addressing the digital divide in the poorest communities of the developing world and also among countries in transition. The CMC opens a gateway to active membership of the global knowledge society by making information and communication the basic tools of the poor in improving their own lives.

A CMC combines community radio by local people in local languages with community telecentre facilities (computers with Internet, e-mail, phone, fax and photocopying services). The radio, which is low-cost and easy to operate, informs, educates and entertains, but also empowers the community by giving a strong public voice to the voiceless, thus encouraging greater accountability in public affairs.

A CMC creates social capital by mobilizing participation and action on development issues, increasing collaboration, representing citizen and community interests and views by providing a voice to groups and individuals, connecting with other citizens and communities and ensuring accountability.

CMCs have been piloted in three regions of the developing world with initial funds from the Swiss Agency for Development and Cooperation. Many existing community radio stations, telecentres and other grassroots facilities can develop into community multimedia centres. Building on existing facilities avoids duplication and offers a solid basis to scale-up.

Through the scale-up of CMCs, launched in December 2003, UNESCO seeks to have more impact on more people in order to realize their full potential. This initiative concerns Mali, Mozambique and Senegal. The CMC scale-up initiative has 'stretch' targets: it is beginning with enough funds to create around 20 CMCs in each country. But from the start, the stated aim has been to see 50 CMCs established in each country.

Moreover, the target of 50 is the minimum that UNESCO estimates is needed to create critical mass, or enough to really begin to impact on development. If this scale-up project is to be successful, it should not only reach the target of 50 but also go beyond, led by national partners and with broad-based support from development partners.

Since 2001, UNESCO has established 57 CMCs in Africa, Asia and the Caribbean. There are 11 other CMCs underway in the framework of the CMC scale-up initiative in Mali, Mozambique



One of the CMCs

and Senegal. The same initiative is also supported under the umbrella of the International Programme for the Development of Communication (IPDC) where 13 CMCs are to be launched by the end of the year.

## Local content

While indigenous people account for four per cent of the world's population spread throughout 70 countries, they often live on the fringes of society in isolated rural communities and marginalized urban settings. Immensely proud of their cultural identity, they often lack the essential communication skills and technologies needed to communicate and preserve ICT for future generations.

ICT for Intercultural Dialogue: Developing Communication Capacities of Indigenous Peoples (ICT4ID) involves 11 indigenous communities in five pilot projects in Africa and Latin America. Launched by UNESCO in the 2004-2005 biennium, the project aims not only to improve access to new media for these communities, but also give international exposure to the media content produced by the groups themselves.

Many of the projects developed so far centre on audio-visual training and trace the history of the communities along with their future dreams and aspirations. One example, in the north-western tropical lands of Bolivia, centres on a script writing and training programme for different local indigenous communities (the Lecos, Tsimanes, Esse Ejjas, Mosetenezs, Tacanas, Quechuas and Aymaras). As well as producing documentaries and fiction films, the programme also contributes to training activities and programming for a local television station in Alto Beni.

Student Maria Morales, of the Tajlihui-Larecaja community, said the project represented a great personal step. She said: "As a woman, it has been very significant to get trained in audiovisual editing. What has impressed me most is that I have been able to propose the idea of a documentary to my community."

For Esteban Espejo, of the Piedras blancas–Rurrenabaque community, the project's impact has extended well beyond those directly involved: "The training centre in Sapecho is a strategic place since it has become a school for all of us. It means a great step forward for the region as it is run by local people who care about subjects like culture and social issues and try to improve the wellbeing of their community."

## UNESCO and software breakout

From worldwide libraries and documentation centres to science labs and administrative offices, UNESCO has been a pioneer in supporting the development of advanced multilingual software distributed free of charge. Starting with the development of a generalized information storage and retrieval system for bibliographic information in the 1980s, activities have now expanded with the launch of UNESCO's free and open software portal in 2001.[2]

These programmes and training materials are available in many languages, with a focus on allowing Member States to access new technology while being active partners in its development. This is particularly important for those who cannot afford to buy commercial software.

Of all the software tools developed by UNESCO, the most popular has been the CDS/ISIS software for creating, updating and searching textual databases and IDAMS software for analysing numerical data.[3]

The Independent University of Bangladesh's Chittagong Campus is just one example of many institutions around the world which make use of this software to develop and maintain an automated cataloguing system. The CDS/ISIS software for Windows (WINISIS) is provided free of charge by UNESCO and is regularly updated. The university adapts the software to its needs, and has now incorporated it into a web-based tool to access library databases all over the world.



ICT for the poor

# Finland: promoting Information Society development in South Africa

*Mari Kiviniemi, Minister for Foreign Trade and Development, Finland*

THE UNITED NATIONS Millennium Declaration has made access to information and communication technology (ICT) for development one of the key themes of discussion in international development policy forums. Finland's policy for the development of an Information Society gives expression to the country's support for the UN Millennium Development Goals (MDGs) and the declarations adopted by the World Summit on the Information Society in Geneva.

Lack of access to information has become a major problem in a growing number of developing countries, including economies in transition like South Africa. Developing countries do not have the same opportunities to make use of digital information and communications that industrial countries commonly enjoy. We may speak of a digital divide between rich and poor countries, but this challenge also concerns a wider gap — one relating to overall access to information and to the opportunities for communication and knowledge sharing that are key to economic and social progress in developing countries as well.

Narrowing this 'knowledge divide' demands the creation of a favourable operating environment in developing countries. Special



**ICT4D**. The Finnish framework for sustainable Information Society in development cooperation is based on an understanding of ICT as a key enabler in the attainment of social and economic development goals, a perspective that has received wide support in international discussions concerning ICT4D (Information and Communication Technologies for Development) and the Information Society

attention needs to be paid to the availability of ICT and related skills and knowledge, together with appropriate strategies, policies, regulatory frameworks, and private and public sector partnerships in the production of key services. These principles have been adopted as part of Finland's partnership programmes in South Africa.

**The partnership between South Africa and Finland on ICT4D**

Finland supports the development of an Information Society in South Africa with funding of approximately EUR 15m between 2004 and 2008. The Higher Education Support Programme, which is not described in this article, aims to improve the ICT infrastructure and information systems of the merging higher education institutions as well as building the capacity of the institutions on ICT integration. The Provincial Information Society Strategies programme supports two of South Africa's provinces in defining strategies to improve access to information and services, deliver enhanced opportunities for communication, and improve business opportunities through ICT. The National Innovation Framework programme, coordinated by the Department of Science and Technology (DST), supports the development of South African innovation policy and its structures both on a national level and in three provinces. In addition, the institutional collaboration programme of the Embassy of Finland in South Africa provides a platform for several institutions such as science parks, research labs and universities to kick-start cooperation in the field of Information Society pilot projects.

Finland and South Africa have a mutual understanding that the role of ICT is critical to regional development within South Africa. The ability of South Africa to effectively integrate itself into the global economy depends on how well it develops its capacity to handle, absorb and utilize ICT. Improved access to information also has an impact on the awareness, education, and social and cultural development of the public. In South Africa there is a need for technological development as well as for well-defined regional ICT policies, capacity building and human resource development.

**Background for the partnership**

In June 2003, at the annual consultation between the governments of Finland and South Africa, it was confirmed that Finland would continue its bilateral development cooperation with South Africa until 2010. The cooperation would focus on the education and environmental sectors; job creation; small, medium and micro enterprise (SMME) development; and human rights and democracy. As the gradual phasing out of bilateral grant support commences during the latter part of the decade, special focus will be placed on strengthened trade relations and increased institu-

Some of the Northern Cape schools still struggle with learning resources and there are too many learners in classrooms. ICT could help this school in the Northern Cape substantially by providing access to learning materials and by developing learner-centred learning methods



Internet access is still usually organized via modem in South African schools. It is many times too expensive and too slow for schools. National policy and regulations on ICT are needed to make ICT affordable in schools

tional links. More attention will be given to the role of ICT in development, along the lines envisaged by the Prime Minister of Finland, Mr Paavo Lipponen and the President of South Africa, Mr Thabo Mbeki during their meetings in 2000 and 2002. All new bilateral programmes will therefore focus on developing capacity in the Information Society.

Cooperation in the field of ICT and innovation has taken off since. Already between 2000 and 2004, new projects and programmes including ICT components have been prepared and mobilized. In the field of education, the Scope programme promoted the use of ICT in teaching as well as in special education, and was implemented in two South African provinces. The recently launched Higher Education Support Programme is supporting the restucturing of the South African higher education system. The vision of South Africa's Ministry of Education, and the overall objective of this intervention, are to develop a tansformed, democratic, non-racial and non-sexist system of hgher education. Finnish support will be provided through three components:

• ICT back-office establishment and training support to the merger process
• Development of quality assurance at the merged institutions
• Research and collaboration aimed at providing research related to ICT and quality assurance and providing interaction between the main components.

This third element will also create interaction between Finnish and South African institutions.

A capacity-building programme for ICT in the South African Development Community (SADC) secretariat has also been implemented. During 2005, the focus of preparatory work has been on developing programmes to support the planning processes of Information Society strategies at national and provincial levels in

South Africa, as well as to assist in the establishment of a specific programme to support the development of a South African national and provincial innovation system with the South African Department of Science and Technology (DST).

In his State of the Nation address in February 2001, President Mbeki announced the establishment of the Presidential National Commission on Information Society and Development (PNC on ISAD). This body is mandated to advise on various issues relating to the development of an Information Society. The PNC on ISAD submitted its final draft report in January 2004, just after the first phase of the World Summit on the Information Society (WSIS).

The PNC on ISAD works in cooperation with provincial and national governments, national government bodies, and private companies. Its current aim is to develop a common understanding of an ISAD plan for the future among the different stakeholder groups. Since December 2004, the Embassy of Finland in Pretoria has been participating in the development of a national ISAD plan and implementation, under the leadership of the PNC on ISAD. The PNC recommended a phased approach to the development of a national ISAD plan and implementation strategy, which would incorporate a long-term vision for the country as a whole within the timelines agreed at the December 2003 WSIS in Geneva. The ISAD plan and implementation strategy should naturally include the corresponding and complementary national, provincial, local government and public entities plans, along sectoral lines and consistent with government-approved cluster priorities for economic and social development.

In this context, the Embassy of Finland agreed with the PNC and provincial governments of the Northern Cape and Limpopo to identify the priorities for cooperation in the provincial Information Society plan and its implementation strategy. The priorities established will be based on the needs identified in the provincial growth and development strategies. The provincial-level partnership is extended to include national institutions and

agencies operating at provincial level, such as the State Information Technology Agency, the Small Enterprise Development Agency, and the Council for Scientific and Industrial Research Meraka Institute.

One important goal is to identify, even at the preparatory stage, the possibilities for creating interlinkage between different provinces in South Africa. It is essential to address the possibility of learning from more advantaged and developed provinces, such as the Western Cape with its e-innovation programme. The programme is therefore expected to leverage best practices, both in content and in collaboration with other South African provinces participating in the drafting process under the PNC.

**The ISAD plan in Limpopo and the Northern Cape**

In Limpopo, the emphasis will be placed on the ICT-enabled and facilitated development of industrial value clusters, as identified in the Limpopo's Provincial Growth and Development Strategy. Work will also focus on interweaving these industrial value clusters with one another, in order to form a competitive provincial economy. The Limpopo Provincial Government puts heavy emphasis on industrial value clustering in its socioeconomic development strategy, and the Limpopo Provincial ISAD plan needs to indicate how ICT could help accelerate the development of these industrial value clusters. Over and above this, the Limpopo provincial ISAD plan and implementation strategy must take into account the areas of focus highlighted by the State President of South Africa, namely e-governance, e-education, e-health, local content development, and the participation of SMMEs in the Information Society. A start has been made in Mogalakwena through the deployment of ICT facilities in rural, underdeveloped and under-serviced villages by the Mogalakwena HP i-community project. The provincial ISAD plan needs to leverage the lessons learned there and to use ICT as a socioeconomic development multiplier all over the Limpopo province.

The Northern Cape Provincial Government began the development of its Provincial Growth and Development Strategy (NCPGDS) in 2004. One major challenge facing the Government is to promote economic growth and job creation while providing for social development to address the needs of the poor. To this end, the main rationale for the NCPGDS is to enable all stakeholders from the public, private and parastatal sectors, together with labour and civil society, to jointly determine a strategy for the sustainable growth and development of the provincial economy. The overall objective of improved access to information and services, enhanced opportunities for communication, and business opportunities for all beneficiary groups through an efficient and effective use of ICT in the Northern Cape Province, is linked to the broader framework of the social, economic and technological development of the Northern Cape Province.

The Northern Cape Provincial Government has developed its own ICT strategy, looking at its own systems and capacities, and developing strategies to address its own shortcomings. There is currently no sector-specific strategy that encompasses all provincial stakeholders, but recent advances in ICT provide an opportunity for growth and development on a number of levels. Firstly, from a narrow communications perspective, ICT enhances the efficiency of doing business in an increasingly competitive global economy. Secondly, from a broader industry perspective, ICT offers opportunity for growth and development through the promotion of businesses that provide ICT goods and services.



A typical rural school in the Northern Cape, South Africa. Information society strategy emphasizes knowledge as a driver for development

Photo: Jyrki Pulkkinen

But at the same time, equal access to ICT is not enjoyed by all, and the divide between rich and poor is widening. Lack of access to ICT can constrain growth and productivity, with a potentially negative impact on the development of individuals and regions. Steps must therefore be taken to avoid this outcome.

The NCPGDS will provide the province with a sustainable and human-centred Information Society that serves its stakeholders and partners. Special attention will be paid to the development of economic opportunities for SMMEs, and to raising people's awareness, motivation, access, capabilities and support so they can benefit fully from the opportunities provided by the Information Society:

- Awareness — the knowledge of people and SMMEs concerning the possibilities offered by Information Society services
- Motivation — the motivation of people and SMMEs to use Information Society services. These services should ease people's everyday lives, and they must be easy to use
- Access — the accessibility of terminals and networks to people and SMMEs
- Capabilities — the skills and competence of people and SMMEs to fully utilize the available Information Society services and information. The availability of Information Society-related services, both to people and SMMEs, forms part of the Information Society's capabilities
- Support — refers to the sustainability of Information Society-related support measures, both for people and SMMEs.

**Innovation framework programme**

Since September 2004, the Embassy of Finland in Pretoria has been discussing the establishment of a programme within the South African DST to support the development of South African national and provincial innovation systems. The initiative, focused on cooperation in the field, dates back to reciprocal visits between the two countries between 2001 and 2002 which resulted in a partnership between the DST and the Embassy of Finland to develop a framework for cooperation in national and regional

innovation systems, focused on the three pilot provinces of Gauteng, the Western Cape and the Eastern Cape.

The programme conforms to the Finnish guidelines for development of Information Society for 2005, which emphasize the creation of preconditions for the development of an information economy in partner countries, especially those that are in transition. Based on Finland's own experiences relating to the Information Society and economic policy, it is crucial that, by upgrading local innovative activities, legislation and economic policy, cooperation on development ensures economic growth and its more balanced distribution, especially for the benefit of the poorest parts of the population. Of equal importance is the attempt to secure the establishment of a nationally significant entrepreneurial sector in developing countries. This will generate local employment and encourage content production based on national languages and cultures. In its regional and country-specific development activities, Finland gives priority to the coherent development of such regional or national strategies, particularly concerning strategies for the reduction of poverty and the development of an Information Society, and relevant regulatory frameworks.

Mainstreaming ICT into different sectors of society in order to attain the development goals could fail without the creation of more general preconditions for both global and regional sustainable development. The preconditions for establishing a sustainable Information Society must, therefore, be developed comprehensively in the partner countries. This calls for an extensive skills and knowledge base among citizens, legislation, strategies, appropriate infrastructure, and supporting information economy instruments. The guidelines for the Finnish development policy provide a framework for the development of a sustainable Information Society, which can also be seen as laying the groundwork for national innovation systems.

**Sharing knowledge and know-how**

Finland is known for its high technology, but also for its skills and expertise, education, and state-of-the-art research and innovation systems. These factors, which are essentially related to knowledge and know-how, can have a major effect on economic, social and cultural development. In Finland, Information Society policy has pooled technology, know-how and innovation into a coordinated entity, giving Finnish public and private institutions a good starting point to act as a partner in comparable strategic projects in South Africa.

South Africa has great potential for innovation and business development, with key strategic-level and basic educational and research and development structures in place as well as a mature national innovation policy framework. But with the exception of a few initiatives such as Blue IQ in Gauteng and the Cape Information Technology Initiative in the Western Cape, integrated management mechanisms to support innovation at the national and provincial levels are not yet sufficiently developed. Presently the critical innovation actors (higher education, public, research and technology organizations, industry and government) have failed to optimally converge around the broad objectives of innovation-based growth and development.

Whereas South Africa is only beginning to grapple with the challenges associated with establishing a national system for innovation, Finland has achieved highly acclaimed success in terms of regional innovation and development. Finland obviated the main impediments of its innovation system by broadening and deepening the national innovation policy discourse and providing concessions and incentives to support, for example, the following actions, which are also of interest for South Africa:

- Innovation management activities based on regional strengths
- Development of cluster-based programmes in key core competence sectors
- Strengthening of the Centres of Expertise Programme
- Development of regional innovation programmes
- Target-based research and development activities to promote local and foreign companies
- Increased and more effective utilization of foreign technology
- Well-defined spin-off and start-up processes with financial and commercialization tools.

Finnish experience shows that unless interventions are coordinated, with the government playing a proactive role, opportunities to leverage the national innovation system are piece meal and constrained.

Closer regional cooperation, coordination and integration within South Africa at all levels of political and socioeconomic life is a strategic national priority. South Africa, therefore, participates actively in all the forums, including those related to science and technology, of the SADC, a regional organization whose members comprise South Africa and thirteen other Southern African countries. The objectives of the New Partnership for Africa's Development (NEPAD), a Pan-African initiative aimed at accelerating Africa's growth and development, also serves to inform the strategic policy objectives of both South Africa and the other SADC member states. Both the NEPAD and SADC programmes recognize the important role played by science and technology as instruments for growth and development.

The strengthening of national innovation systems in African countries and their regional and continental integration are, therefore, key objectives for both NEPAD and SADC. South Africa and Finland agree that strengthening regional cooperation in Southern Africa. The Finland-South African Cooperation Framework on Innovation Systems also shows rich potential for finding applications in other Southern African countries. In light of this goal, opportunities for appropriate expansion of the cooperation framework to include other Southern African countries will also be explored during implementation of the framework.

**Building sustainable institutional links**

Both Finland and South Africa agree that the strengthening links between institutions, corporations and civil society organizations is a key element to sustainable collaboration in the future. These partnerships should be based on mutual interests, and should benefit all participants. In this spirit, Finland has encouraged the creation of partnerships by providing special seed funding for the startup and planning of joint projects. The science and technology sector was identified as an area where this type of partnership could flourish, and within the development of information technology envelope, the development of Information Society was specified as a target area. Since 2004, several fruitful partnerships have been established between the institutions of the two countries. Bearing in mind the multinational nature of science and technology collaboration, the partnerships have been opened to other countries as well, even if they do not necessarily benefit from the Finnish funding associated with South Africa and some of its neighbouring countries.

# Fostering digital inclusion

*Appui au Désenclavement Numérique*

THE MOST ESSENTIAL element in addressing the digital divide is the job of democratizing access to information and communication technologies (ICT). Developing countries are still in considerable need of widespread access to these technologies. Indeed, in some remote areas there is no access to ICT at all. The task of ensuring an evenly distributed access to ICT among developed and less developed countries demands both the deployment of infrastructures and the promotion of access patterns that fit into the local environment.

The French Department of Foreign Affairs (Directorate-General for International Cooperation and Development, or DGCID) is fully aware of this double imperative, and is running the *Appui au Désenclavement Numérique* (ADEN) project, funded with EUR6 million, between 2003 and 2007. The ADEN project is currently active in 13 African countries: Angola, Burkina Faso, Burundi, Cameroon, Ethiopia, Guinea, Mali, Mozambique, Nigeria, Central African Republic, Democratic Republic of the Congo, Senegal and Tanzania.

This project is structured around three objectives. First, around 60 centres of public access to the Internet will be installed and connected in remote rural and peri-urban areas. These will be managed by local organizations, in most cases associations, local authorities or educational institutions. Secondly, around 40 training sessions for network administration, financial and administrative management will be provided for the managers of these centres. The third objective is to foster the local production of software and contents and the publication of original content online. It is worth noting that currently, less than one per cent of online content is African, and that most software applications are produced in developed countries.

About 30 ADEN centres are now open. Some of them have achieved financial self-sustainability after only 12 months of activities, despite the cost of the bandwidth, which is still much too high. These centres are already extending professional opportunities to local students in computer science, who are finding work as interns and, in some cases, as employees.

All of the ADEN centres are to work together. They will share experiences with each other and will confront issues together. The list of countries included in the project emphasizes its multilingual nature: French-speaking, English-speaking and Portuguese-speaking countries are involved, and this diversity demands careful consideration. Some language-based networks can be formed in order for ADEN centres to relate to each other more easily. And in the case of Mozambique and Angola, a connection with centres of public access to the Internet in Brazil is currently being developed.

The ADEN project's website[1] and the mailing list[2] are used to facilitate the networking of ADEN centres. The DGCID is also organizing a round table at the second phase of the World Summit on the Information Society, to be held in Tunis in November 2005. The Summit will consider the issues surrounding public access to the Internet, and is an opportunity for the ADEN network to strengthen the ties between its members, to meet other actors involved in this field, and discuss its experiences with others.

In order for ADEN centres to run efficiently and in a sustainable way, the DGCID and the French company Mandriva Linux are working together to conceive and produce a package of open source software. The ADEN pack is a simple and effective software solution to enable Internet centres to organize their administrative and financial management. It will evolve according to the centres' needs, thanks to the suggestions and contributions of open source software users and developers. This illustrates the commitment of the French Department of Foreign Affairs to being involved in multi-stakeholder initiatives that associate civil society (in the management of ADEN centres) with the private sector (in the production of a needs-tailored management tool). The pack is available in French, English and Portuguese. It is supported by a rich documentation available in all three languages, which facilitates the understanding and management of all steps in the installation and maintenance of networks for ADEN centres.

In order to improve knowledge about how well points of public access to the Internet are performing their everyday activities, the French Department of Foreign Affairs is also supporting the Venezuela-based NGO Columbbus: it has conceived an open source software pack enabling the tracking and evaluation of these activities. This pack can be installed in any structure offering public access to the Internet, which in turn can attract investment.[3]

A further partnership is coming into being between ADEN and the Digital Solidarity Fund (DSF). The DSF is an African initiative that has been proposed by the President of Senegal, Abdoulaye Wade, and has been welcomed within the WSIS as an innovative financial mechanism to reduce the digital divide. This fund associates local authorities, nation states, private firms and non-governmental organizations in an original pattern, in order to fund the democratization of access to ICTs in areas where the private sector cannot operate alone. The DSF has been endorsed by the 60th session of the United Nations General Assembly in the World Millennium Summit outcome document (A/60/L.1).

France is a founding member of the DSF. The fund focuses on community-based projects so as to foster the appropriation of ICTs in places where the market does not have incentives to intervene. It is based on an innovative financial mechanism: the voluntary commitment of vendors to a one per cent contribution on public ICT procurement contracts, paid by the vendor on his profit margin, in all ICT public calls for bids.

# Enabling a national ICT transformation

*ictQATAR*

B Y ROYAL DECREE in 2004, Qatar's Supreme Council of ICT (ictQATAR) was formed with a clear and authoritative mandate as both a regulator and an enabler of Qatar's ICT sector. In May 2005, His Highness and Heir Apparent of Qatar Sheikh Tamim Bin Hamad Al-Thani unveiled ictQATAR's vision and mission with the further directive "to create an advanced information-based society that will improve the life of everyone in Qatar and will enhance the social and economic development of the country." As such, its main responsibilities include drafting telecommunications-related legislation and regulations as well as defining, maintaining and prosecuting a national ICT vision, strategy and masterplan aimed at enabling the socioeconomic development of the nation.

Since its formation, ictQATAR has diligently pursued the development of a national ICT strategic plan tailored specifically to the unique circumstances and requirements of Qatar and based on relevant international best practices. The approach used is provided in Figure 1.

This process led to the development of ictQATAR's strategy, summarized below, which has come to be known by the acronym FIRST:
*Foster the Environment* — Develop the market conditions, infrastructure and supporting legal and regulatory framework that are most conducive to ICT development
*Increase Readiness* — Build awareness and reduce barriers to the use of ICT by citizens, businesses and government agencies
*Raise Usage* — Increase Internet usage among citizens, businesses and government agencies through targeted government policies to provide incentives and support the development of compelling content

*Sustain Impact* — Continuously gauge progress, measure impact, and refine initiatives accordingly
*Target Early Results* — Prioritize initiatives and secure quick wins to sustain momentum and support.

## Twelve development programmes

In order to realize this strategy, ictQATAR devised twelve ICT development programmes, seven of them cross-sectoral and five of them sector-specific, which in total encompass nearly 170 initiatives. ictQATAR will continue to partner with the different stakeholders in Qatar (including other government agencies, ministries and the private sector) to implement these twelve programmes:

1) *State-of-the-art infrastructure*: Initiatives include broadband for all, wireless neighbourhoods, and a National Data Centre to support the transformation of Qatar into a knowledge based society and the growth of its business as a leader in IT services

2) *Innovation and capability building*: Initiatives to address ICT literacy, educational programmes, stimulation of the ICT job market, development of ICT ventures, fostering of ICT research and development, and inducing foreign ICT enterprises to open development centres in Qatar.

3) *Regulatory and legal framework*: Initiatives include the drafting of regulations to govern a competitive market while ensuring universal access. Other initiatives address the development of cyber-laws and e-commerce regulations to address privacy, cyber-crime, security of transactions, etc.

4) *Safety and security*: Initiatives include the creation and implementation of a Computer Emergency Response Team (CERT)

**Figure 1: Approach to develop the ICT strategy and masterplan**
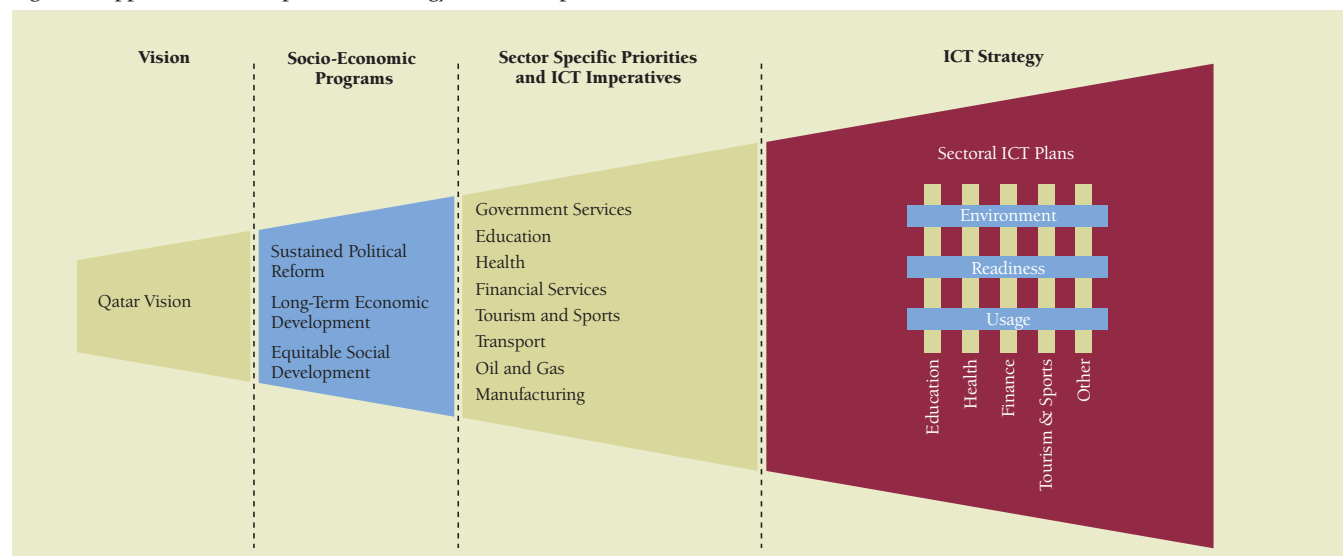
with a mission to make Qatar a regional IT security hub. Another initiative is to promote and support the capabilities of emergency communications during disaster recovery operations.

5) *Connected citizens*: Includes initiatives to promote attractive online services and content, reduce barriers to use and increase the number of homes with PCs and Internet access.

6) *Connected business*: Includes initiatives encouraging small- and medium-sized businesses to invest in information systems, software and Internet access, and to promote the use of ICT to make business processes more efficient.

7) *Connected government*: Includes initiatives to supply information and services online, and to deploy a government-wide intranet.

8) *e-Education*: Includes initiatives to expand the ICT infrastructure of schools, increase the ICT literacy of staff, build knowledge communities, develop laws and policies for ICT use and exploit the full potential of ICT as an educational tool.

9) *e-Health*: Includes initiatives such as the Electronic Health Card and Electronic Patient Network, and the Integrated Healthcare Network linking all healthcare institutions

10) *e-Finance*: Includes initiatives addressing the security of financial transactions, diversification of delivery channels for financial services, and electronic billing and payment.

11) *e-Tourism and sports*: Includes initiatives to deploy broadband Internet in hotels, conference centres and public areas, make best-in-class mobile and wireless broadband infrastructure available in sports facilities, and develop such services and infrastructure as high speed streaming video and hosting sites in Qatar.

12) *ICT in other economic sectors*: Includes initiatives to promote the use of ICT in industries such as Oil and Gas, and to promote adoption of e-Procurement to streamline the supply chain.

With the national ICT strategy and masterplan complete, ictQATAR has begun the implementation effort on five critical initiatives from within these development programmes:

**Telecommunications and e-commerce Legislation** — ictQATAR has appointed a renowned international law firm to draft the telecommunications and e-commerce legal and regulatory frameworks. Progress is well underway on a number of related fronts:

Figure 2: Approach to developing the e-Government strategy and masterplan



- Drafting amendments to the existing ICT Act, new primary legislation, or new secondary legislation as appropriate
- Drafting appropriate secondary legislation (bylaws, regulations, rules of procedure) as necessary to further implement the telecommunications regulatory framework, addressing principles and procedures including licensing, pricing, penalties and privacy protection
- Developing an e-legislation framework to address everything from censorship to electronic transactions and from digital signatures to encryption and piracy.

**Q-CERT** — The Qatar Computer Emergency Response Team (Q-CERT) is a joint venture under discussion between ictQATAR and world-renowned cyber-security group CERT/CC from Carnegie Melon University in the US. Q-CERT will aid the international Internet community by building cyber-security expertise in the State of Qatar and the Gulf Region. Q-CERT also will work with public and private institutions as well as the general public to provide proactive and guided approaches to managing ICT security.

Cyber-security workshops conducted so far have focused on raising the awareness of cyber-security issues across the IT community in Qatar and the need to establish a lead national incident response and cyber-security centre to deal with increased cyber-security risks.

**National e-Government strategy** — ictQATAR is making good progress in developing a national e-Government strategy and masterplan. The effort is being driven through five core imperatives:

- Baseline the structure of the current e-Government programme to compare against relevant international best practices
- Assess the current e-Government strategy against relevant international best practices
- Redevelop a national e-Government strategy and masterplan in line with relevant international best practices, to leverage as much as possible from what is currently available or underway in Qatar
- Develop a migration plan to move the current e-Government programme under the auspices of ictQATAR
- Prepare the programme management environment necessary for effective and efficient implementation and begin to prosecute the strategy and masterplan.

Driving the e-Government strategy development framework will result in both a governing masterplan and prioritized, agency-specific e-services. The approach used is illustrated in Figure 2.

**e-Education**: The School Knowledge Net, which aims to establish building blocks for implementing a Qatari education portal, is being piloted by ictQATAR and the Supreme Education Council in seven independent schools. ictQATAR will also pilot the use of Tablet PCs in schools to enhance the students' learning experience and creativity. Tablet PCs will leverage an end-to-end solution integrated with the School Knowledge Net portal.

In addition, ictQATAR will work with the Ministry of Education to upgrade the existing network infrastructure and computer labs in order to support the changes in the ICT teaching curriculum.

**e-Procurement**: In line with international trends and best practices, ictQATAR is working with Qatar's Central Tendering Committee to help establish a world class e-Procurement capability. Like many projects, this is an evolutional process towards the end goal. In Qatar's case, this evolution will begin with a pervasive e-tendering system becoming operational.
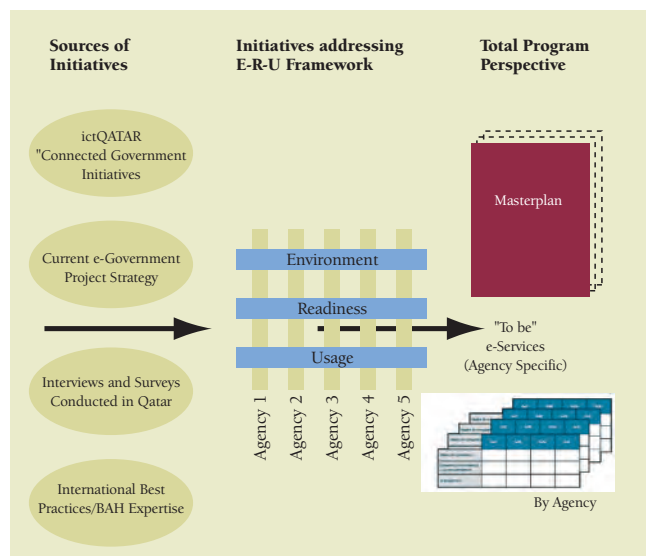
# Ubiquitous Network Society Charter

*Japanese Ministry of Internal Affairs and Communications*

Japan is confronted with a number of major social problems that must be addressed by 2010. These include the declining birthrate, the aging population and a downturn in the general level of public safety and security. It is hoped that information and communication technology (ICT), which is rapidly establishing itself as a core infrastructure of modern society, can be used to develop genuine solutions to these pressing problems.

To this end, the Ministry of Internal Affairs and Communications has developed a policy package describing ubiquitous networking and how it will be implemented. The policy package is presented in the form of a report along with other elements, which is based on the deployment of ubiquitous networking in society by 2010.

The report posits two main objectives for ubiquitous networking – freedom and diversity of information access, and the safety and security of information access. It considers the development of a new social infrastructure to support these aims.

Ubiquitous networking is designed to provide all citizens with instant, ready access to networks, at any time and from any location. Ubiquitous networking will generate a whole range of new goods and services and deliver greater convenience for all. At the same time, ubiquitous networking also gives rise to a host of concerns and potential damages in connection with the usage of ICT that will need to be addressed and satisfactorily resolved.

As part of the effort to create an appropriate ICT environment, the Ministry has produced a set of guidelines for dealing with a range of issues associated with the development and utilization of ubiquitous networking throughout society, known as the Ubiquitous Network Society Charter.

The Ubiquitous Network Society Charter represents the basis for the formulation of ubiquitous networking policy by the Ministry of Internal Affairs and Communications.

Since the 1990s, ICT has been rapidly growing and is becoming the motivating force for creating the future society that we all dream of. The influence of ICT on society, economy, lifestyle and culture is clear for all to see as it promotes economic growth in a wide variety of countries. This is encouraging the efficiency of social systems and talented individuals and corporations to blossom.

As we move into the 21st Century, we have seen the potential for ICT to grow and an increase in value and application from a variety of digital networks such as the Internet, mobile networks and digital broadcasting, to various digital devices such as information appliances, electronic tags and sensors. By focusing on users and making progress, the flow of the information revolution has made it possible to realize the "ubiquitous network society" which is the next-generation ICT society that should be here by 2010.

The ubiquitous network society will enable simple connections by wireline or wireless, at "anytime, anywhere, anything, anyone" to the information communications network (hereafter known as "network"). Through the use of devices and services without complicated operations and the transmission and use of various kinds of data, it is possible to share all the knowledge and information collected by mankind and give birth to new systems of value. In other words, a society where everyone can live in a convenient and happy way will be possible. The wide range of issues that face us in the 21st Century such as aging and environmental problems will be forgotten through the realization of the ubiquitous society. It will be possible to bring about a lively society with rich lifestyles in the spiritual and physical sense, and peaceful activities based on peace in society and the environment. This will also contribute to individual respect and empowerment.

In the ubiquitous society where all people are connected to the network, it will be possible to exchange information going beyond the boundaries of time and distance, making a society with smooth communication. As a result, it is necessary to secure the safe distribution of information under a highly reliable environment, with emphasis on the distribution of various types of information based on free opinions. Harmony on both sides is essential to the sound development of a new society. While all people should fairly receive the rights and benefits of the ubiquitous network society, it is necessary to form a social structure where these roles and responsibilities are fully understood and recognized.

This charter, based on the above concept, is aimed at all people and aims to draw up the basic rules and shared understanding of how to use the latent powers of ICT as a valid stage for realizing the ubiquitous network society. We are sure that the execution of the policies and actions corresponding to this charter, through the construction of a shared, cooperative system for regional society and international society and an effective link between related parties, holds the key to the sound development of the global ubiquitous network society.

## Chapter 1. Free distribution of a variety of information

*Article 1 — Rights concerning the sending and receiving of information*
The ability of all people to freely and easily access the network anytime, anywhere and obtain and share information and knowledge is the key element of the ubiquitous network society.

Everybody accessing the network should be able to share published information and knowledge, and be able to use these freely in principle.

Provided it is not against the public interest, we should ensure that all people can freely and easily connect to the network to transmit and express themselves via information.

In order for all people to be able to access the network regardless of geographical requirements, it is necessary to strive to eliminate the geographical digital divide (information differences).

*Article 2 — Diversity of information content*

Social and cultural diversity is an asset common to mankind, and it is necessary to respect unique cultures, traditions and languages in content distributed on the network.

By ensuring the most mutually interoperable access method as possible, independent of media, format or devices, it is vital to consider all people including users in the old-fashioned or low speed connection environments when promoting creative activities in wide-ranging content.

It is also vital to promote an environment in which it is possible to store and freely use superior software in terms of convenience in both high quality and high volume.

Governments and regional administrative institutions, working towards the realization of the ubiquitous network society in regard to the information they own, should take the lead in publicizing and raising transparency of such information.

*Article 3 — Information in the economic society*

It is vital to bring out as much as possible, the possibilities of ICT and through the promotion of its use in a wide range of areas, and plan for increased efficiency of existing systems and create new companies and services.

We should promote a wide range of information in economic and social activities in harmony with the establishment and use of ICT foundations. In addition, we should establish a sound, ordered environment in which it will be possible to conduct e-commerce trades with as much freedom as actual trades.

It is important to promote information in public fields, such as administrative services, education, medicine and law and complement this by using information by private enterprise as a tow.

As a foundation for realizing the ubiquitous network society, we should place attention on the convenience of the users and through interconnection with different networks and devices, establish an easy-to-use environment.

*Article 4 — Ability to use information*

In order for all people to be able to receive the benefits brought about by ICT, it is necessary to secure opportunities to improve the ability to efficiently use and to effectively take and select ICT information, so that the required technical skills, knowledge and manners can be learned.

It is necessary to strive to nurture experts in the fields related to the ICT fields and improve and promote the knowledge, skill and quality to develop the ubiquitous network society.

In order to encourage everyone including the elderly and the handicapped to participate in society in a lively way, we should strive to secure information accessibility for developing and providing devices and services, and receive the required support for responding to all individual needs. Furthermore, we should strive to improve safe and ideal operability in order for devices and services to be used easily without requiring advanced knowledge and operation with regard to ICT.

In regard to the transmission of information to general users, we should strive to avoid using difficult to understand specialist

vocabulary and foreign words, and use easy-to-understand words and expressions.

## Chapter 2. Safe and reliable information distribution
*Article 5 — Privacy*
For people to avoid unknowingly connecting to the network and to prevent spreading unwanted information and knowledge is an important element in the ubiquitous network society.

In order for people to connect to the network in a reliable way, it is necessary for individual information to be protected to a greater extent, such as preventing the leaking of information related to personal attributes, usage history and illegal usage.

In order to harmonize between the secrecy of communications and freedom of expression, it is necessary to avoid the transmission of information that invades the rights of portrait and privacy to a large number of people and be able to deal with these cases in a swift manner.

In regard to the installation and use of devices that collect personal information, such as photographic images and sound recordings, it is necessary to pay attention to their legitimacy and operate in a fair and careful manner, such as providing notification and displaying information on the existence of devices.

*Article 6 — Information security*
In the ubiquitous network society, in which all things mutually connect and there are strong wave effects, we must strive to build and maintain a safe and robust network against cyber-terrorism and large-scale emergencies.

It is necessary to impress on all people using the network the need to correctly perceive the influence that one's own usage can have on society, the need to strive to use the network correctly, taking action against computer viruses and to prevent escalation of damage.

It is necessary to promote the development of safe information distribution, such as digital authentication, digital signatures, encryption and other security technology and establish a structure where safety can be simply maintained without advanced security knowledge.

*Article 7 — Intellectual property*
With the development of digitalization and the network becoming more and more simple to use, the drastic reduction in the costs of reproduction and distributing information mean that anyone can obtain content easily. On the other hand however, the potential for violating the rights of the owner are greatly increased. In order to encourage the sound development of the ubiquitous society, it is necessary to both plan for the convenience of the user and establish a framework for respecting ownership rights.

Through the technical management of content reproduction and distribution as the rights of the owner are respected, it is necessary to promote the development and spread of technology for both securing convenience for the user and stoking the enthusiasm of the creator, while at the same time carefully consider the treatment of technology that causes ownership rights to be invaded.

*Article 8 — Information morality*
All people should strive to establish information ethics in order to prevent obstacles towards the sound development of young people such as discrimination, crime, violence and child abuse and work towards the development of appropriate social norms to contribute to the strengthening of public welfare and social unity.

In addition to refraining from inappropriate use of the network such as the transmission of illegal and harmful content likely to cause defamation of character, we must strive to avoid the interception of illegal and harmful content transmitted by a third party and aiding the spread of inappropriate use of the network.

Technicians in ICT fields should be conscious that the technology in which they deal has great potential for influencing the safety of people and society, and should follow their consciences when conducting research and development by working to secure the safety and reliability of technology. If while conducting research and development issues that impact on social safety arise, in principle they should make public the facts related to this straight away.

Content creators must also be aware of the great impact of the content they distribute on the network has on society, and follow their conscience when creating content, to secure the safety and reliability of it.

## Chapter 3. Constructing new social foundations
*Article 9 — Harmony between actual society and cyber society*
In order to avoid hindering the construction of a legal system for social information, it is necessary to strive to establish a flexible system that places emphasis on everyone being able to use in a safe and secure way. Based on the awareness that despite the ubiquitous network society being different from both the actual society and the cyber society it has strong ties with both. Therefore it is necessary to create harmony between actual society and the cyber society, in order to establish an environment in which the maximum benefits from the cyber society can be received.

With the emergence of new technologies and services, people should strive for the smooth realization of a new code based on social conformity with manners and rules related to the use of ICT as required, which was not possible to adapt to under the previous framework.

By embedding mechanisms to alleviate the burden within the social system and encouraging recycling and energy conservation, it is important to keep to a minimum any undesirable influences on the environment and human body and strive to realize a sustainable society.

Policy objectives and period in which to realize them should be clarified and in addition to overall optimization from a general viewpoint, we should review policy flexibility through objective feedback.

*Article 10 — Regional and international harmonious and cooperative systems*
Through the use of ICT, a diverse range of bodies across private enterprise, industry, academia, government, heads of government, local government, industry, universities, civilian society and NPOs can contribute to the policy proposal process, and through the building of cooperative structures from a wide range of angles, we should place an emphasis on tackling issues.

It is important to clarify the objectives and time frames for realizing policies, and in addition to total optimization through a comprehensive viewpoint, secure flexible reviews of policies through the feedback of objective evaluations.

The ubiquitous network society has an essentially global nature that requires effective cooperation from the international society. It is desirable for all people throughout the world to be able to access the network, and by receiving the benefits of realizing the ubiquitous network society, work to increase mutual understanding within their own country and adopt a linked approach throughout the world based on this charter.

# Bridging the digital divide: the experience of Grameen Bank in Bangladesh

*Muhammad Yunus, Grameen Bank, Bangladesh*

OVER THE PAST three decades, Grameen Bank has been able to demonstrate that the provision of microcredit — small, collateral-free loans to the poorest of the poor — is a powerful intervention for the reduction of poverty. Grameen Bank has provided USD5 billion to more than five million borrowers, 96 per cent of whom are women. Currently, Grameen Bank lends out half a billion US dollars a year in loans averaging USD120. Its repayment rate is 99 per cent. The bank is financially self-reliant, and does not take any loans or grants from any source. All its funds come from the deposits it collects from borrowers and non-borrowers, and it routinely makes a profit. Grameen Bank's experience has shown that poor people, who have been systematically excluded in the past by conventional banks, are creditworthy, and in most cases, more creditworthy than the rich.

## ICT and globalization

Information and communications technology (ICT) is changing the way people do business globally. It has created a world where communication is instantaneous and cheap. At the same time, ICT is strengthening the processes of globalization. ICT and globaliza-

tion offer great social and economic opportunities for the developing countries, by enlarging market place and creating greater access. But these opportunities will not be realized if left to market forces alone. In order for the poor to ride the waves of globalization, there has to be a sustained effort to equip developing countries, and particularly the poor within those countries, with ICT.

## Microcredit, ICT and the poor

There are some who believe that ICT is irrelevant for the poor. It is thought to be too expensive, and too complicated for the poor to use. The poor need food before anything else — they say. But technology works in all directions. If ICT can be used by the poor to generate income, why not go for ICT for the poor? Look at health. We can use ICT to bring health to poor people. Whether you want to deliver microcredit, or education, or health, ICT has a powerful role to play.

Microcredit and ICT have a great synergy. Whether or not a poor person can afford ICT does not depend on how much he or she already has, it depends on whether financial institutions are available to finance the project. Microcredit can provide such an



Photo: Sanjay Acharya/MAP

Photo: Sanjay Acharya/MAP

appropriate institutional environment. ICT and microcredit both empower individuals, which makes them mutually reinforcing. The experience of the Grameen Village Phone programme is a good example of this synergy between ICT and microcredit.

**The Grameen Village Phone programme**

The Grameen Village Phone programme involves Grameen Bank financing borrowers to get a mobile phone in order to become a "telephone lady". That is, to become a mobile phone operator in the village and provide telephone services to the villagers. The typical loan size is Tk15,000 or USD250. With Grameen Bank's financing, there are now 150,000 telephone ladies in almost all the villages of Bangladesh, who offer telecommunications services where they never existed before. Many of these phones are powered by solar power since grid electricity has not yet reached these villages. While telephone ladies do make impressive profit from their businesses, the isolated villages of Bangladesh have suddenly become connected to the rest of the world.

Telephone ladies are also generating good revenue for Grameen Phone, the largest telephone company in the country. Telephone ladies use 16 per cent of Grameen Phone's total airtime, but they represent only four per cent of the total number of the company's telephone subscribers. A telephone lady earns a net profit of over USD100 per month after paying all her bills and loan instalments, which amounts to three times the per capita gross national product (GNP) of Bangladesh. As her business grows, she earns larger amounts. Grameen has even begun to give mobile phones to beggars in Bangladesh, proving that even the poorest person can benefit from microcredit as well as technology.

Parveen Begum is a telephone lady of the village of Chakalgram, Savar. She sees the benefits of technology this way: "The mobile phone is like a cow, which I can 'milk' as many times as I want. All I need to do is to keep its battery charged. It does not need to be fed or cleaned. It has now connected our village with the world."

**Impacts of Grameen Village Phone**

The presence of telephones in villages has meant saving money for members of the community, who no longer have to travel long distances to carry messages or to collect market information. It has helped overcome the isolation and lack of information in rural areas. A farmer who previously had to make a trip to the city to find out the market price of produce or to hire transport can now stay at home and do all that simply with a phone call.

Phones are also used to keep in touch with family members living in cities and overseas. Details about remittances from other areas and overseas are transmitted in a direct and cost-effective way. We are waiting to see when these telephone ladies will transform into Internet ladies, selling Internet services through their cell phones.

**International Centre for ICT**

ICT needs to be designed in such a way that a poor person feels comfortable using it, and can begin using a device without feeling threatened.

The ultimate design of an ICT device should be like an Aladdin's Lamp in the hand of a poor woman. As she rubs the lamp, a digital genie comes out of it and asks: "What can I do for you, ma'am?" She commands the genie to get the information or support she needs, which would enable her to use her creativity to take care of her life.

I have been advocating the creation of an 'International Centre for Information Technology to End Global Poverty', to build a platform where all the ingenuity of creative people can be brought together to find ways to bring ICT into the service of the poor. The Centre could comprise a network of ICT companies, their staff, research and academic institutions, social activist groups, entrepreneurs, social business entrepreneurs, investors, microcredit institutions, development agencies, health and educational institutions, individuals, and just about anyone who has any interest in bringing ICT to help create a poverty-free world.

Whatever ICT exists today, with all its glories, it is still in its infancy. But we must make absolutely sure of what it should grow up to be. If we think of it as a digital genie, it is not yet out of the bottle. But soon it will be. Under whose command will this genie be? The Centre that I am proposing will work to ensure that the poor get an equal share of the command.

# Malaysia bridges the digital divide

*Mohamed Sharil Tarmizi, Malaysian Communications and Multimedia Commission*

"MALAYSIA TRULY ASIA" is a catchphrase one may often hear on television, extolling the exotic tourist destinations in Malaysia with crystal clear waters and white sandy beaches. Malaysia is also home to one of the oldest rainforests in the world and many species of flora and fauna not found anywhere else on earth, not to mention the tallest twin tower building in the world, the Petronas Towers.

Malaysia, a country of approximately 26 million people, is in many ways a microcosm of Asia, with multiple races, people of various religions and cultures living harmoniously together, and contributing towards nation building.

What is less known, or perhaps taken for granted, is the country's commitment to investing in the information and communications technology (ICT) field as the next growth area, moving away from traditional manufacturing to a knowledge-based economy. This investment in ICT is multistakeholder in nature with the government, the private sector, and the users and community groups each playing their own part in a cooperative and collaborative manner.

Malaysia has continued to invest in ICT since the creation, several years ago, of Vision 2020 and the National Information Technology Agenda (NITA), a national long term vision to bring Malaysia to the status of a developed country through ICT use. The country has created its own ICT buzz word — its use of the term 'multimedia'. For example, the communications and multi-media industry regulator is the Malaysian Communications and Multimedia Commission (MCMC), the Multimedia Super Corridor (MSC) is Malaysia's own version of Silicon Valley with the government-owned Multimedia Development Corporation (MDC) being charged with the responsibility of stewardship over the MSC and the Multimedia University, one of the country's foremost tertiary institutions focusing on ICT.

Malaysia was also the first country in the world to create a regulatory framework to deal with convergence as part of the NITA. The agency created to deal with the converged communications and multimedia industry was the MCMC and the licensing environment and laws were also revised to be able to manage the challenges that would be brought about by convergence. A new law was introduced in 1998 to deal with the issue of convergence where telecoms, broadcasting and the Internet would be treated in a technologically neutral manner. This law is known as the Communications and Multimedia Act 1998 (CMA 1998) or the 'convergence' legislation. Malaysia decided to rise to the challenges brought about by the Information Society and take advantage of the benefits that such a society would bring.

The Internet market continues to grow in Malaysia thanks to a relatively low tariff and with the increased introduction of broadband access via wired and wireless means. A large part of this steady growth is due to rising awareness and a strong government commit-



Exterior view of the CCDP site



Interior of the CCDP site

ITU Digital Access Index (DAI), 2002

| Top 5 in developed Asia-Pacific | | | | Top 5 in developing Asia-Pacific | | | |
|---|---|---|---|---|---|---|---|
| Rank | Overall | Economy | DAI | Rank | Overall | Economy | DAI |
| 1 | 4 | Korea (Rep) | 0.82 | 1 | 46 | Malaysia | 0.57 |
| 2 | 7 | Hong Kong, China | 0.79 | 2 | 49 | Brunei Darussalam | 0.55 |
| 3 | 9 | Taiwan (China) | 0.79 | 3 | 6 | Thailand | 0.48 |
| 4 | 14 | Singapore | 0.75 | 4 | 84 | China | 0.43 |
| 5 | 15 | Japan | 0.75 | 5 | 85 | Fiji | 0.43 |

ment to ICT for Development. Dialup Internet access rose from 1.8 per 100 inhabitants in 1998 to 13.7 per 100 inhabitants in the second quarter of 2005. While this is still relatively low compared to developed countries, it marks a substantial increase and continues to grow. Broadband is largely available for very competitive prices in the cities. Outside the cities, several programmes have been put in place to help increase broadband penetration, which has grown from 0.08 per cent in 2002 to 1.35 per cent in the second quarter of 2005.

There are various initiatives to help improve access to communications and ICT. There are two main initiatives in this regard, one for the rural areas and the other for semi-urban areas. With regard to access to rural areas, there is an initiative called the Universal Service Programme (USP), which has the objective of providing access to under-served areas, that is, areas that have a fixed line telephone penetration rate of 20 per cent below the national average. The current national average stands at about 17.6 per 100 inhabitants. Priority is given to collective access to basic phone and internet services followed by individual access to basic phone and internet services, which in the future will include access to broadband services. The USP is funded collectively by contributions from the licensees in the communications and multimedia sector with licensees contributing a proportion of their revenues to a USP Fund administered by MCMC.

Under-served areas are identified by MCMC and these areas are subsequently tendered out to eligible licensees to make a proposal to provide USP services. Generally, the lower the amount of subsidy that the licensee requires with regards to USP service provisioning, the better the chances of that particular licensee of winning the tender for the area. Licensees are free to choose whichever technology they so desire provided that the proposal is cost effective and sustainable. This is in line with the technology neutrality concept practiced under the CMA 1998.

For the semi-urban areas, MCMC initiated the Community Communications Development Programme (CCDP). This programme is aimed at areas which fall between the urban areas, which are generally commercially attractive and the rural areas which are covered by the USP programme. The concept of the CCDP brings together the various stakeholders, namely government, the private sector and the user and community groups together to increase broadband penetration. It is essentially the creation of local community cybercafes or *Kedai dot Kom* (Dot Com Shops) in areas where the community congregates such as sundry shops or community centres. A large part of the effort to set up and identify suitable locations for the *Kedai dot Kom* is carried out by the local community in partnership with other stakeholders.

The programme is fully funded by the MCMC and covers the initial set up costs of communications access facilities and is intended to help narrow the digital divide that currently exists. The CCDP is intended to have a positive socio-economic impact on the community and is designed to be a platform for capacity building of current and future initiatives via community access to communications and network services and network facilities.

A main feature of the capacity building element of the CCDP is to enable communities in semi-urban areas to acquire skills, knowledge and experience through the use of communications and multimedia facilities; to connect these communities to the knowledge economy and help them acquire new skills in the use of technology; and to improve information access and opportunity for socio-economic development.

The main focus areas of the CCDP is an active community base with limited communications access and areas which have existing cottage industries or activities which can benefit from communication access.

As mentioned above, the CCDP brings together various stakeholders, namely the MCMC which provides start up funding and appoints the service provider, the State Economic Planning Unit or other relevant local government agency to coordinate information gathering of sites identified by district offices, the Village Development and Security Committee which also assists the state departments to identify suitable sites for the CCDP, the operator of the *Kedai dot Kom*, and the service provider who supplies the communications access, computers and telephones as well as enrichment programmes for the CCDP project.

The basic elements of the *Kedai dot Kom* are the availability of an initial number of five PCs with high speed internet access, two public phones. This Kedai dot Kom is operated by a local entrepreneur and owned by the local community and is supplemented with an enrichment programme which includes the creation of a community website which profiles the local community and the products that the community might be producing.

Notwithstanding the comprehensiveness of the CCDP initiative there remain several challenges, namely, the requirement to bring all stakeholders together and to conduct meetings and briefings to every state government and to get timely feedback on potential CCDP sites. Other challenges include getting committed and good entrepreneurs and the time taken to train the entrepreneurs as well as ensuring smooth roll out from the service provider.

The two programmes mentioned are but only a few of the plethora of programmes and initiatives undertaken by the government together with the private sector and user and community groups. Only time will tell as to the effectiveness of such initiatives, but based on the ITU Digital Access Index study done in 2002, it does appear that Malaysia may be on-track as regards its initiatives to bridge the digital divide.

# Women and ICT development

*Faryal Mouria Beji, Chief Executive, INBMI;*
*Professor Researcher-ENSI, Tunis University;*
*Head of Artificial Intelligence Laboratory;*
*Member of the Working Group on Internet Governance*

THE OUTGOING CENTURY has witnessed tremendous advances in the fields of information and communication technology (ICT) and artificial intelligence (AI). This technological revolution has radically reshaped our lives and has deeply affected our way of thinking, communicating, learning, accessing and treating information.

Needless to say, the broad range of intelligent tools offered by ICT and AI are opening many possibilities for a wider participation in a global exchange and sharing of accurate and constantly updated information in all domains. They are changing every aspect of human life, communications, trade manufacturing, education, services, culture, entertainment, research, national defence and global security.

Undoubtedly ICT and AI promise to play this role even more dramatically in the next millennium and to offer a better world where equal opportunities and justice prevail. Nevertheless, although most countries are trying to take profit from these tools for leapfrogging to higher stages of economic development, a major question remains at the heart of present concerns: is it a great opportunity or a greater divide, mainly when it comes to women's development and empowerment through ICT?

## Women and ICT

Until very recently, women have been rather worried about issues such as gender equality, illiteracy, health problems and poverty. Now, with the explosion of ICT and AI, those who lack skills and access to the information superhighway are even more disempowered and frustrated. Among them are women and girls, mainly those who live in remote rural areas and in low-income families. If we focus on developing countries, we can notice that the pace of women is still slow but steady: more and more of them are concerned with ICT and ready for the new challenges. Yet, we still need to ensure that women have real access to knowledge and information to bring them into the main stream of the technological world.

An action plan to involve women in a more effective way should include the development of targeted methods for taking the benefits of distributed intelligence to women. We should, also, create a women's cyber-culture where they interact and expose their analysis and reality and feed it to the global community instead of allowing themselves to be sponges or victims. Women's networks should use the worldwide web and AI techniques to create their news and views.

For those who did not have the chance to finish their studies due to social and economic constraints as well as some cultural attitudes, distance education and E-learning offer the opportunity to combine studying at home with their domestic duties. This type of education opens up new vistas for them and helps enhance their knowledge, create a positive image and self confidence and, above all, contribute to their empowerment.

## NGOs and Women's empowerment through ICT

In this respect, the Tunisian government encourages civil society and NGOs to play a crucial role in the promotion of ICT and particularly in relation to women. If we take the example of Tunisia — one of the leading developing countries in the implementation and integration of ICT in different fields — we can notice that the number of associations and organizations concerned with ICT and the empowerment of women is growing steadily. Thanks to the support of such associations by the government, we can witness the growing presence of women on the Internet and in ICT-related domains. We will take the example of Tunisie-21, an NGO which developed new ideas regarding some problems that are of concern for women.

As a Professor – Researcher at ENSI-University of Tunis, PhD Computer Science Major Artificial Intelligence and Head of the Artificial Intelligence Laboratory (LIA) and a founding member of this association, I organized several successful meetings and projects about the information technology in order to narrow the digital gap and facilitate access to information as far as women are concerned.

Some titles of these meetings and projects are:

- Challenges in the Information and Communication Society (presentations, round tables and demonstrations)
- Artificial Intelligence and Internet (conferences, round tables and demonstrations)
- Information Technology: Multimedia and Networks (conferences, round tables demonstrations: Visio-conference and internet navigation)
- The Y2K: problems and solutions (conferences, round tables and demonstrations)
- Training sessions for the members of NGOs (computer science and Internet tutorials)
- With a grant from the Japanese government, a computing centre was equipped with PCs for children at a hospital. This centre was inaugurated on 24 November 1998 corresponding to the 51st anniversary of the Human Rights Declaration. Supervisors appointed by the association provide training to the sick children at the hospital.

We believe that information technology is central to poverty reduction, which in turn is central to the empowerment of women. Indeed, ICT and AI applications can improve governance and

Preparatory school students using computers in their class

advance gender equality in North Africa, for example, provided that they are made more accessible and consciously applied towards the achievement of these objectives. With a more positive and conscious use of ICT, the impact of women on society could become stronger and their role could become more important.

We have to point out that women's expectations are great even though they are faced with some pitfalls. Awareness raising is important because some North African intellectuals and policy makers question the potential of ICT and AI methods on a continent where many people can neither read nor write, and consequently wary of the possible harmful effects.

**Policy recommendations: specific recommendations regarding women and girls**

*General recommendations:*
- All initiatives to address access empowerment and governance should be planned, implemented, monitored and evaluated with a gender perspective
- The Global Knowledge Partnership should actively seek out and facilitate the inclusion of women's organizations and networks in the partnership, and promote greater representation of women in existing partners
- Targets, indicators and benchmarks are needed to support learning and assessment of progress on women and girls' access to the benefits of ICT and AI methods
- There is much to be learned from the good practices and lessons learned about the innovative ways that women and girls are using ICT. These should be identified and promoted for widespread use
- The public sector should create an enabling environment in which market competition, private initiatives or NGO cooperatives cater to the needs of women.

*Recommended actions related to empowerment:*
- Capacity building to ensure gender equality and empowerment; in particular ICT and AI should be integrated in the national education curriculum
- Promotion of positive images of women using ICTs and AI methods by developing capacities so that content on ICTs and AI methods can be generated by women

- Content analysis assessment from a gender perspective using computer software and Internet.

*Recommended actions related to access:*
- Mobile Internet services and kiosks should have a specific focus on women and girls and can be used to promote self-employment for women
- Development of software should be gender sensitive
- Access to and sharing of women knowledge databases should be available through ICT and AI methods.

*Recommended actions related to governance:*
- Enhancing democracy and women's participation through electronic connectivity and with skills to develop websites that offer services relevant to local and community groups
- Investment in public facilities should be encouraged and designed for easy access by women and girls.

**Towards more open societies**
The overview given above shows how technological innovation, ICT and AI methods combine to produce rapid rates of diffusion, which in turn affects society. These results are not standardized; they vary in direction and degree in different locations.

Many individuals, academic institutions, NGOs, women's organizations and developed agencies in various regions, even in North Africa (with the initiative of our Tunisie-21 NGO), have used ICT and AI methods as tools for further sustainable human development, contributed ideas on ICT and AI methods and development and addressed practice within the ICT and AI industry. However, these efforts are still at an early stage. They need to be substantially strengthened by international development organizations.

Our ultimate hope is that technological innovations lead to a worldwide trend towards more open and more cooperative societies, in a world which is both globalized and fragmented into separate communities, where the gap between those who have access to digital information and those who do not yet, is in no way fixed for all time.

# Citizens and local authorities in the knowledge age: promoting information and communication technologies for local sustainable development

*Anne Fraser, Information Services Section,*
*United Nations Human Settlements Programme*

UN-HABITAT IS THE United Nations agency for human settlements. It is mandated by the United Nations General Assembly to promote socially and environmentally sustainable towns and cities with the goal of providing adequate shelter for all. It is also the UN agency responsible for monitoring the progress in the implementation of Millennium Development Goal seven, Target 11: "Improvement in the lives of at least 100 million slum dwellers by 2020."

As our rapidly urbanizing planet turns more and more into a 'cyber-sphere', we have to ensure that everyone can breathe in it. Information and knowledge are crucial to better socio-economic development, and this is largely recognized throughout the world. It is also recognized, however, that too many people are being left behind by the computer age. This is why a number of United Nations agencies have taken the lead in making information and knowledge part of their strategy to combat poverty in developing countries.

According to UN-HABITAT research in 2001, 924 million people or 31.6 per cent of the global population lived in slums, mostly in developing countries where they accounted for 43 per cent of the urban population. That compares to six per cent in the developed world. Within developing regions, sub-Saharan Africa had 72 per cent, the largest proportion of its urban population, living in slums. In South-central Asia this figure was 58 per cent, East Asia 36.4 per cent, and in Western Asia 33.1 per cent. In Latin America and the Caribbean those living in slums constituted 31.9 per cent of the urban population, North Africa 28.2 per cent, Southeast Asia 28 per cent, and Oceania 24.1 per cent. On this side of the digital divide, the majority has no access to computers, let alone the basic education to use them.

These figures show that we live in a very unequal world, and unless we do more to lift the hopes of people in poor countries, we will compromise our own hopes of giving our children a better future, even in wealthier countries. Therefore, when we speak of poverty and connectivity, it is the world's poor themselves on whom we must focus — not technology. The technology has to be engineered to their concerns and needs. They should not be technology-driven; rather the technology must suit them.

It is with this that UN-HABITAT views information and Communication technology (ICT) as a powerful means to improve and streamline local governance, and empower citizens by involving them in the running of their cities. As hubs of communication and economic activity around the world, urban centres were the first to feel the impact of the ICT revolution. Place these benefits within reach of the urban poor, and the positive impact will be huge.

According to a report in 2004 by the United Nations Research Institute for Social Development (UNRISD), Senegal has invested heavily in ICT infrastructure in recent years — more than any other country in sub-Saharan Africa.[1] Nonetheless, the digital divide remains a reality in the developing world. In an effort to redress this situation, a Digital Solidarity Fund (DSF) proposed by President Abdoulaye Wade of Senegal was launched in March 2005 at Geneva with funding from public and private sectors.

Through their international umbrella body, United Cities and Local Governments (UCLG), local authorities recently reaffirmed their commitment to inclusive communities and neighbourhoods by using information technology as a tool for development and promoting local democracy. "Information and Communication Technologies should increase the capacity of cities and local authorities to provide universal basic services, and to increase citizen participation in local decision-making," UCLG said in a statement at its World Council at Beijing in June 2005. "In an era where information is an important human and civil right, local authorities will demand from national governments the capacity and competencies to guarantee services to their citizens, including communications infrastructure."

For successful implementation of ICT at a local level, national governments must show the political will and commitment to create the right environment for the management of information technology by building telecommunications infrastructures grounded in liberalized policies and regulations. And this has to be backed up by a modern legal infrastructure with data and copyright protection laws, computer crime legislation and defined rights on access to information. Not least, the system must also emphasize the role of computer education and literacy as a vital step towards creating 'smart communities' of people aware of their rights and the gains they can make.

It is generally agreed that ICT has an impact and enormous potential for achieving the goals of good governance in developing countries. Effective decentralization and efficient management of limited resources, through information sharing, popular participation and the development of productive part-

A young Maasai in Arusha (Tanzania) being introduced to information technology

nerships are essential tools in the fight against urban poverty. ICT has created an unprecedented opportunity for local authorities to interact with their citizens as information and knowledge sharing fosters participatory decision-making. A growing number of cities and regions in the developing world have their own websites. In Indonesia for example, half of the country's 385 municipalities are now wired[2]. However, very few provide two-way communications enabling the public to participate in or vote on local policy decisions.

In recent years however, the concept of e-government has dramatically evolved, leading to profound changes in what people expect of their governments. In 2001, the United Nations defined e-government as "utilizing the Internet and the WWW for delivering government information and services to citizens". The current Organization for Economic Co-operation and Development (OECD)[3] definition is "the use of ICTs, and particularly the Internet, as a tool to achieve better government." In fact, European countries issued the European Charter of Rights of Citizens in the Knowledge Society in July 2005, also known as the Charter of e-Rights, which was signed by European local authorities keen to promote wider Internet access. The Charter urges them to foster the idea of e-democracy through online consultations with the public on housing, healthcare services, schools, transport, urban planning, the local environment, and other areas of concern.

Greater public participation can lead to better rules, which are less likely to be challenged in court and are more likely to be accepted by the public. Unfortunately the lack of ICT infrastructure, computer literacy and political will means many developing countries are lagging behind but local governments, particularly in Asia, have demonstrated positive results by taking steps to create an enabling environment for generating and disseminating information.

UN-HABITAT's Global Campaign on Urban Governance is based on the principles of subsidiarity, justice and transparency. But the agency has found that while e-government has the potential to bring major improvements, this is by no means automatic because of government controls or interference. The campaign promotes interactive local information services complete with facilities to receive and channel complaints from the public, election and municipal administration monitoring, urban planning maps using the latest satellite technology, properly computerized property and revenue records and other urban management methods that promote transparency and accountability.

To promote such transparency, 60 countries around the world have implemented some form of freedom of information legislation, which sets rules on government secrecy. Over 40 others are working towards introducing such laws. For example, in 2000 South Africa passed the Promotion of Access to Information Act, intended to: "give effect to the Constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any rights.[4] It covers information held by private bodies, and has been widely welcomed by the public at large. It is interesting to note, however, that while Singapore has been cited as being an innovative leader in e-government, the authorities have electronic censorship filters for academics, business and the general public.[5]

Access to local authority information is often greatly limited because of poor organization and management of administrative records. An electronic record keeping system can facilitate easy access to information by the public. Moreover, record management systems can also guarantee that individual civil servants can be held accountable for their actions. This minimizes corruption.

An exemplary case study is that of Bellandur near Bangalore, India.[6] Information technology through the implementation of
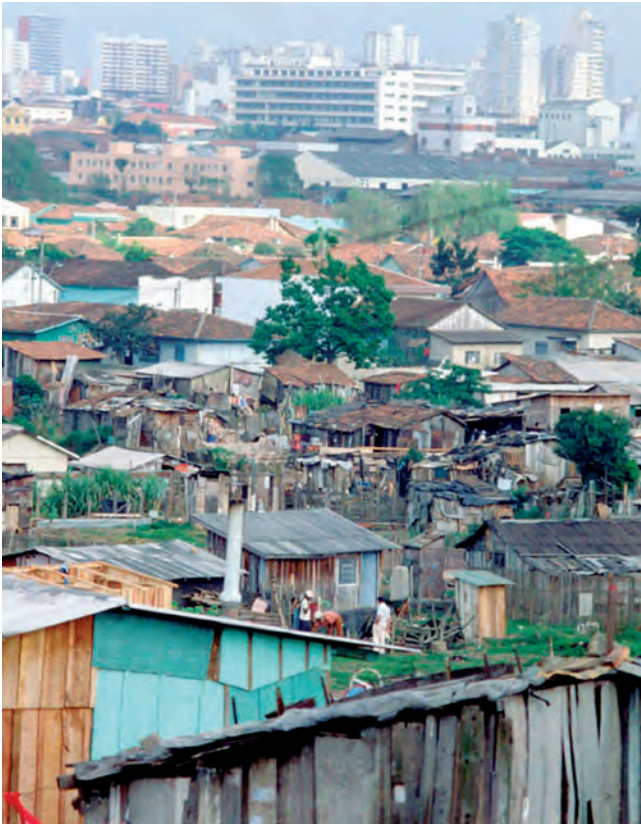
Photo of Curitiba in Brazil showing the contrast between the low-income areas with the more affluent ones
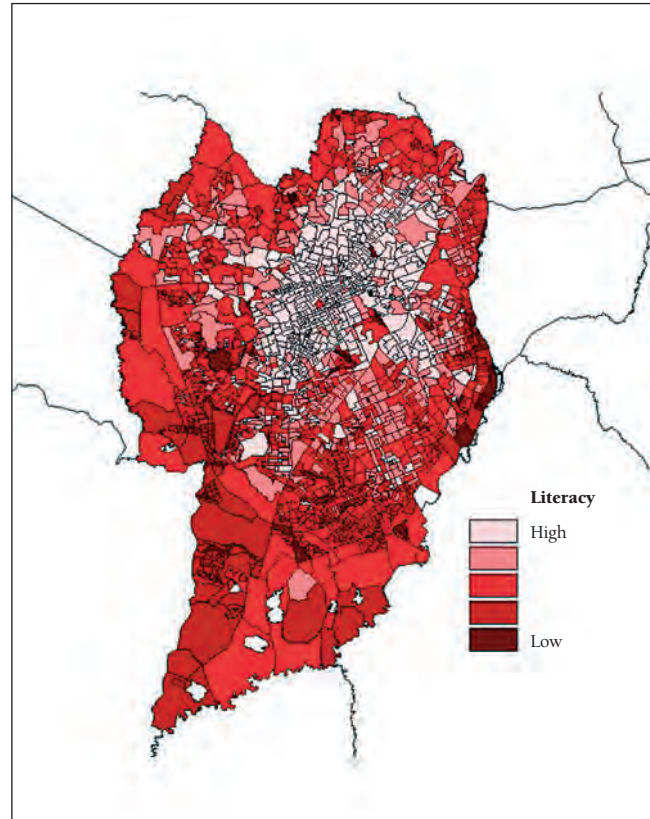


This map shows the average level of literacy per area for the city of Curitiba (Brazil). The darker zones respresent a low level of literacy.

an online public records system, featuring information on records of property details, tax collection, births and deaths has transformed the village. Its implementation has drastically reduced corruption and red tape. Bellandur is credited with being the first village-level administration to introduce e-governance in India in 2002. The computerization of public records has helped speed up tax collection and property transfers. The project has also helped recover large amounts of outstanding revenue for new community projects such as roads, underground drainage systems and wells.

In the Philippines, the city of Naga won the Dubai International Award for Best Practices. Naga's e-governance initiative is a "people-driven" programme that promotes transparency, accountability, public participation to enhance governance processes, local service delivery and the standard of living.[7] The programme uses various ICT tools such as the Internet and text messaging to deliver information to its citizens. The Naga City People's Council (NCPC) and a local federation of approximately 100 non-government and people's organizations in the city run the system. Since its inception, the initiative has sought to involve the least privileged and most vulnerable sectors of society. By promoting transparency in local city management it has brought annual savings into city coffers amounting to at least ten million pesos or USD180 000 per year. By raising awareness on performance standards, it has allowed Naga to "do more with less". With almost no budget increase, streamlined processes and adherence to cost standards have enabled Naga council to meet growing demands for services to the poor, such as a 10 per cent annual rise in the number of city hospital patients; and a 7.7 per cent increase in yearly enrolment in the public school system.[8]

Besides bringing the urban poor closer to the decision making processes that concern them most, modern technology is also crucial to good urban policy and planning — especially where it requires accurate information on the size of a city, its streets, the number of households, water connections, public transport and other important aspects of everyday city life. Indeed, many municipalities around the world simply do not have an accurate idea of where slums begin and end, or how much lighting is provided along a back street, or which roads are in need of repair.

It is here that UN-HABITAT's Urban Indicators Programme and the Global Urban Observatory (GUO) come in. The agency uses Geographic Information Systems (GIS) to show how satellite photographs taken from space can be used to tackle such problems. Using simple software, these images can give a city mayor or a town water engineer not only snapshots of the town, but a bird's eye view of a single neighbourhood or even a street. If they are doing a head count, or checking electricity supplies, a team is sent in to do a survey on the ground. This then enables those using GIS software to fill in blanks and produce a simple, highly cost-effective map of any given situation. Through the 1 000 Cities GIS Programme, UN-HABITAT in partnership with the developer of Geographical Information System (ESRI) distributes free software and training packages to municipalities around the world. Around 160 cities throughout the world have already benefited from the project.[9]

The city of Curitiba in Brazil uses GIS technology to help provide indicators so that elected city officials gain a good understanding of the complexity of urban migration, foreseeing growth trends and planning.[10]

UN-HABITAT also supports the six urban observatories run by the Third World Environment and Development Relay for Participatory Urban Development (ENDA-RUP) in the French-
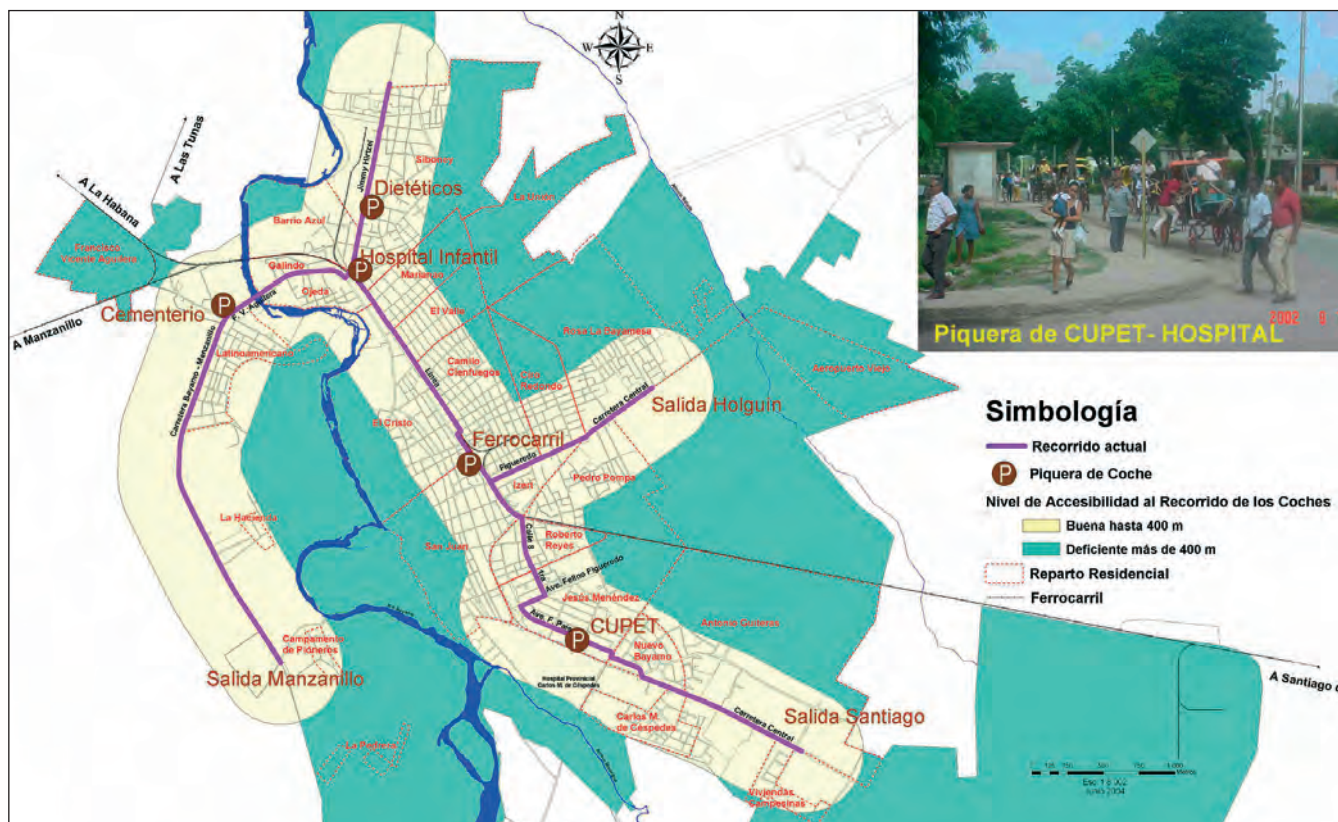
This map of Bayamo in Cuba is an example of how EMIS is used to highlight urban features, such as the dark areas showing low-income neighbourhoods not served by public transport

speaking African countries of Benin, Burkina-Faso, Cameroon, Mali, Morocco and Senegal. The data is made available to local decision makers.[11] These Local Urban Observatories (LUOs) are essential for monitoring implementation of the Millennium Development Goals at the local level, a key area of focus for UN-HABITAT.

ICT is pivotal for implementation of Agenda 21, the Rio pledge by world leaders on sustainable development, at both national and local levels. Public involvement in resolving environmental problems is key to the improvement of urban environmental conditions. The Aarhus Declaration of 1998 was the first of its kind to emphasize environmental rights of the public. With adequate access to environmental information, with a full understanding through the availability of data, the public is more likely to support sustainable development and Agenda 21. UN-HABITAT is a key partner in the Cities Environment Reports on the Internet programme,[12] which works within the framework of Local Agenda 21 to collate environmental information for sound decision-making and general awareness-raising in cities.

As well as advocating the use of online environmental data for public use within the framework of its Sustainable Cities Programme, UN-HABITAT has been actively involved in improving the capacity of local authorities to manage their environmental resources. One of the first cities where the Environmental Management Information System (EMIS) was implemented in 1997 was Dar es Salaam in Tanzania. It is a tool for collecting, organizing and applying information relevant to urban development and the environment. UN-HABITAT provided equipment, software and spatial data to the city and followed up with capacity-building initiatives. This allowed Dar es Salaam to develop up-to-date maps so that it can create a strategic urban environmental management plan.[13]

For EMIS to succeed, municipalities have to be committed to staff training, keeping information systems up to date and providing information to the public. UN-HABITAT has produced a large number of tools to support EMIS as part of the Environment Planning and Management Process. EMIS is now in use in more than 20 cities in the developing world. To date, cities such as Accra, Chennai, Dar es Salaam, Ibadan, Ismailia, Shenyang, Wuhan, and Zanzibar have developed locally relevant mapping standards and GIS software. Besides addressing environmental hazards such as air and river pollution, EMIS has also contributed to improving the management of the city's cadastre as in Lusaka, Zambia, or better urban transport, as in Bayamo, Cuba.[14]

The challenge for many developing counties to become part of the Information Society is to commit themselves to develop their human potential and knowledge assets at every level as this is an essential for achieving the Millennium Development Goals.

Better connectivity creates ideal conditions for overcoming developmental hurdles and reducing poverty. New ICT developments such as wireless Internet technology hold promise for the cities of the developing world, as research from the Wireless Internet Institute (W2i) and the United Nations ICT Task Force recently demonstrated. A new publication series entitled *Global Municipal Government and Local Authorities* aims to raise awareness about opportunities for local governments to build high-capacity wireless communications infrastructures in support of municipal economic, social and educational development. Unless ICT development remains sensitive to the human and cultural values of the communities it serves, the world will see the emergence of a new digital divide in an even more complex cyber-sphere.

# Bridging the rural digital divide

*The Food and Agriculture Organization of the United Nations[1]*

THE INFORMATION REVOLUTION has completely bypassed nearly one billion people. They are the rural poor, who constitute 75 per cent of the people in the world who live on less than one dollar a day. Most rural communities are dependent on agriculture and related enterprises and need constant up-to-date information on everything from new farming methods and inputs to market prices. Rural people and institutions could more effectively use the world's knowledge and information resources if they had the means to access it. Such communities have much valuable local agricultural knowledge to contribute as well.

Digital information and communication technology (ICT) is enhancing the existing ways that people communicate, exchange knowledge and access information. It may not be realistic to talk about universal access to ICT in rural areas, but clearly the billions of dollars invested globally in ICT infrastructure could and should also benefit marginalized rural populations.

The Food and Agriculture Organization of the United Nations (FAO), together with governments and other international agencies, is implementing a programme on bridging the rural digital divide to enhance the role of knowledge exchange and access to information in combating hunger and poverty.

The programme addresses the first Millennium Development Goal of eradicating extreme hunger and poverty, and the Plan of Action of the World Summit on the Information Society (WSIS), which undertakes to build a people-centred, inclusive and development-oriented Information Society.

The programme on bridging the rural digital divide is a novel approach in this fast-moving field aimed at harnessing innovation through collaboration. Governments and international agencies, in addition to the FAO, are investing in the programme. It has three main objectives: to increase the availability of information content in digital form; to develop innovative mechanisms and processes for information exchange and communication; and to develop networks for exchange of information on food and agriculture.

The Programme involves the following stakeholders in developing countries: rural communities and households, using participatory approaches; rural service providers focusing on agricultural, financial, and communication services, including rural communication networks, community radio broadcasters and community telecentres; and policy-makers and their advisers, in order to foster a pro-rural information and communication policy environment.

The Programme is developing a model set of policies and guidelines for governments, institutions and communities aimed at improving the impact of information and communication.

The policies and guidelines will address the following key issues:

*Locally adapted content and context* — ensure that information is sourced appropriately and presented suitably

*Building on existing systems* — enhance rather than replace existing channels of communication

*Addressing diversity* — respond to the different information and communication requirements of men and women, youth and other groups with specific needs

*Capacity building* — strengthen the capacity of institutions and people to provide the right content and to access a wider range of information

*Access and empowerment* — ensure that information reaches and empowers poor people, as well as enable them to participate in decision making processes
*Strengthening partnerships and participation* — build horizontal and vertical links, as well as shared ownership among communities, organizations and sectors
*Realistic approach to technologies* — build sustainable systems that enhance existing structures, can be extended and exploit the full range of existing media
*Costs and financial sustainability* — evaluate and finance the provision of suitable information infrastructure and content, particularly in remote areas.

In order to bridge the rural digital divide, the programme is focusing on two main actions:
*1. Information and communication approaches*
The programme is analyzing current mechanisms and processes in developing countries for exchanging information and for communication using digital ICT in order to compile a set of good practices. Larger-scale national and regional initiatives related to bridging the rural digital divide are also being monitored and evaluated. The lessons learned will help the programme formulate policy and operational guidelines, supported by case study evidence.
*2. Developing international networks of professionals*
The programme will also support development of international networks to enable people working in information and communication in agriculture and rural development to share resources, new ideas and examples of good practice. Members of this inter-

The rural digital divide is the inequitable access to ICT between rural and urban areas that separates those in rural areas from the world's information and knowledge resources. The rural digital divide is derived from a complex range of problems, including the lack of: telecommunications and other connectivity infrastructure; skills and institutional capacity; representation and participation in development processes; and financial resources.

national community provide mutual support, build the capacities of other stakeholders and constitute a roster of international experts able to provide technical advice. Community members include information and communication specialists, policy makers, planners and development practitioners.

The programme is based on active partnerships between all types of organizations specializing in agricultural and rural issues, in collaboration with organizations from other sectors where appropriate, for example, telecommunications. The scope of the partnership provides opportunities for the integration of stakeholders and types of intervention regionally, nationally and locally.

The programme is committed to ensuring that the rural poor and the organizations that serve them are better able to use technology to exchange information and to communicate more effectively within their communities, with decision makers and with others concerned with development. Tangible steps towards alleviating hunger and poverty through the effective application of ICT are already being made:

The Government of El Salvador has developed an Internet-based early warning information system for natural disasters, which captures data from a variety of local and national sources.

Radio producers throughout anglophone and francophone Africa are able to enrich the content of their programmes for rural audiences, such as women listeners, with information on food and agriculture obtained from the Internet.

Researchers in over 100 of the poorest countries are now obtaining up-to-date agricultural information directly from scientific journal websites without paying prohibitive subscription charges. This aids their work on increasing agricultural production.

Agricultural researchers and extension workers in Egypt are now actively communicating important technical information via the Internet between rural villages and district and national offices in seconds rather than days or weeks.

In Asia, rural finance institutions are benefiting from low-cost micro-finance software, resulting in more efficient banking operations and lower transaction costs, enabling the institutions to lend to small borrowers like farmers would want to expand production.

# From digital divide to use-divide

*International Trade Centre*

EVEN IN COUNTRIES where the information and communication technology (ICT) infrastructure is well developed, the use of e-systems by enterprises shows great disparity. This is the reason for the shift of emphasis from digital divide to use-divide. We have come to the conclusion that the use-divide is not due to the weaknesses of e-solutions but to managerial weaknesses. These weaknesses are either related to the inability of managers to decide where and when to use e-solutions and for what purpose, or to their inability to assess the impact of e-solutions on other areas of business management. In both cases, suggestions on e-solutions must go hand in hand with managerial solutions or must be made after making sure that the management competence is there.

There are many definitions of e-business, the most frequent one being the conduct of business on the Internet. Let us take a broader view and define e-business as the application of ICT in macro-, meso- and micro-level business management processes. E-business, or e-trade, captured the attention of policy-makers and strategists as early as the 1980s. While developed industrialized countries expanded their telecommunication infrastructures and incorporated ICT solutions in business management, developing countries, lacking the infrastructure, fell further behind. At that point the debate on the digital divide started.

A lot has been written about the 'digital divide'.[1] Its adverse effects on poverty alleviation and economic development have been the subject of hundreds of articles and books. The World Summit on the Information Society, the first phase of which was held in Geneva in December 2003, further fed the debate.[2] There is, in fact, some debate as to what the digital divide actually refers to — a gap in infrastructure, in access, in ICT know-how — and whether it is widening or diminishing.[3] Numerous initiatives for bridging the digital divide have been suggested; some were tried, many have failed. A common theme of these initiatives was the infrastructure, or more correctly the inadequacy of the infrastructure in developing countries.[4] As well as the building of state-of-the-art telecommunication infrastructure being beyond the means of developing countries, market mechanisms to ensure the efficient distribution and use of scarce resources were also lacking. Thus, the digital divide seems to have widened at the expense of many developing countries.

While some developing countries continued to suffer as they did not have adequate telecommunication infrastructure and developed ICT sectors, others were able to improve theirs. This is, for instance, the case with Senegal and the Philippines.[5] Quite a few developing countries have had the opportunity to build telecommunication infrastructures matching western standards, at least in major centres. Even then, due to various reasons that have been well documented, many individuals and institutions still did not have access. Hence, the phrase 'access divide'. Distorted market mechanisms leading to high costs, unavailable

and/or unreliable communication systems, poor ICT standards, etc, were listed as the culprits for the access divide.[6] In many places the attention shifted therefore from digital divide to access divide. As infrastructure improved, albeit not enough, in many developing countries, the divide between the haves and the have-nots was no longer an issue between countries but within countries as well. Thus both the digital divide and the access divide concepts broadened their relevance to inter- and intra-country use of ICT.

A rather curious phenomenon is now attracting attention. Even in countries where the telecommunication infrastructure is developed and the ICT sector seems to have the sophistication needed, the use of ICT by those who are expected to apply it is lagging behind. A very common observation both in developed and developing countries indicates that especially at the small and medium-size enterprise (SME) level, the use of ICT by SMEs is far from what is expected. In countries where there is little or no digital or access divide, there is therefore the 'use-divide'.

## The use-divide

The use-divide is quite simple to describe. Although there is both adequate telecommunication infrastructure and sufficient access, ICT use, by SME managers in particular, seems to be lacking. The extent of this trend is such that SME managers fall behind most private users in the utilization of the Internet in their countries. In the same countries some enterprises, especially bigger ones, use the ICT availability almost to its full extent.[7] Hence the use-divide.

Interestingly enough, it happens that most enterprises utilizing ICT are in the supply chains of bigger foreign buyers.[8] This is not a coincidence. The buyers, especially the big buyers of developed countries, insist that their suppliers build up their capability to transact on the Internet. In other words, most ICT customers are customers because their buyers want them to be.

Regarding those enterprises that are not in the supply chain of big buyers, either because they cannot or because they have deliberately chosen to pursue niche markets, the utilization of ICT is low. The case of SMEs is particularly marked. Except those that are forced by their buyers to adopt ICT, most seem to have little or no interest in this modern day wonder called e-business.[9]

In business management, the use of ICT tends to come down to the use of the Internet. The fact is that the use of ICT in business management has not been clearly defined in generic terms. Discussions on the topic have always been in terms of cases and examples. Although there is no question that buying and selling on the Internet are examples of ICT use in business, they certainly are not the only examples.

A programme executed by the International Trade Centre (ITC) that is designed to address the use-divide, uses a model that provides a generic definition called the e-Trade Bridge Paradigm (ETBP).[10] Based on the Business Management System (BMS)

Any investment in propagating e-solutions to managers must be incorporated into programmes that cover management competence

paradigm,[11] this taxonomy points out that e-business is not necessarily confined to web page design or buying and selling on the Internet, but covers all ways of managing a business using ICT. This use ranges from Pinoy fishermen using cell phones to receive price quotations from wholesalers while they are out at sea to the most sophisticated financial transactions on the web.

When the definition of e-business is expanded as described, it becomes clear that even the most technologically handicapped business manager uses ICT in one form or another. On the other hand, it is true that what is being used is far from what could be potentially used. The bottom line is expressed by Donald A. Marchand of IMD: "If you ask senior executives and managers as I do in my executive programmes at IMD whether their companies are extracting the expected business value of their investments in ICT, the overwhelming answer by a large margin is, 'No!'"[12]

Surveys indicate that a major reason why most managers do not use ICT is because its use in business is too expensive. According to Marchand, the reasons are more related to the disappointment of managers with e-tools themselves: "Some focus on the disappointments their companies have experienced with implementing Enterprise Resource Planning, Customer Relationship Management (CRM) and various e-systems internally and externally during the last several years. Many business-oriented ICT projects have failed outright or not lived up to expectations. Blame is often shared on both sides between the business and I.T."[13]

Considering e-applications 'expensive' implies a comparison. As 'e' is not a thing to do but a way of doing things, 'expensive' means that the managers find the e-way of doing things more expensive than the non e-way of doing them. This may be a disguised form of the known and expected resistance to change or it may be indeed based on a rational comparison. However, it is not likely to be the result of a rational calculation if one considers Marchand's conclusions that those who use e-tools are disappointed because "many business-oriented IT projects have failed outright or not lived up to expectations". One would conclude that the general reluctance of managers is due to the unsatisfactory experiences of the first adopters. If this is the case, as it seems to be according to studies, the only conclusion one can reach is that the pro-e decisions of the managers were wrong. In other words, there is evidence of managerial incompetence.

Management can be described as making decisions about the acquisition and allocation of resources.[14] Decisions concerning information and know-how, human resources, financial resources and physical assets, and network resources, is what management is all about. Therefore, by definition, if the acquisition and allocation of these resources does not produce the results expected, this constitutes a managerial mistake. The failure rate of the e-systems, perceived or actual, is an indicator of managerial weaknesses. This deduction leads to the conclusion that the use-gap is largely due to managerial weaknesses and not to a digital or access-divide.

**The problem**

First, one needs to decide whether or not the fact that enterprises use ICT less than was expected is a problem. Often we take it for granted that not using what technology makes available is a bad thing and more often than not, this is true. Indeed, the use of ICT can provide advantages over the traditional non-e way of doing things. These advantages usually concern the efficiency rather than the effectiveness of management. There are, however, cases where the e-way of doing things also provides the effectiveness that enterprises seek. In other words, the e-systems can strengthen the competitiveness of the enterprise as well. At the same time, using any system, be it e- or non-e, inefficiently or worse, wrongly, is probably worse than not using it. Many researchers have found that this is particularly true of e-systems. Thus, the problem is not so much the lack of use but more the lack of proper use. When management, for one reason or another, fails to utilize systems properly, there can be only one reason and several consequences. The reason would be the inability to make rational decisions as to

where and why a system should be used. For a manager to make such rational decisions, certain inputs must be there. In respect of consequences, there could be several. Probably the most important consequence would be that the market would be more and more supply-driven as opposed to demand-driven. As managers fail to use or utilize a system, they also fail to articulate to suppliers what they need and what changes would be appropriate and to lead suppliers. This is often cited as a problem of the e-systems industry. Indeed, the industry is supply-driven and many managers are still wondering whether "e" is for them in spite of the media hype about its advantages.

What needs to be done is not to expose the possible advantages of e-solutions or come up with new solutions conceived by producers, but enable management to make decisions on a better way of doing things. If we want managers to use e-solutions, as we believe it is better for the enterprises, we need to enable them to make that decision. Only then will they be able to use them properly and only then will they be able to lead the suppliers. This is extremely important as it makes the solution bigger than the problem. For a decision about a particular way of doing things to be rational, the decision about what needs to be done must also be rational. So far as e-solutions are concerned, managers may be doing the right things the wrong way, or the wrong things the right way. Naturally, leaving aside the possibility that they may be doing the wrong things the wrong way, the idea is to get them to do the right things the right way.

If managers are equipped with the competence to choose the right things to do, then the problem is to show how the e-way of doing them will bring about greater efficiency. But if managers do not have this competence, then no matter how much is invested in telling them e- is the right way of doing it, the results will be frustrating. If you are making a mistake, the e- way of doing it will just result in you making your mistake faster.

As a result, any investment in propagating e-solutions to managers must be incorporated into programmes that cover management competence. Presently, e-solutions are seen as the best way of doing things, assuming that those things must be done. But an enterprise does not have to buy or sell on the Internet to be competitive and neither does it need a CRM system to become customer-oriented.

Probably the most important element supporting the assertion that e-competence must go hand in hand with management competence is the impact of the way of doing things on all the things that are done. For example, selling on the Internet keeps an enterprise open to its customers 24 hours a day. While selling on the Internet may be a good way of reaching customers, other tasks to be completed in the areas of production, logistics and all the management activities, especially those related to financial resources, need to be adjusted. Unless management has the competence to analyze and decide on the whole picture, such e-solutions are likely to continue to lead to failures and frustrations.

**Conclusion**

It can be asserted that the present level of frustration with e-solutions is not connected to the weaknesses of the solutions but rather to managerial weaknesses. These weaknesses are either related to the inability of managers to decide where and when to use e-solutions and for what purpose or to their inability to assess the impact of e-solutions on other areas of business management. Whatever the reason, suggestions on e-solutions must either accompany managerial solutions or be made after making sure that the management competence is there.

*The International Trade Centre is the joint technical cooperation agency of UNCTAD (United Nations Conference on Trade and Development) and WTO (World Trade Organization).*



ICT training seminars bridge the use-divide

# Ringing economic changes in the developing world

*ZTE Corporation — committed to building a seamless Information Society*

INNOVATION AND TECHNOLOGY are often at the heart of change. New methods, materials and inventions are the causes of macro shifts in society and economics that shape the world we live in. It may take years, or even generations, for the shift to become evident. But despite being obscure during their appearance, they are powerful.

Every schoolboy knows that the building of roads was the core infrastructure strength behind the Roman Empire that enabled its legions to control so much of the then-known world. Similarly, the British Empire ran on steam trains and the emergence of the USA owed so much to the car. These technology innovations weren't about new super weapons or greater economic power, they were about communications. They enabled messages to be sent to the furthest reaches, and allowed the population to move freely as economic opportunities presented themselves, as well as enabling the administration to be able to understand and control the extent of its domain.

In the last decade, we have seen a new innovation that is changing the world. The mobile phone has probably been one of the most profound changes in history. It has affected not just the speed with which business operates, but has changed forever the social structures and rules by which we live our lives. Relationships and families are sustained over global distances because of the instant availability of communication; working life has been transformed as the shackles to the telephone on the office desk have been removed; and even love-struck teenagers have found through text messaging the means to overcome their natural shyness and fears of personal rejection.

It all sounds great, but there are two very major issues with this utopic interpretation of events: it has only happened to date for the developed world, and it has only involved voice.

For the four-fifths of people outside of the industrialized world, the mobile phone phenomenon has had scant impact beyond the political elite. Most people throughout Africa, Latin America, the Indian sub-continent and Asia have yet to experience the life-changing force of mobile communications.

And even within the capital cities of the most developed nations, it is voice communications that the people are using mobile technology with. The networks may be in place for music downloads, video conferencing and data applications, but very few are using them compared to the potential that the mobile 'multiplay' communication possesses.

These two issues may sound unrelated, but in fact they are one and the same, because it is through the power of the mobile multiplay that the developing world will join this communications revolution.

Looking at the situation in Africa, and right here in Tunisia, we see the effects of these changes taking place right now, today, as a generation of Tunisians are able to jump decades of technology development. Working with the Tunisian PTT, ZTE has built the country's first 3G network. There follows an overview of the benefits that have been derived from this.

**The focus on growth**

Today, the world is focused on finding ways to generate this growth in the developing world — especially in Africa.

At the recent meeting of world leaders at the G8 summit in Gleneagles, Scotland, it was Africa that headed the agenda for the world's leaders. And specifically, it was how the wealthier nations of the world can collectively lift these nations out of poverty. As the world leaders at the G8 discussed: while billions have been pledged towards aid for Africa, it is investment, expertise and practical ideas that are essential to helping Africa share in the benefits of the global economy.

At ZTE, we believe that it is in the creation of a robust, scalable communications infrastructure that the greatest good can be done. It is self-evident that this infrastructure must be wireless, and equally self-evident that it must be based on industry standard WCDMA specifications to ensure the greatest interoperability.

Through this infrastructure, the business and consumer sectors can be provided with the easily accessible communications that fuel economic growth. As the expression goes: "It is from small acorns that mighty oaks will grow" — and in the economies of Africa and other developing nations, it is the indigenous businesses that will create the economic momentum. To do this, they need reliable and affordable communications.

Take, for example, seed traders in Sousse — without communications they must take their chances in deciding where they will find the best market for their products. Should they travel to Tunis, where they will be certain to find buyers in the big city? Or should they go to Monastir or Mahdia, where they may find less competition and so receive higher prices? With a mobile infrastructure they can find out where they will receive the best prices and so act in an economically smart way. With a 3G mobile infrastructure they have a plethora of options through which to track the market — by fax, SMS and Java applications, as well as voice calls — and the trader can start to build in systems for how the business is run based on live data, delivered seamlessly.

Before long, our trader from Sousse may start looking at export opportunities and the higher prices paid in other countries. Video conferencing and the Internet introduce him or her to buyers in London, New York and Tokyo. The trader's seeds win major contracts and he or she starts acquiring more local capacity,

ZTE donated one set of "emergency mobile communication system" to Thailand for the Tsunami Disaster Recovery, April 2005

employing dozens of people and building new supply chains for the business. Before long, our seed trader is in the commodities business, tracking world supply news through mobile television services and hedging contracts through Java-based bank transactions. This is fantasy today, but an absolute reality for tomorrow, and what makes it possible is the communications infrastructure.

**Development on the ground**

Earlier this year, the BBC reported on a study from the Centre for Economic Policy Research that looked at the social and economic impact of mobile phones. It pointed out some successes — that small business in South Africa relies on mobile phones and that adoption in Nigeria is doubling annually. But it also contained some depressing reading — that an average of only six per cent of people in Africa have phones. This figure is way below the point where an economic uplift can be established.

At its most basic, the phone is a strange device, because just purchasing one for yourself is useless unless you know someone who also has one, and with whom you wish to talk. While the fixed-line telephone took ten years to become established for exactly this reason of synchronicity, the same effect is in place for the mobile phone in today's developing nations. The question remains: "Why should I get one if nobody else has one?"

But the long-promised winds of change are finally arriving in Africa, courtesy of the mobile phone. In Tanzania, 97 per cent say that they have access to a mobile phone — but only 28 per cent can access a landline. Given that the latter statistic is unlikely to change radically with the cost of developing landline infrastructure (although the economics of Wireless Local Loop may assist this), the reality is that the mobile handset must become the catalyst for change.

The change, when it does occur, is fairly rapid. In the study, 62 per cent of businesses in South Africa and 59 per cent in Egypt said that mobile use was linked to higher profits. And this was true even when a lower costs landline was available. When the

shift happens, it can be extraordinarily rapid, and today in South Africa over 85 per cent of small businesses rely solely on mobile phones for communications.

What was most telling from the Centre for Economic Policy Research's study was the statistic that a developing country which had an average of ten or more mobile phones per 100 population between 1996 and 2003 had a 0.59 per cent higher gross domestic product growth than an otherwise identical country. Now, 0.59 per cent growth may not sound much, but in the context of a developing nation this can be the engine that eradicates poverty and provides the education and healthcare to which all strive.

In rural Uganda, the Grameen Technology Centre's Village Phone project has put over 1,300 mobile phones in villages in its first year of operation. The Village Phone provides an interesting blend of social and economic benefits — people are able to save time (opportunity cost in many cases) and travel costs if they don't have to travel tens of kilometres to access a phone. The phones get used for a wide variety of purposes — staying in touch with families, getting commodity prices and calling for medical care. The phone is a community resource and is also economically beneficial to the individual operator, who is able to run a business by selling usage of the phone to others in the community at competitive rates (and fixed rates — this is important as it enables people with mobiles to get help from their neighbours at 3.00 AM when they have a sick child).

The 1,300 phones are clearly a tiny fraction of the 82 million phones in Africa, but the model is an interesting one from the perspective of combining mobile communication and development — rural development in particular — with an eye towards direct economic benefit to entrepreneurs along with tangible community benefits.

**The Tunisia experience**

September 2004 was a milestone month, when the first ever 3G call was made on the African continent. A WCDMA commercial

ZTE donated to Project Hope by building a middle school in Yunnan province, China (December 2003)

network, built by ZTE, was deployed as a commercial service by the Tunisian PTT. It represents a major step for Tunisia's communications and places the country at the very forefront of African communications. Two of Tunisia's most important cities — Tunis and Sousse — will be covered by the planned 3G network, meaning that Tunisians and European visitors alike will be able to enjoy a higher standard of services across the country in future.

As well as the benefits to business and consumer customers, the Tunisian 3G network is also proving to be an economic success for the operator. Revenue-generating 3G networks in cities like Sousse, Monastir and Mahdia will give perfect coverage without the need for local operators to bear any additional infrastructure cost.

The ZTE WCDMA network has also proved its worth in the diversity of services it supports. So far, all permutations of voice calls (between 3G, 2G and fixed phones) and conference calls have been proven to work, along with SMS, MMS, VoD, WAP and JAVA applications. Additionally, videophone services and real-time surveillance/broadcast have also been made possible. As part of the first 3G network in Africa, the Tunisian PTT is currently developing new TV-enabled mobile, and more specialized services to cater to the economically important hotel and tourist industry are also planned for the future.

**How does the developing world get there?**
Hopefully, the above statistics and examples prove the absolute desirability of a modern, scalable and affordable mobile phone network for developing nations. Anyone outside the telecommunications industry would at this point have every right to start shouting about why something so evidently beneficial to economic growth and society as a whole has not occurred. Working within the industry, many have got accustomed to the real answer and no longer see its inadequacy.

The real answer is, cost. For far too long, access to communications has been seen as a privilege of the urban elite. In the era of copper networks, this thinking could be explained as the cost rose linearly with the deployments.

The arrival of new technologies has changed the equation entirely in terms of both scalability and the cost of production. No longer does it require decades of investment in physical infrastructure, and the way has been opened for companies and governments to leapfrog generations of technology. New technologies such as microwave networks, satellite transmissions and wireless local loops have transformed the cost equation of a network infrastructure. Massive improvements in the scalability of voice calls for WCDMA compared to GSM and GPRS have also brought calls to an affordability that the whole community can reach.

Some telcos have remained resistant — believing that letting in cellular, satellite and Voice over Internet Protocol technologies would diminish the returns they were achieving from the aged copper network. These telcos are few and far between now, and most have seen the future and engaged in the types of ambitious projects that we see here in Tunisia.

As well as the openness of governments and the development of new, more efficient technologies, the third aspect of the cost issue has simply been the mindset of the technology manufacturers. Geared up to service the needs of the wealthy telcos of the West, they indulged themselves with expensive people, offices and private jets — satisfied that they would suffer no great price pressure. This meant that they were simply ignoring the needs of the developing world and their prices made it prohibitive for the telcos in these regions.

Since the telecoms bubble burst in 2001, many have had the opportunity to reflect on where the major markets will be for the next twenty years, and realized that the US and Western Europe represent only ten per cent of the world's population. China, India, Africa, Latin America, and Russia are the new business frontiers, and the technology companies have tried to adjust to meet their needs. At the same time, a new generation of company has arisen, which is dedicated to providing the infrastructure for the 90 per cent of the world that most needs it.

With the technology in place and affordable, the companies focused on supplying and installing it efficiently and the growing understanding of economic and social benefits by governments, the picture does at last start to look more optimistic for growth in the developing world.

# Saudi Arabia — towards the Information Society

*Dr. Mohamed Ibrahim Al Suwaiyel, Governor, Communications and Information Technology Commission*

SAUDI ARABIA SHARES the world aspirations to build a people-centered, development-oriented information society. Saudi Arabia is a large country with an area of 2.4 million km² and a population of around 23.4 million; GDP per capita was estimated to reach USD13 600 in 2005. Over the last few years, Saudi Arabia has made remarkable progress in different Information and Communication Technology (ICT) fields including connectivity and access, sector reforms, national IT initiatives and e-services.

From 2000 to 2004, there has been remarkable growth in all major ICT indicators in Saudi Arabia; most notably mobile subscribers with a cumulative annual growth rate (CAGR) of 58.6 per cent (more than twice the world CAGR of 23.4 per cent), with subscribers approaching 12 million as of October 2005 (over 50 per cent penetration). Internet users grew by over 430 per cent in four years, amounting to a CAGR of 44.4 per cent, (vs. world growth rate of 27.4 per cent); Internet users are exceeding 2.5 million. Personal computer penetration has also grown 40 per cent annually (vs. the world growth rate of 9 per cent) to around a 16 per cent penetration. Fixed mainland telephones are approaching 4 million lines, a tele-density of 17 per cent. Internet international bandwidth capacity has increased by nearly seven times in four years to over 1 800 megabytes per second.



e-learning. Children in a Saudi school using ICT's in the learning process

In terms of e-government readiness (which include ICT infra-structure and other metrics), the UN Global E-Government Readiness Report has moved Saudi Arabia's ranking from 105 in 2003 to 90 in 2004, a jump of 15 places in one year.

Saudi Arabia has adopted a multi-phase plan to restructure the ICT sector. To date, four phases have been implemented. The first phase, entitled corporatization, specified that the responsibility for the provision of telecom services was transferred from the Ministry of Post, Telegraph and Telephone (PTT) to a state-owned company, incorporated in 1989 as Saudi Telecom Company (STC).

The second phase, policy and regulatory reform, included the June 2001 Telecommunications Act, which established the legal framework to develop the telecommunications sector and autho-rize the creation of a regulatory agency. An independent regulator, Saudi Communications Commission (SCC) was established. Recognizing the importance of an integrated ICT approach, the Ministry of Communications and Information Technology (MCIT) was created in 2003 to replace the Ministry of PTT (www.mcit.gov.sa). The mandate of the Regulator was extended to include IT, and its name changed to Communications and Information Technology Commission (CITC; www.citc.gov.sa).

The third phase concerned the partial privatization of the state-owned STC, which was completed in early 2003, by divestiture of a 30 per cent stake in the Company for the public.

The fourth phase, liberalization, began in September 2002 when the Government announced a timetable for telecom sector liber-alization — licensing a second mobile operator the fourth quarter of 2004 and for fixed telephony services in 2006. In the period 2002-2004, the CITC adopted processes to introduce competi-tion in the ICT sector. As a result, service provider licenses have been issued to: the incumbent service provider, four additional VSAT operators; a new mobile service provider (a GSM and a 3G license), two additional data service providers, a GMPCS service provider, as well as a number of ISPs. Work is now under way to liberalize the fixed telephony services market and to issue addi-tional mobile services licenses.

## National ICT plan

The national ICT plan includes a long-term vision and a five-year plan for ICT in the Kingdom. The long-term vision is "to trans-form the country to an Information Society, so as to increase effectiveness and efficiency, and provide e-services for all sectors of the society, and build a solid ICT industry to become a major source of income for the nation". An objective of the plan is to seek to bridge the digital divide by enabling all societal sectors to reach and access ICT services easily and utilize them effec-tively. Other objectives include creating job opportunities, raising

Fifa village – ICT services to Fifa are provided through a modern cellular and microwave system linking this community to the national network. Mobile satellite coverage is also available in all areas of the Kingdom



The capital city of Riyadh along with all other major cities enjoy full ICT service coverage. Programs are now under way to increase the penetration of broadband access in all urban centers

the efficiency of education and training and the preparation of qualified manpower through the use of ICT.

The five-year plan includes projects that cover the main aspects of ICT usage such as e-government, e-commerce, telework, telemedicine, e-learning, and digital Arabic and Islamic cultural content. Furthermore, they cover regulatory activities such as issuing licenses for new voice and data operators and establishing regulations for the ICT market. The scope also includes elements relating to the development of the ICT industry, such as fostering investment opportunities, research and development, innovation, international cooperation and technology transfer. A set of indicators called the Information Society Indicators are identified and measured against specific targets by the end of the plan.

**ICT initiatives**

Saudi Arabia is pursuing a number of ICT initiatives to speed society's access to, and use of, different ICT services. The Home PC Initiative is a public-private-partnership that aims to deliver one million PCs to Saudi homes within 4-5 years. It enables citizens to own high-end PCs at reduced prices, through a USD27

monthly installment. The package includes a suite of desktop applications, free monthly Internet access, training and a wide range of Islamic and Arabic digital literature. In addition to increasing both PC and Internet penetration across a wide sector of Saudi society, especially students, the initiative aims to improve the computing skills and qualifications of citizens.

"Easy Net" was introduced to reduce barriers to Internet access and to stimulate its' usage and penetration in the country. This is achieved by cutting the cost of Internet access to the cost of a local call, coupled with eliminating the need for separate Internet subscriptions. Users can obtain Internet access by dialing dedicated national Easy Net numbers and receiving a single bill for Internet and other telephone charges. Assessments indicate an 11 per cent increase in Internet usage over the past six months as well as a major shift to the Easy Net model.

A joint national e-government programme was launched in early 2005 under the name Yesser, an Arabic word meaning "simplify" or "make easy". Yesser (www.yesser.gov.sa) acts as an enabler to implement e-government in the public sector. Its objectives include raising the public sector's efficiency and

**Figure 1: ICT indicators, CAGR 2000-2004**
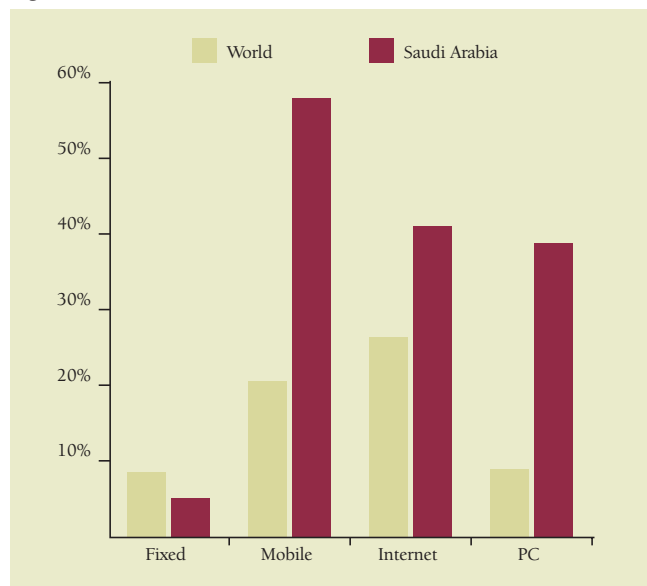




Madinah is a major city and holy site. Citizens as well as hundreds of thousands of annual pilgrims and visitors to Madinah have access to a wide range of ICT services both fixed and cellular

**Figure 2: Timeline of Major ICT development and Telecom Sector Reform**



Corporatization: Saudi Telecom Company (STC)

- Telecom Act
- Independent telecom Regulator (SCC)

- PTT changed to Ministry of ICT
- IT added to Regulator mandate, renamed CITC

- National ICT Plan
- Launch of smart cards
- EasyNet
- e-Gov. program "Yesser"
- Home PC Initiative

1998  1999  2000  2001  2002  2003  2004  2005

ISP Sector Liberalization

- Telecom Bylaws
- Partial Privatization of STC
- VSAT Liberalization

- Liberalization of data and mobile
- IPO of 2nd mobile licensee (Ettihad Etisalat)
- National IT plan
- Draft e-Transaction Act
- e-Payment gateway

effectiveness; providing better and faster government services and ensuring availability of the required information in a timely and accurate manner. The Yesser vision is that "by the end of 2010, everyone in the Kingdom will be able to enjoy world class government services offered in a seamless, user friendly and secure way by utilizing a variety of electronic means."

Furthermore, a number of e-government projects have been implemented or are being developed by different government organizations. Examples include: the e-government portal, public key infrastructure (PKI), national ID cards, e-payment gateway (Sadad), e-tax system, social insurance system and electronic information exchange. A number of government services are currently available on-line, such as investment licenses, visa applications, traffic ticket enquiries and payments, passport fee payments and utility bill payments. A yearly contest (e-Award) is conducted to promote and recognize local initiatives, innovation and contributions to e-services and applications.

**e-Services**

The Saudi Payment Network (SPAN) was one of the first countrywide inter-bank retail payment networks in the world. Implemented in 1990, SPAN is a nationwide network comprising of thousands of ATMs and point of sale (POS) terminals. Other e-banking systems include Saudi Arabian Riyal Interbank Express (SARIE) for electronic fund transfers, Tadawul (securities trading) and Semah (a national credit bureau). Also, most Saudi banks offer e-banking services such as phone, mobile and Internet banking in addition to e-share trading.

The major elements for the e-Business applications are either developed or in the final stages of development. These include:
- The legal elements. The e-transaction and e-crime acts are in the approval phase
- The e-payment gateway "Sadad" is operational
- The public key infrastructure (PKI) is under development
- Postal services are undergoing major improvement
- Ensuring information security and privacy

Major e-business applications have been developed and implemented. Examples include e-procurement systems at major corporations such as Saudi ARAMCO and SABIC, e-umrah system (providing religious tourism packages by linking international travel agents, local suppliers and the related government author-

ities), and an e-trade system that supports import and export processes by linking different stakeholders like customs, ports and agents.

The Ministry of Education is working on enhancing public educational environments by promoting curricula, preparing teachers, developing student skills and capabilities in dealing with ICT and building computer clubs in schools. Computer labs exist in virtually all secondary schools and will be set up in intermediate schools as well. Universities are increasingly adopting the e-education concept.

A Hospital Management Information System (HMIS) is currently being implemented in over 200 hospitals and clinics across the country. Telemedicine has been used with great success at the King Faisal Specialized Hospital and at a cluster of military hospitals. Nineteen hospitals and clinics are connected for voice and video conferencing services as well as remote diagnostics. The system links Saudi hospitals to medical facilities abroad for lectures and video consultations as well as live casting of surgical operations. The Ministry of Health has also embarked on a programme to link 25 additional hospitals in major cities and important rural areas in an effort to further telemedicine services and infrastructure as well as provide international connectivity to these sites.



The Dammam city coast line is one of the coastal areas that enjoys advanced mobile telecommunications service coverage

# IT industry progress in Syria and the road to the Information Society

*Syrian Telecom Establishment*

THE SYRIAN GOVERNMENT has been keeping pace with modern developments and scientific inventions in the world of information and communications technology (ICT), and the country has made considerable efforts in recent years to improve its participation in the global ICT market. Syria's telecom infrastructure, from voice and data telephone systems to the Internet, has undergone extensive development and modernization in order to increase accessibility and improve Syria's competitiveness in the global market place.

The Syrian Telecom Establishment (STE) is the main provider of ICT services to the population across Syria, in rural and urban areas, and in industrialized cities. Under the supervision of the Syrian Ministry of Telecommunications and Technology, STE is working to build, develop and expand telecommunications, data and Internet infrastructure countrywide.

STE is working to achieve a number of specific goals. Public Switched Telephone Network (PSTN) penetration currently stands at 15 per cent of the population, and STE intends to raise this to 22 per cent. Mobile phone network penetration, currently at 14 per cent, will be doubled to 28 per cent. But the most ambitious target is that of increasing Syria's Internet and data infrastructure penetration from one per cent to 12 per cent.

Partnerships with the private sector are crucial to these projects, and to the establishment of an ICT industry in Syria. Private sector companies manufacture and supply computing equipment to the market. Whereas currently, STE and the Syrian Computer Society are the two main Internet service providers (ISP) in Syria, private sector companies will soon join them in Internet service provision. Internet access notes have been established in tourist areas, and intranet Local and Wide Area Networks (LAN and WAN) have been set up at government premises and in universities. A further, ongoing project is to connect the census offices that provide Syria's Ministry for the Interior with all data relating to the personal status of its citizens.

## ICT drives development

The ICT industry is helping to shape the development plan for Syria, especially when it comes to the youth and children. Many schools at different levels have been connected to the Internet networks, and Internet applications, or e-applications, have begun to have a real impact on different sectors in Syria, including the economic, social, cultural, commercial and health sectors.

The adoption of ICT across Syria is varied and widespread. Many sectors have now started to use e-applications such as e-



E-Government applications - E-payment

Customer care centre

payment, e-mail, e-commerce, and tele-learning, which is now being applied at several different universities in Syria. Tele-learning is employed in the provision of some teaching specialities, and thousands of students make use of it.

Furthermore, a variety of private and public sector organizations have commenced a process of rearranging their organizational structures to make better and more efficient use of the IT applications that apply to their different fields of work. The Ministry of Health has begun to use IT applications in some hospitals to perform some surgical operations.

But despite the growing application of ICT in Syria, its adoption is still in the early stages. Because of this, many projects are now underway with the aim of developing the infrastructures necessary for ICT and the Internet, as well as e-mail use in many areas.

**Ministry of Telecommunications and Technology projects**
The Syrian Ministry of Telecommunications and Technology initiates and oversees many projects aimed at improving access to and use of ICTs. The importance of making ICT accessible and encouraging its effective use makes for a busy landscape of activity. Five key projects are currently underway.

In order to help generate new businesses, a software incubator is being established in Damascus to help IT professionals create software start-ups and small- to medium-sized enterprises (SMEs). This incubator will contain all the infrastructures necessary for creating the target SMEs, including software, communications and computing equipment, and office facilities.

Government information and services are also to be made available electronically. A government portal, or a web portal for government information and services, is being developed. It will act as a privileged access point for citizens, with the goal of facilitating and encouraging citizen-to-government and government-to-government interaction. This portal should be regarded as an initial step toward e-government in Syria.

A further Ministry of Telecommunications and Technology project will target the rural community. A number of community centres are to be established in rural areas across Syria. These centres will contain telecoms and computing facilities to help integrate ICT in the daily life of rural citizens. They will be managed either directly by the Ministry, by the municipalities, or by private sector organizations using a franchise mechanism.

STE and the Syrian Ministry of Higher Education will collaborate on a project to establish a high-level postgraduate ICT training centre, which will also provide continuing education training courses for ICT workers in government organizations.

The fifth key project will see the establishment of a data centre to leverage the automation process among the different government institutions by providing consultancy, data hosting, ASP and similar services.

**Towards a connected future**
Alongside the Ministry of Telecommunications and Technology projects, STE plans to continue its own initiatives to develop the Syrian ICT industry. STE's third project for the modernization and expansion of Syria's telecoms services includes the following targets:
- Expand PSTN penetration by creating one million lines in urban and rural areas
- Create 340 000 lines for the rest of Syria's rural areas in addition to the existing telecoms and data network
- Expand the Internet and data network in order to add one million new subscribers
- Expand the backbone network
- Expand the intelligent network and increase ICT applications
- Increase the use of pre-paid cards for a variety of services.

These ongoing endeavours, based on cooperation between public and private organisations, will help to ensure that SMEs in Syria are competitive in the global market, and that Syria continues to develop its ICT infrastructure, connecting all areas of its population.

# The global postal network — a natural gateway to the Information Society

*The Universal Postal Union*

THE POSTAL SECTOR'S role in the Information Society, and in particular its contribution to reducing the digital divide, has been the subject of ongoing discussions at the Universal Postal Union (UPU) since Phase One of the World Summit on the Information Society in Geneva in 2003. UPU also adopted a resolution on the subject at its 2004 Congress in Bucharest. In fact the UPU and postal sector stakeholders have a lot to contribute in meeting the challenges of the digital revolution. There have been big developments in the postal sector over the years, mainly due to technological advances, increased competition and the liberalization of markets. Through the judicious use of new technologies, the postal sector has achieved a prime position at the heart of today's Information Society.

In addition to the numerous electronic services introduced by individual Posts, UPU, with the active assistance of its member countries, has developed a whole range of applications and software enabling public postal operators to offer essential services matched by improved service quality. This software enables them to track mail items more closely and makes international money transfers more efficient, while ensuring their security. Furthermore, UPU's Quality of Service Fund, financed by contributions from industrialized countries, is an excellent example of global partnerships for cooperation and development. This allows developing and least developed countries to acquire the technology they need to access the universal postal network and puts it within the reach of even the smallest and remotest countries.

"Thanks to the new technologies adopted by the postal sector, communicating with remote areas abroad is no longer a question of sending messages in bottles," says Edouard Dayan, UPU Director General: "Through its integrated physical, electronic and financial network, the postal sector is helping not only to reduce the digital divide, but also to bridge the economic gap by enabling developing countries to acquire these technologies and know-how and giving them access to the markets of industrialized countries."



VSAT technology has enabled Kenya's rural communities to rapidly access the information superhighway, with post offices serving as the access ramp

Internet kiosks and cyber cafés inside postal outlets (as seen here in the United Arab Emirates) provide access to information about social services as well as markets, thereby contributing to achieving the Millenium Development Goals by helping to reduce poverty, increase literacy and gender equality, and improve health and environmental sustainability

## Unprecedented access

With more than 660 000 postal outlets combining the physical, electronic and financial dimensions of a worldwide communication network, postal services provide a natural gateway to the Information Society. The distribution of information and goods, the provision of financial services and access to information via Internet points inside post offices also contribute to the economic and social development of countries.

Post offices were widely recognized as ideal access points in the Geneva Action Plan adopted during Phase One of the WSIS, precisely because of their accessibility. Internet kiosks inside postal outlets have mushroomed in recent times, providing access to information about social services such as health care and education, as well as access to markets where products can be purchased and sold. In this way, it directly and indirectly supports the United Nations Millennium Development Goals helping to reduce poverty, increase literacy and gender equality, and improve health and environmental sustainability.

## Connectivity through secure money transfers

UPU believes that the financial component of the world postal network is an integral part of the global effort to develop economies and reduce poverty. Postal financial services — in particular postal savings and third-party agency services offered by Posts on behalf of private and public enterprises — provide isolated communities with access to vital services and thereby contribute greatly to their economic and social development. Posts worldwide perform some ten billion financial transactions a year, of which more than 15 billion involve money orders, amounting to more than USD130 billion per year. It is in this area that UPU believes the postal network can make a difference,

especially at a time when the World Bank and G8 countries are addressing issues around international migration.

The United Nations estimates that migrant workers represent three per cent of the world population, and figures show that the number of money transfers by these workers continues to grow each year. According to a World Bank report, money transfers by migrant workers reached USD110 billion in 2004, an increase of 52 per cent from 2001. This transfer of funds represented five per cent of developing country imports and eight per cent of domestic investment, making it the second largest source of investment in these countries after direct foreign investment.

Certain drawbacks remain however, most notably the costs associated with money transfers. UPU is convinced that the worldwide postal network offers a solution and will therefore continue to expand the network with its International Financial System (IFS); a suite of applications that facilitates the electronic fund transfers between public postal operators and with certain banks. It is a secure service that reduces the risk of money laundering. The system is already implemented in more than 30 countries and is expected to connect up to 70 countries by the end of 2007. A recent recommendation approved by the Council of Arab Ministers for Telecommunications and Technology could see the majority of Arab countries linked to the IFS by 2006. UPU also works with other solution providers in a constant effort to expand its network and recently set up a gateway with the Eurogiro network to facilitate the transmission of electronic money orders.

As Director General Edouard Dayan points out: "Easy access to money transfers at affordable rates addresses a key need for millions of people, especially migrant workers, and the postal sector has the capacity to respond to this need with its vast

Thanks to UPU's International Financial System (IFS), the Russian Post has experienced an increase in international money transfers from 400 to 70 000 transactions per month in just over one year, and transmission times are reduced from 20 days to only three

network and the new technologies being developed by UPU for Posts in a spirit of cooperation and development."

**Trust and security**

While turning its vast infrastructure to good account, the postal sector is also well placed to help meet some of the other challenges of the Information Society. It offers expertise in the field of Internet governance and in building confidence and security in information and communication technology (ICT). These areas were identified as priorities in the Geneva Action Plan and in the report by the working group on Internet governance that was created to tackle challenges arising from Internet use such as spam e-mail, Internet security and cyber crime. UPU believes that the postal sector can make a contribution to help solve the problems arising from Internet identity management. Its convention lays down statutory and legal obligations binding all of its 190 member countries. Within this legal framework, the postal sector is well placed to meet the demands of a reliable Internet identity management system by providing a legal digital address to complement the physical address, thus reducing the risk of identity fraud. UPU has received initial approval for a .post domain from ICANN (Internet Corporation for Assigned Names and Numbers) that holds great opportunities to migrate physical addresses to digital addresses, thereby laying the cornerstone for a next generation universal postal service.

Bound by national laws, Posts are recognized as trusted third parties in the processing and distribution of information and the delivery of goods. As they develop their range of electronic and hybrid mail services, Posts are extending their role of trusted third parties to the digital world. The coming of the Internet has brought in its wake a large number of confidential and legal documents circulating in cyberspace. Secure delivery, ensuring that these documents can only be retrieved by the addressee, is essential to senders and addressees alike. Public postal operators already provide certification services for physical mail that

can very easily be applied to digital mail, as a number of them have already proved through the introduction of electronic postmarks (EPMs).

Furthermore, as a standards organization with over 100 international standards to its credit — many of them relating to electronic messaging — UPU provides consistent online postal communications worldwide to ensure better quality of service to the public. Security forms an integral part of these standards. For example, the electronic postmark standard ensures that an electronic message carrying the EPM confirms the identity of the sender. It also ensures the inviolability of the message; in other words, it shows that no one has tampered with it. Combining the .post address system with the use of electronic postmarks could enable Posts to offer one of the best security mechanisms.

**Towards an all-inclusive Information Society**

The development of new technologies should be seen as a great opportunity to adapt postal services and position the postal sector as an essential infrastructure for the development of the Information Society. New developments in ICT are enabling Posts to expand their service offerings, interconnect the worldwide postal network and open up new opportunities. One example is e-commerce. Goods ordered via the Internet have to be delivered after all. Express mail is another growth segment, with new digital technologies making it easier to monitor parcel transmission worldwide. Many postal operators are providing hybrid mail, saving time and money by combining electronic communications — for both personal letters and business mail — with physical delivery.

To conclude in the words of UN Secretary-General Kofi Annan: "By harnessing the power of the different elements of the global postal network — physical, electronic and financial — and finding synergies between them, such projects can help everyone benefit from and become a citizen of the inclusive and empowering Information Society that we all are striving to build."

# Telecommunications and socioeconomic development in developing countries

*Belgacom International Carrier Services*

Productivity growth is the key factor for any country's economic development, and this is also one of the significant contributions of telecommunications. The telecommunications infrastructure contributes towards the growth of productivity in many ways; one of the most important is enabling the sharing of information between areas and countries around the world. There is a lot of information that countries can share with others that stimulates economic development, like technological expertise, software development, hardware manufacturing, educational aspects and projects, cultural artefacts and activities such as art.

Unfolding a telecommunications infrastructure and promoting access to this infrastructure has a range of direct effects on the economic development of a country, from the diffusion of new ideas to facilitation of the coordination of economic activity. Developed countries are already experiencing these benefits through well-established telecommunications systems and continuous modernization of their telecommunications networks. On the other hand, the developing countries have realized the impor-

tance of a modern telecommunications and information infrastructure for achieving a high growth rate and economic development. But existing social constraints to the ownership and use of telecommunications technology, and the proper adoption and utilization of rapidly changing IT, are major challenges to them.

It is imperative that developing countries make use of the information opportunities provided by information and communication technology (ICT) like the Internet to increase their communication with other countries. In the least developed countries (LDCs), where the Internet and telecommunications technologies are unavailable, it is time that governments and the private sector made such services available to most people. This accessibility to ICT will, in the long run, reduce illiteracy rates, increase opportunities for employability, and reduce poverty.

## Information flow as a pillar for economic development

In any developing country, one of the prime ingredients of development is information. Through communication via ICT, the world is a global village where people from one country learn about events in many other countries as soon as the news breaks. ICT and traditional mass media such as television and newspapers are therefore some of the most important components of the information transfer system in international communication.

The sharing of information through ICT, thanks to telecommunications, allows countries to leapfrog stages of economic growth by being able to modernize their production systems and increase their competitiveness faster than in the past. Countries should therefore build telecommunications infrastructures, as these contribute towards socioeconomic development. In the global information society we now live in, there is a clear direct correlation between access to telecommunications and socioeconomic development: telecommunications is no longer the consequence of development; rather it is a necessary precondition for development. Improved teledensity in a country, for example, and the use of international communication by that country, will improve both its development and its economic status.

Local payphone or shared mobile phone access experiences in remote African villages have yielded incredible success due to the reduction of the entry barrier to placing either local or international calls. Belgacom International Carrier Services — as the partner for the international leg of these calls — has indirectly facilitated access to the world to a part of the population that was totally isolated before.

Other examples included SMS-push delivery of the local market prices for cereals and vegetables. Through this, the local farmers

could decide — before walking long hours into the market — whether the daily price was worth the long walk.

Information plays an important role in business and economic development as the source of knowledge, education and human capital. The availability of better information helps to improve education and health services, and provides knowledge, ideas and opportunities. Thus it contributes to national productivity. The efficiency of household activities increases with telecommunications by enabling easy access to services like healthcare, education and financial services.

But this easy access to telecommunications services should be affordable to many ordinary people. Such affordability is a challenge in LDCs, one that must be tackled. Governments and telecoms service providers have a duty to make access to ICT a practical reality, not just a policy of universal access written in government policies, statutory documents and companies' annual reports. Universal access means that telecoms and ICT services should be available and affordable to most people in society at a reasonable distance from where these people live.

In the context of its numerous business activities with African fixed and mobile operators, Belgacom International Carrier Services responded positively to a request from the Social Foundation of one of its African customers by donating 30 computers. These computers will be distributed to schools in Senegal for the purpose of helping children to have access to the many possibilities offered by ICT.

## Telecommunications as a medium for transportation of information

Telecommunication contributes to positive economic, social and cultural development by facilitating the efficient transfer of information. In the information age, the access to ICT through telecoms is not simply a major factor in socioeconomic development. Its absence could become an even greater constraint on national development than in the past.

Malaysians, for example, use the Multimedia Super Corridor (MSC) to develop the social lives of people and for the economic development of their country through telemedicine, electronic government, technological research and other kinds of development. The primary means by which telecommunication services can promote economic development is by serving as a medium that facilitates the acquisition and transportation of information in cost-effective ways while minimizing the obstacles of distance and time. The Internet will make the world a global village by interconnecting countries.

Through its quality SMS transit product, Belgacom International Carrier Services has facilitated the exchange of international SMS between African people in their home country and their relatives in other countries. Such improved communication flow has definitively strengthened again the link between dispersed relatives.

## Direct and indirect effects of telecommunications on economic development

*Diffusion of new ideas and knowledge* — The importance of new knowledge and new ideas as key elements for stimulating growth is widely accepted. The source of knowledge and new ideas can be domestic or global. If knowledge is local, telecommunications technology can be used to globalize that local knowledge. This process is known as localization: making a local idea global. Where information or an idea is made known in various countries (and usually adopted in those countries), this process is known as globalization. ICT, then, makes both localization and globalization possible. Modern telecommunications provide a cost-effective and time-efficient medium for accessing the rapid development of ICT.

*Reduction of the regional infrastructure and development gap* — The telecommunications infrastructure gap existing today between rural and urban areas gives rise to an information gap. This digital divide threatens the economic power of rural areas. Increased availability of telecommunication services can help to improve
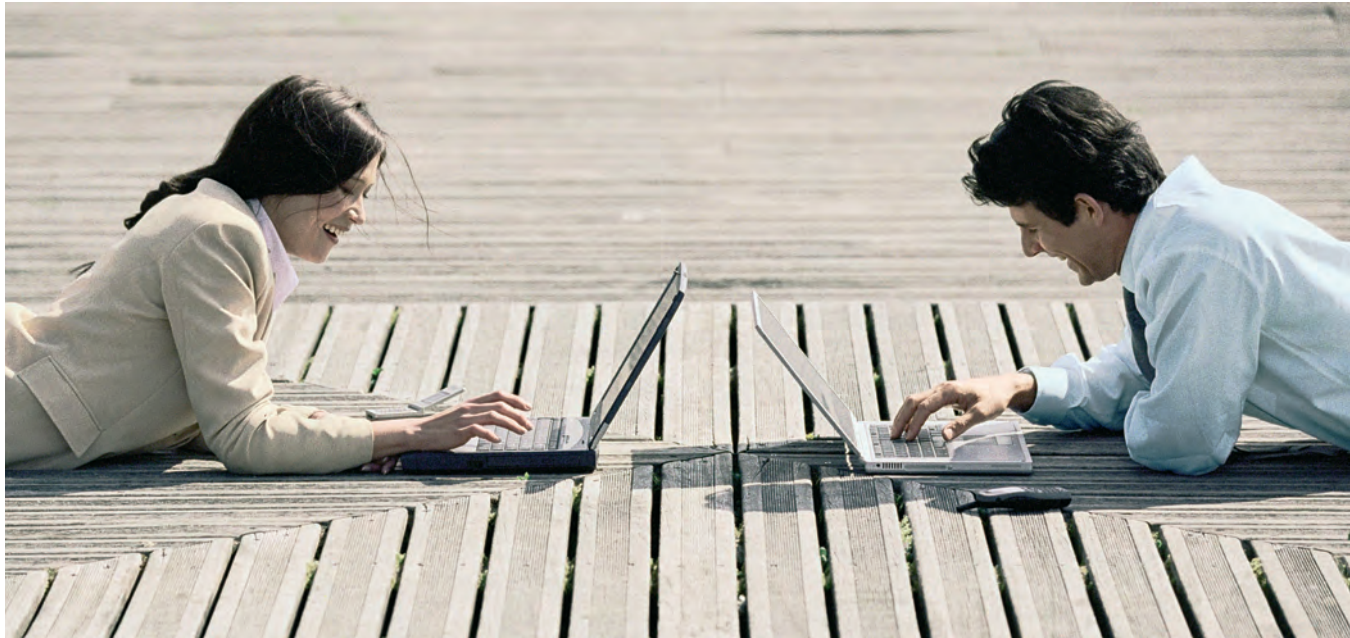
information flow between rural and urban regions and thus reduce the gap in economic development. For example, if rural people obtain more information about agricultural prices, markets and economic opportunities beyond their geographical horizon, they will be able to increase their productivity.

*Market Efficiency Effect* — By facilitating information flow and enhancing the communication between buyers and sellers, telecommunications increase the efficiency of market operations by increasing arbitrage opportunities in financial markets, which in turn lowers the capital costs of production.

*Spill-over and externality effects* — Telecommunications networks and their use generate significant spill-over effects in other sectors of the economy. The externalities involve lower search costs, increased arbitrage abilities; and more information on the distribution of prices and services. Because of these spill-overs and externality effects, the social rate of return on telecommunications is expected to be much higher than its return on just the telecommunications investment itself.

*Coordination of economic activity* — In business, this mechanism improves the capability of managers to communicate with each other and helps them to make better decisions and business plans. Telecommunications help to remove, to a great extent, the physical constraints on organizational communications in all sectors of the economy.

*Indirect effects of telecommunications on economic development* — Telecommunications contribute to economic development indirectly by improving the coverage of basic services like health, education and environment protection in a country. Telecommunication facilitates emergency medical assistance, long-distance consultation, and quality assurance to remote locations. In developing countries, there is a growing consensus that telecommunications can ease the cost of providing medical care throughout the nation, subject to a tight national budget constraint. Telecommunications also helps to spread education to remote locations. Modern telecommunications services like voice, data and video services through high bandwidth allow effective distance learning.

**The social constraints to the ownership and use of telecommunications technology for development**
In developing countries there are various social problems, which create barriers to people owning and using telecommunications and ICT. These barriers include, amongst others, illiteracy, cultural obstacles, lack of computer skills and technological know-how, lack of access to computers and computer networks as a result of the digital divide, lack of Internet access, lack of significant usage opportunities, background to increasing information equality and structural information equality.

The Internet, for example, is a good educational tool but can be expensive for poor members of society in terms of paying for all the monthly connections to the Internet service providers. Most LDCs in Africa still do not have access to the Internet, which will add to their slow development. This is exacerbated by poor telecommunications infrastructures and low teledensities. Should people have access to the Internet, they can access a wealth of information from this global service and develop many aspects of their lives. The use of the Internet by members of the general public and commercially is, however, a relatively recent phenomenon.

**A key for development and growth**
Information is the key for development and growth. Information flows can be enabled or ameliorated through the use of telecommunications infrastructure and ICT. The availability of an adequate telecoms infrastructure is key to the further development of a country, and it is the role of the developed countries to help put in place this infrastructure.

Today, developed countries already assist LDCs in the development of various ICT projects. This role should be emphasized because developed countries have the financial or economic muscle to provide development aid to LDCs without compromising their own financial standing or development plans. The International Telecommunications Union, with many members among the developed countries, assists many LDCs with the development of telecommunications infrastructures. Also, the United Nations Development Programme carries out various ICT projects in African and Asian countries, such as the development of telecentres. Together, developed and developing countries can create a richer, global village.

# Regulating telecommunications
# in Thailand

*The National Telecommunications Commission, Thailand*

A ROYAL PROCLAMATION FORMALLY established the National Telecommunications Commission (NTC) on 1 October 2004. His Majesty the King of Thailand appointed General Choochart Promphrasid as chairman of the NTC, along with six commissioners: Mr Rianchai Reowilaisuk, Professor Prasit Prapinmongkolkarn, Mr Suchat Suchavejapoom, Professor Sethaporn Cusripituck, Associate Professor Sudharma Yoonaidharma and Dr Artorn Chandavimol.

The NTC can now fully exercise its role as Thailand's telecommunication regulator, pursuant to the provisions of the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunication Services BE 2543 (2000) and the Telecommunication Business Act BE 2544 (2001).

The NTC is the first independent state telecommunications regulator. Its duties and responsibilities are to regulate all telecommunication services in the country through formulating a master-plan on telecommunications activities, setting criteria and categories for telecommunication services, permitting and regulating the use of spectrum for telecommunication services, and granting licences to operators.

At the outset, the NTC started mapping out its action plan, which is aimed at regulating and promoting telecommunication services in the country on a free and fair basis. The action plan focuses on creating transparency and non-discrimination in telecommunication services, enhancing public participation, balancing and making the best use of resources, building the telecommunications infrastructure and promoting research and development on telecommunications technology to support the sustainable growth of the domestic telecommunications industry.



CENTRE: General Choochart PROMPHRASID STANDING ROW, FROM LEFT:  Mr. Suchat SUCHAVEJAPOOM, Associate Professor Sudharma YOONAIDHARMA,  Mr. Rianchai REOWILAISUK,  Professor Sethaporn CUSRIPITUCK, Dr. Artorn CHANDAVIMOL, Professor Prasit PRAPINMONGKOLKARN, Ph.D

The following important policies were formulated by the NTC as a guideline for governing telecommunication services in the country:

*Frequency management* — Allocate fair distribution and efficient use of frequency for the ultimate benefit of the citizen and the country

*Competition* — Support market mechanisms to generate fair competition in the telecommunications market and relevant industry

*Licensing* — Grant licences to promote free and fair competition and to prevent anti-competitive conduct

*Internet* — Promote widespread Internet provision with the lowest charge or licence fee exemption

*Licensing and enforcement* — Regulate telecommunications business operation on a fair competitive basis to ensure that service charges can compete with those at a regional level, and that the services are of good quality

*Interconnection* — Establish rules for interconnection charge on a fair cost basis

*Telecommunications numbering* — Allocate efficient and adequate telecommunications numbers for network expansion and assign special numbers for public actives, national security and emergency.

*Universal service access* — Strive for equal and universal service access throughout the country

*Industry promotion* — Promote competitiveness of telecommunications industry at national and international levels by supporting research and development, and telecommunications equipment manufacturing

*Consumer protection* — Set measures that allow consumers to have choices of telecommunication services with standard quality and fair price

*Human resource development* — Promote human resource development for NTC staff.

The NTC held both virtual and actual public consultations on various key issues. Comments and advice from the general public are welcomed by posting on the website, and two public consultations have been held to receive comments and recommendations from stakeholders.

The first consultation was held on 9 June 2005, and considered the Draft Telecommunications Master Plan 2005-2007. The consultation has been divided into five groups:

*Group one* — Telecommunications Business Competition and Fee Structure

*Group two* — Telecommunication Business Licensing and Non-Business Licensing Promotion

*Group three* — Interconnection and Telecommunications Resources Management

*Group four* — Universal Services Obligation and Consumer Protection

*Group five* — Educational and Industrial Telecommunications Development and Disaster Preparedness.

The second consultation, focusing on four different regulatory issues, was held on 28 July 2005:

*Group one* — rules and procedures for telecommunications business operation licensing including types and categories of services subject for licenses

*Group two* — Universal and social services on basic telecommunications

*Group three* — Numbering plan

*Group four* — Telecommunications Business Operation licensing fee and numbering fee.

The major issues of public consultation attracted the attention of telecommunications operators, stakeholders, government sectors, financial institutions and law firms, as well as the general public. Comments and recommendations received from the consultations will be taken into account to formulate the Telecommunications Master Plan and to regulate and to promote telecommunications services in the country.

The NTC has formulated a draft Spectrum Management Master Plan as a direction and guideline for administrating the spectrum management of the country. The public consultation on the Draft Spectrum Management Master Plan 2005-2007 was held in July 2005 by the NTC in order to gather comments and recommendations for developing and regulating spectrum management in Thailand.

The Telecommunications Master Plan 2005-2007, formulated by the NTC to regulate and promote telecommunications services, was publicized in the Government Gazette from 3 August 2005 as having been implemented. In June 2005, the first Internet licence covering narrowband, broadband and Internet leased line was granted to KSC Commercial Internet. The NTC has subsequently granted Internet licences to a number of Internet service providers (ISPs), which do not have their own network on which to operate their businesses.

On 4 August 2005, the NTC celebrated the 122nd anniversary of National Telecommunications Day and granted six telecommunications operating licences. Type I and Type III were given to TOT and to CAT Telecom, the incumbent telecommunications operators, under the Telecommunications Business Act.

The granted licences cover the existing telecommunications services, having been operated by those two companies. The licences provided to TOT are for fixed-line, ISDN, 470MHz and 900MHz mobile phone, Internet, trunk mobile, paging, international phone, leased line, audiotext and card phone services.

CAT Telecom was offered licences on a number of services such as CDMA 800, 1800, maritime and aviation radio, trunk mobile, satellite communications, international phone, data communications and Internet services.

To promote telecommunications business in Thailand, NTC has striven to achieve the following key missions.

1. Detailing, within 180 days, as from September 1, 2005, the terms and conditions for telecommunications business licensing, having been granted to CAT Telecom and TOT

2. Prescribing rules and procedures on licensing issuance for the third-generation mobile phone (3G), international gateway, and satellite network, approximately by the end of the year 2005

3. Setting up the telecommunications business-licensing fee, interconnection, numbering plan and competition code for regulating the telecommunications industry

4. Enhancing equal access to the existing networks of all operators under the interconnection framework as well as prescribing rules for settling disputes arising from interconnection.

5. Prescribing rules on competitive safeguards to prevent anti-competitive behaviour.

6. Targeting, within the Universal Service Access framework, the establishment of community access points for public telecommunications services such as health centres, schools and religious houses, as well as bringing advantages to handicapped persons, children and the elderly, to ensure universal access to the infrastructure and applications.

7. Drafting rules and procedures governing universal and social services on basic telecommunications.

# Redefining communication, transforming India

*Reliance Infocomm*

CAST YOUR MIND back a bit, to the mid-1990s. The only means of communication a lay Indian had was a landline phone fixed either at home or in the workplace. Once away from these premises, he or she was totally unconnected from family, friends and workplace. The Internet was an enigma. Not many people had heard of "wireless" and "mobile phone." Talking or surfing on the move was something people thought was possible only in a *Star Wars* or a James Bond movie.

Today, all of this and much more has become possible. More Indians today own a mobile phone than ever before. And the number is growing rapidly. And, why would it not? People use a mobile handset today not only to talk, but also to get news updates including blow-by-blow cricket reports; to trade, shop, and bank online; to check availability and book railway tickets; to get the results of key state and national level examinations; to surf the Internet from anywhere and everywhere and at any time of the day. Traders or those interested in commodities can check prices online on a real time basis using a mobile handset.

For their part, enterprises are able to do things thought impossible in the past, certainly at today's costs. They can hire the best talent, literally from their boardrooms, using multi-city video-conferencing infrastructures put up by new-generation operators

including Reliance Infocomm. More and more companies, large and small, are using the same infrastructure for sales and review meetings. Fast moving consumer goods and automobile manufacturers are connected with vendors and dealers on a real time basis, and this is leading to massive savings for them in inventory and related costs. All this has led to significant capital formation in the country.

Today, India is the second fastest growing market after China. It has the same number of subscribers today that China had some five years ago. China's success stems from its economic policy. Economic growth was accorded top priority in the late 1970s and early 1980s. China identified telecommunications as a key industry almost a decade earlier than India did, and started directing resources including foreign investment towards the deployment of networks — both landline and mobile. India, in contrast, was a closed economy until recently, with heavy regulation in the telecom industry. Until as late as 1998, two licences each had been auctioned to private entities in each of its 23 telecom circles (markets).

Service providers have unleashed a digital revolution in a country of over one billion people, with some 8,000 companies listed on the stock exchanges. Gnawing at the digital divide marks

**Mobile subscriber growth**
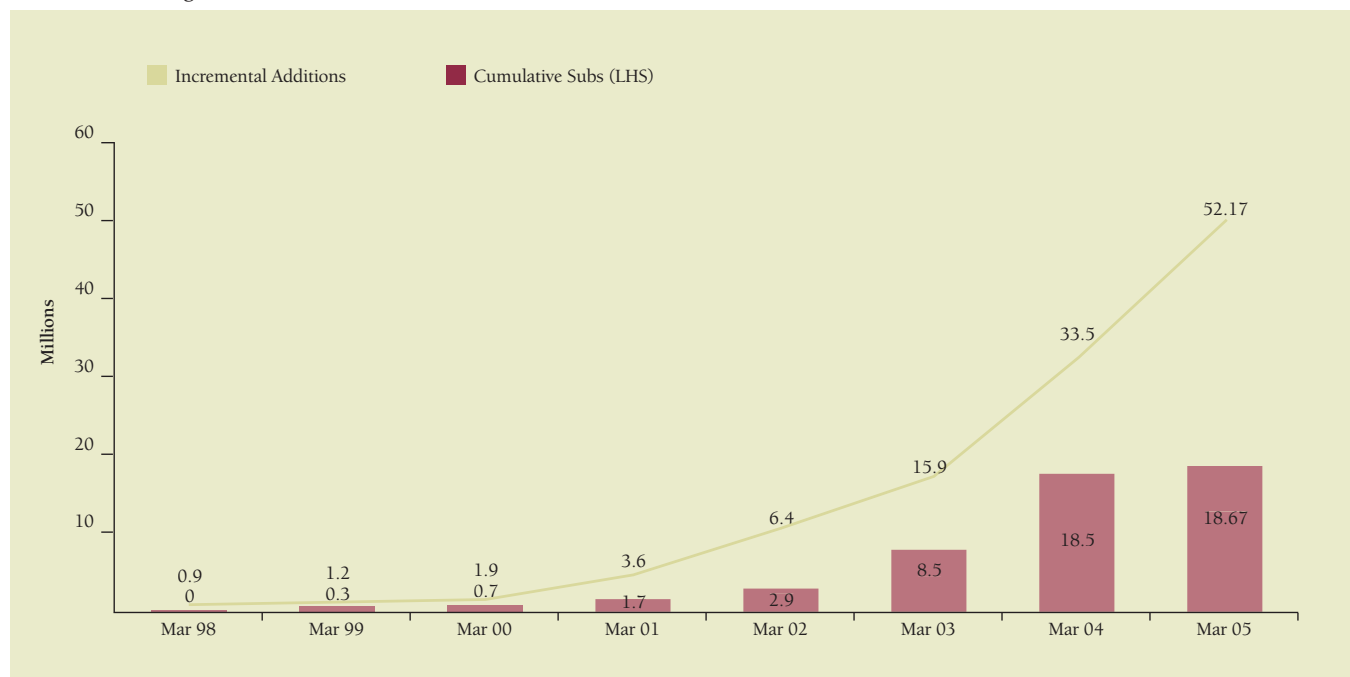
every aspect of it, from learning to health to entertainment to commerce to governance.

**So far…**

The role of information technology in a country's economic development and growth cannot be overemphasized. India's Planning Commission stated in its 'Vision 2020': "The shift from material to knowledge-based resources opens up vast opportunities for developing countries to accelerate the pace of development. India's rate of economic growth can be substantially increased if the country becomes a superpower in knowledge and if the potential of information and communication technology are fully understood and exploited."

Reliance Infocomm was among the service providers that understood quite early on the pivotal role that information and communication would play, not only in helping India to grow, but also in sustaining it. That information can help bridge the digital divide between urban and rural areas and create an equitable Information Society.

There are now 57 million mobile phone users in the country. In March 2003, there were 13 million. The country then had a mobile phone density of 1.22, fixed line density of 3.88, and a total density of 5.10. Today the figure is nearing 10. There were 3.64 million Internet users in the country in March 2003, compared with six million today.

Service providers have contributed to this growth in large measure. In less than two years, Reliance Infocomm has gained 10 million subscribers to emerge as India's largest private sector telecom service provider, with a total of 12 million subscribers and a 20 per cent share of the mobile market.

With high tariffs and handset price, a mobile phone was a luxury barely two years ago. Today it is something that is increasingly making users' lives easier. Phones are no longer a luxury; in fact they have become a part of daily life for everyone. The cross section of users across India, depending on the need and the capacity to pay, varies from school-going students to top business executives, from small vendors to corporate houses, from agriculture farmers to traders, from housewives to working women.

**Careful planning for the future**

Experts acknowledge that the success of service providers has resulted as much from careful planning as from the rigorous execution of those plans. Reliance Infocomm founder Dhirubhai Ambani would say that if you want every Indian to afford mobile communications, make mobile phone calls cheaper than a post card. A mobile phone call today costs 40 paise per minute, a far cry from 1995, when the first cellular call was made in Calcutta (now Kolkata) at Rs 16.80. While many companies ramped up in desultory, sporadic stop-and-go bursts, Reliance Infocomm launched its services nationally only after it had first established an infrastructure that encompassed 60,000 route kilometres of terabit-capacity optical fibre cable, providing a national network that could support unlimited voice, data, and video traffic.

Given the kind of voice, data, and video content it wanted to transport over its network in the years to come, Reliance went for a pan-Indian, high capacity, integrated (wireless and wireline) and convergent (voice, data and video) digital network, designed to connect every individual, home and office in India with one another and the world through a terabit optic fibre digital distribution system. CDMA 2000 1X network technology was fully data enabled with high-speed data capabilities across the network and was capable of supporting multimedia applications on millions of Reliance India Mobile (RIM) handsets. The network was unified and not fragmented.

**Narrowing the digital divide**

Be it education, health, entertainment, communications, or governance, the national infrastructure has been able to make many people's lives easier. Useful services and applications across these areas continue to be introduced. Mobile data and multimedia services like R World from Reliance Infocomm contain a growing number of applications in everyday use — for example, commodity prices, railway reservations and mobile commerce like bill payments and exam results. High-speed wireless Internet services (Reliance's service is called R Connect), are giving users Internet access anywhere at anytime, even while on the move.[1]

Reliance Infocomm's services are accessible to about 50 per cent (2,800 towns) of the rural and semi-rural towns, and 75,000 villages. The second phase of the digital revolution envisioned by Reliance begins with the rollout of real broadband, capable of delivering 100 Mbps to Gigabit bandwidth across the country. Through innovative use of leading-edge technologies in the fields of fibre optics, Ethernet, microwave radios, switching, routing, digital compression and encoding, a new benchmark is being set for the world to follow. Mass rollout of broadband, offering speeds of 100 Mbps to millions of people across the vast geography of India, is a major technological breakthrough.

Reliance Infocomm is proud of its broadband initiative because the entire nationwide network has been built from scratch to bring about a digital revolution in India. The network is designed to deliver affordable and quality education, governance and healthcare to millions across India; to improve the efficiency of businesses and generate millions of new jobs; and to put India at the centre stage of the world. Broadband applications like e-Education have the potential to revolutionize Indian society. It can help transcend traditional barriers to development, like a lack of capital, infrastructure and the challenge of distribution in a vast country like India.

*e-Education:*

With real broadband connectivity, educational institutions can and have been able to source the best study material from anywhere in the world. Libraries and laboratories across the country and the world can now be linked to each other for a seamless exchange of information and learning. One can e-attend lectures at Oxford from Teynampet in Chennai. Teachers will be able to share knowledge with their peers from across the world.

But the reality is that huge disparity marks the country's educational landscape. Most educational installations are located in metros. Despite the government's best efforts, education has not been nationalized in reach.

Through the e-learning platform, Reliance Infocomm is using its vast retail network and massive bandwidth capacity to impart high quality education as and where it is needed. The company's broadband-enabled 241 Reliance WebWorld stores, located in 110 cities, double up as classrooms that can accommodate 10-15 students at a time. Currently, a Xavier Institute of Management, Bhubaneswar management course is being offered to students across these locations, with the aim of using the infrastructure to pump in more specialized courses in the future.

*e-workplace:*
With real broadband, distance no longer hampers your work. Geographies and boundaries have become inconsequential as voice and data are transferred in real time between computing devices. Collaboration at work has taken on a new meaning. With video conferencing, it makes no difference whether your colleague sits in the cubicle next to you or thousands of miles away.

*e-transactions:*
Now that one can buy railway and airline tickets, pay bills, and conduct bank transactions from any desktop, laptop or handset, standing in a queue for hours has become a thing of the past for many Indians.

*e-healthcare:*
With real broadband, a new generation of online healthcare delivery system is now available that can provide new dimensions to existing medical services and open up new areas of medical services that were hitherto non-existent. Medical expertise is no longer confined by geography. Even an ordinary Indian now has access to the best global medical advice and treatment on a real time basis, something that has until now been a preserve of only a few.

Medical records and documents can be digitally sent across thousands of miles in a flash, as well. This is sure to redefine the logistics of medical care.

Reliance Infocomm's recent tie-up with Apollo Group of Hospitals is a case in point. The arrangement enables the group to make its healthcare available to millions of ordinary Indians through Reliance WebWorld's 241 outlets across India using videoconferencing. Apollo Hospitals is synonymous with the best in healthcare in India.

*e-entertainment:*
Reliance Infocomm offers, or is close to offering, next generation interactive televisions, digital cinema, and e-homes. Services

- Over 200 content partners and over 10,000 content items
- Over 15,000 individual and corporate registered application developers
- Over 250 applications & 64 games live on 'R World'

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like Netway are set to redefine home entertainment and bring distance learning, remote health care, e-governance, smart home controls, video-on-demand and numerous other digital applications into millions of Indian homes.[2] Interactive television services like this enable users to, for example, 'pause' live television. Reliance has patented a remote control that for the set-top box, whose functions include a VoIP telephone handset, Karaoke microphone and keypad for surfing the Internet or typing e-mails.

Netway also ushers in the convergence of television and Internet. Users will be able to surf the web at super speed and compose e-mails on their television. Other features include access to a wealth of information, from travel guides, quizzes and health and fitness information, to documentaries on various topics. Services like these provide a gateway to a new digital way of life for Indians.

*e-markets:*
Mobile technologies enable users to buy and sell products in real time, anywhere in India, and to get the best value for their products and services from far and near. Mobile phone users, especially traders, are reaping rich economic benefits because of reduced traveling and faster decision making. Using his mobile phone, a fisherman in Kerala State, still fishing in deep seas, can find out which market will offer him the best price. Likewise a fruit merchant in Mumbai can keep a tab on alphonso (a type of premium mango) yield in far away Konkan. There are many such examples of small traders benefiting from the mobile revolution.

*BPO:*
Workers can communicate with clients abroad from anywhere in India. Industries like telemarketing, medical transcription, back office accounting, legal research and animation are gaining momentum over the digital infrastructure across the country. Localization of this industry is no longer confined to metro cities. It is now moving to smaller cities where low cost, quality manpower is available in abundance. This is helping to extend ubiquitous job opportunities across the country.

*e-governance:*
Local, state, and central governments and citizens can use pannation and high-capacity networks like Reliance's for e-governance. People can use it to check their land record from home without having to go to the local government office. Likewise, they can lodge a complaint and also get a response from a distance. The model can be replicated at other levels of government too.

**Lower costs for accessibility**
Analysts say that the success of the mobile multimedia revolution is as much due to companies' ability to lower the cost of owning and operating a mobile phone as it is to a far-reaching vision. On the cost front, service providers owe their success to economies of scale and the innovative bundling of handsets and tariff. Reliance Infocomm was able to take advantage of these factors to reduce the entry cost and help open up this vast new market.[3] We are now working overtime to connect 400,000 villages and 5,700 cities and towns by December 2005, and we expect the benefits of the Internet revolution to permeate deeper into rural India, bridging the urban and rural digital divide.

# III

## WSIS FOR DEVELOPMENT

# ICT fuelling development through the eyes of the women of Siwa Oasis in Egypt

*Ministry of Communications and Information Technology, Egypt*

SIWA, ONE OF five oases in the Western Desert of Egypt, stands out with its own language and tribes. An oasis of surprises in a spectacular desert landscape, Siwa is located 320 kilometres from the closest urban area and eight hours' drive from Cairo. The modern town of Siwa is set among thick palm groves, walled gardens and olive orchards, with numerous freshwater springs and salt lakes. Siwa also clusters beneath the impressive remains of the ancient fortress town of Shali. As beautiful as the oasis of Siwa might be, it presents a challenging environment for the development of its inhabitants. The oasis has long been remote geographically, culturally and politically.


Siwa women can access ICT in the context of their traditions

The women of Siwa still wear traditional costumes and silver jewellery, and have their own culture and tradition that makes them unique among Egyptian communities. Although the culture of Siwa is characterized by great respect for women, the society is very conservative even by regional standards. Gender roles are strictly defined, and gender segregation strictly enforced. Girls still find it difficult to receive education and are usually married off at a young age. Married women are not allowed to leave their homes and, when they do, adhere to a strict dress code. This special nature of the Siwa community underlines the importance of helping women to participate in the oasis' social development, within the context of their traditional patterns.

It is not easy to find ways and means by which ICT can address these problems. Several initiatives in remote areas have not realized this fact, and assumed that a 'push to technology' is sufficient. Such approaches have neglected to realize the importance of contextual, educational, institutional and financial sustainability. This is especially true with educational infrastructure, where pedagogical issues need to be considered. This has lead to the consensus that access alone will not provide solutions that are both genuine and effective. In addition, an important element that needs attention is the human factor, which includes individual users and communities at large.

**NGO management for smart schools**

The story of deploying ICT for development in Siwa started with the implementation of the Smart Schools Network (SSN) pilot project. The SSN, one of the projects of Egypt's ICT Trust Fund, linked the school and the education objectives with community needs. The project was facilitated through Siwa Community Development and Environmental Conservation (SCDEC), a local non-governmental organization (NGO), which assumed the management of the project. SCDEC is well rooted in the community and well positioned to play the role of a catalyst to introduce ICT tools in education. In addition, the organization possesses a wider vision to use the schools as possible tools, not only to enhance the educational and teaching methods within the school itself, but also to improve the quality of life of its surrounding community. NGO management proved to be a viable model to manage smart schools in remote and deprived areas.

The model was built around active community participation from the early stages. Local contractors took the responsibility of facility preparation and the renovation of school labs using local resources. This increased the sense of community owner-

Beautiful Siwa


Palms in Siwa

ship of the school IT infrastructure while reducing significantly the implementation cost. Local staff were hired, maintaining the gender balance to cater to the underrepresented female segment of the local society and to help empower women in Siwa. School principals, teachers and students started to get exposed to high-speed Internet and to advanced educational digital content introduced into the oasis for the first time through the project.

The project also applied different methods to reduce the cost of introducing ICT in education. Open source software and innovative hardware solutions were used, including the '4-for-1' computer model, where four students share the same CPU with separate monitors, keyboards and mice.

The Community Development Portal and the Community Knowledge Generation and e-Library (CKGeL) project witnessed a huge influx of content from the community. Communities started to mobilize in exploring new opportunities for socioeconomic development. Teachers, students and other community members such as farmers, traders and youth are developing an understanding of how to use ICT resources to respond to their immediate needs, such as date and olive exports, attracting tourism, combating environmental pollution, and documenting cultural and natural heritage. Technology is now considered more accessible and relevant to the day-to-day life of local communities in Siwa.

Another project of the Egypt trust fund, ICT for Basic Literacy, was deployed in Siwa. Illiteracy eradication classes were conducted in the schools. In addition, when the issue of extending the outreach to local women was raised with local leaders, they suggested that a separate women's working group, conducted by a trusted female community development expert, be organized in a private home. The project management developed ways to adapt the in-home training facilities to local customs and house organization.

Most of the women were interested to learn more about computers, as it would help improve their economic status, and their awareness of information on subjects of interest, such


A view of Siwa

as the raising of children. Several initiatives of the Egypt ICT Trust Fund have been integrated in Siwa to provide a holistic and people-centred approach to the introduction of ICT for development. Such an approach is necessary to help communities understand and appreciate the potential and possibilities that ICT, and new technology in general, offers. The implementation approaches adopted also overcame hurdles of local culture to empower women. These initiatives also go hand in hand with those of the Ministry of Communications and Information Technology in Egypt, among which are broadband access, free Internet, IT clubs, and the goal of having a PC in every home.

# The convergence of summits: the 2005 World Summit and the World Summit on the Information Society

*José Antonio Ocampo, Under-Secretary-General of the Department of Economic and Social Affairs, and Chairman, UN ICT Task Force*

THE YEAR 2005 is drawing to a close. Will history look upon this time as a turning point in human welfare and development or as a missed opportunity? It is too soon to tell, but not too late to act.

The Member States participating in the second phase of the World Summit on the Information Society (WSIS) are slated to agree on steps to build the inclusive, people-centered and development-oriented Information Society envisioned in the Geneva Declaration of Principles and Plan of Action. Thousands of representatives from governments, civil society, the private sector and intergovernmental organizations will gather in Tunis to add their contributions towards realizing this ambition.

At the 2005 World Summit, which was convened only a few weeks earlier in September, Heads of State and Government from around the world committed themselves to action to meet the Millennium Development Goals (MDGs) and to address the formidable challenges and threats of the 21st century outlined in the Secretary-General's report *In Larger Freedom: Towards development, security and human rights for all.*

These two summits may appear to be separate streams, but their goals are, in fact, closely intertwined. A universal Information Society is not conceivable in a world that is deeply divided between the affluent few and the majority who live in abject poverty. The recent United Nations Department of Economic and Social Affairs (UN DESA) *Report on the World Social Situation*[1] testifies that 80 per cent of the world's gross domestic product belongs to only one billion of its five billion inhabitants, evidence of an inequality predicament that has only become more profound and complex in recent decades. The report states that disparities in income distribution and in access to productive resources, basic social services, opportunities, markets, and information can cause and exacerbate poverty.

WSIS attempts to address at least one key dimension of this predicament head-on by reducing inequality in access to information. However, the persistence of the intergenerational transmission of poverty demands a broader approach to poverty reduction in social, economic and political dimensions, integrating improvements in health, education, economic development and representation in legislative and judicial processes. The *UN DESA Report on the World Social Situation* states that it is the implementation of policies in these areas that contributes to the development of human capital, enabling the poor to realize their full productive potential. Information and communication technology (ICT) can and must be a significant part of the solution. Policies designed to enhance the role of ICT in development have created new avenues for reducing poverty, especially through the beneficial effects they have on mainstream development objectives such as improving health, education and living conditions. Ultimate success in meeting the MDGs will demand the strategic, intensive, widespread and innovative use of science and technology, especially ICT, in development policies and programmes — and not just goal-by-goal but across and among all the MDGs.

In his report *In Larger Freedom*, the Secretary-General expressed his optimism about the world's capacity to meet the MDGs: "The unprecedented combination of resources and technology at our disposal today means that we are truly the first generation with the tools, the knowledge and the resources to meet the commitment, given by all States in the Millennium Declaration, 'to making the right to development a reality for everyone and to freeing the entire human race from want.'"[2]

This conviction has taken hold over the last decade. A 1998 United Nations General Assembly resolution recognized that the information revolution, and in particular the Internet, was having a profound impact on the global economy and on development, and agreed that ICT should be leveraged to promote economic and social welfare. Acting upon this, the Economic and Social Council (ECOSOC) devoted the high-level segment of its 2000 substantive session to the theme "Development and international cooperation in the twenty-first century: the role of information technology in the context of a knowledge-based global economy". Pursuant to ECOSOC's decision of March 2001, the United Nations Secretary-General established the ICT Task Force, the first body created by an intergovernmental decision of the United Nations in which all members — governments, the private sector, civil society and multilateral institutions — have equal rights and responsibilities. The ICT Task Force was designed to provide a platform for bringing together not only different stakeholders, but also different constituencies within each stakeholder (such as different ministries within a government), in open and inclusive discussions on ways to enhance the impact of ICT on development.

With such a mandate, it is natural that the ICT Task Force has contributed to WSIS in many ways, the most important of which had been helping to place development, rather than technology, at the heart of the Summit. Through its regional networks in

Africa, Asia, Latin America and the Caribbean, the Arab States, and Europe and Central Asia, the Task Force organized events around the developing world in order to bring regional perspectives to WSIS. The ICT Task Force also held several parallel events during the Geneva Summit and participated in the ICT for Development (ICT4D) Platform, incorporating various stakeholder perspectives into the process as well as making substantive contributions to discourse on ICTs-for-development.

The Task Force organized global forums on key substantive issues of relevance to WSIS, including Internet Governance, An Enabling Environment for Digital Development, and A Multistakeholder Approach to Harnessing the Potential of ICT for Education. The ICT Task Force has, thus, used its convening power and influence to link the ICT4D agenda to the broader United Nations development agenda emerging from major UN summits and conferences and that guides the work of the UN system and its partners.

The ICT Task Force has also supported a number of successful initiatives independent of the WSIS process. Through a programme with partners UNITAR and Intel, hundreds of diplomats in New York and in capitals have completed the Policy Awareness and Training in Information Technology series. The Task Force supports the work of the Wireless Internet Institute in delivering a global programme aimed at accelerating the adoption of wireless Internet in support of universal connectivity. The Global e-Schools and Communities Initiative , now an independent organization with a secretariat headquartered in Dublin, was originally a joint project of the Working Groups on Low Coast Access and Connectivity and on Human Resources Development and Capacity-building. And the Task Force actively participates in the Partnership on Measuring ICT for Development, led by the United Nations Conference on Trade and Development (UNCTAD), in particular through contributions by the Task Force's Working Party on ICT Indicators and MDGs Mapping.

During the second phase of WSIS in Tunis, the Task Force will continue actively to contribute to the success and sustainable development impact of the Summit, by releasing a number of substantive publications, holding a series of parallel events organized with partners and taking part in the ICT4All exhibition.

The ICT Task Force will complete its term in December 2005. Recent discussions, including those within the context of the WSIS, have reiterated the need to sustain and strengthen substantive dialogue on ICT4D-related issues in a global, multi-stakeholder, cross-sectoral, open, inclusive and transparent manner. Surely, achieving the Summit's ambitious objectives will require multi-stakeholder cooperation and the deployment of all available resources in a coherent and collaborative manner. While an intergovernmental Summit follow-up process is indispensable, there is a need for complementary multi-stakeholder processes that support and add value to intergovernmental efforts.

We therefore believe that a mechanism — a global, inclusive, multi-stakeholder undertaking under the umbrella of the United Nations — is needed to link the ICT agenda with the broader United Nations development agenda and follow-up to the Millennium Declaration, most recently examined at the September 2005 World Summit.

Any succeeding entity or network should build on the experience and advance the work of initiatives such as the G8 Digital Opportunity Task Force (DOT Force), the UN ICT Task Force and the WSIS process, providing a platform for cross-sectoral policy and partnership dialogue with the full and equal engagement and collaboration of all stakeholders representing all relevant constituencies from all parts of the world. It should make full use of and cooperate with existing institutions and networks and their forums, and complement and contribute to the WSIS follow-up and implementation. Its principal task should be to serve as a think-tank and promote dialogue and exchange of experience on global ICT4D and Information Society issues, thus contributing to the effectiveness and development impact of these entities and initiatives.

As we implement the outcomes of both the Geneva and Tunis phases of WSIS, we must confront the painful paradox of extreme poverty and human suffering alongside the availability of immense resources and technology. Technological solutions to many development problems are known but remain inaccessible to those who would benefit most. Among the solutions, ICT provides platform technologies with a fundamental impact on the various sectors of society, culture and the economy. As little as a decade ago, ICT was considered marginal to the issues of economic growth and poverty reduction. Since then, scepticism has diminished. ICT is now seen as a powerful enabler of development goals.

WSIS has provided a highly visible forum for discussing and advancing this critical role of ICT in achieving the MDGs and putting ICT4D issues on the 'radar screens' of policy makers at the national, regional and international levels. We, the participants, now have a duty to ensure that the energy generated by the World Summit on the Information Society does not dissipate, that the issues do not recede from the policy agenda, and that the vision and action plan do not go unfulfilled. To maximize the impact of our efforts, we should ensure that they are complementary to the outcome of the 2005 World Summit, helping to deliver "freedom from want" through the effective use of science and technology, especially ICT, for empowering people everywhere and advancing their well-being.



José Antonio Ocampo, Under-Secretary-General of the Department of Economic and Social Affairs and Chairman of the UN ICT Task Force

# Information Society:
# regional initiatives and activities

*United Nations Regional Commissions*

INFORMATION AND COMMUNICATION technology (ICT) is an increasingly important tool for social and economic development and is the driving force behind the transition towards economies and societies based on information and knowledge. For developing the transition economies, ICT can provide a means to leapfrog some long and painful stages in the development process, and help to stimulate growth and prosperity.

The United Nations Regional Commissions — the Economic Commission for Africa (ECA), the Economic Commission for Europe (ECE), the Economic Commission for Latin America and the Caribbean (ECLAC), the Economic and Social Commission for Asia and the Pacific (ESCAP), and the Economic and Social Commission for Western Asia (ESCWA) — are playing a leadership and catalytic role to provide digital opportunities and harness the growth potential of ICT. They provide an interface between different ICT layers and the development community, bringing together public and private sectors, foundations and donors to develop initiatives and modalities aimed at building ICT capacities for developing countries and countries with economies in transition.

The regional perspective is an indispensable intermediate stage in bringing together national particularities and global requirements for the Information Society. This has been demonstrated during the Geneva 2003 WSIS process, especially by the regional consultations and negotiations that resulted in the Declarations of Bamako (Africa), Bavaro (Latin America and the Caribbean), Beirut (Western Asia), Bucharest (Europe and North America) and Tokyo (Asia Pacific), which provided major inputs for the WSIS Declaration of Principles and Plan of Action.

This has continued with the preparation of the second phase of WSIS as a result of the regional conferences held in Brazil (Latin America and the Caribbean), Ghana (Africa), Greece (Europe), Islamic Republic of Iran (Asia and the Pacific), and Syria (Western Asia), with concrete Regional Action Plans and Roadmaps.

As the world prepares for Tunis, the role of the Regional Commissions will be critical more than ever in the implementation of the Regional Action Plans that will be adopted in Tunis, where the work on building the Information Society will gather momentum.

The post-Tunis phase will require technical assistance, capacity building and training, facilitating peer dialogue, exchange of experience and promoting good practices; and in the implementation of national and regional Information Society strategies and roadmaps.



ECA has implemented the Africa Informal Society Initiative (AISI)

**United Nations Economic Commission for Africa**

ECA, based in Addis Ababa, Ethiopia, is the regional arm of the United Nations Secretariat, mandated to support the economic and social development of its 53 Member States, foster regional integration, and promote international cooperation for Africa's development.

ECA is a key pioneer in the area of ICT for development, implementing the Africa Information Society Initiative (AISI) — an action framework for promoting Africa's digital agenda adopted by the Conference of Ministers of Planning and Economic Development in 1996 and subsequently endorsed by African Heads of State. Major activities include the development of national e-strategies for socioeconomic development and current activities.

E-policies/e-strategies — ECA has been assisting some 28 African countries in developing national e-strategies through the National Information and Communication Infrastructure Plans, to address MDGs and national Poverty Reduction Strategies. ICT strategies have been introduced at sector-wide levels including support for public administration (e-government), commerce/trade, agriculture as well as health and education. At the sub-regional level, activities are underway to facilitate the harmonization of national strategies and regulatory frameworks in collaboration with the Regional Economic Communities. Measuring the impact of the Information Society is being undertaken through the Scan ICT initiative to build statistical capacity of Member States and use ICT indicators for development.

Information and knowledge resources — this entails building the capacities of African policy makers, civil society organizations, the private sector and institutions through workshops, training and exhibitions led by the Information Technology Centre for Africa. Through VarsityNet, ECA is supporting the research and development capacity of African universities and research institutions for applications to serve African interests. A WSIS African Academia Research Network has been in operation since 2003 where leading researchers are working on four themes: ICTs and Industrialization; African Languages and Cyberspace; the Enabling Environment; and Measuring the Information Society. The African Virtual Library and Information Network (AVLIN) provides Internet-based information and knowledge resources and services to assist Member States and their institutions. The Commission's Geo-information Programme is increasing its work to promote geo-spatial data sharing and integrating geo-information policy into e-strategies and plans, as well as fostering public participation in geo-information management.

Partnership and networking — under the broad framework of the Partnership for ICTs in Africa (PICTA), ECA works with partners such as the Finnish Government, Industry Canada, European Commission, German Technical Cooperation, Swiss Agency for Development and Cooperation, International Development Research Centre, International Institute for Communication and Development, and Ford Foundation. Other partnership mechanisms and activities include implementing the regional node of Global ePolicy Resource Network (ePol-Net Africa) to ICT policies — collaboration between ECA, Industry Canada and the Canadian ePolicy Resource Center (CePRC). ECA is also the regional focal point for the Global Knowledge Partnership in building multi-stakeholder partnerships for the Information Society, and provides secretariat support for the African Stakeholders Network of the United Nations Information and Communication Technology Task Force. ECA is also working with the International Institute for Geo-Information Science and Earth Observation (ITC), the Global Spatial Data Infrastructure Association, EIS-Africa, and the International Federation of Surveyors to mention a few, in implementing the Geo-information programme.

Outreach and communication entails a series of activities to promote AISI goals, involving key stakeholders, including academia, civil society, media, MPs, private sector, women's groups and the youth. Information outputs produced to promote and create awareness include the ICT for Development video documentary *Africa Goes Digital* and the award-wining AISI radio series, newsletters (iConnect Africa, PICTA bulletin), briefing papers and web resources.

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**Implementation of WSIS Geneva Action Plan**

As part of the African Information Society Initiative (AISI) framework, ECA has been mobilizing Member States for their active participation in the WSIS process starting with the first regional conference for the Geneva World Summit on the Information Society (WSIS) held in Bamako in 2002. The Second Africa Regional preparatory conference held in Ghana under the theme of "Access: Africa's key to an inclusive Information Society" in February 2005 brought together over 2,000 delegates, including governments, civil society, private sector, media and academia as well as representatives of the international community, to prepare an African Regional Plan of Action (ARPoA) for the second phase of the Summit (WSIS II) scheduled in November 2005 in Tunis. Among the high-level delegates was His Excellency Paul Kagame, President of the Republic of Rwanda, His Excellency Mohammed Ghounnushi, Prime Minister of Tunisia, and His Excellency Mr Yoshio Utsumi, Secretary-General of the International Telecommunications Union (ITU), as well as ECA's Executive Secretary KY Amoako. The event was supported by ECA's key partners and the outcome was the Accra Commitments, which is serving as a roadmap for Africa for the Tunis phase and beyond, focusing on development orientations, resource mobilization including human resources, international cooperation, with concrete operational aspects.



AISI activities include the development of national e-strategies for socioeconomic development

**United Nations Economic Commission for Europe**

UNECE provides a regional forum for cooperation among its 55 member countries in Europe, North America and Central Asia. Working to forge tools of economic cooperation, it brokers international agreements to define standards for trade, transport and environment; supplies statistics as well as economic and environmental analysis; promotes sustainable energy, industry and enterprise development throughout the pan-European region; and raises awareness and promotes a dialogue on mainstreaming gender into economic policies and ICT. The UNECE also provides related capacity building and technical assistance, where high priority is given to assisting its member countries with economies in transition.

In November 2004, UNECE, jointly with ESCAP, UNDP and the Secretariat of the UNICT Task Force, supported the organization of a conference on the Information Society in Central Asia and Regional Cooperation in ICT for Development, which was hosted by the Government of Kyrgyzstan. To address the gender digital divide, a publication on access to financing and ICT for women entrepreneurs was prepared. It includes good practices and policy recommendations to be considered by governments and other stakeholders in the process of mainstreaming gender into ICT policies for small and medium-sized enterprises (SMEs).

In early 2005, to promote public participation in environmental decisions, the Meeting of the Parties to the Aarhus Convention adopted Recommendations on the more effective use of electronic information tools to provide public access to environmental information, which give practical effect to the conclusions of the first phase of the WSIS relevant to the promotion of environmental democracy. In May 2005, the theme of ICT for Development was included in the UNECE-ESCAP Work Plan in Support of the UN Special Programme for the Economies of Central Asia. Then, on 30 June and 1 July 2005, the UNECE, together with the Greek Government, the Stability Pact for South Eastern Europe and United NAtions Development Programme held a WSIS Thematic Meeting and South-East Europe Ministerial Conference as part of the joint preparations of the countries of South-Eastern Europe for the WSIS meeting in Tunis.

Implementation strategies to exploit the benefits of ICT are being developed by UNECE in areas such as:
- Trade, where standards and tools for electronic business and trade facilitation are being developed, including a project for UN electronic trade documents (UNeDocs) and standards for the electronic exchange of administrative and trade data
- Electronic data reporting/dissemination, management of statistical information systems, data editing, disclosure control, registers for business demographics and social statistics
- Environmental governance, where electronic tools are being developed to strengthen public access to environmental information and encourage digital democracy
- Intelligent transport systems, vehicle safety devices and computerized transport documents
- Support for SMEs on the efficient use of ICT and their participation in the Information Society
- Measures to support a gender-sensitive Information Society.

These actions are aimed at encouraging and providing opportunities for people to participate more in the knowledge-based economy and promoting an enabling environment of legislation, regulation and policies throughout the North American and European region.

Website: www.unece.org
E-mail: info.ece@unece.org

In support of the WSIS process, UNECE brought together all stakeholders at the Pan European Regional Ministerial Conference on WSIS in November 2002 in Bucharest, Romania. UNECE was instrumental in developing a Ministerial Declaration, which was adopted by the meeting, as well as a set of principles and priorities for the Information Society providing a substantive input to the WSIS process. UNECE also played a lead role in organizing a round table on gender and ICT, which contributed to strengthening the gender perspective. The Information Economy Report, E-Policy Development in Transition Economies 2002-2003, was also launched at WSIS Geneva to assist Member States in developing and implementing e-strategies, e-policies and e-regulatory frameworks for a knowledge-based economy.



One aspect of the UNECE's work is the promotion of dialogue on mainstreaming gender into economic policies and ICT

## Economic Commission for Latin America and the Caribbean

ECLAC is the UN Regional Commission for Latin America and the Caribbean, dedicated to promoting economic, social and sustainable development in the region, reinforcing relationships among countries and with other nations of the world. Founded in 1948, ECLAC (CEPAL in Spanish) has 42 Member States and seven associate members. Its Information Society Programme counts on the financial support of the European Commission, through its @LIS(Aliance for the Interactive Society programme and the International Development Research Centre, especially ICA-Panamericas. ECLAC's activities in the area of Information Society include:

In-depth analysis of public policies — research priority is on national strategies for the Information Society and the socio-economic impact of ICT on development. Work is focused on institutional building and coordination mechanisms and financing and regulatory instruments that may facilitate and expand ICT access and infrastructure — e-government and public information and production of ICT based goods and services.

Technical cooperation — ECLAC has set up technical cooperation projects with various countries in the region, especially in the field of national strategies for the Information Society, public spending on ICT, universal access and alternative technologies, open source software in the public sector and ICT measurement.

Observatory on the Information Society in Latin America and the Caribbean (OSILAC) — in close cooperation with the regional statistical community and contributing to the global Partnership on Measuring ICT for Development, OSILAC collects ICT indicators, with the aim of centralizing data, normalizing and harmonizing ICT related indicators and methodologies, and thus generating new indicators through technical assistance and workshops. OSILAC is also producing frequent benchmarking reports, such as the Benchmarking of the WSIS Plan of Action and the eLAC 2007 Benchmarking Report.

Website: www.cepal.org/socinfo
www.cepal.org/socinfo/default.asp?idioma=IN (English)
E-mail: socinfo@cepal.org

In preparation for WSIS, two major intergovernmental meetings have taken place in the region: the Regional Technical Preparatory Meeting for WSIS, 4-6 May 2005 in Quito, organized by the government of Ecuador, UNESCO and ECLAC; and the Regional Preparatory Ministerial Conference of Latin America and the Caribbean for the second phase of the World Summit on the Information Society, convened by Brazil and supported by ECLAC, 8-10 June 2005. As a result, the Rio de Janeiro Commitment and a Plan of Action for the Information Society in Latin America and the Caribbean, eLAC 2007, were agreed. Together with other international and non-governmental organizations in the region, ECLAC is committed to support governments to implement eLAC 2007 and assess its outcome.

## Economic and Social Commission for Asia and the Pacific

ESCAP is the regional headquarters of the United Nations Secretariat in Asia and the Pacific, dedicated to promote economic and social development in the region. It was founded in 1947 and is located in Bangkok, Thailand. It consists of 53 Member States and nine Associates.

ESCAP's work is focused on three key areas: reducing poverty; managing globalization; and addressing emerging social issues.

The Information, Communication and Space Technology Division (ICSTD) serves the "Managing Globalization" thematic area.

*Information, Communication and Space Technology (ICST)*
Recognizing the importance of information and communication technology in the knowledge economy and its impact on economic and social development, ESCAP established the Information, Communication and Space Technology Division in July 2002. It comprises three sections — the ICT Policy Section, the ICT Applications Section and the Space Technology Applications Section. The Division was established to assist ESCAP Members and Associates to apply information, communication and space technology to the tasks of reducing poverty and promoting sustainable development by building capacity in the use of ICT and in formulating sound policy, creating a regional platform for the exchange of knowledge, skills and experiences, and promoting regional cooperative mechanisms in some major information, communication and space technology (ICST) application fields.

ESCAP's previous work in the area of information, communication and space technologies has shown that the Asia-Pacific countries are in need of support related to the development of cross-sectoral policies that enable them to take full advantage of the opportunities presented by these technologies. Such policies are critical in determining the ability of ESCAP member coun-



ESCAP's ICST Division assists ESCAP Members and Associates in the tasks of reducing poverty and promoting sustainable development

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tries to fully participate in, manage, and benefit from, the process of globalization, as well as in overcoming key development challenges in a cost effective manner.

At the same time, there is not enough awareness of the real and positive impacts that the application of these technologies can have in key areas of economic and social development, including *inter alia*, commerce, effective and transparent governance, disaster reduction and efforts towards sustainable development and poverty reduction.

ESCAP is therefore focusing on supporting the development of cross-sectoral policies and strategies, and on promoting ICST applications in key sectors, through support for key national institutions. ESCAP is also promoting regional cooperation aimed at making the expertise of many relatively advanced countries of the region available to the less advanced countries, and at addressing critical issues which require regional cooperation, such as cyber crime and information security.

Website: www.unescap.org/icstd
E-mail: escap-icstd@un.org

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**In preparation for the Tunis phase of WSIS**

ESCAP, in cooperation with other international/regional organizations, established the Regional Interagency Working Group on ICT (IWG) in August 2001, with a view to strengthen cooperation and coordination at the regional level, and to promote mutually complementary and coherent strategies and programmes which would ensure synergy of efforts in achieving Millenium Development Goals (MDGs). The IWG played an instrumental role in developing regional consensus in the regional preparation for WSIS. Members of IWG made substantial contributions to the organization of the Regional Preparatory Conferences and other regional events. They also participated in the formulation of the Regional Action Plan towards Information Society.

With inputs from four sub-regional preparatory meetings, a High Level Asia-Pacific Conference for the World Summit on the Information Society was held from 31 May to 2 June 2005 in Tehran, Islamic Republic of Iran. The Conference was organized jointly by the Government of the Islamic Republic of Iran and the United National Economic and Social Commission for Asia and the Pacific in cooperation with the UNDP Asia-Pacific Development Information Programme and the International Telecommunication Union.

The objectives of the Conference were to define regional course of action towards building a people-centred, inclusive and development-oriented Information Society in Asia and the Pacific as stipulated in the Declaration of Principles and the Plan of Action adopted by the Geneva phase of WSIS and contribute to the preparatory process of the Tunis phase of the WSIS. The Conference adopted the Tehran Declaration and the Regional Action Plan – Programmes/Projects and Methodology for Regional Cooperation. The Action Plan pays special attention to the promotion of the use of ICT for empowerment of women, young and senior people as well as people with disabilities.

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## Economic and Social Commission for Western Asia

ESCWA promotes regional cooperation and integration among its 13 Arab Member States and serves as the main development forum within the United Nations system for the region. The objective of ESCWA is to accelerate the pace of economic, social and technological development in the region and to minimize the unsustainable exploitation of its natural resources.

*Information and Communication Technology Division*
ICTD, which was established in mid-2002 through ESCWA restructuring, aims to increase the capabilities of Member States in harnessing information and communications technology for their development, including achievement of the United

Nations Millennium Development Goals. In this respect, it provides support with regard to the development of information and communications technology policies, infrastructure, and applications, and raises awareness with regard to the potential of ICT in promoting sustainable development and enabling ESCWA countries to integrate into the global economy.

*Developing the ICT sector and Arab content industry*
ICTD's launching of the Arab Content Initiative to build up an Arab content industry and promote and disseminate digital Arabic content was followed by collaboration with the League of Arab States (LAS) and initiating projects to construct needed tools. This should make the Internet of interest to the non-English speaking Arab populations. An Arabic Domain Names Task Force under the auspices of ESCWA laid the groundwork for using the Arabic language to access the Internet. ESCWA and LAS are jointly tackling the deployment of an Arabic Domain Names System, which should facilitate the use of the Internet among Arabic speaking communities. ESCWA is also promoting regional ICT sector development by providing expertise on related policies and strategies and supporting incubation schemes for nascent ICT enterprises.

*ICT for sustainable development*
Within the framework of its Initiative on Technology, Employment and Poverty Alleviation (TEPA), ESCWA is implementing a number of programmes and projects with a view to piloting concepts and modalities aimed at harnessing new technologies, including ICT, for socioeconomic development. Through training on ICT and other modern technologies, these projects are creating new job opportunities among the remote and rural communities. A number of modalities have been identified and implemented for delivering new technology inputs at the local community level, including ICT community centres and smart community projects. Partnerships have been established with municipalities, civil society institutions and enterprises involved in activities targeted by TEPA.

Website: www.escwa.org.lb/divisions/ictd/main.htm
E-mail: bizri@un.org

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**Implementation of the WSIS Geneva Action Plan**

Through intergovernmental conferences, expert group meetings, regional workshops, advisory services and technical assistance, ESCWA is supporting the Member States and coordinating their preparation for WSIS, while working towards building the regional Information Society. The Second Regional Preparatory Conference for WSIS, under the motto "Partnership for building the Arab Information Society", was held in preparation for the Tunis Summit and culminated with the Damascus Call for partnership to provide strategic support for the implementation of projects whose implementation should establish solid foundations for the Arab Information Society. The conference also led to the development of a Regional Plan of Action for Building the Information Society (RPoA) addressing a range of issues for building the Information Society in Western Asia while taking into account Arab regional specificities. Partnerships are being forged by ESCWA to fulfil the objectives of the Damascus Call and to pave the way for the implementation of the RPoA, such as increasing community access with emphasis on the marginalized and disabled. Within the framework of the global Partnership on Measuring ICT for Development, ESCWA organized a roundtable and a regional workshop to agree on a common set of core indicators for measuring the information society and to build capacities of national statistics offices and ICT units in this domain.

# Meeting the targets of the World Summit on the Information Society in Asia and the Pacific by 2015

*United Nations Economic and Social Commission for Asia and the Pacific*

THE TARGETS OF the World Summit on the Information Society (WSIS) Plan of Action to be achieved by 2015 have been approved at the highest political level. However, it is apparent that they may be difficult for some countries to achieve. It is therefore important to identify the problems encountered in target implementation as early as possible and to suggest remedial measures in order to be on track with the deadlines set in the WSIS Plan of Action.

As follow up to the first phase and preparation for the second phase of the World Summit on the Information Society (WSIS), The United Nations Economic and Socila Commission for Asia and the Pacific (UNESCAP), in cooperation with the International Telecommunication Union and United Nations Development Programme (UNDP) Asia-Pacific Development Information Programme (APDIP) organized a number of sub-regional Conferences in 2004 and 2005. These events were aimed at reflecting sub-regional perspectives and specific needs of sub-regional countries in the Regional Action Plan. During the sub-regional events organized for the Pacific in Suva, for South-east and East Asia in Bali and for South and South-west Asia in Kathmandu, the ESCAP secretariat conducted sub-region-specific surveys on the Information Society with the objectives of exploring participants' views on the possibility of achieving the WSIS Plan of Action targets in their countries by 2015 to be included in the Regional Action Plan towards the Information Society in Asia and the Pacific.

In conducting the sub-regional surveys, questionnaires were distributed which compared all 11 targets mentioned in paragraph six of the WSIS Plan of Action against four options for level of achievement: already achieved; easy to achieve; may be achieved with extensive efforts; and impossible to achieve the target. The participants were requested to complete the questionnaire and make comments accordingly, if required.

The Sub-regional Symposium on ICT for Development in Pacific Island Developing Countries held in Suva, Fiji from 6-9 December 2004 was attended by 60 participants that included representatives of the following countries: Australia, Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Nauru, New Zealand, Niue, Republic of the Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu; international and regional organizations; the private sector and NGOs. The ESCAP secretariat received responses to the questionnaires from 11 country representatives, four participants of the international organizations and two NGO participants.

The South-East and East Asia Conference to follow up the first phase and prepare for the second phase of WSIS, held in Bali,

Indonesia from 1-3 February 2005 was attended by 53 participants including representatives from Cambodia, China, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor Leste and Vietnam; international organizations; private sector and NGOs. The ESCAP secretariat received 11 responses from government participants representing different countries.

The South and South-west Asia Conference to follow-up the first phase and prepare for the second phase of WSIS, held in Kathmandu, Nepal from 1-3 March 2005 was attended by 38 participants, including representatives from Bangladesh, Bhutan, the Islamic Republic of Iran, Maldives, Pakistan, Sri Lanka and Nepal; international organizations; private sector and NGOs. The ESCAP secretariat received responses from 11 country participants and four private sector participants.

## Results

*Pacific*

Many respondents considered that it was relatively easy to achieve connectivity to villages, educational institutions, scientific and research centres, cultural centres, post offices, health centres and government departments and to adapt the school curriculum to meet the challenges of the Information Society. However, among the Pacific island countries, the possibility of achieving those goals differed from country to country. Some countries had already achieved many of the goals and felt it would be able to attain all by 2015. For others, because of financial and other constraints, considerable difficulties were anticipated.

It was unlikely that all people would have access to radio and television services as the remoteness of some island countries hindered this. Developing content in local languages and ensuring technical conditions for the use of the languages was also considered difficult. One respondent thought that this issue was relevant to low literacy levels and that it was necessary first to raise the literacy rate under a national medium-term development strategy placing primary education as a priority. There was a view that in some Pacific island countries, English was the official language and so the use of local languages was not a priority. Respondents had less than optimistic views about the feasibility of more than half the world's inhabitants having access to ICT.

*South-East and East Asia*

As in the case of the Pacific, many respondents considered that it was relatively easy to achieve connectivity to villages, educational institutions, scientific and research centres, cultural centres, post offices,

health centres and government departments, and to adapt the school curriculum to meet the challenges of the Information Society.

It was observed that with extensive efforts, most of the other goals were achievable. In particular, adopting school curricula to the requirements and challenges posed by the Information Society would require a major initiative and commensurate resources. The target of ensuring that all people have access to radio and television services was considered difficult though it would be relatively easier to achieve that than in the Pacific where half of the respondents viewed it as impossible.

The target of developing content in all local languages was also considered difficult as the sub-region had many languages in use, and a large amount of financial as well as human resources were needed to realize this target. Respondents expressed pessimism over the feasibility of ensuring that more than half the world's inhabitants have access to ICT by 2015. One respondent thought that it was impossible to eliminate poverty and therefore, there would inevitably be marginalized people without any ICT in their reach.

In general, the most fundamental issue was adequate funding for infrastructure to enable connectivity and access and thus meet many of the targets envisaged.

*South and South-West Asia*
The views expressed by most of the respondents indicated that it would require substantial efforts to realize the goals of connecting villages with ICT and to establish community access centres, and these targets posed major challenges in being met by many of the countries in the sub-region. It was also considered difficult to attain the target of connecting universities, colleges and schools, especially in providing connectivity to all schools. Geographical conditions (i.e. mountainous areas) and the lack of power are among the barriers for attaining this target. A dearth of resources, for example, shortcomings in human resources and funding, have also been considered formidable barriers to providing connectivity to schools.

The survey results pointed out that connecting scientific and research centres with ICTs could be achieved relatively easily by 2015, yet sufficient efforts would be required to achieve this. The views of many respondents suggested that the target of connect-

ing all local and central government departments had been either achieved or was considered easy to achieve. However, many respondents expressed their concern over the pressing need for requisite human resources development in achieving this target and considered a lack of skilled manpower as a major barrier.

Progress has been made in adapting school curricula to the Information Society. ICT was already an important subject in some countries in 2005. The target was therefore expected to be achieved by 2015. Most respondents felt that the target of ensuring TV and radio services was achievable but only with extensive efforts. Satellite broadcasting was deemed an appropriate option if affordable reception equipment was available on the market.

Different views were evident on the achievability of the target related to content development and technical conditions for the use of all world languages on the Internet. More work was required in local language computing due to language barriers. It was considered unlikely that this target would be achieved in some countries. Respondents considered it rather difficult to ensure more than half the world's inhabitants would have access to ICT, just as in the surveys for South-East Asia and the Pacific.

The foregoing results indicate that although the respondents generally held the view that most of the targets were easy to achieve or could be achieved with extensive efforts, there were some targets such as developing local content in all languages and ensuring more than half of the world's inhabitants had access to ICT that were considered especially difficult. The target of providing access to radio and television services to all people was also considered unlikely to be achieved. Lack of resources, such as the availability of funding and proper technical/skilled manpower, was considered a barrier towards achieving these targets. Geographical or topological conditions, such as remoteness or mountainous terrain were cited as other reasons for the constraints. The analyses of the responses to the questionnaire have been taken into account in the formulation of the Regional Action Plan towards the Information Society that identifies specific measures at the national and regional levels which would facilitate the achievement of the WSIS targets. The meaningful and timely implementation of the Regional Action Plan will, therefore, require close cooperation of all stakeholders including the public and private sectors, civil society and the international and regional community.

# eLAC2007 — Implementing the Geneva Plan of Action in Latin America and the Caribbean

*Information Society Programme, Economic Commission for
Latin America and the Caribbean, United Nations[1]*

POLICY-MAKERS IN Latin America and the Caribbean have adopted a common short-term digital agenda for action, embodied in the Regional Plan of Action for the Information Society in Latin America and the Caribbean, eLAC2007. This agenda seeks to strengthen national strategies and serves as a link between the ambitious goals of the global community and the needs of the countries of the region based on their specific local features. The Plan of Action, eLAC2007, serves as a bridge in two respects: it combines the political consensus existing in the region with an operational agreement, and it reinforces worldwide international cooperation through the development of partnerships and advances at the regional level.

**Challenges for public policies for the Information Society in Latin America and the Caribbean**

In the past five years, significant progress has been made in disseminating information and communication technology (ICT) in Latin America and the Caribbean with a growing impact on the public, social and economic spheres. Between 1998 and 2004, the number of fixed telephones almost doubled, rising from 53 million to almost 93 million; the number of cell phones grew 8.5 times,



Adopting a plan of action for Latin America and the Caribbean

from 20 million to 172 million, and the number of Internet users increased twelve-fold, from six million to 72 million.[2]

Significant gaps persist, however, and indeed, are becoming wider if one considers broadband Internet access; only 14 per cent of the population in Latin America and the Caribbean have access to the Internet, compared with more than 50 per cent in developed countries. Growth in ICT faces increasing challenges, as these technologies penetrate sectors of the population where the purchasing power is lower. According to estimates, the richest 20 per cent of the population in the region dispose of USD800 per year investing in ICT, while the poorest 50 per cent can only afford to spend USD100 per year, or USD2 per week. The poorest 25 per cent of the population have only USD1 per week with which to connect to ICT.[3] Thus, the region is coming to the realization that without proactive policies, new technologies can exacerbate existing inequalities, which makes it increasingly important to take public action that will ensure socially desirable results.

Second, the digitization of information and communication processes in the public sector can help to increase public efficiency and transparency. This includes overcoming deficiencies in inter-agency coordination, facilitating coordination between different spheres of government, improving efficiency and transparency of bureaucracy, and opposing arbitrary or outright corrupt decisions. In addition, e-government is a new dynamic factor for other sectors of the Information Society, as it creates network effects that stimulate businesses and individuals to use the Internet on an increasingly massive and intensive scale. Contrary to the situation in many developed countries, in many cases it is competitive bidding that prompts firms in Latin America and the Caribbean to make their first online transaction. Similarly, it is public procedures, such as paying taxes or fines and obtaining motor vehicle or trade licences, that encourage citizens in the region to take the cultural leap and make their first digital transactions.

Third, since training is a basic requirement for knowledge-based societies, the Information Society calls for the development of new capacities and their continuity over time. Any effort in this direction must include training and computer literacy programmes for women and men who are already in the labour market, as well as a business innovation dynamic through digital technologies with innovation and learning systems.

**National and global strategies and the regional strategy**

Almost all the countries in the region have implemented public policies based on cooperation between the public and private

The Regional Preparatory Ministerial Conference of Latin America and the Caribbean for the second phase of the World Summit on the Information Society, held in Rio de Janeiro from 8 to 10 June 2005

sectors and civil society, aimed at turning these new technologies and digital networks into tools for economic and social development. In some countries, the digital agenda is increasingly an integral part of the development agenda. Such initiatives are tending to become widespread and more intense in all the countries of Latin America and the Caribbean; this increases the scope for cooperation and the exchange of best practices among them, the creation of economies of scale and the reduction of the cost of learning.

At the global level, the region participated actively in the formulation of the Declaration of Principles and Plan of Action, adopted at the first phase of the World Summit on the Information Society, which was held from 10 to 12 December 2003 and at which goals were set for 2015, to coincide with the fulfilment of the Millennium Development Goals. Under this long-term strategy, 175 countries adopted 67 guiding principles and 167 global goals, often with vague wording to satisfy the needs of the least developed, as well as those of the most advanced nations of the world. The challenge for Latin America and the Caribbean is to translate these global efforts into local initiatives for the benefit of the region.

In the region, countries have made a supreme effort in the past five years to formulate political declarations on the strategic orientation of the Information Society and the guiding principles that should direct public policy in this sphere.[4] The challenge in the short run is to move rapidly from agreements and political declarations to action, identifying instruments and appropriate standards and promoting initiatives and concrete projects, since there is already consensus on the importance and advisability of using ICT.

Bearing in mind the historic opportunity provided by the current progress of the World Summit, the political consensus existing in the region, the similarity of challenges and the scope for ICT, the countries of Latin America and the Caribbean proposed, at the meetings of the first two preparatory committees of the second phase of the World Summit on the Information Society (Prepcom 1 and 2), that their regional plan of action

should be prepared for the period 2005-2007, so that it might serve as a first step towards prioritization and preparation of concrete international projects on the long road to 2015.

During the Regional Preparatory Ministerial Conference of Latin America and the Caribbean for the second phase of the World Summit on the Information Society, held in Rio de Janeiro from 8 to 10 June 2005, the countries adopted a Plan of Action for the Information Society in Latin America and the Caribbean, eLAC2007. This plan seeks to strengthen national strategies with a vision that recognises the opportunities facilitated by regional cooperation for using digital technologies and networks for economic development with equity.

In the 30 goals listed in eLAC2007, the governments of the region are pursuing three potential gains:

1. Support the implementation of national initiatives through intra-regional technological transfers and capacity building in areas by, for example:
   • Reducing by half the potential national average user base per community Internet access centre or reducing its coverage to 20 000 people per centre and fostering the quality and ensuring the sustainability of Internet access centres (goal two)
   • Doubling the number of public schools that are connected to the Internet or connecting one-third of them (goal three)
   • Doubling the number of health centres and hospitals in the region that are connected to the Internet or connecting one third of them (goal four)
   • Connecting at least half of urban local governments and one-third of rural local governments to the Internet (goal six)
   • Providing ICT literacy training to at least 2.5 per cent of the working-age population (goal nine)
   • Creating and/or strengthening instruments for exchanging e-government services, such as the e-government network of Latin America and the Caribbean (REDGEALC), developing regional cooperation for the transfer of technologies (goal 15)
   • Encouraging existing regional initiatives to integrate ICTs in national justice systems (goal 19).

2. Deepen knowledge and understanding of critical areas of support for the definition, implementation and evaluation of policies by, for example:
- Creating a regional working group to elaborate proposals on options and strategies for the development of digital television (goal seven)
- Establishing a regional working group to exchange experiences and criteria used for the development and use of free software (goal eight)
- Promoting regional dialogues, exchanges and cooperation on national experiences in Internet governance (goal 14)
- Establishing a working group that assesses national and regional financing requirements (goal 23).

3. Create, sponsor and reinforce concrete regional initiatives and projects by, for example:
- Promoting the development of regional ICT infrastructure, including broadband capacity through backbones (goal one)
- Developing and expanding advanced ICT-based networks for research and education (goal ten)
- Linking national educational portals with a view to establishing a network of educational portals (goal 16)
- Strengthening the interconnection of digital information networks for disaster prevention (goal 18)
- Supporting and fostering, with technical cooperation programmes, institution-building and methodological strengthening and the development of ICT access and usage indicators (goal 26).

**eLAC and the World Summit: parallel processes and a concrete contribution from the region**

eLAC2007 was elaborated at a time when the countries of the region were preparing for the second phase of the World Summit on the Information Society, scheduled to be held in Tunis in November 2005. Through eLAC2007, the countries of Latin America and the Caribbean have succeeded in combining a political consensus with an operational agreement for the regional development of digital public policies. In formulating realistic, measurable and flexible goals under eLAC2007, the countries seek to coordinate their public policies and to promote regional practices and forms of cooperation in order to improve the quality and effectiveness of their contributions to the process of the World Summit on the Information Society. In this regard, the structure of eLAC2007 has developed in the spirit of the World Summit; this Plan of Action reinforces the implementation of the Geneva consensus and focuses on short-term goals geared towards tangible results without losing sight of the ambitious, long-term vision.

Against this background, the purpose of eLAC2007 is to act as a link between the goals of the global community and the needs of the countries of the region, in accordance with the situation existing in each of them.

**One step at a time towards 2015**

The idea behind eLAC2007 is to be able to demonstrate the positive impact that international cooperation has had in a relatively short space of time with a view to ensuring that interest in this crucial issue for the development of the region does not peter out once the visibility of the World Summit fades after its second phase. In order to show results, the countries of the region formulated concrete, measurable goals. The most important objective of eLAC2007 is to strengthen the creation of

strategic partnerships between institutions that are convinced that coordinated action can achieve successes that individual action cannot attain, without the need to sacrifice particular interests.

In this context, ECLAC, in cooperation with other agencies and international, regional and sub-regional organizations, supports governments and actively promotes coordination and collaboration. The objective is to create effective cooperation scales and models that contribute in a positive way to the global agenda. The road to the fulfilment of the global goals in 2015 is long and the challenges formidable. In order to fulfil its commitments, the region is seeking to foster a solid base that will facilitate future agreements and multi-year programmes, based on regional cooperation that will grow from strength to strength, thus approaching the global goals one step at a time.

Correspondence between the regional goals of eLAC2007 and the WSIS Plan of Action

| Goals eLAC2007 | Goals of the World Summit on the Information Society |
|---|---|
| **A. Access and digital inclusion** | |
| 1. Regional infrastructure | 9 a, 9 d, 9 k, 9 j, |
| 2. Community centres | 6 a, 6 d, 23 d, 10 d |
| 3. Online schools and libraries | 6 b, 23 b |
| 4. Online health centres | 6 e, 9 c, 18 |
| 5. Employment | 19 b, c |
| 6. Local government | 6 f, 10 f, |
| 7. Alternative technologies | 6 h, 6 j, 9 l, 13 a, 13 p, |
| **B. Capacity-building and knowledge creation** | |
| 8. Software | 10 e, 10 j, 13 p, |
| 9. Training | 11 a, 11 c, 11 e, 11 g, |
| 10. Research and education networks | 6 b, 6 c, 22 a, |
| 11. Science and technology | 19 d, 22 |
| 12. Firms | 13 m, 16 c |
| 13. Creative and content industries | 23 g, |
| 14. Internet governance | 13 b, 13 c, |
| **C. Public transparency and efficiency** | |
| 15. Electronic government | 13 n, 13 g, 15 a, 15 b, 15 c, |
| 16. Electronic education | 11 l, 11 n, 11 f, |
| 17. Electronic health | 18 b, 18 c |
| 18. Disasters | 20 c, 18 f |
| 19. Electronic justice | |
| 20. Environmental protection | 20 a, b, |
| 21. Public inform. and cultural heritage | 10 a, 10 b, 10 h, 13 h, 23 c, |
| **D. Policy instruments** | |
| 22. National strategies | 8 a, b, 8 c, 8 d, 8 e, 26 b |
| 23. Financing | 26 a, 27 a, 27 b, 27 c, 27 d |
| 24. Universal access policies | 9 b, 10 d, 27 d, 27 g |
| 25. Legislative framework | 12 a, 12 b, 12 c, 12 d, 12 e, 12 f, 12 g, 12 i, 12 j, 13 i, 13 j, 24 c, 25 c |
| 26. Indicators and measurement | 28 b, 28 c, 28 f, |
| **E. Enabling environment** | |
| 27. Regional follow-up | 28 a, c, 29 b |
| 28. Solidarity with disfavoured countries | 7, 9i, 27D2b |
| 29. Minimizing obstacles | 27 D2c |
| 30. Radioelectric spectrum | 9 d i, 13 r |

# Priming today's generation for the digital future

*H. H. Sheikh Mohammed Bin Rashid Al Maktoum IT Education Project*

DUBAI, ONE OF the seven emirates forming the United Arab Emirates (UAE), has been experiencing phenomenal growth in these past few years. A truly modern metropolis undertaking some of the most enterprising infrastructural projects of our times, Dubai is positioning itself as the digital hub of the Middle East. Among the first Arab leaders to recognize the impact of information and communication technology (ICT) on society is H.H. Sheikh Mohammed Bin Rashid Al Maktoum, crown prince of Dubai and the UAE Defence Minister, who has laid out an ambitious multi-pronged strategy to transform Dubai into a digital city. Today, the initiatives include the Dubai e-Government, Dubai Internet City and Dubai Knowledge Village among many others.

Alongside the infrastructural initiatives are programmes recognizing the critical importance of an ICT literate society. The Education Project (ITEP) has been set up with the focal aim of ensuring the permeation of IT literacy within society. In accordance with this commitment, ITEP has been successful in increasing the IT literacy levels within various segments of society such as students, teachers, government employees, women, and special needs individuals.

Prior to its launch in 2000, education experts in the country had been expressing the need for an interactive education system that would help schools and students to keep pace with the rapidly developing trends of the ICT world. Furthermore, demographic data and other factors, including long term benefits, identified school students as the ideal segment to begin the ICT literacy programme. Therefore, in partnership with the Ministry of Education, ITEP launched its operations first at the school level, training first- and second-year secondary Dubai school students in ICT.

**Students**

As well as fostering IT literacy, the school programme is designed to complement the Ministry of Education's aim of introducing new means of enabling graduates to meet market requirements. The programme now covers 39 schools, in Dubai and Abu Dhabi, and has trained around 65 000 students in the last five years. Its success is largely attributed to the following factors:

Curriculum: the school curriculum (containing over 500 information objects) provides a blended learning approach where teachers mediate the learning experience, and the online resources including interactive demonstrations allow students to work independently. Provided both in English and Arabic, the curriculum is learner-centred, context-based, provides multiple learning



School students in one of the IT labs

pathways, and allows for a flexible pace of learning. One of its important design elements is to promote life-long learning skills such as teamwork, project management, problem solving, and conflict resolution.

IT Labs: ITEP has 41 labs with over 1 600 PCs and 80 servers connected to the largest virtual private network (VPN) in the UAE. Each school has a purpose-built IT lab whose unique design is one of the 'pull' factors instrumental in getting students interested in IT. The lab is equipped with lab management hardware and software that incorporates the latest ICT, leading to a richer interaction between the teacher and students.

Trainers: Recognizing the issues involved in the learner-centred paradigm, ITEP's ongoing Train the Trainer initiative provides trainers with technical, educational (pedagogy), systems, and soft skills training amounting to 20 days of training per trainer per year. Additionally, to capture the knowledge and experience of experienced trainers, ITEP has an online Knowledge Management System that allows trainers to share knowledge, and simultaneously records the same for future reference and use.

Portal (www.itep.ae): Available in English and Arabic, the portal is an extremely important tool in ITEP's strategy and has over 60,000 registered users. It not only offers personalized e-community services to the general public but is also used to supplement the learning experience with online resources, e-mail facilities and discussion groups. It hosts a Learning Management System that allows school students access to the online curriculum, whilst also allowing trainers and administrators access to the Student Management System, Knowledge Management System, and Teacher Management System, all of which are complete purpose-built solutions.

The programme for school students has been instrumental in raising their IT skills. Awards won by some UAE students in international and regional IT competitions are a testimony to this; in April 2002 a website designed by four ITEP students won first prize in a pan-Arabian website design contest organized by the Jubilee e-Learning and Training Centre based in Jordan. Similarly, in the 2004 UAE Educational IT Challenge, ITEP students secured the first and second place in the Best Secondary Student Project category.

ITEP's programme is not limited only to school students. It has been actively involved in providing customized IT training within the higher education sector as well, training over 3,700 students of the Islamic & Arabic Studies College as well as over 700 officers and cadets of the Dubai Police Academy.

## Teachers

Working with the student community had the added benefit of identifying a critical segment that apparently needed concomitant development: the teaching community. Acknowledging the important role of teachers in laying the foundations for the future, H.H. Sheikh Mohammed launched an initiative under which around 6 000 Dubai Education Zone teachers and administrators must attain the International Computer Driving License (ICDL) certification, a globally recognized credential that certifies an individual as competent in using computers, by 2006. ITEP has been entrusted with the responsibility of training and facilitating their certification. Towards this objective, it not only conducts training using ICDL approved courseware developed in-house, but has also built the largest ICDL accredited testing centre in Dubai.

However, ITEP's offering for teachers goes beyond basic IT literacy. In recognition of the fact that the utilization of ICT in

education and training enhances the effectiveness and efficiency of teaching, ITEP has recently launched the i-Teach program for Teachers, to promote the usage of ICT in educational establishments by providing teachers with a professional development programme that leads to the Cambridge International Diploma in teaching with ICT.

## Government employees

While the student and teaching communities do have critical focus, ITEP has also been active within sectors that require training on an immediate basis to reduce their existing levels of IT illiteracy, for example, the government employees sector. Acknowledging that the IT training provided to government employees enhances their productivity, leading to higher efficiency in day-to-day work processes, ITEP has been providing customized IT literacy training to government departments since 2002, and has successfully trained over 4 200 Dubai Police personnel. To accelerate the progress made in this sector, a directive issued in April 2005 requires 12 000 UAE nationals working in Dubai government departments to achieve the ICDL certification by 2007, with ITEP being assigned to train and facilitate their certification.

## Women

ITEP recently initiated another milestone IT literacy programme especially for women, not only to promote personal growth, but also to enhance the special role of women in social development. Based on a strategic partnership established with the Dubai Ladies Club, ITEP has set up an IT lab at the club, and is in the process of implementing the different phases which will see women being empowered with various IT skills and certifications. Such alliances with various entities are valuable in broadening the reach of IT literacy programmes to ensure that they cover as wide a populace as possible, as is also evident in the special needs community.

## Special needs individuals

Believing that IT literacy within the special needs community is an important step towards their inclusion and integration with the rest of society, in its first initiative ITEP partnered with Tamkeen (Arabic for 'enabling'), a non-profit organization that empowers vision-impaired individuals in the UAE, providing them training in touch-typing, business applications and the Internet in a purpose-built IT lab. This partnership reached new levels when ITEP in conjunction with Tamkeen unveiled the world's first ICDL Arabic coursebook in Braille. Based on, and encouraged by the positive results at Tamkeen, ITEP forged a partnership with Al Thiqah (Arabic for 'confidence') Projects for Employment and Rehabilitation, extending its efforts to cover hearing-impaired students. The programme proved highly successful, with some trainees attaining employment immediately upon its completion.

*ITEP has trained over 76 000 people since its inception. Being the largest IT training provider not only in Dubai but the entire UAE, it commands the confidence to not only target new sectors but is also well positioned to take its programmes beyond Dubai and the UAE. Today, Dubai as a digital city is no longer just a vision, but an unfolding reality, and ITEP is ensuring that it encompasses as wide a populace as possible including students, teachers, employees, women, and special needs individuals, in its role of preparing this generation for the digital future.*

# Digital convergence and the development paradigm: improving development effectiveness in the IDB partnership with the countries of Latin America and the Caribbean

*Danilo Piaggesi, Chief, and Robert A. Vitro, Programme Development Coordinator — Intersectoral, Regional and Special Programmes, ICT for Development Division, Education Science and Technology Sub-department, Sustainable Development Department, Inter-American Development Bank*

REVOLUTIONARY DIGITAL TECHNOLOGY could have a considerable impact on development. It is therefore important to consider the institutional realignments needed for this impact to be effective. The digitalization of information and communication technology (ICT) offers opportunities to deepen understanding of the functions that access to information and the application of knowledge play in development. This understanding can contribute to improving the effectiveness of efforts to achieve development objectives.

Digital technology makes it possible to carry in one channel the signals that previously used separate channels. By blurring the technological and economic distinctions among historically separated activities involved in processing, storing, distributing, transmitting and accessing information in text, image, audio and multimedia formats, digital technology applications can bring into focus the idea that all economies have been and will continue to be knowledge economies. They differ in the degree to which they are committed to human development and the creation of enabling conditions to facilitate access to information and the tools people use to build and apply knowledge to all economic, social and political activities. In other words, advances in digital technology: provide incentives for innovative applications of ICT, provoke changes in institutional arrangements, and offer the possibility for strengthening the capacity of societies to manage change in a democratic process of efficient, equitable and sustainable development.

Whether or not these incentives are implemented, the institutional transformations realized and development effectiveness improved depends on how each society integrates its understanding of information and knowledge into a process of ongoing change.

Digital convergence may well reveal that 'value-added development' has been and always will be the basis of efforts for achieving sustainable economic growth while reducing poverty and promoting equity, giving more and more people the possibility for an improved quality of life without jeopardizing that possibility for future generations. Indeed, this perspective may already be re-shaping public, private and civil society partnerships in Latin America and the Caribbean as well as the partnership between these countries and the Inter-American Development Bank (IDB) to improve development effectiveness.

**Digital convergence in development**

Information is understood in the context of this discussion as an input that people use to create and apply knowledge which, when reproduced using other media, becomes information. The important developmental challenge is the evolution of mechanisms for matching an increasing and diverse demand for information and learning opportunities with access to a supply of accurate, complete and timely information and the quality learning environments needed by citizens in all aspects of their lives. A crucial aspect of this challenge involves ensuring that the technological, legal and economic safeguards exist so that all people have the basic resources needed to participate in and benefit from an expanding marketplace for information and access to the learning environments. In other words, societies constantly need to make sure that incentives exist
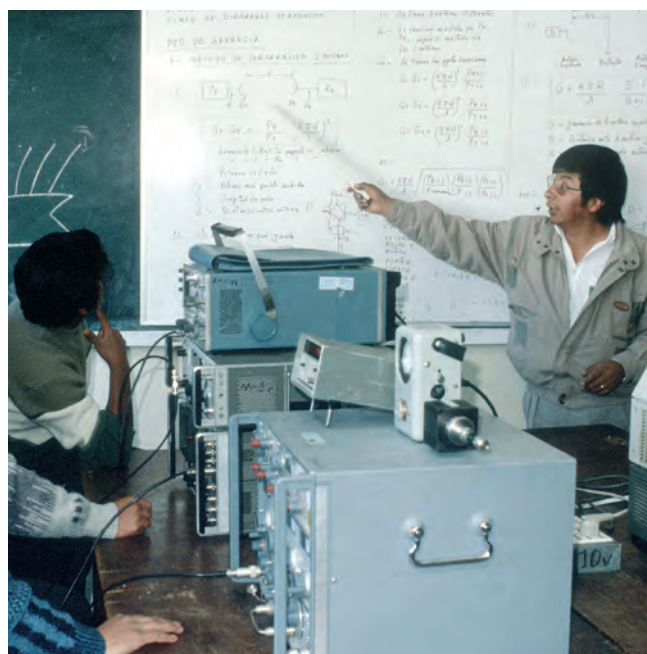


Training centre in La Paz

Photo: International Telecommunication Union (ITU)

for individuals and organizations to take risks and make investments for satisfying information and learning needs. A balance in the level of fair and open competition among these groups ensures access to the highest quality offerings at the lowest possible price.

Advances in digital technology and the corresponding convergence in their application can have a profound impact on transforming these matching mechanisms and ensuring citizens access – as users and producers — to information and learning resources. As the technological capacity to access, compile, process, distribute and transmit data is increased, digitalization can potentially bring about profound changes in the economics of information production, distribution and access. Institutional realignments are crucial in realizing this potential.

Digital convergence is occurring simultaneously on various levels. One level is between voice and data communications, including the current battle between public switched telephone networks and voice over Internet protocol (VoIP). On another level, it is occurring between telecommunications and broadcasting. Three types of convergence are being played out on this level: network convergence that makes it possible for telecommunications companies and broadcasters to enter each other's markets within the context of shared use; service convergence that includes Internet broadcasting; and terminal convergence that includes multimedia PCs and television receivers equipped with communications functions. A third level of convergence is between telecommunications and consumer electronics, where advances in digital technology make it easy to connect equipment, including consumer products, to the telecommunications network.

Digital convergence presents a fundamental challenge to traditional approaches to regulation, not to regulation per se. Advances in technology do not replace regulation. However, they do challenge government policy makers and regulators to rethink how they carry out their functions in a new context. Public policies and regulations define the climate for risk-taking and investment needed to promote innovative applications of digital technology.

The fundamental policy and regulatory issue is to ensure that conditions are created that promote incentives for innovation in the applications of converging digital technologies in three areas: infrastructure, software and content. The challenge for policy makers, the private sector and civil society is to define what constitutes fair and open competition in each of these levels and how to be sure that fairness and openness is achieved overall. Undoubtedly, this will require some combination of public and private incentives in each of the three areas.

One additional point should not be overlooked. Policies and regulations that promote fair and open competition throughout the economy must exist and be enforced. Fair and open competition among the firms in the knowledge economy is not a substitute for the absence of fair and open competition throughout the economy. Efficient, equitable and sustainable economic growth is a product of the symbiotic relationship between fair and open competition among knowledge economy organizations and between them and organizations in other sectors.

**Development paradigm: seeing the 'new' in the 'old'**

One reason why there are increasing calls for a new development paradigm may well turn out to be an insufficient understanding of the role of information and knowledge in the current paradigm. Advances in digital technology and convergence in their application help focus on the 'new' in the 'old.'

The development debate is primarily between those who call for increasing development assistance and those who promote free trade to achieve development objectives. However, a third way has always existed — value-added development. This consists of applying ideas, information and knowledge to local resources to create and distribute new wealth. Value is added to resources by the application of knowledge to increase their information content. Knowledge economy expansion reflects the capacity of an economy to add value to resources. This approach has been implicit in the development efforts of countries and development assistance organizations. As it becomes more explicit, new opportunities can emerge.

The profound differences among countries can be traced to the degree to which they are committed to creating conditions through which individuals and organizations can add value to themselves and other resources. In other words, one of the basic differences among countries is the degree to which they build human capital through policies and projects that contribute to a comprehensive expansion of their knowledge economy. Various countries without abundant natural resources have achieved significant substantial economic growth by focusing their development strategies on adding value through knowledge economy expansion. Other countries with abundant natural resources sometimes fail to achieve needed levels of growth because of an insufficient and/or ineffective commitment to the value-added, human centered approaches to development that simultaneously diversify local production while increasing local purchasing power.

Access to information for humans to build and apply knowledge has historically changed the volume and character of supply and demand for all goods and services. Put simply, the application of ideas transforms raw materials into products and services as well as changes the processes that produce them. Similarly, people become more productive the more they learn. In the context of a fair and open competition, access to information and the application of knowledge can increase productivity and competitiveness on the supply side. On the demand side, this competition can contribute to opportunities that can increase purchasing power and improve quality of life.

A knowledge economy reflects the capacity to add value to the factors of production for example, by increasing the information content in raw materials, financial and human resources. New mixes of them can lead to the creations of new wealth in more efficient, equitable and sustainable ways. The core of the knowledge economy, the information sector, is an economic activity the character and size of which have not yet been sufficiently measured and integrated into development planning.

Adding value takes place on two levels. As raw data in text, image, audio and/or multimedia formats is organized, it is transformed into information that becomes more valuable for users. As people use information as an input to create and apply knowledge to non-information resources, those resources also assume more value for potential users. The capacity to add value offers the potential to change the volume and character of supply and demand for all goods and services. Similarly, a value-added perspective involving information and knowledge, helps define and promote a deeper understanding of the inextricable and symbiotic link between macro and microeconomic growth. In the macro context, the production, distribution and use of information takes place through the operation of a marketplace. In the micro context, the production, and distribution and use of information is generated within organizations. Sometimes referred to as the primary (external) and secondary (internal) information sectors, respectively, these are economic activities that are provoked by and contribute to expansion of other sectors in the economy.

## Strengthening the IDB-LAC partnership for development effectiveness

The IDB commitment to development effectiveness was renewed on 3 October 2005, when Luis Alberto Moreno became the third president since the institution was founded in 1959. In his address to IDB staff, Mr. Moreno placed an emphasis on results. He also underscored the importance of the generation and diffusion of applied knowledge for development as one of the fundamental pillars of the welfare of citizens. Further elaboration on these thoughts should be forthcoming as Mr. Moreno moves forward as IDB president.

It could be useful to consider that the cumulative added value of the IDB, like that of all international development organizations, has historically been and will continue to be the expansion of the capacity of the countries themselves to add value to their human, material and financial resources. By generating synergy and improving effectiveness among their activities in this area, development institutions strengthen their partnership with beneficiary countries to increase the rate of sustainable economic growth and reduce poverty while promoting equity.

At the IDB, the Information Technology for Development Division, Sustainable Development Department, promotes the application of new development effectiveness processes, tools and funding instruments to measure the contribution of knowledge economy expansion as a conceptual and programmatic 'bridge' for achieving the two objectives of the IDB institutional strategy. These are to increase the rate of sustainable economic growth and reduce poverty while promoting equity. An important part of this effort is to promote consensus on outcomes, outputs and indicators to measure, monitor and evaluate the contributions to the construction of the bridge.

More than any particular solution, the IDB partnership with the countries of Latin America and the Caribbean (LAC) seeks to create an enabling environment for innovation and learning about what works and what does not work with respect to ICT deployment in each of these areas. Promoting incentives for risk taking is crucial if innovation and learning are to become more widespread in development efforts.

The objective of the IDB-LAC partnership in this area is to strengthen country and Bank capacity for effectively adjusting to the new conditions of development emerging from the widespread deployment of ICT and knowledge economy expansion. A crucial aspect of this process is creating enabling environments for managing change for development effectiveness.

The Information Technology for Development Division serves as a catalyst for a Bank-wide effort to match the changing and expanding needs of the countries in the region with respect to the institution's experience and resources. Out of this effort, a matrix approach is emerging for integrating ICT and knowledge economy expansion into development planning. We do not believe that a sector approach (ICT in vertical sectors such as education, infrastructure and rural development) is better than a horizontal approach (ICT in sustainable economic growth, ICT in human development and ICT in governance). However, we do believe that opportunities for synergy and greater effectiveness between the two approaches could emerge if incentives for communication and collaboration were expanded.

The 'effectiveness' of development effectiveness methodologies, currently receiving justifiable attention by national and international development organizations will depend, in large measure, on how well the role of information and knowledge in development is understood and integrated into the application of these methodologies. These organizations, including the IDB, are committed to working with beneficiary countries to refine processes and instruments for formulating outcomes, outputs and indicators to measure, monitor and evaluate development effectiveness. However, it is crucial to make sure that what is being measured is relevant and makes a strategic contribution to achieving development objectives.

Applying development effectiveness methods to measure the contribution of knowledge economy expansion to development is important for a variety of reasons. First of all, since there are no simple solutions to the challenges of development, the capacity to manage change becomes crucial. Managing change depends on access to information about what, when and how development challenges are articulated and addressed as well as if adjustments are needed in the approaches for addressing them. A dynamic knowledge economy can ensure that such information is available and the capacity to manage change is strengthened.

Secondly, information about information and knowledge about knowledge economy are essential to formulate strategies and design projects regarding the effective deployment of ICT for development.

Development effectiveness is enhanced as the capacity for managing change is strengthened. Managing change depends on access to information and the application of knowledge, including information about information and knowledge about knowledge. Ensuring this access, therefore, depends on applying development effectiveness methodologies to ICT deployment and knowledge economy expansion.

As the idea of applying development effectiveness methodologies to knowledge economy expansion spreads, the questions that emerge relate to what should be measured and how should it be measured. Our concern is as much with measuring the deployment of specific technologies as it is with measuring the contribution of their applications to the two objectives of the IDB institutional strategy: increasing the rate of sustainable economic growth and reducing poverty while promoting equity. A great deal of important work is being produced that measures technological deployment. This approach is based on collaboration with other groups and a desire to increase the application of economics to measure the contribution of knowledge economy expansion to sustainable economic growth and reducing poverty while promoting equity.

### Policy convergence

Digital convergence requires policy convergence among the components of the knowledge economy if these technologies are to contribute effectively to a democratic process of efficient, equitable and sustainable development. Policy convergence should involve the application of development effectiveness methodologies to measure, monitor and evaluate the contribution of digital convergence and knowledge economy to this process. Lessons learned from efforts currently underway in a growing number of countries are likely to provide concrete and practical linkages between digital convergence and the strengthening of their capacity to increase sustainable economic growth and reducing poverty while promoting equity. Such linkages between economic and social development are critical if the countries of Latin America and the Caribbean are to carry out 'second generation' reforms needed to achieve the Millennium Development Goals.

*The ideas and opinions expressed in this chapter are those of the authors and do not necessarily reflect the official position of the Inter-American Development Bank (IDB)*

# ICT, poverty reduction and the role of micro, small and medium enterprises

*United Nations Industrial Development Organization*[1]

THIS PAPER PRESENTS a framework for understanding the roles of information and communication technology (ICT) across a range of micro, small and medium enterprises (MSMEs) applications and the implication for poverty reduction through ICT. It provides practical guidelines and guidance from United Nations Industrial Development Organization (UNIDO) for the future development of projects involving ICT and MSMEs.

## MSMEs and poverty reduction

Expansion of MSMEs has the potential to contribute most directly to Millennium Development Goal 1 (eradication of extreme poverty and hunger) in three main ways:

- Creation of income generation and diversified livelihood opportunities for the poor in developing countries
- Provision of more secure employment opportunities for the poor in developing countries
- Provision of other socio-economic benefits to the poor – i.e. enhancement of skills, increased self-confidence, increased participation of women, empowerment, and security against income loss.

In general, enterprises in developing countries may be categorized in two different types:

*Livelihood enterprises* – micro-enterprises that form the majority in rural and urban areas delivering benefits in terms of livelihood assets. In rural areas, micro-enterprises are largely founded on direct sale, trading or processing of natural resource inputs. In urban areas, livelihood enterprises are predominantly informal and service-based. Livelihood enterprises depend primarily upon informal and social networks to provide the information needed, which can be unreliable, inaccurate and lack timeliness. Only a few livelihood enterprises have direct access to digital ICT. They possess radio, and a small minority utilizes telephony.

*Growth enterprises* – small and medium enterprises (SMEs) that show a greater business focus and which deliver broader/longer-term benefits regarding competitiveness, innovation, exports, etc. They are concentrated mainly in urban areas, and are active in a broad range of sectors covering manufacturing, services (including ICT) and trade. Growth enterprise needs for information will reflect a greater degree of business maturity, and many of them already utilize ICT.

Table 1: ICT applications in the value chain

|  | Value chain core | Value chain boundaries | Value chain support | Networking support |
|---|---|---|---|---|
| **Livelihood Enterprise** | Limited application (e.g. mobile phones) | Faster & more timely communications. Lower transaction costs | Access to business development services/ information via infomediaries (e.g. telecentres, BICs, etc) | e-networking for enterprise support structures (e.g. MFIs)<br><br>Building social capital<br><br>e-advocacy |
| **Growth Enterprise** | Computer hardware production, Tele-communications products<br><br>Software/digital products<br><br>ICT-based business services and training<br><br>Productivity improvements and production control | Facilitating and conducting transactions (e-commerce)<br><br>e-marketing | Information access via Internet/e-mail<br><br>Internal processing of information<br><br>Support for decision-making (e.g. e-appraisal) | e-networking for business support structures<br><br>Cluster development<br><br>e-advocacy |

**The role of ICT**

The promise of ICT to contribute to poverty reduction lies in its power to give the poor access to improved information and communications. ICT can remove the constraints to obtaining and communicating information, thus empowering enterprises and poor people. Utilization of ICT reduces transaction costs and improves information about new opportunities and communications with markets within the supply chain. Specifically, ICT can:

- Provide reliable market access (local, regional and international) through increased use of affordable communications (phone, fax, e-mail)
- Improve contact with suppliers and transport links to and from markets (e.g. through enterprises databases, products and suppliers)
- Inform choices, particularly regarding offers of raw materials and finished goods, enabling better prices for enterprises when dealing with traders
- Provide information about available non-financial business development services (e.g. training schemes, business skills and marketing)
- Provide direct or intermediated access to business development services (e.g. training packages, advice on better practice)
- Provide access to legal information, including information on registration, regulations, contract and tax law
- Improve access to information about financial services (e.g. micro-finance institutions – MFIs).

**A value chain model of ICT application**

Regarding ICT applications, four direct value chain roles of ICT could be defined:

- *Value chain core:* using ICT for core operations of the enterprise
- *Value chain boundaries:* transactional applications of ICT used to interface with suppliers or customers; mainly seen in terms of e-commerce
- *Value chain support:* application of ICT for access to information and decision-making
- *Networking support:* using ICT in building networks (cluster development and linkages to other stakeholders).

ICT roles for livelihood enterprises (see Table 1) will be mainly for value chain support and networking support (through informal information systems). Access to ICT can be enabled through tele-centres or localized business information centres (BICs). However, ICT interventions for livelihood enterprises should not be judged solely on monetary impact (as issues of governance). Environmental sustainability and social benefits cannot be readily separated from enhancements to their ICT for enterprise purposes.

Growth enterprises will support all four ICT roles (see Table 1). Therefore ICT is of most direct value to growth enterprises. They are better placed than others to make use of ICTs, and they provide a greater capacity to generate wealth, employment, exports, innovation, and to build a wider range of local and external business linkages. However, growth enterprise sectors (including the ICT sector) will play a critical role in increasing the volume of ICT critical mass in developing countries. A focus on ICT sector production of goods and services will emphasize organic growth – encouraging a step-by-step approach to building local capacity and partially serving needs of ICT consumers.

**Intervention priorities**

Following up the role of ICT and its implications described above, a question that could be raised is: livelihood or growth? Livelihood enterprises represent the area of greatest needs for intervention, but ICT-related interventions have greatest effect on growth enterprises. Whatever the conclusions would be, it should be recognized that one size does not fit all, and targeted strategies are required due to the diversified roles ICT plays:

- *Livelihood enterprises:* for these, information is not the critical issue; there are greater constraints that relate to markets, finance, skills and motivation. They have the least capacity to meet information needs, and want to rely heavily on enterprise support agencies to meet those needs. They need help in building informal linkages. Therefore ICT is of limited value.
- *Growth enterprises:* they have a greater capacity to meet their information needs. They need help in building business linkages. Therefore ICT can be of significant value and they should be the priority focus for ICT interventions. Growth enterprises are best placed to make use of ICT; they provide a greater capacity to generate wealth, employment, exports and innovations.

There are arguments that more focus should be put on demand- and less on supply-side interventions. In value chain support, enterprises need more help getting information on demand and on customers. For value chain boundaries activity needs to stay customer- rather than supplier-focused. Demand-side interventions should focus on development of linkages to customers



Photo: Sanjay Acharya/IMAP

(e.g. sub-contracting to local large customers; export support to link to overseas customers); and other marketing support.

**Macro-level support**

Successful adoption and effective use of ICT by growth or livelihood enterprises is crucially dependent on the environment they are operating in. The limited resources of MSMEs in developing countries mean that they are more dependent on the external environment for ICT services than large-scale enterprises. In particular, the effective use of ICT for MSMEs is significantly affected by the constraints and shortcomings present in the policy, institutional and market environment.

Full participation in e-commerce and widespread adoption of ICT for enterprise operations will require expansion of the ICT infrastructure and other essential services (e.g. electronic banking). The development of a strong user base would support MSMEs to enter into e-commerce and support services – such as public access facilities (telecentres).

In summary, the essential macro-steps required to develop and promote ICT amongst MSMEs are:
- Development of infrastructure and facilitation of access;
- Government on-line;
- Improved knowledge/awareness;
- Support to adopt technology by enterprises and sectors;
- E-commerce and ICT sector development.

**Meso-level support**

In general, the most effective intermediaries for MSMEs will be commercial organizations, and/or those able to add value to MSME goods and services by providing other marketing chain resources. Private sector business membership organizations should be considered as effective and sustainable information providers for both livelihood and growth enterprises. ICT-capacity should therefore be built within:
- *Trade associations* – representing national (small) business sectors (e.g. tourism, legal, accounting, manufacturing, etc.)
- *Chambers of commerce* – representing the private sector within districts or regions
- *Umbrella associations* – national associations dealing with government
- *Employers associations* – organized at a national level.

Interventions should concentrate on support for facilitation, technical assistance and incentives encouraging the competitive performance of new and existing Business Development Service (BDS) providers, innovations, and the development of appropriate service products. Agencies should also focus more on policy advocacy pressing to improve macro policy-level interventions.

One possibility to provide business information services (BIS) to MSMEs is to use ICTs to network services already existing, providing a single entry point (e.g. one-stop-shops) and operating the network and support services on a commercial basis. UNIDO's BISnet model – established through a consortium of information providing organizations – provides a suitable framework achieving that purpose.

ICT may also support the sustainability and outreach objectives of MFIs, through enhancing the outreach and effectiveness of the private and public sector, the non-profit oriented community (NGOs, community and area based organizations) as well as the BDS institutions.

Donors and governments that provide funds to ICT intermediaries at least must be aware that there might be other – or even better – interventions possible with the resources invested in ICT. This is particularly of issue in developing countries given higher technology cost/lower income, demand and given the far greater penetration of pre-existing information technologies (e.g. radio, newspapers, television).

**Prioritized action plan**

Concluding the above, an action plan could recommend to:
- Support the enabling environment for supply- and demand-related macro-level interventions, including adopting national strategies for ICT development
- Raise awareness among donor and enterprise support agencies about the role of ICT for productivity and competitiveness
- Develop demand-driven information services incorporating e-partnerships and development of local content with a sustainability requirement
- Develop an authoritative knowledge base of good practice on ICT through support for networking, including e-networking with business partners
- Support development of the ICT sector and ICT technical capability, including localization of ICT sector support services
- Develop integrated e-business support and productivity enhancement packages for SMEs through sector strategies, such as through the use of e-appraisal tools (e.g. UNIDO's methodology for project preparation and appraisal – COMFAR).



Mr. Abel J.J. Rwendeire, Managing Director, Programme Development and Technical Cooperation Division, UNIDO

# How can information and communication technologies make a difference to rural poor people?

*International Fund for Agricultural Development*

Almost 700 million people worldwide have access to the Internet. The majority of them, about 62 per cent, live in North America and Western Europe, while only 2 per cent of Internet users live in Africa. Access to telephones, especially mobile telephones, is increasing rapidly in sub-Saharan Africa. In Tanzania, for example, about 60 per cent of villages have direct access to mobile phone networks. But few people, only 2.5 per cent of the total population, actually own a mobile phone.

Statistics such as these continue to spur debate over the digital divide between rich and poor countries and, increasingly, it has been recognized that this divide also exists between rural and urban areas within poor countries themselves. The truth is that the digital divide is a symptom of a wider inequality, especially in rural areas of developing countries, where more than 800 million of the world's poorest people live. Many of these people suffer from chronic hunger. They do not have access to safe water, electricity, or to roads, markets and employment opportunities, or to an education.

Communication technologies such as the Internet are fantastic tools. However, most rural poor people do not enjoy the benefits precisely because they are poor. The International Fund for Agricultural Development's (IFAD) approach to the use of information and communication technologies (ICT) to support development initiatives is to focus on people and not technology. Information and communication technology is a tool, not a solution. Technology is really only an instrument. Content and how the technology is used are what make the difference.

It is crucial that the emphasis is on communication processes, and learning and sharing — not on technology itself.

This implies participation, sharing of knowledge in a horizontal way, and respect for diversity and culture. This is fundamental to IFAD's commitment to strengthen the capacity of rural poor people and their organizations to overcome poverty.

Access presents one of the most obvious obstacles to ICT use in the developing world — especially in rural areas, where electricity is not always available or reliable, poor roads and terrain, and extreme weather can add to a remote community's isolation. But the real challenge facing IFAD and others involved in rural development is learning how to make ICT meaningful as well as accessible, so they can effect real change in the lives of poor people.

In effect, access to ICT becomes important only once certain conditions have been met.

The first step is ownership: poor people need to have a stake in their own development before projects can be successful.

ICT cannot help empower poor people unless content is locally-driven and meets their particular needs. Language can present a major hurdle, especially on the Internet: English remains its dominant language. Moreover, the Web is designed primarily for literate users, which excludes nearly 1 billion poor people in the world.

**Blending the new and the old**

Appropriate technology should always be a consideration in using ICT for development. The most modern and expensive equipment is not necessarily the best way to reach poor people, or to enable them to communicate among themselves or with others. For example, in rural areas of the developing world, radio is often the only mass medium available. Several IFAD projects have supported radio broadcasting. In Mexico, an initiative in the Mexcanu region of the Yucatan Peninsula trained children to develop and broadcast their own radio programmes. The children, who were often the only literate people in their communities, spoke both Mayan and Spanish. As a result, they provided an important communication bridge for older generations, who often only spoke Mayan. They also combined radio with the Internet to expand access to useful information. By accessing the Internet, the children were able to get information on matters of local concern, like crop prices and market opportunities, vocational training and access to microcredit programmes, and share it with the rest of the community.

The Mayan radio project is just one example of how blending new communication technologies with older ones can benefit rural poor people. In Peru, for example, farmers have used geographical information systems, or "talking maps", to assess the status of their natural resources. They then walk from farm to farm, sharing their knowledge with the community.

**Local content and ownership**

Another example of IFAD's work with ICT in rural areas is the First Mile Project in Tanzania. Emerging experience from the initiative underlines the importance of local ownership, relevant content and the blending of old and new communication technologies.

Linked to an IFAD-supported agricultural marketing systems programme, the First Mile Project will build the capacity of small producers, processors, traders and others in the market chain, to communicate better, form partnerships and learn from each other to ensure better access to markets and market information. The term "first mile" refers to bridging the connectivity gap between a village with no electricity and no telephone line to the nearest computer that is online.

The major challenge of the First Mile Project is to determine how smallholder farmers can connect through intermediaries to the Internet, to get market information and to communicate with other

farmer groups and key players as they learn to construct their own producer-to-consumer marketing chains.

Africa is now the world's fastest growing mobile phone market. Lively competition and increasingly good coverage in Tanzania's rural areas by mobile phone companies means rural people are using mobile phones who might never have used a landline. And soon the need to use a computer to send e-mails could be eliminated before most people have even seen a computer, with the introduction of General Packet Radio Service (GPRS) technology. This will enable people to send and receive e-mails on their mobile phones.

However, experience from the first phase of the First Mile Project shows that rural poor people use their mobile phones almost exclusively for social communication, to contact families and friends, and usually only when there is an urgent need. To get market information, for example, they are more likely to look at their village billboard — even though the prices listed might not be up to date.

However, the situation is changing rapidly. As network coverage expands throughout the country and mobile phones are proving worthwhile, people are starting to think about the possibilities of using them for other purposes — including to get updated information on market prices, to be posted on village billboards.

An important feature of the First Mile Project is that it works with groups of farmers, processors, traders and others in the market chain, who will combine use of old and new communication technologies — from face-to-face communication to the Internet — to get the information they need, share it and learn together. Building trust and collaboration within and between the groups, and ensuring the relevance of content are already emerging as crucial factors — more important than actual access to ICT. The problem is not the access to the technology, which is closer and more accessible than thought, but whether enough value is seen in exchange of information to justify the cost.

**Networking is critical**

Since 1995, IFAD has supported the development of information and knowledge-sharing networks: first came FIDAMERICA in Latin America and the Caribbean; this was followed by ENRAP, the Electronic Networking for Rural Asia/Pacific; FIDAFRIQUE in western and central Africa; and Karianet in the Near East and north Africa. By linking IFAD-funded projects via the Internet, these four regional networks use a range of electronic services and activities, including monthly newsletters, mailing lists and e-conferencing, to complement face-to-face interaction and share ideas, issues and experience. They also help improve communication between projects, as well as with IFAD headquarters and other partner organizations, and provide training and connectivity support to projects.

To raise awareness of rural poverty as an issue of global, regional and national importance, IFAD is creating a Rural Poverty Portal, a one-stop, interactive, Internet-based learning tool that will allow individuals to create, acquire, adapt, store, disseminate, manage and use information about rural poverty.

**Conclusion**

The rapid uptake of ICT like mobile phones is a significant step forward. But, despite progress towards more widespread access, it is important not to lose sight of the fact that development is not about technology or information — it is about the economic, social and political empowerment of poor people. Collectively, investments by both the international community and the private sector can help bridge the gap between the information "haves" and "have-nots". But the key to narrowing the digital divide is understanding that ICT is not an end in itself.

*IFAD is a specialized agency of the United Nations dedicated to eradicating rural poverty in developing countries. Seventy-five per cent of the world's poorest people – 800 million women, children and men – live in rural areas and depend on agriculture and related activities for their livelihoods. Through low-interest loans and grants, IFAD works with governments to develop and finance programmes and projects that enable rural poor people to overcome poverty themselves.*

Twaha Abdallah updates the market information on the billboard in Wili village, Hai district in Tanzania. Chairman of one of the village producer groups, Twaha said: "Sometimes it takes longer to update the information due to communication difficulties but we do our best nowadays, especially with the coming of the mobile phones."

# Financing information infrastructure in the developing world[1]

*Rym Keremane and Charles Kenny, World Bank*

OVER THE PAST decade there have been significant improvements in access to basic information and communication infrastructure (ICI), although the picture is more mixed for advanced ICI. Progress to date has been due to new technologies, declining costs and considerable investment, with a growing share of that investment coming from the private sector. Competitive, well-regulated private investment remains the key to meeting the growing demand for ICI.

Going forward, there are considerable investment needs for ICI in developing countries, and the first question is how to attract private financing to meet those needs. Even with greater private involvement, however, gaps will remain. Some investment gaps can be filled with pro-investment policy and regulation, and by leveraging the government's role as consumer and infrastructure owner. Some gaps may also require government-supported access initiatives. While the donor community plays a relatively small role in overall financing, the role for donors and the World Bank Group (WBG) in particular can still be significant.

**A changing digital divide**

The WSIS Plan of Action called for more than one half of the world's population to have access to information and communication technology (ICT) by 2015.[2] If that is defined at a basic level as living in an area covered by a mobile network signal, that goal has already been surpassed in every developing region, with an estimated 77 per cent of the world's population covered by the mobile footprint.[3] In fact, at least in terms of access to basic infrastructure, the digital divide is rapidly closing. People in the developing world are getting more access to ICT and basic voice access goals are being met at an incredible rate (Figure 1, based on IUT 2004a).

This positive trend is also clear from surveys asking organizations to list the major constraints they face in doing business. These surveys are available from over 80 countries in the developing

world.[4] No doubt as a result of significant worldwide improvements in access and quality of ICT, telecommunications limitations rank far down in the concerns of most businesses worldwide — last in a list of 14 constraints including factors such as policy uncertainty, corruption, electricity, transportation, and access to land.

Regarding access to more advanced ICT such as the Internet, however, the picture is more balanced. While the growth of Internet users in the developing world has been faster than growth rates in rich countries since the mid 1990s and, compared to what might be expected given the size of their economies, the developing world is doing quite well in terms of usage, still only about one in 100 sub-Saharan Africans use the Internet, for example. Interregional Internet bandwidth between Africa and the US is less than one three-hundredth of the capacity between the US and Europe. Sub-Saharan Africa has less than one-thirtieth of the broadband subscribers and less than one-eighth of the international bandwidth than would be suggested even by its small share of world GDP. This suggests significant work still needs to be done to bridge the digital divide.

**Growing share of private investment**

Driving the worldwide trend towards infrastructure rollout is the availability of new technology and falling prices, combined with considerable investment spent with greater efficiency. Annual telecommunications investment in the developing world has doubled over the last ten years (rising from 21 per cent of the world total in 1992 to 46 per cent by 2002). And although investment has declined from its peak in 2000, the decline has been less dramatic in the developing world than the rich world (Figure 2, calculated from ITU, 2004a).

Looking further at these investments, we find that their source has changed markedly over the past ten years — with an increasing percentage coming from private operators. Between 1990 and 2000, over 350 private operators began providing mobile services in more than 100 developing countries. In Africa, the top six (private) strategic investors in mobile had total revenues in 2003 estimated at USD7 billion, with profits of USD800 million.[5] Moreover, since 1988, 76 developing countries have privatized their fixed public telecommunication operators, raising over USD70 billion (Guislain and Qiang, 2004).

Investments in infrastructure projects with private participation in developing countries totalled USD210 billion between 1992 and 2002.[6] Sixty-six developing countries have attracted private participation in telecommunications infrastructure worth in aggregate more than five per cent of their GDP between 1990 and 2002, including 14 in the sub-Saharan region.

Figure 1: Teledensity (fixed and mobile) per region

| | 1990 | 1996 | 2002 |
|---|---|---|---|
| Africa — Sub-Saharan | 1 | 1.4 | 5.3 |
| East Asia & the Pacific | 5.5 | 11.6 | 38.1 |
| Europe & Central Asia | 12.8 | 17.3 | 38.9 |
| Latin America & Caribbean | 6.4 | 11.5 | 36.7 |
| Middle East & North Africa | 4.7 | 8.3 | 22.4 |
| South Asia | 0.6 | 1.5 | 4.5 |
| Developed Countries | 46.5 | 64.1 | 120.1 |

**Figure 2: Telecommunications investments in the developing and developed world**
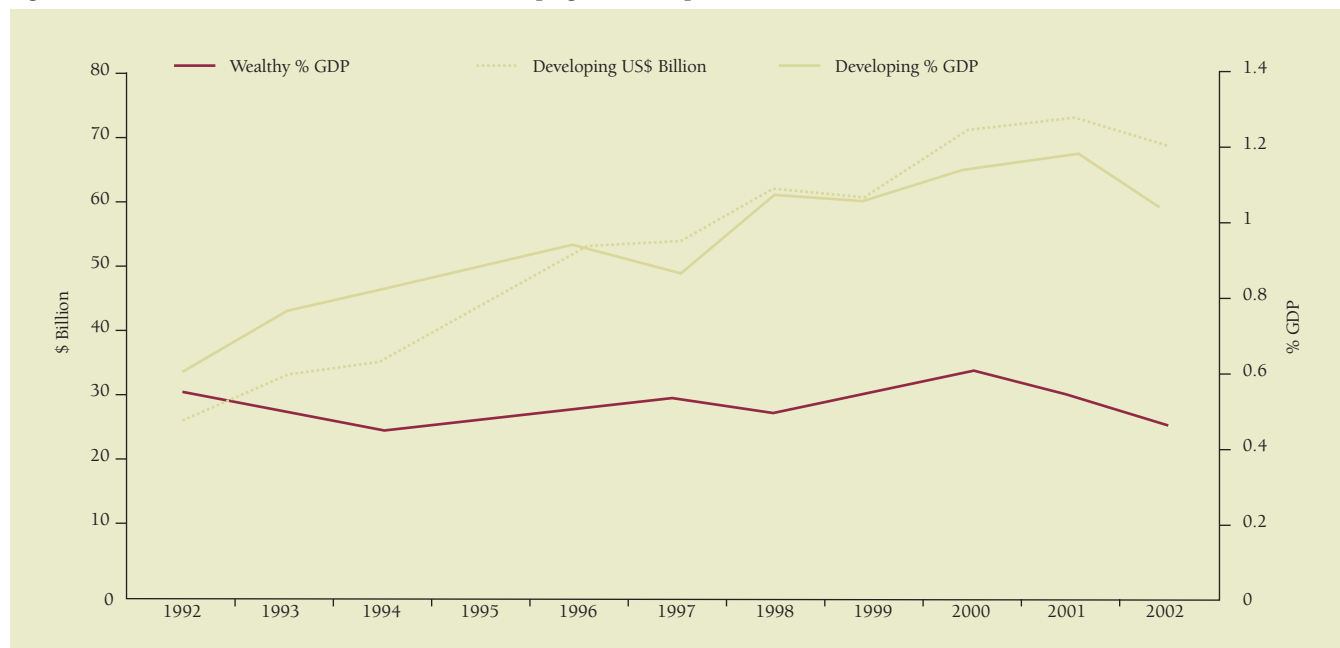


## Competitive, well-regulated private investment remains the key

While much progress has been made in closing telecommunications supply gaps in developing countries, there is still a long way to go, both to fill existing supply gaps and also to meet the growing global demand for telecommunications services. Looking forward, governments can play a key role in achieving this by attracting private investment.

The evidence is overwhelming that countries which have introduced private, competitive provision of telecommunications services under a strong regulatory framework have seen far more rapid rollout of information and communication infrastructure. One recent study suggested that low-income countries which had seen considerable reform towards competition saw a growth of 1 075 per cent in Internet users over the 1998 to 2000 period, compared to 405 per cent growth in countries that were lagging on the basic reform agenda. The same study suggested that fixed and mobile teledensity was approximately 80 per cent higher in reformed low-income countries than in non-reformed countries (Kenny et. al., 2003). The first step for many countries to attract greater private competitive financing is therefore to complete the basic reform agenda of opening up to private competitive operators. Nearly half of the world's governments still maintain a monopoly in the international segment, for example (Figure 3, source: ITU 2004b).

In addition, particularly important in a sector such as telecommunications is the ability to attract foreign direct investment (FDI). In fact, FDI has been the major source of private participation on telecommunications infrastructure projects to date. FDI restrictions not only place a maximum limit on potential foreign private investments (many countries limit foreign participation in ICI to less than 50 per cent), they can also deter such investments altogether. A recent survey of strategic telecommunications investors in Asia asked about the determinants that encourage or deter private investors, and found that investment decisions in the sector depend on far more than sector-specific policies and regulation — not least of which is the broader macro and institutional environment. Nine specified risk factors that influenced such decisions were ranked by investors in approximately the following order of concern (highest to lowest): regulatory consistency, rate of return, quality of local partners, direct control, country risk, repatriation of profits, currency risk, the scale of the investment, and insurable risks (Ure, 2004). Therefore, reform covering FDI, regulatory stability, and capacity building would help to attract and retain financing.

Beyond providing the legal and practical opportunity to invest, it is clear that risks and returns drive private financing decisions in ICI as much as in other sectors. Here the evidence suggests that, in the right policy and regulatory environments, ICI investments can make considerable returns in every region of the world. Taking the example of the International Finance Corporation's (IFC) telecommunications portfolio, estimated returns are double the Corporation's average (World Bank, 2002).

## Private involvement will not be enough to fill the gap

While the private sector can meet a great part of the developing country's demand for telecommunications services, it is likely that the private sector alone, even if supported by strong regulatory institutions that foster fair competition and a broader investment-friendly climate, will not meet demand for all information and communication infrastructure services that are economically efficient or socially acceptable, especially when looking forward to an evolution from narrowband to broadband networks.

For example, geography is still a key determinant of communications costs and functionality. Basic reform may also leave gaps in national backbone networks (typically long-term investments with significant sunk costs) or in cross-border facilities (transactions costs and timing uncertainties of multi-jurisdictional investments provide a daunting extra challenge to investors). Finally, countries where security uncertainty is so high that investors are deterred from even very profitable ventures may also face considerable difficulties in attracting sufficient private investment to meet immediate needs for ICI in support of reconstruction efforts. Therefore, there is a major role to play from the public side, taking advantage of policy and regulatory levers, but also by direct government subsidy of rollout initiatives.

Figure 3: Level of telecommunications competition worldwide
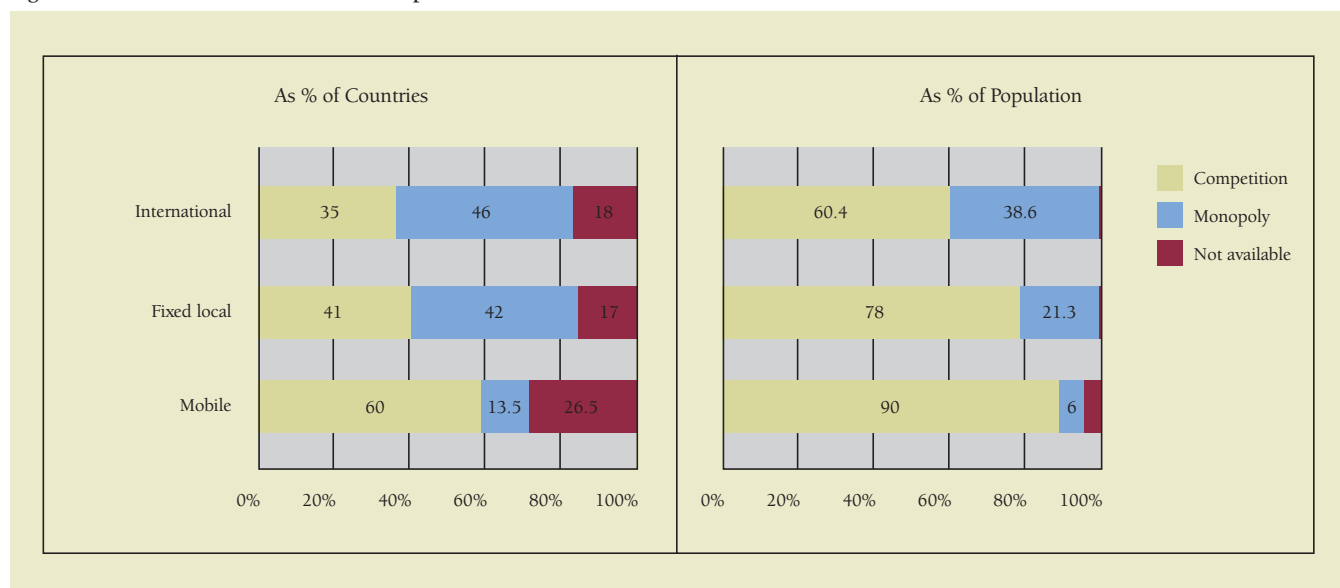


Some gaps can be filled by leveraging the government's role as consumer and infrastructure owner. By offering to pay for services to be rolled out to public sector operations in rural areas such as schools, hospitals, and customs posts, governments can provide an incentive to private operators to serve local communities. For example, in Mongolia a World Bank-backed project supported the Ministry of Finance to link up rural banks using a private provider of services who also plans to offer telecommunications services to people living near the connected banks.

In addition, because governments remain in the business of providing a number of other networked services, there is also the opportunity to leverage those networks to reduce the economic cost of backbone build-out. The potential to roll out ICI alongside other networks such as power, rail, water, pipelines, and roads is a significant one. In many cases, utility operators have already built private telecommunications networks along these rights of way with capacity that can be leased to private telecommunications companies.

Some gaps may require government-supported access initiatives, such as Universal Access funds. In the wealthier developing countries where most funds to date have been created, the most frequently used mechanism has been to collect between one and two per cent of the annual revenues of telecommunications operators. In poorer countries, funding universal access from a revenue or spectrum levy alone is unlikely to be practicable in the short run, and the use of government budgetary resources may become necessary, perhaps financed by donors. A very approximate upper-end estimate suggests that the additional funds required for global universal access above a two per cent levy would equal less than USD2 billion globally, if all countries had completed the basic reform agenda prior to launching access initiatives (Keremane and Kenny, 2005).

Chile is a good example of what can be achieved with universal access programmes, with its system of auctioning subsidies to pay for rural telecommunications rollout. In 1994, the country set up a limited-life fund to support the provision of the first payphones to remote and rural areas. Companies were asked to bid for the lowest subsidy that they would accept to provide service. Within two years, the fund had achieved 90 per cent of

its rollout objectives using only about half of its USD4.3 million budget (Wellenius, 1997).

**What role for donors?**
It is worth noting that, in volume terms, international donors and financial institutions have played a relatively small role in investments in ICI, with the great bulk of external financing to developing country telecommunications sectors coming from private flows. Having said that, it is important to note that donors and international financial institutions can play both catalytic and counter-cyclical roles. For example, during the post 2000 slowdown in private flows to developing market telecommunications companies, the IFC's telecommunications investments in Africa increased from an average of USD5.4 million between 1996 and 1999 to USD54.5 million between 2000 and 2003. Each dollar of IFC[7] investment in the ICT sector attracted USD8.7 million of outside financing in 1999, and each USD1 000 of IFC investment supported the rollout of an average of 14 new lines (World Bank, 2002).

Within the World Bank Group alone, a large range of instruments are available to support technical assistance, policy reform, and investment in the area of ICI. The International Bank for Reconstruction and Development and the International Development Association have a number of instruments to provide technical assistance and investment in the sector (investment loans, but also development policy loans — quick-disbursing assistance to support policy or institutional reforms in a sector or the economy as a whole). Along with the IFC, the Multilateral Investment Guarantee Agency promotes foreign direct investment by providing political risk insurance (guarantees) to investors and lenders, and by helping emerging economies attract private investment. The World Bank Group also administers programmes and trust funds on behalf of donors, which can support technical assistance and pilots. Examples include the Public-Private Infrastructure Advisory Facility or InfoDev.[8]

The World Bank Group fully recognizes the relevance of modern information and communications services to poverty alleviation and sustainable development, and stands ready to continue and increase its support to client countries in developing the ICI sector.

# Implementing UNFPA's knowledge sharing strategy

*Susan Kingsley Pasquariella, DLS Senior Knowledge Sharing Adviser, and*
*Brendan O'Brien, Chief, Strategic Planning Office, United Nations Population Fund*

THE UNITED NATIONS Population Fund (UNFPA) adopted a knowledge sharing strategy in May 2002. The strategy, formulated as part of a change management exercise, was designed to improve the work of the organization through the integration of knowledge sharing and organizational processes.

As an international development agency and part of the United Nations system, UNFPA has a specific and challenging mandate. In 2004, the Fund worked in 126 countries, areas and territories through its headquarters in New York; nine regional country technical services teams and 112 country offices worldwide. UNFPA supports countries in using population data and in formulating policies and programmes to reduce poverty and to ensure that every pregnancy is wanted, every birth is safe, every young person is free of HIV/AIDS and every girl and woman is treated with dignity and respect. The broad dispersion of staff and the range of activities and focus areas necessitate the development of a knowledge sharing strategy that is both people-centred, and, for practical and economic reasons, facilitated by technology.

What follows is a description of UNFPA's experience to date in the design and implementation of its knowledge sharing strategy and some thoughts about what has made this experience a success story.

UNFPA is one of a number of UN agencies that are attempting individually to define and apply knowledge management in the context of international development programmes. Among these, UNFPA's approach to knowledge sharing is unique in its comprehensiveness. More specifically, while UNFPA's approach focuses on people, processes and technology, its knowledge sharing strategy is also supported by strong commitment from the highest levels of the organization and is reinforced by inclusion of knowledge sharing competency as a criteria for measuring staff performance.

### The structure of knowledge sharing

In 2001, UNFPA established a Knowledge Sharing Branch consisting of three senior level staff with expertise and experience in knowledge and information management issues and systems. From the beginning it was assumed that knowledge sharing would be an implement for staff empowerment and teamwork. Technology, which is often the initial focus of knowledge sharing activities in other organizations, was therefore viewed primarily as an enabling mechanism and, as such, has played a catalytic supporting and facilitating role.

Implementation of UNFPA's knowledge sharing strategy was managed by the Knowledge Sharing Branch from 2001 until February 2005. During this initial period, the Branch formed a

Knowledge Sharing Working Group, as an integral part of the organization-wide change management process, consisting of staff from all organizational levels, drafted a knowledge sharing strategy, enlisted solid support for knowledge sharing at the highest levels of the organization, successfully incorporated knowledge sharing into all staff performance appraisals, developed a suite of tools to facilitate staff current awareness and sharing of experiences, developed a series of knowledge assets on topics of priority importance to UNFPA, drafted and distributed a guideline outlining procedures and staff roles and responsibilities for developing and updating of knowledge assets, and created a document repository which serves as both a corporate depository collection and an institutional memory.

On an operational level, UNFPA created three fundamental pillars:
- Knowledge networking/knowledge assets
- A suite of knowledge resources and tools to facilitate knowledge capture, distillation and management
- Human resource competency on knowledge sharing.

UNFPA defined knowledge sharing pragmatically to focus on how to do things, who to ask for help, and where to find examples. This enabled concentration on documenting staff experience and communicating and transferring dispersed organizational know-how more effectively within the organization, as well as for use with partners. It is this systematic and continuous capture of know-how built from years of experience inside and outside UNFPA's institutional boundaries that enables staff to perform with the competence of an old hand.

### Providing information support and managing knowledge resources

UNFPA's Knowledge Sharing efforts include the collection, retrieval and dissemination of substantive, operational and management information to increase organizational effectiveness. In this area, UNFPA has developed and manages a suite of interconnected Internet-based information and document systems, including an institutional document repository, DocuShare, and a virtual resource centre of commercial publications, the Internet Supermarket. These resources are designed to support knowledge sharing and strategic research.

The cornerstone of UNFPA's knowledge sharing strategy is a unique Knowledge Asset Development System, which staff use to capture, synthesize and share knowledge within the organization. This software tool is an easy-to-use step-by-step intranet-based system which can be used by all staff. Following requests from

collaborating organizations, UNFPA has also developed an open source portable version of this tool, the portable Knowledge Asset Development System (pKADS) in collaboration with Business Information Systems, University College Cork, Ireland, with funding from the Government of Ireland. The pKADS software was introduced in a press conference at the World Summit on the Information Society Phase I meeting in Geneva in December 2004.

## What are knowledge assets?

UNFPA knowledge assets contain distilled experiential knowledge on subjects or issues of primary corporate importance as reflected in the Fund's multi-year strategic plan approved by the Executive Board. The knowledge assets are developed by selected UNFPA staff (known as knowledge networks) who have expertise and experience in the asset topic area. Structurally, assets are based on organizational work processes and present information in a question and answer format. Answers are short and clear (no more than 200 words), and link to examples and further readings. The asset is developed, updated and supported by a network of staff experts who can provide further information to colleagues upon request.

The purpose of knowledge assets are to serve as a definitive readily accessible online resource that staff can access to find out about specific programmes and methodologies in various areas of endeavour. The specific structure and content of each asset is user-defined and depends on the topic the asset is designed to address.

The asset is designed to be both dynamic and interactive, and facilitates both access to staff experience in a particular UNFPA priority area and contact between the asset user and members of the knowledge network that has developed the asset.

The primary developers and users of this knowledge are programme staff in the country offices who are working with national counterparts. Headquarters and regional technical staff support them as networks members. The central ambition of knowledge sharing is that UNFPA staff should have access to the best experiences available for use when they need it and know who to ask in the organization for help based on those contributing to the knowledge asset.

Thus far, UNFPA has developed knowledge assets in eight priority topic areas. These are:
- Obstetric Fistula
- Emergency Obstetric Care
- Female Genital Mutilation/Female Genital Cutting
- Quality of Sexual and Reproductive Health Care
- Sector-wide Approaches
- Reproductive Health Commodity Security
- Human Rights-based Approach to Programming
- Mainstreaming Culturally-sensitive Approaches to Programming.

Assets are currently also being developed on HIV/AIDS, Population and Housing Census and UNFPA's Response in Crisis Situations. These assets are used by staff to inform discussions with colleagues and with governments and partner agencies, and for programme planning and research purposes.

Knowledge assets are developed in five-day workshops attended by staff who have expertise in the asset topic area. The purpose of the workshop is to enable staff to reach a common ground with regard to various aspects of the topic area, and to design and develop asset content.

The development and use of knowledge assets is at the core of the UNFPA approach to knowledge sharing and distinguishes it from knowledge sharing approaches in other organizations. The focus on developing knowledge assets is also very important because it provides a clear context for knowledge sharing.

Figure 1: The Knowledge Asset
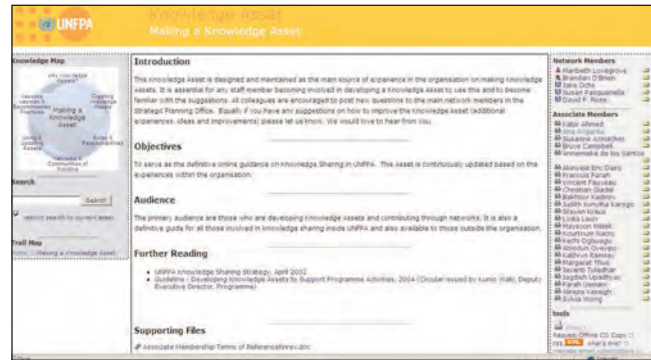


The creation of knowledge assets is dependent on the establishment of well-functioning expert networks which will take responsibility for developing, updating and maintaining asset contents based on the experiential knowledge of the organization. Within UNFPA, the primary source of guidance for knowledge sharing is a knowledge asset on 'Making a Knowledge Asset'. This resource is updated regularly to convey new techniques and procedures and to address asset development issues.

It is important to note that the asset development process can expose a number of challenges, including gaps in staff knowledge and expertise, entrenched and obstructive hierarchical behaviour and authoritarianism, and inflexibility or the inability of staff to adapt to change.

## The role of knowledge sharing in strategic planning

In early 2005, the Knowledge Sharing Branch was merged into UNFPA's Strategic Planning Office (SPO). This was intended in part to facilitate mainstreaming of knowledge sharing into staff daily work and to promote participation of topical knowledge networks into corporate strategic planning exercises. SPO has responsibility for ensuring the translation of UNFPA's strategic direction into results-oriented planning and management at the organizational level, and planning for the effective and efficient allocation of financial resources in achieving organizational results in the context of the International Conference on Population and Development (ICPD) Programme of Action. SPO plays a central role in identifying emerging global trends and issues and analyzing their implications for the strategic positioning of the Fund. In this context, knowledge management is viewed as fundamental to strategic planning as well as for improving results at each level of UNFPA but with particular emphasis at the country level.

In mid-2005, UNFPA began the process of formally evaluating the use and utility of the knowledge assets that have been developed. This evaluation will inform the future of knowledge sharing within the organization over the next few years. Initial feedback indicates that our country office staff use knowledge assets for a variety of functions including briefing of counterparts and colleagues in other development organizations. UNFPA has also agreed to facilitate the use of the knowledge asset development system to support joint initiatives, such as the development of assets in vital United Nations focus areas such as HIV/AIDS, under the auspices of the United Nations Development Group.

*Further information about knowledge sharing in UNFPA can be obtained from the UNFPA website at:*
*www.unfpa.org/knowledgesharing*

# How weather, climate and water information saves lives and promotes sustainable development

*World Meteorological Organization[1]*

THE MAIN PURPOSE of the World Meteorological Organization (WMO), a specialized agency of the United Nations (UN), is to facilitate international cooperation to promote the rapid and free exchange of information on weather, climate and water. Its fields of competence range from taking the pulse of the Earth-atmosphere system to environmental satellites, from weather forecasting to climate change studies, drought prediction to ozone-layer depletion studies, tropical storm and flood warnings to scientific environmental research and advice on sound environmental governance. WMO also furthers the application of weather, climate and water information to aviation, shipping, water resources, agriculture, leisure, energy and indeed all other weather-sensitive activities.

## The importance of information

Weather phenomena of unusual severity or duration pose a threat to life, property, human activities and the environment. They include tornadoes, thunderstorms, cyclones, flood-producing rain and drought. Natural disasters, which occur on timescales ranging from minutes to years, have led to an enormous toll of human suffering, loss of lives and property damage. Severe weather has impacts in all countries. It is estimated that 90 per cent of the three million people killed as a result of natural disasters in the past 20 years lived in developing countries, the majority of which are situated in areas prone to natural disasters and dangerous weather events. In addition to direct damage, severe and extreme weather has serious indirect effects on food security, the spread of disease, and long-term problems of desertification, famine and mass emigration.

Accidental or intentional (e.g. war-induced) releases of hazardous materials into the atmosphere and water bodies also constitute a major threat to life and safety and can take on international or even global dimensions. Information and warnings on the predicted concentration of toxic or radioactive materials
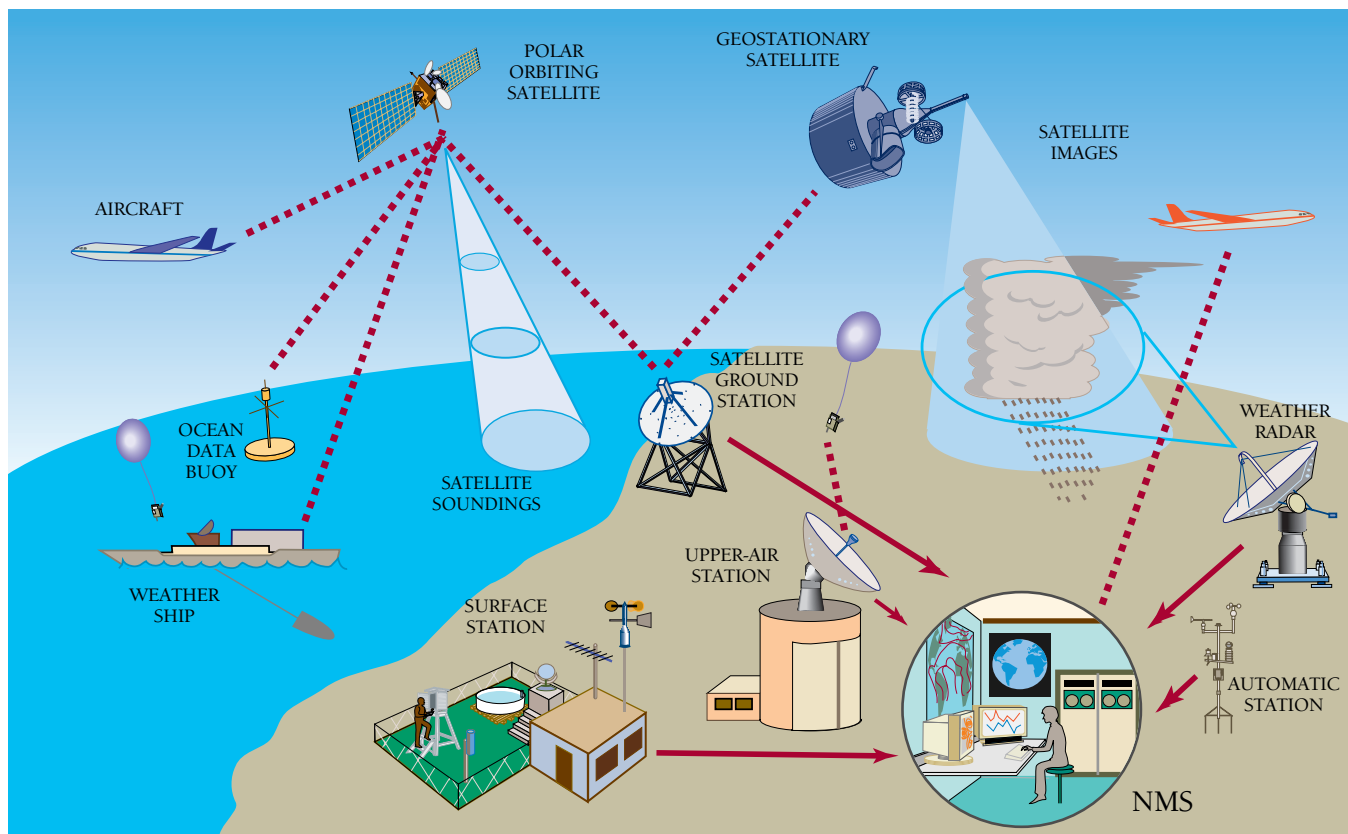


Provision of information benefits many weather - sensitive sectors

Severe weather phenomena can pose serious threats

in the atmosphere and their predicted transportation and deposition are essential for mitigating their disastrous impact on populations and economies.

Increasingly accurate and reliable information on weather, climate and water allows for improved decision-making, which has the potential to offset the negative impacts of weather and climate events. WMO's authoritative information, advice and databases are critical for natural disaster risk assessment, vulnerability analysis, preparedness, response and recovery. Early warnings of weather, climate and water extremes protect life and property, provided that they reach their target audience in a timely and suitable manner.

Provision of weather, water and climate information, analyses, forecasts and warnings to a wide range of weather-sensitive sectors is of enormous socio-economic benefit. Agriculture, fishery and forestry; energy and water-resources management; land, marine and aviation transport; banking and insurance; construction and urban design; and also human health, recreational activities and tourism, all benefit directly from access to meteorological and hydrological information. Major societal and economic benefits for countries are expected from access to climate information, including climate predictions and assessments of climate change.

Access to meteorological, hydrological and climatological information produced and provided by the National Meteorological and Hydrological Services (NMHSs) is of crucial importance for the sustainable improvement of developing and less-developed countries in areas such as urban development and management in the context of population pressures, water supply, pollution, transportation and sanitation.

The collection and exchange of Earth observations (especially related to weather, climate and water), requires the use of information and communication technology (ICT), and is needed for the analysis, monitoring and forecasting of the state of the Earth. The goal is the delivery to populations of weather, climate and water information and warnings as comprehensive and effective services in support of the safety of life and property.

An ongoing challenge lies in the fact that developing countries, which are among the most exposed to natural disasters and least able to benefit from the advances in the application of weather, climate and water information, have limited access to ICT, either because they are unavailable or too expensive. The availability of information technology has a key role to play in enabling and fostering access to weather, climate and water information and services. Information technology should help pave the way to sustainable progress in developing and least developed countries (LDCs), enabling populations and various economic sectors to benefit from comprehensive effective information and warnings which support the protection of life and property and of sustainable economic and social development.

**ICT applications: benefits in all aspects of life**

ICT applications can support sustainable development in the fields of public administration, business, education and training, health, employment, environment, agriculture and science within the framework of national e-strategies. The Plan of Action of the Geneva Phase of the World Summit on the Information Society (WSIS) seeks to address this issue, including actions within the following sectors:
*e-Environment*
Establish monitoring systems, using ICT, to forecast and monitor the impact of natural and man-made disasters, particularly in developing countries, LDCs and small economies.
*e-Science*
Promote the long-term systematic and efficient collection, dissemination and preservation of essential scientific digital data, for example, population and meteorological data in all countries.

Avalanches and landslides 6%

Droughts and famines 9%

Earthquakes 8%

Extreme Temperatures 5%

Windstorms 28%

Volcanic Eruptions 2%

Forest/scrub fires 5%

Floods 37%
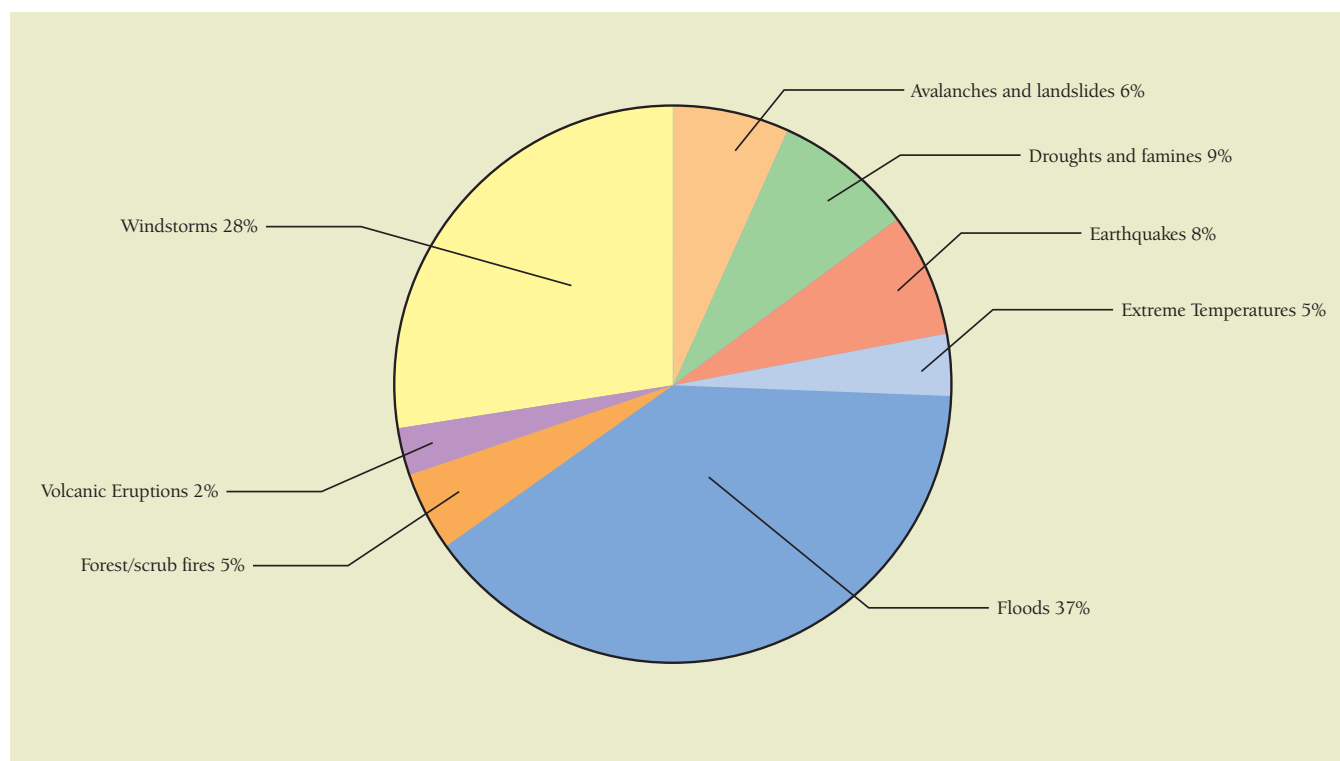
90 per cent of loss of life due to all natural disasters in the past 10 years has been due to weather, climate and water hazards

Promote principles and metadata standards to facilitate cooperation and effective use of collected scientific information and data as appropriate to conduct scientific research.

Since the first weather networks came into effect in the 19th century with the telegraph, ICT has played a key role in meteorology. Within the framework of the WMO's World Weather Watch programme,[2] the NMHSs of the 187 WMO members are exchanging real-time data via the Global Telecommunication System (GTS)[3], which consists of dedicated links, data-communication networks and satellite-based systems. Weather, water and climate know no borders, and effective services to users, economic sectors and the public at large depend on these exchanges of information. The Internet plays an increasing role in information exchange, in particular with users, including scientific and research sectors.

The GTS supports the international distribution of early warnings for weather, climate and water-related natural disasters, including tsunami warnings in the Pacific and Indian Oceans. The GTS in the Indian Ocean is currently being upgraded and expanded in order to collaborate with UNESCO's Intergovernmental Oceanographic Commission in the implementation of a tsunami early warning system in the Indian Ocean, within the broader objective of achieving a multi-hazard early warning system.

WMO has launched the development of a coordinated global information infrastructure, the WMO Information System (WIS)[4], for the collection and sharing of weather, climate and water information for all WMO and related international programmes. WIS implementation will build upon the most successful components of existing WMO information systems in an evolutionary process. WIS will ensure the interoperability of information systems between WMO programmes and outside the WMO community. WIS is based on the use of international ICT industry standards, as well as modern data communication services including the Internet. WIS is expected to be a major component of the Global Earth Observation System of Systems.

WMO strives to apply the most recent ICT, leading to the most cost-effective implementation of ICT systems at the NMHSs. The use of standards ensures a cost-effective implementation of information systems and greatly facilitates sustainable implementation in developing countries. The Plan of Action of the Geneva Phase of the WSIS includes the promotion of principles and metadata standards to facilitate the cooperation and effective use of scientific information and data to conduct scientific research. WMO has long-standing experience in developing international recommended practices for weather, climate and water operations along with research and actively promotes the use of international standards. Moreover, WMO is currently developing weather, climate and water metadata standards for geographic information in the framework of ISO (ISO 19100 series) with a view to enabling the universal search, access and use of weather, climate and water information.

Weather, water and climate know no borders and effective services to users, economic sectors and the public at large depend on the free exchange of relevant information. WMO is strongly committed to the promotion, coordination and implementation of ICT for improving the production, exchange and distribution of information and warnings on weather, climate and water at global, regional and national levels. WMO is pursuing actions towards the development of the next generation of its GTS, the WIS, in line with the outcomes of WSIS and as an important contribution towards the achievement of the Millennium Development Goals. The development of ICT, and its sustainable implementation, have therefore a key role to play in enabling and fostering access to weather, climate and water information and services for the safety of life and property and the sustainable development for the benefit of humanity.

# The social dimension of ICT

*The International Labour Organization*

RAISING ISSUES OF inequality, joblessness and poverty should need no justification. We live in a world of deep seated and frequently rising inequalities. Two in five people live in poverty today, struggling to survive on less than USD2 a day. According to International Labour Organization (ILO) estimates, close to 185 million people are without a job.[1] A further 550 million work in poverty.[2] In total, some 2.8 billion people lack decent, dignified and human standards of living when dependants and family members are added to unemployment or underemployment statistics. The figures become even more tragic in the face of the unprecedented amount of wealth created in the world economy over the past few decades. Globalization is evolving in such a way that what is added to the wealth of the world does not reach those most in need of it, yet it enhances the advantages of those in high-skilled, productive, freely chosen and decent employment.

It is essential to remind ourselves that the ultimate goal of any endeavour by the World Summit on the Information Society (WSIS) ought to be the elimination of inequalities and the eradication of poverty. Information and communication technology (ICT) is a means to this end. We must establish a firm link between ICT and economic growth, else we are doomed to fail in our commitment to building "a people-centred, inclusive and development-oriented Information Society" that would contribute to the attainment of the Millennium Development Goals (MDGs), as stated in the declaration that marked the end of the first phase of WSIS in Geneva.

The missing link between ICT and development is indeed the connection between ICT and decent work. The eradication of poverty in a sustainable manner requires the creation of decent work opportunities for all. As stated in the ILO report *Working out of Poverty*,[3] work is the best — perhaps the only — sustainable route out of poverty. By extension, identifying the relationships between ICT and decent work would be the main goal of the (ILO), resulting in a successful outcome for WSIS. Building this link underscores the importance of the social, as well as the economic, dimension of technological development, which is encapsulated in the relationship between ICT and the world of work.

## Divides

The differences between the rich and the poor cross many divides. The digital divide is but one of the various dimensions of inequality. Information technologies are, like all other technologies, tools. They are as valuable as the use given to them. This, in turn, depends on the capacity of users. Giving untrained workers or managers access to data processing and communications equipment will not improve their incomes, their productivity or their working conditions unless other actions are taken to bridge the human capital gap. At the same time, the more gifted will be able to exploit investments in ICT immediately. Since the well managed adoption of ICT leads to greater competitiveness, these tools can widen existing social and economic gaps.

Enterprises are among the critical beneficiaries of ICT. Their operations depend, in most cases, on existing infrastructure. There is, in fact, an infrastructure divide that encompasses much more than communications; there are wide gaps in available transportation systems; the quality and availability of energy sources in much of the south is a cause for concern; there are wide divergences in financial structures and services; there are large differences in the availability of business development services and in arbitration mechanisms. There are, in short, numerous infrastructure-related factors that limit the ability of enterprises to reach markets or to acquire intermediate goods. When firms encounter these difficulties they cannot access or compete in large markets; when this happens, employment creation is sluggish and the jobs created are neither highly productive nor well remunerated. Economic activity is frequently orientated to survival rather than capital accumulation, thus perpetuating the vicious circle of poverty. The chasm separating enterprises predates the digital divide. The latter only widens the gap, creating diverging employment prospects.

It is assumed throughout the WSIS documents that technology has a positive or, at least, a neutral effect on social conditions: there are no costs involved. Unfortunately, the introduction of ICT has real costs and can lead to wider — not narrower — social and economic gaps. This is true both at individual and enterprise level. Individuals without information processing skills are at greater risk of either being made redundant or not finding a job. Enterprises unable to exploit the benefits of ICT risk losing market share, with consequences for their profitability, and eventually their survival. This will lead to job losses and increased poverty. And this can happen if no efforts are made to help smell and medium sized enterprises in particular to adapt to new technological paradigms.

## Social effects of ICTs

ICT is deeply embedded not only in economic growth, but also in social development. It touches upon every area of our lives. As a revolutionary new set of technologies, ICT is unique in many ways. Owing to its generic nature, ICT has affected all industries, every service in the economy and many occupations and employment structures in our contemporary world. Earlier revolutionary technologies, such as electrification or mechanization, were also pervasive in that sense. The pervasiveness of ICT is, however, unique in affecting every firm and organization as well as every function within them, and doing so at an ever more rapid pace. Most research, development and design work, the majority of market research, back office activities, and many production processes have become dependent on the use of ICT. Occupations have disappeared, to be replaced by others requiring more education; linotypists have been replaced by digital page layout

Internet café that also sells shoes, photocopies and long-distance calls, Bangalore

designers, and the demand for webmasters or web programmers has risen. Economic and social gaps widen if economies do not envisage mechanisms to help the labour force adapt to technological change.

The international context in which this new set of technologies has been growing also reinforces its pervasiveness. Several interrelated trends in the world economy over the past decades have had an impact on, and have been influenced by, the diffusion of ICT. The most notable of these trends are the globalization of economic activity, tertiarization (increasing weight of services in world output) and the increasing importance of knowledge in global production processes. Indeed, services such as back office processes can now be traded across ever widening geographical distances, increasing employment opportunities in some places and reducing them in others. This was simply impossible before the advent of ICT. Together, the technologies not only enabled the rapid dissemination of ICT, but have also contributed, via their effect on demand, to further advances like the union between telecommunication and computer technology, the dramatic decline in the price of information processing, and the rapid growth in international electronic networking.

The recent report of the World Commission on the Social Dimension of Globalization, entitled *A Fair Globalization: Creating Opportunities for All*,[4] also identified ICT as one of the main drivers of globalization through its impact on facilitating trade, investment and capital flows across national borders. The increasingly footloose nature of international production is also to a large extent enabled by ICT.

ICT enables globalization, but also transforms it. The digital revolution made possible by the rapid advance of these technologies is affecting every aspect of the production process, thereby transforming the economic structure and social dynamics in every industry. Tasks can be automated to improve product quality and consistency. The fall in processor prices and some standardization in enterprise resource planning, computer aided design, inventory and other process management strategies are simplifying the integration of production throughout the world. To fully reap the benefits of the adoption of ICT, major reorganizing and re-skilling initiatives must be promoted. ICT boosts efficiency and productivity as long as it is accompanied by the right managerial environment, the right process re-engineering, the right skills for effective use and the right social learning processes. This must be adopted in a climate where cooperation is possible — and this requires effective social dialogue, perspectives for those who might lose their employment because of structural change, and other measures to promote mobility in labour markets.

ICT sets in motion a process of 'creative destruction'. It make jobs in certain production industries and locations redundant, but creates more productive ones in others. There are serious social adjustment costs involved in changing the fabric of job distribution due to such restructuring. A strategy for effective ICT implementation has to involve accommodating institutional and industrial structures — as well as sound industrial relations — in order to have a positive impact on competitiveness, growth and decent employment. Institutional preparedness, especially of the labour market, is crucial. Organization and voice, social dialogue, fundamental principles and rights at work, as well as social protection, such as active labour market policies, are prime components of such preparedness.

**Institutions**

As in products markets, the Internet is changing the working of labour markets. It is doing so for exactly the same reasons that markets for goods are changing. Search and transaction costs are falling due to ICT. There are, however, additional factors that

Internet room in a library, Oman

contribute to the change in the operation of labour markets. David H. Author[5] suggests that the Internet is modifying labour market processes by three different means: first, the Internet changes the way the demand for and supply of labour are developing. Most enterprises have Internet pages on vacancies and numerous sites provide for labour exchanges. Secondly, work can be delocalized and delivered through digital means. Finally, the spatial coverage of markets expands. A fourth factor could probably be added to the list. As competency requirements change, more value will be given to highly skilled and specialized workers who will be able to trade their services as consultants. This can create new markets of free agents developing business-to-business portals for specialized workers.

The improved availability of information on both job offers and jobseekers creates its own difficulties, however. Enterprises must develop tools to filter the most suitable candidates from an ever increasing pool of offers. Indeed, research shows that the quality of recruitment practices (measured in terms of duration of employment as a proxy) does not differ much between advertised vacancies and Internet placements on the one hand, and referrals on the other. It is the latter that shows the best hiring results.[6] However, since the nature of the work available is increasingly specialized, the fragmentation of the labour market will make it increasingly necessary to call upon new technologies to refine labour matching.

Labour markets are not the only processes that are modified by the increased availability of ICT. Workers' and employers' organizations can also benefit from the use of ICT. The Colombian Chambers of Commerce, for example, provide a register of business names and a portal for registrations and other enterprise-related transactions. Such efforts are also being made in other economies around the world. Communications and information dissemination have also been improved within national and international labour unions. Nathan Newman[7] describes a number of specific cases in which the use of the Internet has been critical in the mobilization of labour unions and civil society to achieve specific social goals. These include the fight against the Multilateral Agreement on Investment, the campaign against a prominent North American Bank after it suggested that the Zapatista revolt had to be eliminated, the movement in Seattle against the World Trade Organization, and the campaign against a leading sports goods manufacturer.[8] The important role played by ICT in the process of mass demonstrations is described in terms of vicious cycles where mass media portrays an action which elicits reactions from demonstrators coordinated by other modern information devices.[9]

**Some conclusions**

The dynamics of technology, growth and employment are in perpetual interplay within the framework of ongoing structural change in the global economy. By fostering enterprise development, productivity, economic growth, trade and competitiveness, ICT offers a strategic lever for policy development. Targeted technological interventions can help in the development of enterprise creation — particularly when the nature of enterprise creation values the contributions that labour makes towards common economic and social goals. However, we need to establish clear links between integrated policies in these fields and poverty reduction in order to make headway in reaching the Millenium Development Goals and to attain the goal of fair globalization that creates opportunities for all.

The report of the World Commission highlights decent work for all as the main channel out of poverty. Fair globalization, the report argues, is possible if and when we are able to offer a fair chance at a decent job to all. In order to mobilize ICT for development, we need to establish the links between these technologies and decent work. Dialogue between workers, employers and governments constitutes a first step in that direction, a step that WSIS has taken by insisting on the importance of multi-stakeholder participation at all levels and in all aspects of ICT policy development. An integrated policy approach to ICT is critical to the achievement of the goals set in the Millennium Declaration, including its objective of inclusive globalization.[10]

ILO would therefore like to call for a stronger emphasis, during the second phase of WSIS and its follow-up, on issues related to the world of work, as well as on the social dimension of ICT development and globalization. ILO, with its unique tripartite structure, has much to contribute to making WSIS more relevant to the wider development agenda. We should no longer regard ICT merely as a set of technologies, but rather as socially embedded development tools.

# Digital reach in Taiwan Province of China

IN GENERAL, TAIWAN Province of China is blessed with a comprehensive telecommunications infrastructure and extensive telecommunication services. Mobile phone penetration is close to 100 per cent (97.38 per cent), local phone 59.85 per cent, Internet 64.78 per cent, and broadband access 54.70 per cent. In terms of household penetration, local phone penetration is 97.56 per cent and broadband access 56.84 per cent. Even though many countries may be envious of such performance, Taiwan Province of China is still concerned about the fact that 2.4 per cent of households cannot have access to phones, and that 43 per cent of households do not enjoy broadband services. Under the e-Taiwan Programme in recent years, great efforts have been made to reduce the digital divide and create an equitable Information Society by implementing the policies of providing universal telecommunication services and creating a number of Telecentres in unserved areas.

## Universal Telecommunications Services

A telecommunications deregulation policy was implemented in Taiwan Province of China in 1996. To continue to safeguard the basic communications rights of citizens in remote areas and carry out the Information Society policy, the Ministry of Transportation and Communications formulated the Regulations on Telecommunications Universal Services in 2001 to accommodate the deregulation of fixed networks. Currently, the universal services defined by such regulations include uneconomical payphones, uneconomical local call services, free coastal radio station services for shipwrecks and safety communications, and data communications access services for primary schools, high schools and public libraries. The cost of universal services will be shared by telecommunications operators based on their annual business volumes.

### Implementation of Universal Telecommunications Services

The Directorate General of Telecommunications (DGT), the telecommunications regulatory body, set up a Telecommunications Universal Services Fund in August 2001 in accordance with the Regulations on Telecommunications Universal Services and the Management Committee for the Telecommunications Universal Services Fund in October of the same year. Consisting of 11 scholars, experts and government representatives, the Management Committee is chaired by the DGT's director general and primarily reviews annual universal service action plans and approves the cost of universal services. Universal telecommunications services were formally launched in 2001, and the current provider is Chunghwa Telecom, the incumbent operator.

### God's Tribe – case study of Smangus

Located in mountainous areas in northern Taiwan Province of China at an elevation of 1 500 meters, Smangus is abundant in the production of peaches, with untainted and graceful natural landscapes.

There are a total of 28 households in Smangus. The residents are religiously faithful and refer to themselves as "God's Tribe."

It was not until 1979 that the tribe gained access to electricity, and there were no access roads available until the end of 1995, when tourism development began in the area. However, telecommunication services were still not available due to the difficulties in the deployment of a telecommunications infrastructure. In 2000, the tribe began to enjoy mobile commu -nications with the outside world after Chunghwa Telecom built base stations in neighbouring villages. However, high service charges were a tremendous burden to the residents, not to mention unstable signal quality and unavailability of fax and Internet services.

On 30 April 2003, the tribe sent a letter to the DGT, requesting a resolution of local call deployment issues. After an on-site visit of a delegation led by the DGT's director general and members of the Management Committee for the Telecommunications Universal Services Fund, Chunghwa Telecom was asked to utilize a hybrid network technology (microwave and wired communication technologies) for network deployment. After six months of planning and construction, the network was completed in December 2003 with a total construction cost of USD175 000, translating into USD6 000 per household, 20 times that of the cost for each general household (approximately USD300). Since then, local residents have enjoyed local call services and fax and Internet access at the same prices and with the same quality as other citizens.

Young students in the tribe were encouraged to set up their website to promote tourism and market agricultural products via information and communications technology (ICT). In 2004, there was an increase of tourists and agricultural products, such as peaches, were rapidly sold via the Internet in contrast to tough sales in the past. This is a success story for digital opportunities created by universal services.

## Telecentre

Telecentre is a place equipped with ICT facilities and where community residents can access the Internet and get relevant ICT training. Developing telecentres in remote/rural areas has been one of the key policies for bridging the digital divide in Taiwan Province of China since 2000.

### Stage One

To bring the people of remote areas into the Internet world, Taiwan Province of China launched an approximately USD1.1 million project to establish telecentres in remote areas in 1999. Provice of China offered a bid to request proposals and a proposal from a specialist in integrating resources for religious groups won the contract. It used churches as the major sites for the telecentres and 141 had been built in remote areas by the end of 2001.

Two different types of computer configurations were designed in the project. One was a PC model for 121 points; the other was a kiosk model for 20. The locations for the 20 kiosks included community service centres, libraries, schools, civil organizations, tourist centres, district halls, and national parks, etc.

For the PC model, the telecentres were equipped with PCs, printers and Web cameras. The computers were connected to the Internet by dial-up. The churches were expected to integrate these telecentres with their regular activities in local communities to help promote Internet usage in remote areas. However, the result was not as ideal as originally planned.

With the kiosk model telecentres, each telecentre was equipped with a wall-mounted Internet computer. The kiosks were freely open for public access but users had to get an IC card from the kiosk manager.

The kiosk model was easier for maintenance than the PC model. It could be monitored and updated remotely and was ideal for delivering information and services to the general public.

*Stage Two*

Based on the experience and lessons learned from Stage One, Taiwan Province of China continued to establish telecentres in remote areas. A decentralized implementation strategy was used in the second stage, starting from 2003. Instead of outsourcing a single project, proposals focus on how to cooperate with local communities to maintain the telecentres and promote Internet applications. A committee was formed to review and fund 11 proposals in 2003. Local communities and NGOs were included, and 12 more proposals were approved and funded in 2004. By July 2005, 120 telecentres had been established for Stage Two and a further 20 were on target to be completed by the end of the year.

**Case Study of Lalashan DoWeb Model**

Lalashan (Mt. Lala) is situated in the remote indigenous Fusing Township in northern Taiwan Provence of China. The total population of the township is around 2 200 and over 80 per cent of the residents are indigenous people. Lalashan is regarded as the hometown of peaches.

Although Lalashan peaches have been well recognized as one of the most delicious on the island, the income contributed by selling peaches is quiet unstable. For example, the peach price was down sharply due to an abundant harvest in August 2000. In that year, the average income for each household was just USD6 000. Forty per cent of the households, mainly indigenous families, lived below the poverty line. Most of the households were thinking about switching to another line of business due to unstable income.

In 2003, a government-supported telecentre project, aimed at bridging the digital divide, was launched in Lalashan. A comprehensive approach called the DoWeb (Digital Opportunity Within E-business) model was applied. In this case, technical inspiration and innovation are closely married to eco-social ones in order to gradually combine and balance between profit making and stewardship.

Members of Management Committee for the Telecommunications Universal Fund in Smangus Tribe

Outlook of Smangus Tribe

After two and a half years of hard work, the achievements of the Lalashan DoWeb project had gone far beyond everybody's expectations. Back in August 2000, most of the households knew little about computers and the Internet. But by 2005, Lalashan had been selected as an e-commerce and digital opportunity benchmarking community in Taiwan Province of China. Nowadays, 80 per cent of Lalashan households own computers, and most of the computers are connected to the Internet via broadband. Their children were the winners of the Silver Award in the International Schools Cyberfair award. A total of 91 Lalashan farmers sold their peaches online and generated a total sales value of USD356 000 in 2005. Also, the farmers' average income for selling peaches in 2005 has been doubled since 2000.

*Next steps for the Telecentre*
How to make telecentres sustainable is an important issue. It has been recognized that the full involvement of local communities is a  key for the success of telecentres. Only through local communities' involvement, do telecentres have the potential to provide services full of abundant localized content. Since each local community has its own character, the best development model for each telecentre may be different from the other. For example, online business for selling local products can be successful for a telecentre located in a fruit garden area, while scenic areas can use a telecentre to develop tourism. Taiwan Province of China has built some different successful models for telecentre development in the past years. Based on this, there are definitely good opportunities to make much better progress in developing successful telecentres for bridging the digital divide in remote areas.



Smangus' Web site

# e-Learning through the Tunisian Virtual School: a success story of the integration of ICT in education

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*Member of Working Group on Internet Governance*

As A RESULT of the various transformations and innovations brought by ICT along with globalization, all the nations worldwide are racing to join the first ranks in this new ever-changing information society. Coping with these changes and catching up the track have become a real challenge mainly for the developing countries. The challenge is even more difficult when it comes to education; experiences in distance education / e-learning and online tutoring have become quite common. We are going to take the Tunisian Virtual School (TVS) — an essential basis of the School of Tomorrow — as an example of pioneer experiences in North Africa and in the Arab Countries. Tunisia has been one of the first countries to contribute to the new technological changes in the field of distance education/e-learning through the launching of the Tunisian Virtual School in an experimental phase on 28 January 2002. In fact, as clearly stated in the Presidential Election Programme, all the components of the Tunisian Virtual School will be completed before the end of 2009.

The Ministry of Education and Training, through the INBMI (National Institute of Office Automation and Computing) has been working on the TVS programme since that date, deploying all the human and technical resources required to make it a success story and an example to follow.

## Components, objectives and services of the TVS

The following facts and figures are very significant for the implementation of this ambitious national project and help pave the way towards the information society:
- 2 267000 students are enrolled at school
- 100 per cent of high schools are connected to the Internet. By the end of the National 10th Plan, the quality of Internet connection will be improved
- 100 per cent of preparatory schools will be connected to the Internet by the end of 2006
- Up until now, more than 1300 primary schools out of 4000 have been connected to the internet and the remaining ones will benefit from this service at the end of the National 10th Plan in 2006.

At the beginning, the TVS provided lessons in English and French only to the baccalaureate students through its Academic and Assistance Department (AAD) to improve their collaborative and autonomous learning and to prepare them for the Baccalaureate Exam. Then gradually, it has relied on teams of experienced teachers and inspectors to add more disciplines and more lessons both in secondary and preparatory schools to achieve one of its main objectives which is providing support to students in all parts of the country and ensuring equal opportunities for all.

Up to now, the disciplines covered in the ADD are eight for Preparatory School or what is called Second Cycle of Basic Education and comprise 112 lessons. Nine disciplines are targeted at Education School and comprise 115 lessons.

As for the ICT Department, which is rather oriented to educators, it offers its users 11 lessons providing them with tutorials, training modules, pedagogical scenarios and educational resources. In addition, the TVS gives Arabic language lessons, especially for the Tunisian pupils abroad through its Arabic Language Department (ALD).

In order to make the baccalaureate students' academic assistance more effective, the TVS organizes a yearly important online event starting from the beginning of April: 'Let's Get Prepared for the Bac Together' is a space reserved for online tutoring with the required communication tools designed within the TVS website to establish a direct link between the tutor and the students during the revision period. Apart from the services offered by the above-mentioned departments, users can access the Educational Virtual Library and take advantage of an enormous number of digitalized and evaluated resources.

In addition to the various free services within the TVS, Edunet — the official website of the Ministry of Education and Training — also offers many valuable services to its users, the most important ones being the proclamation of the results of national exams, of professional contests, results of educators' movement, announcements of ministerial circulars and reminders. Also, it hosts disciplinary websites produced by educators.

## Towards more professionalism

The INBMI has always had an ambitious perspective and an innovative insight as far as the development of online content for the TVS is concerned. To be much more professional, it constantly organizes national training workshops for the benefit of all educators (TVS users, content developers, online tutors) in parallel with the content developed by the Multi - Media Unit within the CNP (National Pedagogic Center) and the private sector. On another

Primary school pupils using computers to learn

level, the INBMI has put the platform of distance education developed for the TVS at the disposal of the Workers' Open School to use, which helped them give online courses to the benefit of the students registered at Higher School for Professional Promotion. This type of cooperation is very significant for the future of remote education and the applications of ICT in teaching/learning.

Because of the tremendous success this programme has achieved, we are currently expanding it to cover all the regions of the country. Furthermore, we are working right now at launching a new programme with the collaboration of the National Centre of Trainers' Training in Carthage, taking into account our preparation to shift towards a free software environment as far as distance education is concerned.

### Content production

In his Presidential Election Programme, His Excellency President Ben Ali made it clear that the digitalization of all programmes relating to compulsory disciplines for 3rd and 4th year Secondary Education should be achieved in 2009.

Although a special Multi Media Unit has been created within the National Pedagogic Center to produce a part of the content mainly for some disciplines such as Computing, Mathematics and English, it is still worth mentioning that thanks to the competencies of the educational human resources within the ministry, we will achieve our goal in the due time. The Private sector in this domain has also acquired the necessary experience and is capable of contributing to the TVS content.

Moreover, thanks to some ambitious measures, the encouragement of personal initiative, the strengthening of training in multi-media, the progress towards our fixed goals is steady and straightforward.

### Widespread of digital culture

The huge transformations resulting from the use of ICT have impacted all domains, going beyond economy and commerce to encompass culture and civilization; a digital society has been born, a reality to cope with and to engage in. In Tunisia, we are more than concerned with digital culture and this concern is reflected through the Presidential Election Programme, which stresses the dissemination of digital culture by encouraging the associations that promote it. The ministry with all its resources deploys great efforts to support them through financial help and effective collaboration and considers them as efficient partners in the expansion of this new culture and the conscious and constructive engagement of our youth in it in order to belong to the information and communication society and to contribute to its construction.

We need to stress the crucial role of mass media in expanding digital culture along with the extensive training courses, the workshops, the organization of and participation in seminars, and the promotion of high quality digital content targeted at contributing to the widespread use of this new type of culture to pave the way towards the building of future society.

### Future challenges

To be able to contribute to the construction of the Information Society and global culture, there are various challenges we have to take into consideration. The equipment of our educational institutions, their connection to the internet, the reinforcement of curriculum development and content design, the search for innovation and professionalism, the full rehabilitation of human resources are basic tools for our educational system to join the developed countries.

These challenges are both on the individual, national and international levels. Lifelong learning, basic training, the preservation of our cultural identity, the continual improvement of educational institutions and the empowerment of virtual education are among the key features that will help us rank high and join the developed countries.

Obviously, our engagement in the Information Society and digital culture means at the same time the preservation of our identity, our cultural heritage and our specific socio-economic features. This implies more awareness, more cautiousness and more responsibility in our endeavour.

# For whom does the Internet click in Africa?

*Olivier Nana Nzepa*

THE FIRST DAY I walked into a classroom and announced to my postgraduate communication students that I will be lecturing about the Internet and its reengineering of the communication field, one of my students cut me short, by saying: "You North Americans, please, just let us alone with your Internet! Here in Africa, we have our talking drum. And we are more than happy with it."

This was in October 1997, in one of the best African communication schools, the Advanced School of Science and Communication Techniques of Yaoundé, Cameroon. I was stunned by the charge. If professional journalists, in a post graduate specialization programme, could react so vehemently about a technology which is transforming completely not only the newsrooms, but practically every aspect of life, what about the rest of society? I decided to find out by carrying out research every year on e-access and usage in Africa. The first one was carried out in the Yaoundé region, by the very same student, after four months of lecturing, and concluded that the Internet was a far cry from the talking drum.

The first evidence discovered by the study was that cyber cafés, the main community access points, were growing in the capital city, Yaoundé, like mushrooms. The second stunning evidence was that up to 70 per cent of Internet users were made of women. One of the consequences of the deep and lingering economic crisis the country had faced for more than ten years was, and still

is, that young men are more and more reluctant to tie the knot. For girls grown up in a culture which makes marriage the paramount objective in life, getting a husband has become problematic. In order to solve this, they take recourse in the Internet to look for available parties elsewhere, mostly in Europe.

The journey towards Internet access and usage in Africa brought another revealing practice. In Dakar, to avoid unnecessary journeys to hospital by new mothers, some doctors have set up a network of weight watchers in the most populated and poor neighbourhoods. Their task consists of weighing the newborn babies, from a few weeks to six months, on a periodic basis. The report is sent by SMS to the hospital. The doctor only calls to the hospital if the mother of a baby has an abnormal development path. This has helped in great deal to slim the line of patients in medical premises.

Fishermen's catches have increased by more than 90 per cent. While at sea, they stay in touch with land and can therefore inform in real time about the kind of fish and the quantity, and be informed about where the market is so that, before getting back to shore, suitable trucks are waiting to carry their catch to the market.

The Manobi project has enabled 150 farmers to raise their revenues on average by USD 200 per month. A few farmers were able to raise their revenues by USD 1 000 per month. In Kenya, the Drumnet project empowered farmers to improve their

incomes dramatically through exports by cutting out the middleman via information systems.

I have gathered much evidence like this since I started tracking the grassroots changes the Information Society is driving in Africa. What it all has in common is its spontaneous occurrence. These people didn't wait for decision makers to assert a link between the Internet and development for them to step in and take their future into their own hands.

The implication of this is the risk of disconnection between the prevalent discourse on Internet and development and the grassroots realities. At the time when most African countries are racing to adopt some form of broad-based ICT policies, the lack of resources, unrealistic targets and the complex nature of the global economy are making the linkage between the Internet and development a mere incantation. Despite great awareness around Information and communication technology (ICT) by the ongoing World Summit on the Information Society (WSIS) process, most of the continent is still to hear the ringing of a fixed phone, not to mention holding a mouse. For the 90 per cent of the African population still on the other side of the digital divide, communicating with the outside world is still an obstacle race. African governments are sharing the view that the solution lies through a universal access strategy. The African regional meeting held in Accra, Ghana in February 2005, has strongly advocated universal access as a major strategy to harness ICT for development purposes and build modern information infrastructures and knowledge capability in order to bridge the digital divide in Africa.

The trouble is, 70 per cent of telephone infrastructure in Africa is cellular. Therefore, the issue of universal access goes beyond being purely a matter of telecommunications policy and regulation. It's a matter of access to ICT in the context of human development. It encompasses the new forms of Internet access, the building of community-based or community-driven networks, traditional telephony, as well as broadcasting media such as community radio. More than 60 countries have begun to establish Universal Access Funding (UAF) mechanisms as a core component of their ICT development policies. Successful models of UAF introduced in Africa and elsewhere have indicated that, properly implemented in a competitive environment, these mechanisms can play a critical role in leveraging market forces to expand access to public telephone services, multipurpose community telecentres, and other ICT facilities. But these experiences are still too scarce to enable general assumptions. The low teledensity levels in most African countries have two distinct causes: undersupply of telecommunications or ICT services due to inadequate sector policies, and/or low demand due to low incomes.

Telecommunications reform which led to the privatization or partial opening of the market in many African countries doesn't suffice to address the second cause of universality problems — insufficient local incomes to support the rollout of telecommunications or ICT networks. The privatization of telecom operations, combined with the adoption of new technologies, has greatly reduced net financial flows to African countries. Their largely state-owned telecom operators have seen massive reductions in their primary source of revenue — from incoming international calls — due to the increasingly competitive international environment and the use of bypass technologies such as VoIP and VSAT.

The growth and adoption of the Internet is being hampered by this environment. The high tariffs charged by monopoly operators, the inability of internet service providers (ISPs) to service their customers with adequate telecom infrastructure, the fact that ISPs must pay for both ends of their international telecom links, as well as the transit charges to pass their traffic through to the rest of the Internet and to carry the incoming traffic from developed countries, lead to inequitable access by developing nations to the global Internet backbones.

Addressing these various difficulties will require a major shift in the course of policy making. The complexity of issues places an enormous burden on African countries and requires expensive and skilled regulatory machinery to operate effectively. Addressing the market structure, the credibility problem and the lack of skilled human resources issues will require a major shift in the policy and a clear repartition of roles and attribution amongst the various stakeholders.

The question is no longer whether the Internet leads to development. It does, and the ladies in Yaoundé cyber cafés, the fishermen in Senegal, the farmers in Kenya, proved just that. The challenge is, how to turn the back against the 'one size fits all' policy imposed upon the developing countries by international institutions. The International Telecommunication Union, the International Monetary Fund and the World Bank determine most of the priorities at the national level. Those priorities are unfortunately not always in coherence with the needs expressed at the grassroots level. As a first step towards addressing this development policy divide, together with developing policy tools and approaches that can further the integration of Internet and development strategies, and place the grassroots change brokers at the heart of the Information Society which copes with the central principles of transparency, public accountability, public participation and equity, and at the same time stimulate universal access to ICT and the use, we need to listen carefully to those who daily reinvent the use of the Internet for development purposes.

# Transforming the digital divide into the digital opportunity: Native Language Internet Address

*Netpia, Korea*

THE ORIGIN OF the Internet was the Advanced Research Projects Agency Network (ARPANet). It was developed in 1969 and used mainly by experts to exchange information between remote computers for academic and military purposes. Throughout the 1970s, Internet use gradually increased with the introduction of the IP address system. However, difficulties in using this system continued to impose limits on the use of the Internet.

Since the 1980s, there has been explosive growth in Internet use after the United States Department of Commerce (US DoC) organized and distributed domain names that people would feel more comfortable with than IP addresses. This resulted in the growth of Internet-related industries and the birth of the new economy, and the evolution of the US into a high-tech based economy.

The growth of the Internet has dramatically changed many things. Because the Internet has become so popular and widespread, people are affected by it regardless of their age, culture or language. With the Internet turning into a whole new land to pioneer, individual countries are working hard to expand their territory and to maintain an influence in the form of their own domain address system. Without this evolution of user-friendly Internet addresses from the original IP address system, the era of the dotcom industry would not have arrived.

In the long-run, however, domain names have been the cause of both hopes and despair. The growth of domain names ending in .com has been limited to one language, English. In contrast with the past, people today gain a great deal of information from the Internet. Therefore, countries or people that are not familiar with English are bound to fall behind in an era of information technology.

Consequently, English-speaking countries have been able to continue to accumulate wealth through a rapid growth of Internet-related industries by using the Internet as a common service among the public. Meanwhile, social and economic development has been relatively slow in non English-speaking countries, which account for more of the world's land and population than English-speaking countries.

Many areas of the world are only beginning to gain access to the Internet, and the Native Language Internet Address (NLIA ) will help users in these areas to learn how to access important information using their own language. Using the NLIA will also help them to establish skills and pride in their own culture and language, because they will not be forced to use English in order to use the Internet. Netpia predicts that the NLIA solution will help millions of non-English speaking Internet users around the world to navigate the web through easier and more intuitive access to the Internet.

## The Native Language Internet Address

Netpia.com developed the NLIA in 1997. It has enabled non-English speakers and those who are not very familiar with English to access information freely using the Internet, a task that previously proved difficult for them. For example, with the commercialization and popularity of the Native Language (Korean) Internet Address service in 1999, Korea's ranking in the International Telecommunication Union's (ITU) Digital Access Index jumped from 24th in 1998 to 4th in 2002, signifying Korea as the first country to experience an increase in growth rate. The secret weapon in Korea's significant development as a representative of non-English speaking countries, with its unique alphabet systems, lies in the NLIA system.

Unlike English-language domain names, NLIA is an Internet address which does not sideline anybody in any way. Regardless of the country or ethnic group they belong to, anyone who can read and write their native language can have easy access to the wealth of information on the Internet. Instead of using complicated strings of Roman English letters with prefixes and suffixes, users can type meaningful and intuitive words in their own language directly in the address bar to reach web sites. This is not another search engine, but a one-to-one address mapping system. And because it is a server-based solution, it provides ubiquitous coverage no matter which operation system, browser, or device is being used to access the Internet. People using older computers and those using the newest wireless devices will benefit from the same solution. In this regard, NLIA provides a 'knowledge gateway' to the Internet for everyone.

Under the English-language domain names system, users can encounter difficulties in guessing the names of web sites and their top-level domains (TLDs). Therefore, people tend to run search engines in their native languages and select one of the web sites among the list of results. Occasionally, people even end up visiting several websites before reaching the one they were looking for. An increasing number of Internet users have experienced this type of inconvenience as the existing domains have become saturated.

NLIA is a keyword-type Internet address presented in natural language. It is a third-generation technology that provides Internet users with an environment where they are free from hard-to-remember English domain name containing 'www' and full-points, and can use their own language to access information . Moreover,

Diagram showing the growth of Korean Internet address usage

**Growth of Korean Internet address use**



| | |
|---|---|
| 21,000,000 | (Sep 03) |
| 12,000,000 | (Sep 02) |
| 4,000,000 | (May 01) |
| 600,000 | (May 00) |
| 8,500 | (May 99) |

2,470 times growth in 4 years

**ITU Digital Access Index**

| 2002 | 1998 |
|---|---|
| 1. Sweden | Finland |
| 2. Denmark | United States |
| 3. Iceland | Norway |
| 4. Korea | Sweden |
| 5. Norway | Denmark |
| 6. Netherlands | Canada |
| 7. Hong Kong | Australia |
| 8. Finland | New Zealand |
| 9. Taiwan | Singapore |
| 10. Canada | Netherlands |
| 11. United States | .... |
| 12. United Kingdom | .... |
| 13. Switzerland | .... |
| 14. Singapore | Taiwan |
| 15. Japan | Hong Kong |
| 16. Luxemburg | Japan |
| 17. Austria | .... |
| 18. Germany | .... |
| 19. Australia | .... |
| 20. Belgium | .... |
| 21. New Zealand | .... |
| 22. Italy | .... |
| 23. France | .... |
| 24. Slovenia | ... |
| 25. Israel | Korea |

because it is in the users' native languages, it is more intuitive and users are able to guess the Internet address they are looking for much more easily. Because NLIA guarantees interoperability and compatibility with the domain name system, it is also ready to be used without any modification of or changes to existing applications, and without the or installation of new ones.

NLIA is easy to remember and convenient to use, and has been a leader in transforming the computer-oriented Internet address system into a human-oriented one with the goal of helping people around the world use real-name Internet addresses in their own native language.

**Success story in Korea**

Korea, the first country to adopt the NLIA system, has witnessed remarkable development. Internet usage rates increased rapidly nationwide, bridging the information gap substantially among various sectors in society. Korea's success in rising to fourth place in the ITU Digital Access Index for 2002 was compounded by the country's rise from 17th place in 2003 to fifth place in the United Nations' Global e-Government Readiness rankings in December 2004.

In Korea it is quite common to see people who do not know a word of English, such as the elderly or young children, using NLIA to access the Internet, conduct e-commerce, find important information, and get benefits from e-Government services without difficulties.

Currently, all of Korea's local government websites, in association with the Ministry of Government Administration and Home Affairs, have registered their Korean Internet Address, helping the Korean people to access civil services online more easily. In addition, during the 17th General Election campaigns, more than 90 per cent of the National Assembly candidates registered their homepages using the Korean Internet Address, giving voters easier access to information about them.

The online election campaigns turned out to be more effective by cutting costs and time as well as enabling the exchange of opinions compared to the old-fashioned offline promotions. The new Internet address system has helped realize a genuine digital democracy by eradicating irregularities arising from offline campaigns and by establishing apparent election campaigns.

**Status quo for the globalization of NLIA**

NLIA has completed its test for languages that are now being used in 95 different countries. The commercialized service has already been launched in Korea, Turkey and Thailand, while pilot services are being provided in Japan, Bulgaria and Mongolia. In addition, a lot of efforts have been devoted to the preparation of service commercialization in the regions traditionally considered to be non-English speaking countries, such as Greece, and Malaysia, and some Arabic countries.

International activities have been undertaken including participation in Internet address-related organizations such as ICANN, IETF, ITU, and APRICOT. In particular, the ITU started discussing the possible technical standardization of NLIA in 2004. Recently, Dr. Kangsik Cheon, who has actively been involved in numerous international meetings as a member of Netpia, was appointed a member of the United Nations (UN) Working Group on Internet Governance (WGIG) by UN Secretary General, Mr Kofi Annan.

In September 2005, Netpia sponsored to organize the Native Language Technologies and Policies (NLTP) consortium to help overcome the digital divide. Numerous countries and organizations were represented at this intense preparation workshop to share a high level discussion of the current condition of the digital divide and to underline the benefits and the merits of NLIA. This event accentuated a strong sense of Internet equality through NLIA as a major solution in helping to bridge the digital divide. Louis Pouzin, a legendary figure in the Internet society, was appointed as an interim chairman at this workshop, to oversee the worldwide promotion and implementation of the NLIA service. This is considered to be a major milestone in the service's globalization.

**Effects from the introduction of NLIA**

As proven in Korea, the NLIA service has been effective in narrowing down the digital divide. Indeed, its effects can be shared by those not only in developing countries, but also in advanced non English-speaking regions of advanced countries. Considering that the information gap exists between those who can speak English and those who cannot, even in advanced countries, including France and Germany, the introduction of the NLIA service is essential.

English-speaking countries that have the upper hand in the IT industry might also enjoy positive effects from the active use of

Her Royal Highness the Princess Maha Chkri Sirindhorn of Thailand visited Netpia head office (Seoul, Korea, October 2004)

the Internet in non English-speaking countries. Eventually, an increased Internet penetration rate in the non English-speaking countries will follow in the growth of the market by presenting more opportunities to export the latest technologies.

NLIA also has far-reaching effects on Internet infrastructure and in other related industries. For instance, NLIA has boosted e-commerce activities in Korea, which stimulated that country's economic growth. In the long run, NLIA will help to develop ICT-related industries such as software and hardware. NLIA will give birth to big new enterprises in much the same way as domain name-related industries have done in the past (e.g. Microsoft, eBay, Yahoo, Google, Amazon and Hewlett-Packard). This will present further opportunity to increase the number of Internet users worldwide. It is therefore in the best interests of governments around the world to adopt NLIA, to enable national growth and empowerment.

**Preparing for the future with NLIA**

Today's Information Society is rapidly moving towards the IPv6-based next-generation Internet and ubiquitous environment, further emphasizing the need for the implementation of the NLIA system. In the future, when everybody has an IP address and all electronic equipment is controlled using IP addresses, assigning complex English domain names to all equipment will be impossible. Therefore, Netpia's NLIA system, which allows the free use of 'real' offline names, has been catching the public eye as the key alternative that will guide users in the Information Society of the future.

NLIA is an Internet address that is easy to remember and convenient to use. The system has been leading the way to transforming the computer-oriented Internet address system into a human-oriented one, and which can enable people around the world in the ubiquitous computing era to use native language Internet addresses in a convenient manner. The Internet is no longer a sanctuary for the privileged few, for one particular language, or for one culture.

Netpia is dedicated to providing user-friendly, intuitive Internet access through the NLIA system, and takes pride in being part of the global effort to bridge the digital divide caused by the language barrier. As Director Houlin Zhao of the ITU Telecommunication Standardization Sector (ITU-T) stated: "Innovation like NLIA can certainly introduce greater fuel to the global ICT services. To enable people to use their own language to access the Internet is fundamentally an act of defending human dignity and equality. To promote the NLIA will eventually contribute to the global efforts to bridge the digital divide. The world will have to take action to support the needs of developing countries in this respect. I hope the business community will follow Netpia to work on this issue." NLIA, which combines real names and cyber identities, will take its place as a standard in the next generation of the Internet as well as the ubiquitous age.



The Turkish Internet Address service has been launched (Istanbul, Turkey, July 2005)

# How to reach the rural herders scattered across Mongolia

*R.Oyun, Coordinator, Risk Study Working Group and Director,*
*JEMR Consulting Company, Ulaanbaatar, Mongolia*

TRADITIONALLY LIVESTOCK WAS a unique source for sustainable living in a country with an extreme climate and insufficient and irregular distribution of both heat and moisture. Here, the cold weather lasts for six to eight months and the natural grass growing season is short; it lasts for a mere four to five months. More than 80 per cent of atmospheric precipitation falls by the end of the growing season.

In such an unstable environment the ecosystem is poor, and pastoral animal husbandry is a factory that operates all year round and produces living necessities. Here, nature and herders are "co-investors". Nature invests for grasslands and the herder invests for his livestock. Approximately 50—1 200 kg/hectares of annual

grass growth, coupled with the herders' labours, provides one-third of the Gross Domestic Product (GDP) and a quarter of the country's export sales.

Global change affects Mongolia, causing temperatures to rise twice as rapidly as the global average. The epicentre of atmospheric pressure changes is located in Mongolia. The faster the climate changes, the greater the risk of disaster. Steppe grasslands are considered particularly vulnerable to such changes, so pastoral animal husbandry, which is wholly based on weather and natural grasslands, is at great risk.

A severe drought, a dzud disaster and an epidemic disease affected the livestock sector during 1999—2003, and as a result,

**Figure 1: Weekly monitoring of pasture vegetation and its biomass for Erdenedalai county with use of ground and NOAA AVHRR data**
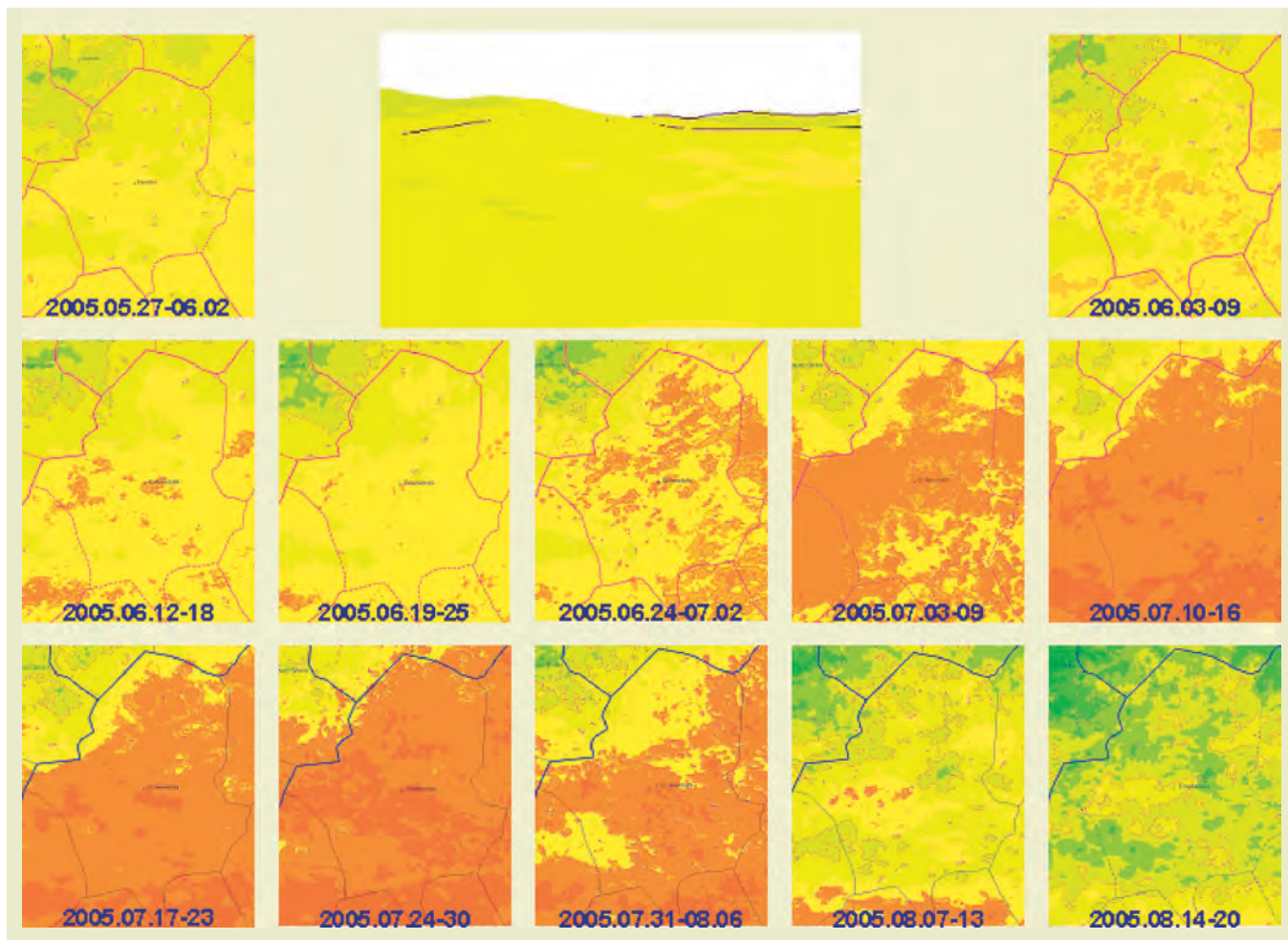
one-third of livestock with a value of nearly USD1 million was lost. The livelihood of rural people rapidly plummeted, contributing to an increase in unemployment and poverty. The latest NSO (National Statistics Office) statistics showed that poverty in the rural population was 43.4 per cent, compared to 36.1 per cent nationally. Current climate hazards are threatening not only the livelihoods of the herders and rural population, but also Mongolia's economy.

Population density in rural Mongolia is less than one person per square kilometre. Here, the telecommunications network has a high cost and a low income, resulting in an increased digital divide and a poor application and uneven penetration of information and communication technology (ICT). Current public service telecommunication facilities have been operating since the 1960s and consist of aged analogue PBX switches connected to province centres that are switched through open-wire transmission links. There are less than two telephone lines for every 100 inhabitants. A mobile telephone service has been started in a few counties.

Recent developments in the telecommunication infrastructure with fibre-optic cable, VSAT and wireless technologies have created an opportunity to bridge the digital divide to the settled centres of the counties. But reaching herders living in or migrating for better pastures with their animals, often 40—150 kilometres away from county centres, is still highly problematic.

**Mongolia's efforts to reach the rural herders**

The Mongolian Government gives the utmost significance to ICT. In 2004 it established the Information and Communication Technology Authority (ICTA) under the Prime Minister's office, as this institution is responsible for overall policy formulation, planning, implementation and the coordination of all ICT-related activities throughout the country.

Recently, the parliament of Mongolia approved a government action plan (2004—2008) to implement a nationwide programme called 'e-Mongolia' for 2005—2012[1]. This would create an Information Society that would apply ICT in all political, social and economic sectors, enhance the quality of public services, bridge the digital divide and establish a favourable legal environment.

The Government has set goals to create a broadband backbone network throughout the country, a high speed connection to the international backbone gateway, increase overall public services utilizing ICT as a tool for improving quality of life, and implement e-government, e-commerce, e-industry, e-education, e-citizen, e-health, e-democracy and e-business projects. The Government hopes to achieve the following goals by 2012:

- increase the telephone density rate in rural areas by 15 per cent
- create mobile connections in 65 per cent of counties
- create Internet connections in the centres of all counties.

At present public hydro, a meteorological service, provides nationwide weather and climate information. But this is not downscaled to local areas where the livestock pastures and the herders live. There is a need to improve disaster risk reduction and early warning systems with accurate predictions of hazards designed to assist the herders, farmers, rural communities and local governments. But the current density of meteorological stations is too low to provide more detailed information and Mongolia cannot afford to increase them at this point. The official weather prediction system does not provide monthly or seasonal forecasts localized to the county level.

Since 2000, the National Agency for Disaster Management, the National Agency for Meteorology, Hydrology and Environmental

Figure 2: Vulnerability assessment — pasture and livestock



[ 118 ]
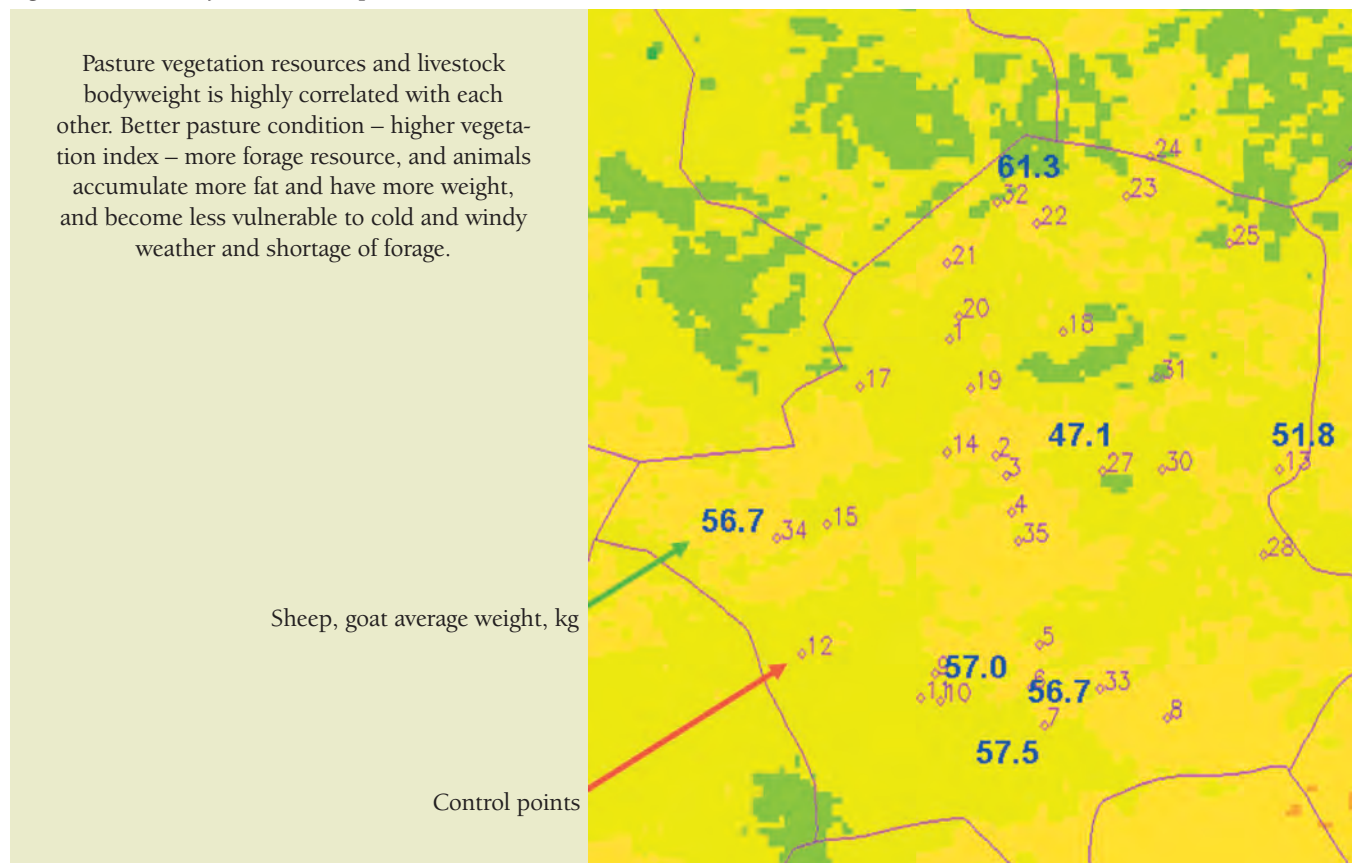
Monitoring, the Poverty Research Unit of the Ministry of Finance and a volunteer working group for risk study (RSWG) have been conducting a series of disaster risk case studies with both professional and participatory approaches. This has resulted in the development of a 'risk manager' information system with the following components:

- Hazard prediction, vulnerability and risk assessment methodology localized to the county level
- Integrated database for rural county
- Integrated information processing techniques and software for preparation of and service with content that would assist the herders and farmers
- Partnership and telecommunications network, Internet website for sharing information and early warning
- A community information centre that would operate in rural areas and bridge the digital divide.

Risk assessment methodologies have been developed and piloted for 14 counties of Mongolia with the broad involvement of local stakeholders on the example of frequent hazards such as dzud, drought, epidemic diseases, and forest and steppe fire. In addition, more studies and database developments with indigenous knowledge, ground and satellite data, digital image processing, GIS and Internet technology have been conducted for three counties.

### Public and Private partnership for the e-Soum[2] and e-Kara Korum[3] project

Mongolia's ICT community and the RSWG have initiated the 'e-Soum' project proposal, which is designed to bring digital technology to rural Mongolia to serve the basic needs of ordinary people at the grassroots level. The project aims to establish a sustainable system as well as using or developing software tools and digital content that enable the monitoring, assessment and prediction of both natural and human-made environments, structures and systems. This will assist people in understanding, evaluating and coping with complex systems, sharing knowledge to create new ones, and actively participating in management and decision-making processes. The right information at the right time will help to warn, secure, develop and empower people — thus improving their knowledge, awareness and creativity.

There are many software packages developed by local companies that could be utilized for e-Soum today. Newly established ICT companies at the National IT Park have used e-Soum as a market for their new developments and products, and decided to join this initiative with their own organizational structure.

On 5 September 2005, the e-Soum website was launched with the joint effort of incubator companies and a Memorandum of Understanding to collaborate towards e-Kara Korum (the former capital of Mongolia). This will be the first complete prototype of e-Soum and was signed by five public and private partners, namely the ICTA, National IT Park, the governor of the O'vorkhangai province (where Kara Korum is located) and the Mongolia IT Development Association (MIDAS/MONITA), which represents several private ICT companies in Mongolia.

e-Soum is opening a market place for intelligent businesses. The establishment and operation of Community Digital Centres (CDC) in the rural counties requires dedicated investment. A funding mechanism that operates for one to three years is fundamental to getting real benefits from digital technology, strengthening the local community and households, reducing the risks of rural business, improving productivity, attaining efficiency,

generating income and providing the basis for further success in the information market. More than 50 organizations have joined to work with or support the e-Soum initiative.

### Discussions

Most rural counties are not self-sustainable economically, even though they have their own land and resources. County territory is divided into several bahgs, which is a territorial unit with a governor and medical practitioner.

Improving the telecommunication infrastructure cannot alone bridge the digital divide. There is a need to develop software tools and digital content appropriate to the small rural economy with its few residents. These developments are complex and are country- and people-specific, as there are no ready-made methodologies and techniques. The development process tends to be synonymous with learning-by-doing exercises. These require substantial time and human, technological and financial resources that are usually not affordable for a small and developing economy.

ICT developments in e-Soum are to be constructed according to rural market requirements — the capacity and resources of the particular counties — and to go through an open partnership that would encourage the involvement of various groups, in order to avoid both the 'central point of view' and long development cycles for 'one big application' approaches. The point of this system is to get the herders to participate in gathering information about their local environment and livelihoods. The herders are pragmatic, skilled and experienced observers of nature, weather, pasture vegetation and wild and domestic animals, as their indigenous knowledge has been accumulated over thousands of years and passed from generation to generation.

In our pilots, the herders are involved in making notes on weather conditions, air pressure, temperature and meteorological phenomena and the impact of these upon their livelihoods. Some experienced herders have been involved in monthly and seasonal weather predictions and consultancy for winter 2004 and spring 2005. The evaluation of both official and traditional weather predictions showed good matching results, so this exercise will be conducted again for winter 2005 and spring 2006 for some counties in the Dundgobi province.

The ground measurement of pasture grass biomass and animal bodyweight, and the daily and weekly monitoring of weather, vegetation (Figure 1, Figure 2), temperature and moisture with the use of satellite data has been improving the understanding of natural processes. They have also shown how they interact with the rural economy, human activities, and reveal the strengths and weaknesses of organizations, particularly those in public services. The results of disaster risk studies and pilots are valuable not only for science and technology; but also to improve the efficiency of governance with sound decision-making and policy development.

The conceptual design of a rural county database and its simplified prototype on Microsoft Access DMBS has been developed for three counties (Figure 3). The common specifics of these databases are:

- To be based on the digital elevation and land cover/use model of the county territory
- To relate environmental and socioeconomic data with each other temporally and spatially
- To attribute data tables on family members, employment, health, education, herds, winter stands, wells and link them with a 'household' primary key.

Such an approach is new in Mongolia and important to ground-level government policy, development strategies, governance and business operation down to the rank of the households — a primary unit of the society — and peoples' livelihoods. Linking a household with its surrounding natural and artificial environment will lead to an accountable relation between the head of a family and public and private stakeholders.

Satellite remote sensing is a valuable information source, and geographical information systems (GIS) embody a useful technology for working with digital maps. But they are not affordable for the small county economies. Moreover, their technology is not accessible to the public as it is very expensive and requires appropriate capacity building. In addition, transmitting and downloading a large volume of digital images requires a high-speed data network.

Database contents of the above mentioned two counties have some specifics in complexity due to differences in climate, natural environment, economic systems and administrative and territorial units. The economy in Erdenedalai is based solely on the livestock sector, while Mandal has forest areas, livestock, crop and vegetation farms, mining, wood, urban and rural areas, a well-developed infrastructure with paved and railroads. Therefore the digital content of Mandal is more complex than the Erdenedalai. The majority of Erdenedalai's population are herders who migrate with their animals, while the majority of Mandal's population are settled urban citizens and farmers.

Digital information flow is the lifeblood for making e-Soum work. Technology provides tools to foster a well-integrated infor-mation flow to the right people at the right time. In addition, digital processes monitor, assess, predict and manage any phenomenon and changes of a system and its environment, and react appropriately to their impacts.

An example of digital information flow can be seen from the risk manager system established at the Erdenedalai. It has three directional data flows and provides coordinated action on the information of 15 organizations (Figure 2). Top-down data consists of daily, weekly and monthly weather predictions down-scaled to and specified by different areas of the county territory, warning messages for hazardous phenomenon, weekly maps of pasture vegetation and temperature produced by using advanced technology such as remote sensing and GIS. Bottom-up flow provides informal data from the herders and farmers on air pressure, temperature (measured by general equipment), extreme meteorological phenomena that affect people and livestock, households, and some data from county meteorological stations and local government that is necessary for vulnerability studies and risk assessment. Horizontal information flow helps to coordinate the activities of different stakeholders in the county, namely local government officers responsible for social insurance, agriculture, land and disaster management, bahg governors, the county hospital, veterinary procedures, the meteorological station and local FM radio.

Pilot projects that started in May 2005 to assist crop farmers from the Tsagaannuur and Tushig counties in the province of Selenge and in the Teshig county of the Bulgan province are to provide more detailed information on weekly and long-term

**Figure 3: Spatial database for Tsagaannuur county**
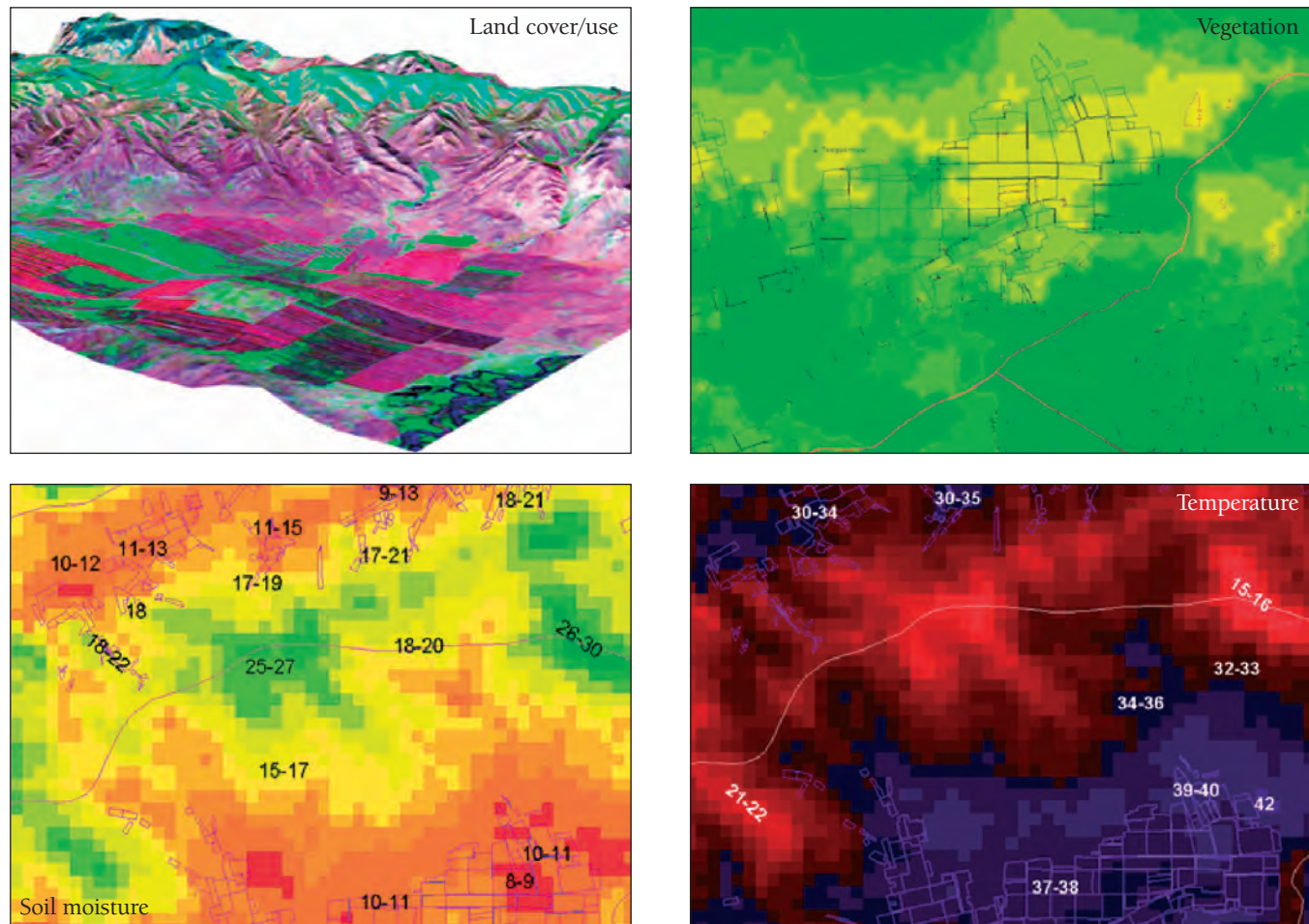
weather predictions. These will include warnings for drought and hoarfrost, assessment of vegetation, soil temperature and moisture. Meanwhile, most of the information flow is top-down and different for each county according to available infrastructure, as through voice, fax and e-mail communication. The bottom-up information flow started in Tsagaanuur in July.

**Community Digital Centres (CDCs)**

Proposed CDCs are intended to assist herders and farmers by providing regular information on weather, climate, hazards, physical parameters of pasture and crop fields, yields, vegetation biomass and its relation with animal bodyweight and bio-capacity that is detailed and specified by county territories. Secondly, the CDCs are intended to assist the local government and public organizations. Another purpose they have is to empower the local community by providing true and comprehensive information and ways to enable participation in socioeconomic and environmental systems assessment, analysis, open forums, planning and decision making.

In addition, businesses can provide information and ICT tools to reach the rural market, manage businesses in rural areas and increase the quality of services. Lastly, it is a great challenge for the ICT industry and research and development institutions to develop and provide digital content, software, application tools, hardware, and infrastructure.

Initial steps towards the creation of a prototype for CDCs started in 2004 in three counties across two provinces, with the effort and valuable contribution of different sectors. Unfortunately, funding for the regular operation of such centres became more problematic without a sustainable business model.

The main users of CDCs will be the local government, herders' cooperatives, farmers, SMEs and public. They know the importance of the information service for a healthy, safe and secure life as well as education and businesses. However, they are not able to pay for the service unless their income reaches a level to afford it. Therefore, the e-Soum project has to define a self-sustainable business model for an information market based on the concept of a digital network system. It needs to develop and pilot a prototype using the existing telecommunication infrastructure and based on public and private partnership, advances in information technology, international best practices, initiatives, findings and achievements of stakeholders, indigenous knowledge and the skills of rural people.

Several lessons have been learnt from these exercises. The system designed for disaster risk reduction is not sustainable by itself. It should be enriched and incorporated within the broader context of economic and social developments to attract those in governance, business and social development sectors. In addition, the small size of the market and limited capacity of local businesses requires:

- A strong government commitment, supporting policy, and leadership and coordination of ICT developments in government organizations
- Donors and international organizations' support for funding of developments, technology transfer and capacity building
- A well developed national platform and coordinated public and private partnership for the investment, development and sustainable operation of such a system
- There is no market for competition; therefore a well-coordinated collaboration to share knowledge and technology, and to share cost and profit might be basic rule to be followed here.



Enkhbayar, aged 12 is a herder who breeds sheep and goats. He lives 45 km from the county centre.
Can we reach him by modern telecommunication?

# IV

## PARTNERSHIPS TO CONNECT THE WORLD

# Connect the world: the road ahead

*International Telecommunication Union*

World leaders meeting in Geneva in 2003 and again in Tunis in 2005 have put their full commitment behind building the Information Society and connecting people to the benefits of information and communication technology (ICT).

On 16 June 2005, the International Telecommunication Union (ITU) launched a major new development drive to bring the benefits of ICT to the estimated one billion people worldwide for whom making a simple telephone call remains out of reach.

Called Connect the World, the initiative is a global multi-stakeholder effort established within the context of the World Summit on the Information Society (WSIS) to encourage new projects and partnerships to bridge the digital divide. By showcasing development efforts now underway and by identifying areas where needs are the most pressing, Connect the World will create a critical mass that will generate the momentum needed to connect all communities by 2015.

The Connect the World platform will support a global online community that is greater than the sum of its parts by leveraging the skills and experience of a diverse range of players to achieve a common goal: the empowerment of all the world's people through ICT.

## The challenge

At present, ITU estimates that around 800 000 villages — or 30 per cent of all villages worldwide — are still without any kind of connection. It would take an estimated USD1 billion to connect all villages through shared community access points such as a school, hospital or post office. From there, villages could expand access through various local solutions.

## Levering partnerships

Connect the World places strong emphasis on the importance of partnerships between the public and private sectors, United Nations (UN) agencies and civil society. It has 22 founding partners, including leading corporate players such as Alcatel, Huawei, Intel, Microsoft, KDDI, Telefónica, Infosys and WorldSpace, whose CEOs have all embraced the goals of the initiative.

Founding partners also include governments and government agencies including Egypt, France, Senegal and the Korea Agency for Digital Opportunity and Promotion, regional and international organizations including UN Educational, Scientific and Cultural Organisation (UNESCO), the Universal Postal Union, the European Commission, the International Telecommunication Satellite Organization, RASCOM and the United Nations Fund for International Partnerships (UNFIP), as well as a range of organizations from civil society including Télécoms Sans Frontières (TSF), the M S Swaminathan Research Foundation (MSSRF) and Child Helpline International.

Connect the World is an open-ended initiative. Since its launch, new organizations continue to join, and new partners are actively welcome.

Creating partnerships to connect the world to information and communication technologies is in fact one of the Millennium Development Goals. Connect the World will contribute in achieving several other global challenges and development targets through expanded access to ICT.

ITU Secretary-General Yoshio Utsumi said: "No one living in today's interconnected world can doubt the importance of ICT in achieving development goals. It's important to remember, however, that it's not ICT that will solve the problem of the digital divide, it's people. More than that, it's people working in partnership. So while Connect the World is about harnessing the power of ICT, it's also about harnessing the power of partnership."

## Building blocks

Connect the World comprises three key building blocks – Enabling Environment, Infrastructure & Readiness, and Applications & Services – which together constitute the primary areas that need to be addressed when developing concrete measures to accelerate ICT development. All Connect the World founding partners have current development projects in one or more of these areas. They will be encouraged to develop new partnerships and initiatives, while additional partners will be actively sought in areas not adequately covered to ensure underserved communities get what they need where it's needed most.

## Projects at a glance

As more partners join, Connect the World will grow to include many promising projects that will contribute to the shared goal of connecting all communities by 2015. The following is just a glimpse at some of the many important initiatives currently underway by some of our founding partners.

MSSRF is leading a project in India to transform the lives of the rural poor through improved access to information. MSSRF's 'Mission 2007: Every village a knowledge centre' aims to take the knowledge revolution to the more than 637 000 villages in India by 15 August 2007. To achieve this, MSSRF has set up one of the largest multi-stakeholder partnerships in the history of development. The focus is on information sharing and knowledge generation at the village level. Knowledge centres provide information related to health, agriculture, fishing, education, markets, crop diseases and animal husbandry.

The government of France is supporting the establishment of an African Internet Registry and the creation of local Internet registries to allocate Internet resources (IP addresses) on the entire African continent. It is also helping set up African national domain name entities (Network Information Centres) to manage Africa's

country code top-level domain names efficiently and transparently to help create a stronger African web presence.

Telefónica del Perú has an initiative underway to integrate the country's rural areas and provide better access to ICT and international markets. Internet connection is established by means of VSAT satellite terminals connected to indoor public telephones. Public booths provide flat-rate Internet access, 24 hours a day and 365 days a year.

The International Telecommunications Satellite Organization is working with countries around the world to promote affordable access to high-speed Internet services in underserved, remote and sparsely populated areas using satellite technology. The project includes a USD1.5 million infrastructure component to use existing excess satellite capacity and a USD23 million component to establish a framework for the creation of a broadband satellite market.

Alcatel is building partnership spaces in developing countries to provide local entrepreneurs with the means to develop local ICT-based services and implement pilot trials of those services in rural and under served areas. For example, in Senegal, farmers can get real time information on the price and arrival status of their products at market using a GSM mobile, PDA or the Internet. Market information request is entered on the farmer's mobile device (PDA or phone) and sent over the mobile network to a database designed by Alcatel's local partner, the requested data is then made available via Internet, WAP or SMS. The service improves the quality of life of local farmers and encourages operators to improve coverage in underserved areas.

In Nicaragua and Cambodia, Télécom Sans Frontières is helping local NGOs located in isolated regions of the country to offer quality organic products to local communities and residents of the capital through the use of mobile telecoms facilities set up by TSF.

ITU with Swisscom and the Government of Mali are connecting a maximum number of schools in Mali to the Internet. One of the aims is to provide disadvantaged young people (14—20 years) with an additional educational tool by deploying Internet access to remote locations. Built on the Internet for Schools project of Mali, similar projects are now being planned for other countries.

WorldSpace and the Kenya Institute of Education are upgrading Kenya's nationwide school broadcast service to broadcast educational content to 11 million students in 18 000 primary and 3 000 secondary schools. The aim is to improve the teacher-student ratios from 1:100 to 1:60 and to close the performance gap between public and private schools.

UNESCO has established Community Multimedia Centres (CMC), which combine community radio by local people in local languages with telecentre facilities (computers with Internet and e-mail, phone, fax and photocopying). The radio — which is low-cost and easy to operate — not only informs, educates and entertains, it empowers the community. The CMC offers a platform for social and economic development, combining traditional knowledge with the enormous reserve of information on the Internet. UNESCO's CMC pilot project has developed 40 sites in Africa, Asia and the Caribbean.

With more partnerships announced at the World Summit on the Information Society in Tunis, Connect the World will take concrete steps in moving forward from a shared vision to implementing the action lines enunciated by world leaders.



Installing a new aerial telephone line at Ihosy

# Creating transformations: growth and opportunity in the new global economy

*Craig R. Barrett, Intel*[1]

OVER THE PAST fifteen years, the world economy and societies as we knew them have been transformed. China, India and the nations of Eastern Europe have brought three billion people into the global market place. Advanced technology has become more than just bits and bytes. It is now a democratic tool that lowers the barriers to health, education, and prosperity by making it easier to share ideas, compete and deliver solutions.

These changes mean more competition at all levels, but also far more opportunity. Prospects for growth, prosperity, health and education are no longer restricted to a few wealthy, developed nations.

In this new world of global challenges and opportunities, sustained economic growth and prosperity depends more than ever on producers, consumers and innovators to be able to connect with each other. Jobs and growth flourish in nations with a technologically advanced workforce, policies conducive to free trade, and modern communications and computing infrastructure. Governments, businesses and individuals that are determined to be successful in this new world must innovate, and the public and private sectors must collaborate to foster these traits and encourage an environment of innovation and adaptability.

In short, by working together, we can meet the challenges of the 21st century global market place and harness the power of technology to create opportunities and ensure growth. Around the world, nations small and large are embracing technology and recognizing the potential to participate in an increasingly connected worldwide economy.



Dr Craig R. Barrett, Chairman of the board of Intel Corporation

## The basics: technology, Internet access and content

In today's world, nations must encourage the convergence of three basic components in order to be fully engaged in the digital, knowledge-based world economy. The availability of technology tools, access to high-speed broadband Internet, and the development of compelling content and services are the keys to greater economic and social growth.

Broadband Internet connectivity plays a role in the 21st century economy similar to that of the railroad in the nineteenth. It brings people, places, goods and services together like never before. Yet while the railroad took decades of technology innovation and standards development to become truly viable, we're more fortunate. WiMAX, an emerging standards-based wireless technology, offers an affordable broadband solution to rural areas where high-speed wire lines are difficult and very expensive to establish, as well as for last-mile connectivity to homes and businesses in areas of higher population density. One of the smartest steps any forward-looking government can take to promote economic progress is to implement policies that accelerate WiMAX deployment and address regulatory issues that would otherwise impede widespread usage.

However, access to a broadband infrastructure is not enough. Even in countries such as South Korea, where advanced communications infrastructure is widely deployed, the motivation and ability to use newly available technology are stronger in young, wealthy, urban and male populations than in elderly, poorer, female and rural populations. So, while providing broadband access is a critical first step, the second is to encourage technology deployment through initiatives that promote information and communication technology (ICT) usage by citizens, businesses and education.

Affordable access to technology can be a significant driver of national competitiveness as well. Several government-assisted PC purchase programmes have proven to be a cost-effective way to broaden PC use and increase digital literacy.[2] Sweden launched the first such programme in 1998, and saw PC ownership double in three years. Saudi Arabia recently launched a home computing initiative enabling families to pay around USD25 per month for two years via their phone bill for a PC. The Brazilian Government's PC Connectado programme offers tax credits for home PCs, and aims to add five million PCs over the next three years. These programmes and others like them are helping to provide new opportunities for citizens around the world to connect. Over the long term, this means improved education and e-commerce, increased national competitiveness and productivity, and new growth potential. These programmes also enable citizens to access online government services, enhancing efficiency and allowing the cost of such services to be amortized over a larger pool of users.

Equally important are digital inclusion strategies that promote the use of ICT by small and medium-sized enterprises (SMEs). These businesses are the cornerstone of most economies. They typically provide 50 per cent of a country's gross domestic product (GDP) and employ on average 90 per cent of a country's workforce. Yet these small businesses often lack access, funding and education for technology that enables them to be successful and grow. Policies that enable easier funding for PCs, servers, networks and other ICT infrastructure for these businesses are another effective way to ensure their efficiency, encourage worker productivity and promote economic growth.

Finally, people are much more likely to embrace technology if they see compelling benefits in the content and services it offers. It is important to promote the development of content and services that are directly relevant to the people, culture and industries of a nation. For example, South Korea's Information Network Village (INV) project is promoting digital inclusion by supplying PCs and high-speed Internet access to residents of rural villages. The project paid considerable attention to creating a user-friendly interface and compelling, content that included a system for remote medical diagnosis, a village portal and sites for local schools and businesses. Local farming cooperatives in the INVs now use the Internet to find new markets for their produce, and average incomes have increased.

**Innovative services: transforming education, healthcare, government**

Twenty-first century digital infrastructure provides opportunities to deliver innovative services to citizens and businesses in ways that promote economic improvement and opportunity. Examples of how technology is transforming education, healthcare and government services abound.

In the global market place, education is the core of a knowledge-based economy and the skills of the workforce play a large role in a nation's economic growth. Increasingly, nations and regions are recognizing this, educating their children and training or retraining their adults to compete effectively in a technology-based information economy. Success in the knowledge economy depends upon the ability to adapt and innovate quickly and continuously, through the use of 21st century skills. To build these skills, governments are moving away from education targeted at knowledge acquisition and teaching their students how to create knowledge through lifelong learning.

In addition to policies that encourage 21st century skills development, efforts to promote digital inclusion can also be a powerful force for educational progress. With widespread broadband connectivity and PCs available through community centres and home/SMB programmes, people in underserved regions can advance their education through interactive e-Learning modules that use video streaming and other visual technologies to make complex concepts easy to grasp. Schools, libraries, homes and community centres can easily share information and resources. Students in small, remote schools can see and hear the same high-quality lessons presented at the prestigious urban schools. Empowered with lightweight mobile computers, teachers can work more productively and collaborate more effectively. Students can undertake personalized learning and collaborative research projects — the very types of projects that equip them to succeed in the digital economy.

In addition to the role that technology can play in transforming educational opportunities, the 21st century digital infrastructure provides tremendous opportunities to deliver state-of-the-art healthcare to impoverished regions. Patients in remote villages can access online health services and information, and consult with a physician thousands of miles away through telemedicine. In the longer term, emerging digital ICT solutions promise new ways to prevent, detect, diagnose and treat disease, as well as more proactive ways to manage our personal health.

Finally, in the global economy, forward-thinking governments the world over are using ICT to transform services to citizens. The same broadband infrastructure that supports home access to the Internet can be coupled with mobile PCs and tablet computers to enable



Working together with governments, the Intel(r) Innovation in Education initiative has trained more than 3 million teachers, allowing young people to learn key 21st century skills

Dr Craig Barrett, Chairman of Intel Corporation with Dr Tarek Kamel, Minister for Communications and IT, Arab Republic of Egypt in March this year with staff and students of Umm Al Abtal school who are participating in the Intel® Model School Programme



Pictured here is a PC reference that is designed to operate off a car battery for remote areas such as the remote villages of India where extreme conditions including heat, dust and intermittent power supply would limit the use of a more traditional design

government employees to work efficiently and productively when they're out in the field. With widespread PC usage and a ubiquitous broadband infrastructure, citizens in even the remotest areas can access and participate in community portals and e-Government services. Businesses can apply online for permits and licences, helping to cut through paperwork and enhance economic vitality.

Transformations in these areas — education, healthcare and government — are critical to a nation's success and to its competitiveness in the information age.

### Critical to success: policy and partnerships

From companies and governments that have been on the forefront of efforts to promote digital inclusion, we know that the fastest progress occurs when governments and businesses collaborate on innovative ICT policies and solutions.

Enlightened government policies are crucial. Governments that are serious about digital inclusion and economic progress have policies in place that encourage the free flow of information, people and commerce. They're creating policies that promote investment and open the gates of opportunity. They're concentrating on making it easy for indigenous businesses to develop and mature, and making the country attractive to external businesses to bring manufacturing, services and jobs.

These governments are allowing market forces to prevail. They are creating a national climate that fosters innovation and economic competitiveness — to better expand the available wealth and thrive in a fast-changing, interconnected digital world.

Numerous governments plan to implement digital inclusion programmes that make computing and connectivity accessible and affordable for families, businesses and governments. For example, the Jordanian Ministry of ICT is working together with the United Nations Development Fund for Women (UNIFEM) and Jordan Telecom to bring WiMax connectivity to Jordan's eVillage project. UNIFEM and Intel are linking schools-based learning resource centres to create a wireless community in two remote rural communities. This multi-layered programme also includes establishing after-school resource centres and activities, as well as economic empowerment components.

In Cairo, Intel has opened a Platform Definition Centre to define and develop computing platforms that meet the needs and preferences of customers in Egypt and other Middle East and African countries. Intel has also worked with Egypt's Ministry of Education and Ministry of Communications and Information Technology to support the country's digital inclusion strategies.

Businesses have much to contribute to the work of digital inclusion. The global ICT industry has invested extensively in worldwide efforts to support digital access and use ICT to transform healthcare, government, education and other critical sectors. For example, in Malaysia, the global ICT industry worked with the Government to increase its competitiveness through an 'IT For All' campaign aimed at its citizens and its high population of small and medium enterprises. The programme included ICT training, events, and restricted zero per cent loans which help to overcome access to financial resources, one of the biggest hurdles for growth.

Local entrepreneurs are also finding resourceful ways to use technology to improve the quality of life for their countrymen as well as to create economic opportunity for themselves. In India, currently, most rural and semi-rural Indians must leave their villages and travel considerable distances to larger regional cities for relatively basic services such as information on market prices for crops, marriage licences, land records, domicile certificates, driving licences and the like. Drishtee, a New Delhi-based company, is now operating in India to bring services to rural areas through a series of information kiosks located in rural villages and towns. Each kiosk is owned and operated by an entrepreneur and acts as a proxy government extension office as well as offering some private services. The consolidation of these requests at the local level makes tasks much easier on citizens while creating revenue for local businesses.

### Transformation is possible

Change is hard. Failure is even harder. Every nation has a chance to be a part of information-driven competition — it simply needs to embrace information-age competition. For governments, it is critical that they foster the right climate for innovation and invest in research, education, and technology infrastructure. Businesses at all levels, large, medium and small, can play a leadership role by forming partnerships to promote digital inclusion and technology in healthcare, education and small business.

These are the building blocks of a nation that values ideas and people — the things that will define a growing, healthy society for the next century. Intel is proud to be a part of this transformation and to help nations harness the power of technology for growth and opportunity.

# TradeNet in Ghana[1]

*V. Mathivanan, Chief Executive Officer, CrimsonLogic Pte Ltd (Singapore)*

T RADE FACILITATION HAS been a major focus in international trade negotiations since the World Trade Organization (WTO) met in Singapore in 1996. Indeed, it was a key point on the agenda at the WTO Summit in Cancun, 2003. Trade facilitation and the reduction of barriers to trade are seen as a powerful aid that would help countries to better integrate into the global economy. Information and communication technology (ICT) plays a vital role in bridging this divide.

The achievement of Singapore in speeding up trade transactions and connecting most members of the trading community into a single data network has attracted attention, and the experience has been replicated in Mauritius. Ghana, too, has recently moved towards introducing the key features of this approach to its own trading community.

CrimsonLogic has been involved in each of these projects. Having successfully delivered TradeNet, the world's first single electronic window for trade facilitation in Singapore, CrimsonLogic replicated the model in Mauritius. The company is now involved in a joint venture with the Ghanaian Government to facilitate this project.

## The Singapore TradeNet

The Singapore TradeNet links multiple parties, including 35 government controlling units, to a single point of transaction for most trade-related transactions, such as customs clearance and payment of duties, and processing import and export permits.



TradeNet boosted Singapore's status as a trading and logistics hub in the late 80s

It became clear as early as 1979 that ICT could help Singapore overcome the challenges its small size presented in global trade. An early goal was to expand the skills base through accelerated ICT training, with the implied computerization of government agencies. Foreign trade was an area where rapid results could be achieved, especially in shortening the clearance time for imports and exports.

When Singapore entered its first recession in 1985, the matter became more urgent, and the Singapore Trade Development Board (STDB- mow known as IE Singapore) was given the responsibility of coordinating the project. It proposed that all the trade documents should be reduced into one online form that could serve almost all the country's trade documentation needs. With government backing, it was announced that TradeNet would be launched in January 1989, and Singapore Network Services (SNS — later to become known as CrimsonLogic) was set up in 1987 to build and operate the system.

When the Singapore TradeNet became operative, traders were invited to adopt its protocols voluntarily. By the end of the year, 45 per cent of all air and sea shipments were transacted through TradeNet, and this rose to 95 per cent by the middle of 1991, with the use of TradeNet becoming mandatory two years ahead of schedule. The adoption process was supported by continued high-level support, and by extensive training for traders, with particular attention to small traders. Many traders were already computer literate due to the Singapore Government's strategy of fostering ICT application.

## Ghana

The 1990s saw Ghana engaged in fundamental trade policy reforms, strongly supported by bilateral and multilateral donors including the US, the World Bank and the International Monetary Fund. The Ghanaian Government wanted to open up the economy in order to attract foreign direct investment (FDI) and promote competitiveness in global business.

But by 1998 FDI was still lagging, despite the fact that many policy reforms, like reducing import quotas, export taxes and import tariffs, had been made. It became clear that for the reforms to have the desired impact on trade, FDI and growth, the operational efficiency of frontline agencies like customs, immigration and port authorities needed to be improved, and that ICT could enable this. In response, the Government launched the Ghana Gateway project, with the support of the World Bank envisioning Ghana as a gateway through which West Africa could reach the rest of the world.

The Ghanaian Ministry of Trade and Industry (MOTI) devised a scheme inspired by the Singapore model and its Mauritian adaptation, which had transformed Mauritius into a leading textile and garment exporter. With the support of the Ministry of Finance (MoF), MOTI proposed a strategy:

*Photo: PSA International Pte Ltd*

- An Inter-Ministerial Gateway Oversight Committee, with its Secretariat, would oversee the initiative
- CrimsonLogic, which had managed TradeNet in Singapore, would provide the electronic data interchange (EDI) system at the core of the Ghana TradeNet
- Ghana would adopt the customs management system designed for Mauritius, which had a smooth interface with the Singapore TradeNet
- A company would be created to implement both the TradeNet and the Ghana Customs Management System (GCMS) for the Customs, Excise and Preventive Services (CEPS). The company would be given a de facto Build, Own and Operate (BOO) contract.

## CrimsonLogic's role

CrimsonLogic had licensed the trade Single Electronic Window platform to Mauritius. Like Mauritius, Ghana is an African nation, and CrimsonLogic's deep domain expertise in trade facilitation gave it an edge over other ICT solutions providers. Further, CrimsonLogic had developed the Mauritius Customs Management Software. It has also deployed many other e-Government solutions, including several in the Middle East.

CrimsonLogic has created a niche for itself in the Trade and Logistics domain due mainly to its intimate understanding and experience in port operations and trade processes. This made it a very appealing technology partner for Societe General de Surveillance SA (SGS) and the Government of Ghana in this project. As CrimsonLogic's strategic partner, SGS played the role of strategic investor and lead technical partner for the project.

## The Ghana Community Network

Various private and public entities were invited to participate in the equity of the company that would manage the TradeNet and help to computerize customs operations. As a result, the Ghana Community Network (GCNet) came into being as a joint venture with the following shareholders:



GCNet offices

- SGS — 60 per cent;
- CEPS — 20 per cent;
- Ghana Shippers Council — 10 per cent;
- two local banks — five per cent each.

Working under a service contract with MOTI, GCNet must install the EDI system and customs management systems, and produce progress reports.

The GCNet vision was to transform a spaghetti-type network of connections, which had been in operation amongst the various entities involved in the trade transaction process, into an interconnected network for the trading community.

Previously, each agency required a unique set of documents, which must be submitted only to it and which were not shared with other members of the trading community. Data was often duplicated and had to be transcribed for further processing. Lots of paper work, multiple copies error-prone transcriptions were involved. All this was time-consuming and costly.

This situation created a lot of opportunity for soliciting and using 'facilitation money' to speed up transactions or adjust customs declarations. The lack of transparency in these transactions left a very weak audit trail — in most instances none at all — and all this impeded the competitiveness of Ghana's economy.

## Creating a trading community

GCNet's objective is a totally interconnected trading community, like the one already in place in Singapore. According to this vision, the trader submits one document to the TradeNet (GCNet), containing the information for all agencies that require it. The TradeNet then selectively sends information to the relevant agencies, which respond immediately either with requests for further information or with the necessary permits. The objective of this integration is to reduce transaction costs for traders, and to make government regulatory operations more efficient.

A number of reviews during the 1990s revealed that the structure and organization of CEPS, its ICT and human resources management structure, were not appropriate for the demands of modern, efficient customs operations. Many records were kept manually, and the ASYCUDA technology in place was underutilized and under-maintained. Since ASYCUDA could not treat a customs declaration in less than 24 hours, a drastic upgrade was needed: CEPS would simplify its trading procedures and acquire a modern customs management system, and GCNet would enable this.

In December 2000, Ghana's national elections and the subsequent transition of political power stalled operational decisions like the procurement of computer hardware, which was to be CEPS' contribution to the GCNet project. CEPS, too, was initially unsure about the reforms needed in order to introduce the new customs management system.

Under its service contract with MOTI, GCNet would help to implement the EDI system and GCMS at CEPS, receiving a fee for each declaration processed by the TradeNet. GCNet was to be the systems integrator, and needed to select the various systems that would make up the overall package. The choice of EDI was simple: since the initial inspiration had come from the CrimsonLogic platform in Singapore and its modification by Mauritius Network Services (MNS, itself a joint venture between the Mauritius telecoms provider, CrimsonLogic and the Mauritius Government), GCNet secured the services of both organizations. GCNet stepped in wherever necessary to make sure the TradeNet and GCMS
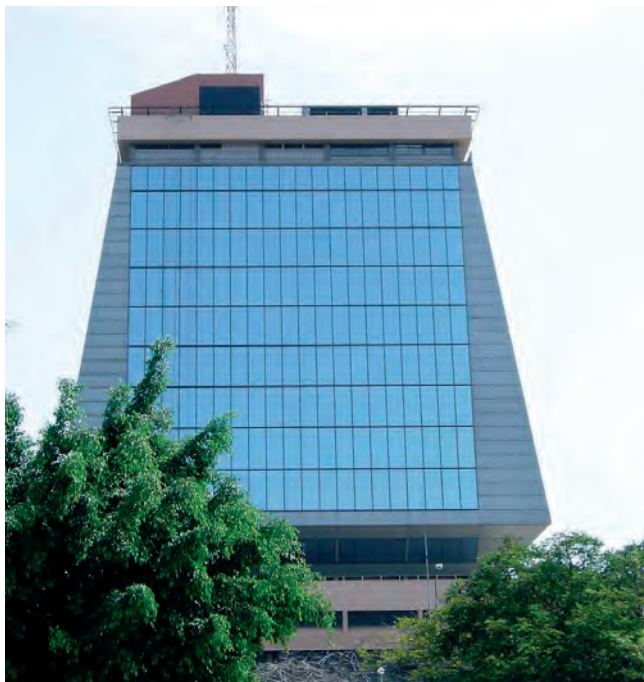
would operate smoothly, including providing infrastructure installation and management, and training for CEPS staff.

**Bridging the trade divide through digital customs management**

GCNet operates a customized electronic system for processing trade and customs documents, recording the related duty and tax payments. This is done using two systems: the Ghana TradeNet and the GCMS. Through the Ghana TradeNet's EDI platform, users can interface with the GCMS, and send and receive messages electronically to other users including key public sector agencies such as MOTI, the MoF, the Bank of Ghana, CEPS, and the private sector (shipping lines, freight forwarders, banks, etc). The TradeNet thus provides a medium for exchanging trade information between businesses on one hand, and government agencies on the other, making GCNet a business-to-government, or B2G company.

GCNet has established its own private communication network, made up of a fibre-optic broadband link between the GCNet office and CEPS. This is complemented by radio links, which also cover other CEPS collection stations, plus dedicated leased lines and points of presence in locations outside Accra. The network links CEPS offices throughout Ghana, enabling users to access the system easily. The development of this private network also ensures that the system will always be up and running, and not suffer any communication hiccups, given the unreliable nature of the normal communication networks. In the absence of a well-articulated national communications strategy, this new network stands in isolation, needing no interface with other agencies.

GCNet has worked closely with CEPS to re-engineer operational processes, including the preparation of new Customs Procedure Codes that meet standards set by the World Customs Organization (WCO). The Ghana Customs Tariff Book has similarly been extensively reviewed and updated to ensure that it meets standards set by the WCO's harmonized system.


GCNet inauguration at Customs

Photo: SGS

GCNet has sensitized all key stakeholders and engaged them in consultations to ensure that the systems address their concerns and meet their expectations. GCNet has also embarked on an extensive training programme for CEPS staff and declarants to ensure that all GCNet users are trained adequately in the fields of the system they need. User guidelines, posters, CD-ROMs, and a website are available at GCNet offices for registered declarants.

The TradeNet and GCMS systems were tested at Kotoka International Airport before a full rollout began. Traders were moved in batches, stretching out the learning process to permit CEPS staff to acquaint themselves with the new procedures and to enable the training of traders and their representatives. The first EDI declarations were lodged at Kotoka airport in October 2002 for import transactions, and the transition was completed by December 2002. From March to June 2003, the system was implemented at Tema Harbour, and on 14 November at Takoradi seaport, where it started facilitating exports.

**Outcomes**

It is still too early to make a full assessment of the results obtained by the Ghana TradeNet project, but several factors have emerged to suggest some progress in trade facilitation:

*Revenues are up* — Airport revenues for July to September 2003 were nearly 40 per cent higher than during the same period in 2002. With no real change in the activities of the Destination Inspection Scheme (DIS) companies during this period, GCNet operations are conservatively estimated to have added 30 per cent to the customs revenues from airport traffic.

*Clearance times are down* — There are no firm statistics regarding clearance times before the introduction of GCNet, but traders are unanimous that the improvements are major with respect to the time it takes to clear goods both at the airport and at Tema Harbour.

*Community Networks are being initiated* — Work has begun on connecting the trading community, with the result that trade transactions are easier for traders and that government and regulatory agencies have access to streamlined data. Much work still needs to be done, but the following members of the trading community are already connected:

- The shipping lines provide electronic manifests to GCNet, which transfers these to Ghana Ports & Harbours Authority (GPHA)
- The Ghana Shippers Council obtains all information regarding the movement of ships and airplanes, but still uses some paper documentation
- CEPS obtains customs declarations electronically
- Banks inform CEPS electronically of payments made
- The Statistics Service is connected to receive from CEPS all relevant trade statistics (it has not yet taken advantage of this connection)
- The MoF is connected and can download all trade information as well as all transactions by taxpayers identified by Tax Identification Number
- The Value Added Tax (VAT) service accesses information on imports made by VAT registered firms.

The clear winners of the GCNet initiative have been the traders that benefit from faster clearance times at customs and a reduced

need to provide facilitation money. Representatives of the shipping owners and agents as well as freight forwarders have to produce fewer documents, and gain quicker vessel turnaround time in the process. The Treasury also benefits from higher revenues and from faster access to tax payments.

### Lessons learned

*Private/public sector partnerships can work to bridge the digital divide* — GCNet anchored the reforms and ensured continuity and focus during a period of political transition, and when no other local organization had the wherewithal to effect such a drastic transformation of trade and customs procedures. The BOO solution to trade facilitation is exceptional. It has been tried only in a few countries, amongst which are Singapore, Mauritius and Tunisia where its 'community-owned' concept found high acceptance.

*Information technology can yield quick results* — It took only from early 2001 to mid 2003 to roll out GCNet and GCMS in ports that account for more than 90 per cent of all Ghana's trade. Clearance times and revenue performance exceeded expectations during this short period.

*Hands-on technical support can speed up operations* — Whereas customs had struggled for years to upgrade its information system or to make the best use of it, the reform required an outside push and hands-on implementation support to force the process simplification required and the adoption of advanced ICT processes.

*Top-level support greatly helps* — Initially, the project benefited from top-level MOTI support, which was seen to bring with it the support of the whole Government. When that support wavered after the December 2000 elections, the Gateway Secretariat could provide no real support and GCNet had to wait for more than 14 months to obtain approval from the National Communications Authority to use a secure radio frequency as part of its communications network. The absence of dedicated support for the project also made it difficult to make sure the various trade-related agencies were fully integrated into the network.

### The road ahead

So far, the reforms at CEPS have been limited to the introduction of the GCMS and the associated simplification of processes. But CEPS is still a rather outmoded and inefficient organization, with limited specialized capacity in customs valuation to provide support to the officers in charge of document compliance checks. CEPS needs to gradually take over from the DIS companies, or could rely much more selectively — and more economically — on valuation support from inspection companies. The MoF should take over the supervision of the activities of the DIS companies.

More members of the trading community should become part of the GCNet community. Obviously, it will take time and persuasion to overcome the lack of ICT knowledge at some organizations and the latent rivalry between them. High-level visible support will help.

In the immediate future, it should be possible to convince GPHA and the Shippers Association to issue waybills electronically, so carriers don't have to manually submit information already contained in the manifest that is electronically forwarded to the council. The Statistics Service should activate its connection and initiate the download of trade statistics. The VAT service and Internal Revenue Service, which are already connected, should prepare themselves to use the data provided by the GCMS, for which a streamlining of Taxpayer Identification Numbers will be needed. The Bank of Ghana and MOTI could do likewise for the online real-time collation of trade data, that they require for preparing various trade statistical reports.

In the near future, it should also be possible to connect MOTI with respect to the issuance of the Import Declaration, if this will still be required in the future, as well as documentation for the DIS companies that operate under MOTI contracts. The early connection of the Food and Drug Board as well as the Ghana Standards Board would also benefit trade greatly by permitting more streamlined inspections. Connections can now be made by a range of agencies such as the Ghana Free Zone Board, Investment Promotion Centre, Driver and Vehicle Licensing Authority, and Minerals Commission, which have key roles to play in the processing of trade documents and the clearance of cargo.



Customs Documentary Review at airport

# Korea: connecting people to the digital world

*Dr. Song Kwan-Ho, President, National Internet Development Agency of Korea*

THE INTERNET HAS become an important central medium affecting all the people around the world in their daily lives. It is a remarkable progress, considering the Internet was merely an objective to exchange information in the early days.

Having recognized early on that the Internet would become a groundbreaking innovation in the 21st century, Korea actively established a broadband infrastructure in the mid 1990s, and the Government's constant information and communication technology (ICT) promotion policies (e.g. CYBER KOREA 21, e-Korea VISION 2006, Broadband IT KOREA VISION 2007) played a crucial role in building Korea as a global ICT leader.

As of June 2005, 72 per cent of Korean people are connected to the Internet, and the number of high-speed Internet subscribers has already passed the 12 million mark, which is the world's highest broadband subscription rate.

This high rate of broadband penetration, with the rapid development of digital technology, has accelerated the growth of ICT infrastructures. High-speed Internet services are an everyday reality almost anywhere in Korea, and its combination of ICT with a world-leading network infrastructure has made it possible to produce semiconductors, mobile phones, TFT-LCDs, digital televisions, and Internet games — all of which have topped the world market.

## How Korea became an ICT leader — ICT development strategies

There were several factors behind the success of Korea's informatization drive. The Korean Government was very active in providing a relevant legal framework (e.g. the Framework Act on Informatization Promotion, Act on Internet Addresses Resources, Act on Promotion of Utilization of Information and Communications Network, etc.) for the promotion of national informatization. Competition was encouraged in the ICT services market and heavy investment was made to develop infrastructures, ICT technologies, a variety of content, and application software. As a result, a virtuous circle was created for the development of informatization and the ICT industry. Furthermore, the Korean Government has offered free Internet and computer training courses for equal access to information for ten million people. The private sector has played an equally critical role, as telecoms companies invested heavily to deploy broadband networks and aggressively offered a wide range of high quality ICT services at a competitive price.

Korea's unique environmental background also contributed to the spread of informatization. Densely populated residential areas of Korea are conducive to the more cost-effective deployment of ICT infrastructure, and large technology-savvy consumer group helped the rapid deployment of the Internet and a variety of digital content.

The goal of these strategies was to make Korea an ICT-advanced society, and the ICT industry has emerged as a growth engine of the Korean economy. However, instead of being complacent about past success mainly in ICT infrastructure and ICT products, Korea is preparing for another take-off, this time to create a 'ubiquitous society' by implementing the 'IT 8.3.9 Strategy.'

**Number of Internet users and rates in Korea**



| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|
| No. of Internet users (Unit: 1000 persons) | 19.040 | 24.380 | 26.270 | 29.220 | 31.580 | 32.570 |
| Rate of Internet users % | 45% | 57% | 58% | 66% | 70% | 72% |

Source: NIDA (June. 2005)
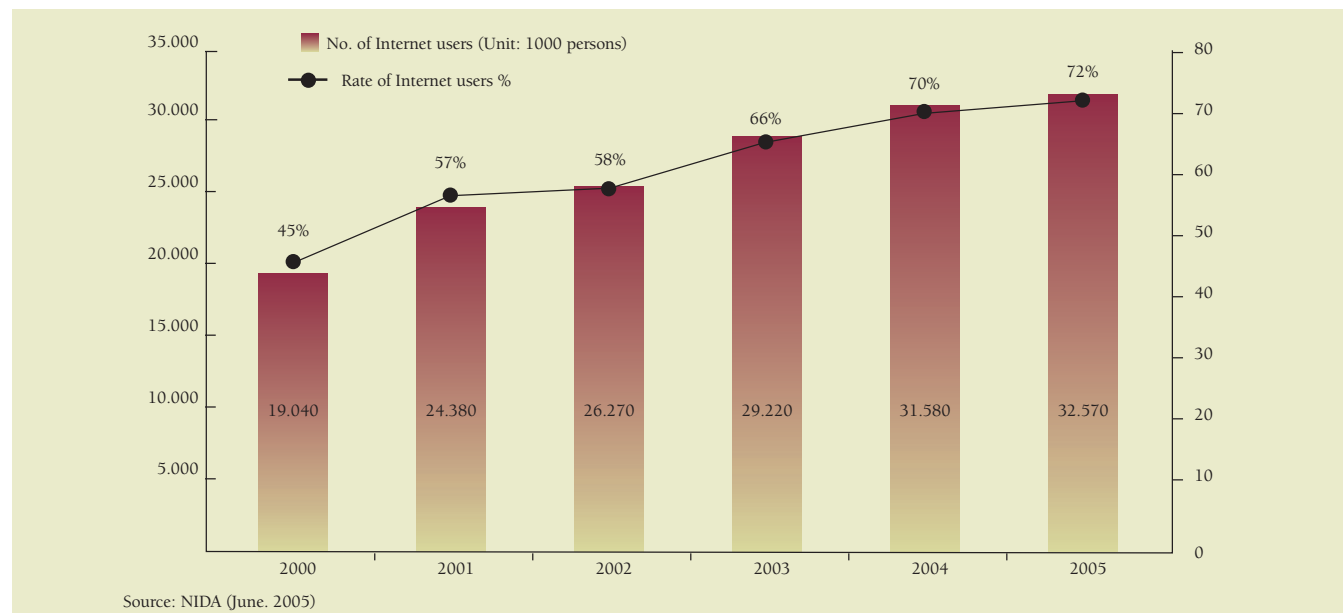
**The IT 8.3.9 Strategy**

The IT 8.3.9 strategy is intended to develop the infrastructure and integrate it with telecommunication services, equipment, software and content to create vertical and horizontal value chains in the ICT industry. IT 8.3.9 involves:

- Introducing and promoting eight services — Promotion of the ICT service industries will be sought through timely decisions on licensing and service methods: WiBro service, DMB service, Telematics service, Home Network service, RFID-based service, W-CDMA service, Terrestrial DTV, and Internet Telephony
- Building three advanced infrastructures — The establishment of advanced infrastructures will provide a firm basis for the promotion of infocommunications and broadcasting services: Broadband convergence Network (BcN), U-Sensor Network (USN), and Internet Protocol v6 (IPv6)
- Development of nine IT New Growth Engines — Next-generation mobile communications, Digital TV, Home Network, IT SoC, next-generation PC, embedded software, digital contents, telematics, and Intelligent Service Robots.

Many agencies under the Ministry of Information and Communication (MIC) are leading the Government's initiatives for the successful implementation of the IT 8.3.9 Strategy. For example, the National Internet Development Agency of Korea (NIDA) has been playing a role in the 'eight services' and 'three infrastructures' areas, managing IPv6 resources and a RFID multicode directory service.[1]

**Bridging the digital divide**

The 21st century is an era where knowledge and information determines a nation's competitiveness. The advancement of ICT facilitated a rapid transformation towards the Information Society and the Internet, especially, made the free flow of information possible, just as the development of the printing press gave people an opportunity to share information and educate themselves in the past. To maximize the value of the Internet, everyone should have access to it. If people in certain regions are unable to access the Internet, then the technology will not be able to live up to its potential. As information should be shareable and equally important to all, we have to recognize that the global digital divide currently presents a serious impediment to the Information Society.
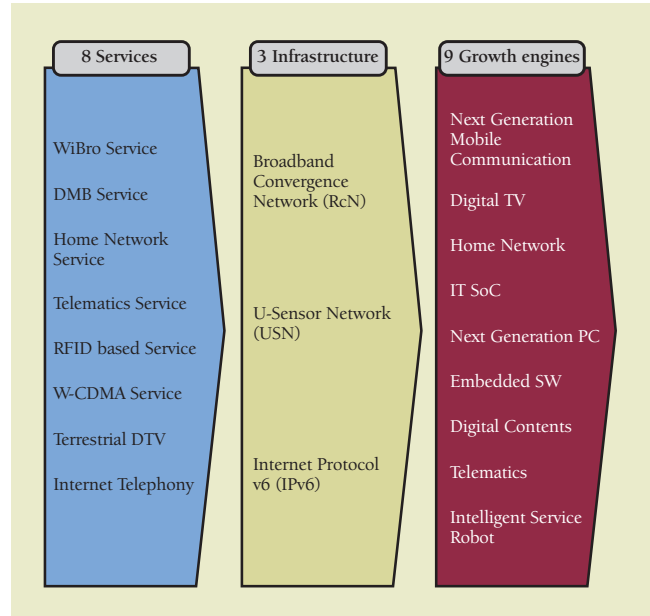
Korea is well aware of this fact, and has made every effort to bridge the digital divide at domestic and international levels, sharing its own achievements with all the other countries. We know it is time to assume a leading role in the international community, to help developing countries in return for the assistance that Korea received after the Korean War less than half a century ago. Korea itself once suffered crushing poverty and hunger, and has successfully transformed itself from an impoverished recipient of foreign aid to a full player in the international effort to eradicate poverty.

IT 8.3.9 strategy



OECD broadband subscribers per 100 inhabitants, by technology, December 2004
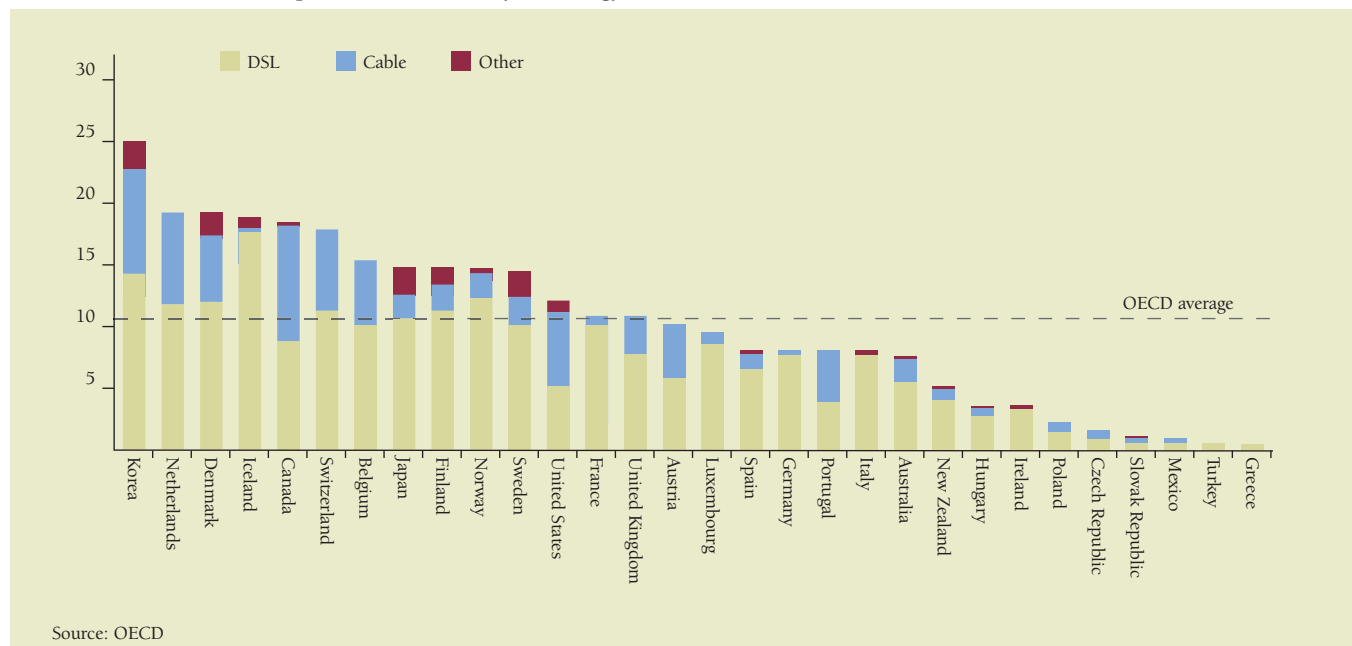


Source: OECD

Internet Governance Symposium held as one of the 'month's of digital opportunity' events



International seminar on Internet Resources Management in Sri Lanka

Based on its experience and knowledge of ICT development, the Korean Government has been conducting cooperation programmes to promote informatization and ICT through the Korea International Cooperation Agency (KOICA), National Internet Development Agency of Korea (NIDA), Korea Agency for Digital Opportunity and Promotion (KADO) and many other institutes.

**Narrowing the digital divide within Korea**
It is important to recognize that the digital divide exists not only between countries, but also within a single country. Therefore,



Free ICT education programme to foreign workers staying in Korea

many national agencies under the supervision of the Ministry of Information and Communication are providing continuous support to narrow the digital divide by working on various projects for those deprived of informatization.

In order to form an Internet-accessible environment for those who cannot afford expensive devices and software, people donated their used PCs to the Government, public organizations or private enterprises. These PCs were distributed free of charge to the underserved population. Furthermore, in an effort to ensure that everyone shares the benefits of the Internet, there have been free Internet education programmes for those alienated from informatization such as provincial residents, elderly and disabled people, foreign labourers staying in Korea, refugees from North Korea, etc. These programmes provide various courses from basic computer skills to high quality information and communication training. Thanks to these courses, people who were lagging behind in the benefits of ICT are now successfully adapting themselves to the information society by improving their quality of life and prospects for employment.

Every year, the month of June is designated as the 'month of digital opportunity.' A variety of seminars, conferences and events are held, such as the Personal Homepage Contest, the Silver Net campaign, and the IT Youth Dream Camp, to promote Internet use and raise social awareness of informatization at a domestic level.

**Narrowing the digital divide around the world**
The Korean Government has been strengthening cooperation within the ICT sector, where Korea has a comparative advantage and competitiveness. Volunteers composed of professors, university students and related experts are providing ICT training courses and other ICT volunteering activities to local communities around the world, in order to share IT knowledge and skills.

Numerous ICT projects are underway in Indonesia, Mongolia, El Salvador, Bangladesh, the Philippines and

Signing ceremony between NIDA and SSP (Vietnam) to provide network equipment and technology


International Seminar on Internet Resources Management in Mongolia

Uzbekistan, among others. ICT centres are opening in areas including Afghanistan, Costa Rica and Panama. Through these projects, ICT infrastructure such as the Internet plaza, computer laboratory and seminar rooms are established with free Internet access, and practical and educational ICT training courses are offered to help nurture ICT human resources. Such facilities, available to students or staff members at private companies, are contributing to the development of an ICT educational environment and arousing the interest of the ICT area. This will lead to the further development of the ICT industry, which is the ultimate goal of this project. In fact, support for the development of an ICT system at the Industrial Control Authority (ICA) and a quality control institution in Egypt boosted domestic demand and exports by improving the value of industrial goods as well as raising the efficiency of quality control mechanisms.

In addition to the basic support of dispatching ICT experts and providing ICT equipment, various seminars are held in developing countries. For example, NIDA has hosted the International Seminar on Internet Resources Management since 2003 in developing countries like Cambodia, Sri Lanka and, this year, in Ulaanbaatar, Mongolia.

The International Seminar on Internet Resources Management was initiated as a means of cooperating with less developed Asian countries to reduce international disparities in ICT, and to help increase basic ICT provision. The seminar gives participants a chance to discuss and present topics related to global trends in Internet technology, and to address policies and national Internet and ICT strategies. Internet resources education sessions are also provided for government officials, ISP staff and students to exchange ideas and broaden their knowledge. The seminar has become a ground for establishing various cooperative relationships between ICT companies, Internet communities and government agencies around the Asia-Pacific region. Attendance has grown year after year, expanding from Cambodia, Laos, Indonesia, Thailand, Myanmar, Mongolia and Uzbekistan to

include Vietnam and Pakistan. Participants share their experiences and knowledge concerning Internet infrastructure and related technologies while learning from Korea's advanced ICT technology and expertise.

All of these outreach programmes have contributed to the development of common wealth, peace in the international society and the promotion of informatization. Korea is determined to eliminate the information gap and build a healthy knowledge and information society by promoting cooperation in the field of the Internet and ICT with other countries. With continuing efforts to narrow the digital divide, Korea is conducting a wide range of research and finding effective ways to prepare and encourage the government, civil society, and business sectors to participate in the World Summit on the Information Society.

**Continuing activities to bridge the digital divide**
Digital technology makes people's lives productive and convenient, but globalization and the rise of ICT can also have undesirable side effects. The disparity in income and development between developed and developing nations has widened, creating a seemingly unbridgeable chasm. In fact, many developing nations have been unable to reap any real rewards from globalization. It is also quite urgent to narrow the digital gaps between regions, classes and generations.

Korea will continue its endeavours to fulfil its role as an advocate of global Internet development, opening an era of next-generation networks around the world. By building u-Korea by laying the foundations for advanced knowledge and ICT, Korea will promote greater international cooperation in narrowing the ICT gap present in the world today.

As a world leader in digital technology of the ubiquitous era, Korea will continue to share its achievements with all the other developing countries. We hope that Korea, and every nation, will be able to share future cooperation in the ICT field. Thus, with the development of ICT industries, we hope that ICT cooperation can bring global economic prosperity in the near future.

# Building an inclusive e-society in Singapore

*Infocomm Development Authority of Singapore*

S INGAPORE SHARES THE commitment and vision of participants at the World Summit on the Information Society (WSIS) in building a people-centred and inclusive Information Society. The Singapore Government has identified information and communication technology (ICT) as both an enabler for its population to achieve its full potential and as one of the pillars of Singapore's economic success. The Government also strongly believes that the benefits of ICT should be enjoyed by all. Therefore, significant efforts have been focused on making ICT more accessible to the general population through the promotion of market competition and ICT adoption.

**Promoting a vibrant and competitive ICT industry**

Singapore strongly believes that the process started by the full liberalization of the ICT sector in 2000, combined with a pro-competition regulatory framework, will drive access prices down and encourage ICT adoption.

Singapore has attracted a total of 36 facilities-based operators and 731 services-based operators since the telecom market was liberalized in April 2000. This has resulted in a corresponding increase in access options and broadband speeds. Today, users have a choice of Internet access through DSL, cable, ATM and wireless broadband, and Internet access speeds have reached up to 25Mbps for residential ADSL and cable modem access.



Bringing ICT to the classroom

Singapore's pro-regulatory framework also allows competing service providers to offer broadband Internet service access on existing incumbents' networks, enabling faster rollout of services and promoting competition at the wholesale level. Since telecom liberalization, our pro-competition regulatory framework has provided an environment conducive to the entry of new players in the Singapore market. In yet another effort to increase competition, the Infocomm Development Authority of Singapore (IDA) is proactive in introducing new infrastructure players into the industry. It recently issued six wireless broadband access spectrum rights in the 2.3 GHz and 2.5 GHz frequency bands through an auction.

Singapore is at the forefront of embracing new technologies to enhance its competitiveness. Trials are underway for applications using technologies such as Radio Frequency Identification (RFID) and nanotechnology. The Lion City is also encouraging technologies like IP telephony to bring the benefits of lower cost, convenience and greater choice to consumers and businesses. It has recently announced a light-touch regulatory framework on IP telephony services, to encourage the growth of that sector and to benefit broadband users who can take advantage of lower cost IP telephony services. Recently, Singapore also issued telephone numbers and licenses for IP telephony services.

Singaporeans are using ICT for working, learning and playing. The 2004 Household Survey by the Singapore IDA shows that 74 per cent of households in Singapore own personal computers. Internet access in households stands at 65 per cent. Such a steady rise in computer ownership and Internet access can be attributed in part to the various national infocomm programmes.

**Promoting e-lifestyle in the Lion City**

The Singapore Government places emphasis on ICT as a pillar of economic growth and social development. In doing so, it takes the lead in the promotion of ICT. As a way of spurring the use and development of the ICT sector, the Government invests heavily in putting its services online and encouraging people to use them.

IT in the Singapore Government started way back in 1981, when the Government set up the National Computer Board to drive the Civil Service Computerization Programme. Since then, the Civil Service Computerization Programme has evolved into an e-Government Action Plan. The first e-Government Action Plan was developed in year 2000. Its vision was for Singapore to be a leading e-Government, in order to better serve the country and its population in the knowledge-based economy.

Under the plan, the Government has been proactively pushing out public services online so that citizens can transact with it electronically with greater convenience. Today, there are about 1 600 public services online, and this makes up nearly 97 per cent of

public services. Some of the online public services include the filing of income tax returns and retrieval of airline and flight information.

These online public services have also been popular among the citizens. According to the 2004 e-Government Perception Survey by the Ministry of Finance and IDA, more than half the population in Singapore (57 per cent) transacted with the Government online in 2004. The latest survey shows that among the total number who transacted with the Government, nearly nine out of ten transacted at least once electronically in the past 12 months. Government electronic services also fared well in terms of service quality, as eight out of ten Singaporeans who transacted electronically with the Government were satisfied with the overall quality of the electronic services.

### Leaving no one behind in the digital age

To ensure that no one is left behind in the digital age, the Singapore Government has been aggressively promoting and raising awareness on the use of ICT. There have also been measures in place to increase ICT literacy in Singapore, including various ICT training and literacy programmes targeted at citizens of all ages. There is also the NEU PC Programme, one of several national infocomm usage education programmes that the Government has implemented since 1999. To date, 18 000 PCs have been given to needy families in Singapore.

The Singapore Government has also put in place measures to engage older citizens to embrace ICT. One such measure is the eCitizen Helper Programme, under which the Government aims to provide Singaporeans, in particular older citizens, with the means to transact electronically at designated eCitizen Helper locations. If they need someone to show them how to use the e-services, there will be trained helpers to lend a hand too. To date, there are 83 eCitizen Helper outlets around Singapore and more than one thousand helpers on these locations to assist Singaporeans in government online transactions. In 2004, about 40 000 transactions were done with the assistance of the eCitizen Helper.

The Singapore Government believes it is crucial to target the population from a young age if it is to be comfortable and competent with ICT and the Internet. In 1997, Singapore launched the Masterplan for IT in Education as a blueprint for the integration of ICT in our education system to meet the challenges of the 21st century. This was followed up by a second plan in 2002. The key objective is to use ICT to help equip the young with learning, creative thinking and communication skills. In doing so, all schools in the country are wired up with broadband and the student-to-PC ratio in schools has reached 2:1.

In the relentless spirit of driving research development and testing of the use of innovative infocomm technologies, IDA and Microsoft Singapore launched the IDA-Microsoft BackPack.NET initiative (BackPack.NET). This five-year undertaking will drive the testing, development, research and showcasing of infocomm technologies in education. It aims to enhance students' learning experiences through the use of tablet PCs, 'digital ink' and other emerging infocomm technologies. Students could use the tablet PCs for a variety of things, including ecology observations around the schools' pond, creating digital art in an open-air class, and recording science experiments in a school laboratory.

The latest infocomm technologies have also been steadily making their way into the healthcare sector. A three-year pilot project between Alexandra Hospital, IDA and Microsoft Singapore was launched in November 2004. Called Healthcare.NET, the initiative aims to deliver a patient-centric, seamless and cost effective healthcare system over the next three years.

The project will deliver critical information to healthcare workers that will enable faster diagnoses, more effective treatment and an enhanced experience for patients, using intuitive 'digital dashboard' user interfaces. Patients will be empowered with healthcare information for preventative and post-illness care as well as their treatment in hospital. The dashboards will provide a consistent interface that allows users — whether patients or healthcare workers — to intuitively start using the system with minimal training, and share information where appropriate.

### Singapore's ICT efforts gain international recognition

Singapore's efforts in promoting and encouraging ICT adoption have gained international recognition. The World Economic Forum has ranked Singapore first in its 2004-2005 Global Information Technology Report. Singapore was listed as the world's most successful economy in exploiting ICT developments.

Accenture has also consistently ranked Singapore among the top three countries in the world in its e-Government Leadership Study. Projects such as the Online Business Licensing Service (OBLS) have been recognized by the United Nations for the use of ICT to enhance service delivery to citizens. OBLS is a one-stop integrated e-service that allows businesses to apply for licences with ease and convenience. This award represents a significant milestone in the Government's journey towards the 'many agencies, one government' vision.

As with the pace of change in technology, Singapore's infocomm landscape is set to witness exciting developments in the years to come. This is the premise of Intelligent Nation 2015, or iN2015 — a ten year masterplan to grow the infocomm sector and chart the use of technology for work, life and leisure. Spearheaded by IDA, iN2015 will be conceived through a national co-creation effort by all who have a stake in the future of Singapore. This includes the industry, Government and the people.



Leaving no-one behind in the digital age

Photo: Monk's Hill Secondary School

# The mobile revolution in Indian society

*Bharat Sanchar Nigam Limited*

THERE IS NOTHING more moving than seeing a carpenter talking business on his mobile, or a fisherman trying to sell his catch, or a farmer keeping track of market information using his cell phone. The benefits of cell phone technology have really reached the masses in India.

It took five decades for India, a country of over a billion people, to reach 20 million landline telephone connections. In 1995 — when mobile telephony was first introduced in the country — few could have imagined that within ten years, India would have more mobile phones than landlines and be the fastest growing telephony market in the world.

The encouraging regulatory regime, falling prices and increasing geographical penetration of networks are all driving mobile growth in India. In 1992, the government took a landmark decision to liberalize its telecom sector by opening mobile telephony to private sector operators, and in 1999 introduced a new policy called NTP 99. This created a new revenue sharing arrangement with private telecom operators, absorbing some of their losses and cutting licence fees to USD5.5 billion. NTP 99, and the subsequent entry to the cellular market of Bharat Sanchar Nigam Limited (BSNL) saw tariffs crash across the board. Call rates also fell by about 60 per cent, and these factors resulted in an increase in the subscriber base from 1.2 million to 1.88 million in 2000.

Over the next three years, the Government took a series of important steps that included opening telecoms to more operators and introduction of the calling party pays (CPP) regime, which made all incoming calls to mobile networks free. As mobile phone prices continued to crash to their present level of less than two cents per minute for local calls, the subscriber base grew from 13 million in 2003 to close to 60 million at the end of July 2005. Meanwhile, to keep up with the competition posed by mobile phones, landline services, controlled primarily by two state-owned companies (BSNL and Mahangar Telephone Nigam Limited), slashed call rates, helping landline subscribers to grow as well. At the end of July landline connections, which took five decades to reach 20 million had jumped to over 47 million.

India has one of the lowest average revenue per unit (ARPU) figures in Asia — and it is expected to slide even further over the next five years. As telecom operators penetrate deeper into the Indian market they are being forced to target new subscribers from relatively low income brackets. According to the National Association of Software and Service Companies (NASSCOM), India's main ICT industry lobbying group, the ARPU of mobile operators fell from USD192 per year to about USD73 per year by the end of fiscal 2005, and could fall by another 11 per cent by the end of fiscal 2006, before starting to stabilize.

Experts say that with growth in urban centres petering out, the real potential lies in expansion in rural areas. According to a recent study by the Telecom Regulatory Authority of India: "Private players are largely hesitant in expanding in rural areas because rolling out infrastructure with huge investments does not appear profitable to many." According to the Cellular Operator Association of India (COAI), the reluctance to invest in rural areas is also evident from the teledensity (telephones per 100 inhabitants) gap between urban and rural India. While teledensity has improved from 1.5 in 1997 to 3.64 in 2001 and is currently at 9.7 in the urban areas, rural areas continue to suffer from penetration of just 1.79 connections per 100 inhabitants. According to some estimates, expansion to connect rural areas would require investments of over USD23 billion — almost double the amount that the telecom sector has invested in the last decade, and a figure which the industry sector cannot yet afford.

Perhaps this is why telecoms players are now being forced to focus on non-voice revenues like data and content services. But with non-voice revenues contributing just about five per cent of the total revenues of the telecom sector, according to research firm IDC, there's still a long way to go before such services can contribute toward improving ARPU significantly.

Nevertheless, India's telecom industry is optimistic. Despite these challenges the sector will survive and even thrive just on the basis of its immense growth potential in term of new users.

**The growth in mobile and its benefits for Indian society**
Indian society is multifaceted to an extent perhaps unknown in any other of the world's great civilizations. The differences of region, language, wealth, status, religion, urbanity, and gender is the special feature of Indian society. Nearly 74 per cent of India's population dwells in villages, with agriculture providing support for most of these rural residents. The ultimate result of mobile growth will be to develop a Information Society in which everyone can create, access, use and share information and knowledge and can be connected anytime, anywhere.

Mobile phones are shaping the identity of individuals, families and social groupings. Like many information and communication technologies, mobiles are meant to save us time. But this new generation of always-on, anytime, anyplace technologies may allow for levels of convenience and safety, but also of surveillance, unknown and unimagined by earlier generations.

Mobile users are getting younger and younger. A technology-savvy segment of society, young people are enthusiastic early adopters of new mobile services. Their use of texting, mobile Internet services and gaming typically exceeds that of their older counterparts. The largest use of the mobile Internet is among young students. In India, teenagers are the most avid texters. The penetration of mobile phones among 18-year-olds is fast increasing. Young people use mobiles to create and maintain social

networks and to reflect their popularity or position in a peer group. The attitude of young people towards their mobile phones is not purely related to device functionality, but rather to their own individuality or identity. The youth market is an important predictor of how the future mobile information society will develop. Service providers and operators alike are looking at better ways to target this growing market segment. At the same time, one must ensure that young people are protected from, among other things, inappropriate content, invasions of privacy, excessive spending, technological addiction (such as gaming addiction), and any negative health effects (for example sedentary lifestyles and cellular radiation).

Professor Ashok Jhunjhunwala of the Indian Institute of Technology in Chennai presented a number of examples from India of the way in which mobile communications are being used to provide, for instance, low cost automatic teller machines, remote education and remote health monitoring services, and open-access Internet kiosks.

In August 1995, when the first mobile call was made in India, brick-sized cell phones used to cost INR 45 000 and each call cost INR 16.5 per minute. The cell phone was a status symbol. Today, there are over 60 million mobile connections in India (expected to double in number in next 12 months). A local call costs around INR 1/minute and a cell phone can be purchased for less than INR 3 000.

Wireless technology has been a boon for India. In a country where setting up wired infrastructure is very expensive and time consuming, wireless is the perfect solution to connect remote villages.

Cell phones have not been just about technology. They have brought about a cultural change in the country. SMS is the favourite means of communication for everybody today. Most television programmes now come with an associated SMS competition. A recent headline in a Hindi newspaper read: "Cell phone compa- nies to ban gayi, ab kaun banega crorepati" ('Cell phone compa- nies have already become millionaires, now who wants to be the next millionaire'), in reference to an SMS contest to gain entry into Kaun Banega Crorepati (Who Wants to be a Millionaire). Of late, cell phones have brought the 'citizen journalism' revolution to India, albeit in an unexpected way. Camera phones and multime- dia messaging have created our own papparazi which spares neither Bollywood personalities nor corrupt officials.

Urban India has transformed completely in the last ten years. Indians have demonstrated that they are not afraid to embrace technology and illiteracy doesn't hinder adoption of technol- ogy, provided it is useful to the masses. The revolution in computing in countries like India will also come through mobile phones. What the personal computer did to offices and then to masses in developed countries, mobile phones will do in devel- oping countries.

India aims to have 250 million telephones and a teledensity of 22 per cent by 2007. Of these phones, around 180-200 million phones are predicted to be mobiles and the public sector opera- tors are expected to contribute about 50 per cent. The operators would cover about 5 000 cities and towns within the next few months. Thus, wireless phones would play an important role in achieving the plan objective of telephone on demand. By the end of 2007, the entire country should be carpeted by telecom networks and all the villages should be connected by phone. Internet connections shall increase from 5.45 million in December 2004 to 18 million by 2007 and further to 40 million at the end of 2010. By 2007, broadband connections are targeted to reach nine million, with 20 million expected by 2010.

The introduction of 3G technology will enhance voice capacity, data speeds, etc., which in turn will facilitate government e-initia- tives such as e-governance, e-health and e-education. With increasing competition, it is expected that the tariff rates will fall further benefiting the consumers at large.

# One Laptop per Child

*Nicholas Negroponte and Seymour Papert*

ANY COUNTRY'S MOST precious resource is its children. Any solution to major problems like poverty, warfare or the environment must include education as a component. All forms of learning are best advanced when the emphasis is upon individual and peer-to-peer learning. It is therefore time to revisit schools to give children new tools to learn in new ways.

The Massachusetts Institute of Technology (MIT) and the One Laptop per Child (OLPC) non-profit association propose a global programme to equip as many as a billion students and their teachers with individual, ultra-low-cost, full-feature connected laptop computers that will be convertible to sunlight readable e-books at the flick of a switch. They will be an appropriate size for children and adolescents, will run Linux and other open-source software, and will be so energy efficient that hand-cranking alone could generate sufficient power to operate them.

The machines will incorporate design and engineering advances developed at MIT's Media Lab, plus innovations in manufacturing and distribution to bring cost, and prices, down to about USD100 apiece. They will be issued to schoolchildren by their national governments via diffused distribution, that is, one laptop per child. None will be available through regular retail or commercial channels, although MIT and OLPC will license or give away the IP necessary to bring similar products to market.

In the programme's pilot phase, between five and 15 million machines would be distributed on a country-by-country basis into culturally diverse regions with a focus, where possible, on rural and remote areas. An essential feature of the pilot programme would be training, logistics and an administrative initiative based in the host country. Here, in partnership with local educational organizations or other groups to be determined, MIT would help create a centre to implement a carefully designed, exponential process to impart the necessary technological and pedagogical skills to classroom teachers over a period of six months or less.



Elaine & Nicholas Negroponte School in Reaksmy, Cambodia, January 2002. Laptops are Panasonic Toughbooks with WiFi. Access point connected to Shinawatra satellite provided courtesy of Thaicom (dish in the background).Photo by Dimitri Negroponte

### The vision

Years ago, only very well travelled people had access to knowledge. Then, technologies such as the compass, paper and printing transformed the world by expanding these limits. Today there is a new opportunity to transform the world once again, to create and disseminate a technology that will give schoolchildren in even the most distant places full access to knowledge and learning.

That opportunity is expressed in a unique device, the USD100 laptop, which will be easily portable and can be used at home as well as at school. Quantitatively, this permits greater high-quality learning than can be achieved at school. But the real gain is qualitative: the USD100 laptop removes the barriers that separate learning from living, school from family and society. It embodies the new information culture and fosters individual growth within that culture. Just as a language is best acquired by speaking it, a culture is best acquired by living it.

OLPC and the USD100 laptop will be a portal to ways of thinking that did not exist in the past or which were accessible only to much older students, the wealthy or professionals. The programme will allow children to learn everything, old and new, more efficiently and more thoroughly. A central theoretical principle of OLPC, amply borne out by our experience, is that learning more can be much easier than learning less.

Research has also demonstrated that we learn best when we are engaged in designing and creating things, especially objects that are meaningful to us or to others around us. When children create pictures with finger paint, for example, they learn how colours mix together. When they create houses and castles with building blocks, they learn about structures and stability. When they make bracelets with coloured beads, they learn about symmetry and patterns.

Like finger paint, blocks and beads, not just children, but everyone can use computers as 'material' for making things. Indeed, the computer is the most extraordinary construction material ever invented, enabling people to create anything from expressive music to scientific simulations to robotic creatures.

In a world that changes dramatically almost every day, we believe it is preferable to become a better learner than to focus on the multiplication of fractions, or to memorize the capitals of the world. The most important skill to master is the skill of learning new skills and ideas. We call this 'learning learning.'

### Laptop economics

The global implementation of OLPC is clearly unfeasible when the average retail cost of even low-end machines is USD600. With the USD100 laptop, however, the programme makes compelling economic sense. We can reduce costs in six major ways:

- Reducing the usual profit margin to nearly zero, together with sales, marketing and distribution costs. These typically account for over 50 per cent of a laptop's price
- Innovation in the machine's display. The display accounts for 50 per cent or more of the machine's remaining cost. We have devised several strategies for reducing these to about USD30 per machine
- Putting the laptops on an 'operational diet.' Up to 75 per cent of the residual expense is cut by deploying a scaled-down processor and needing less memory, using a significantly lighter-weight operating system, or a skinny Linux
- Designing and building our machines to be rugged and durable, thus reducing the annual cost of using them

- Moving to an open-source model for software, both operating systems and applications
- Making each laptop perform as a router in a collaborative, ad hoc mesh network so children operate the telecommunications infrastructure. As a result, very few connections to the Internet will serve hundreds of users.

We commit to restricting costs in the future as well. The enormous potential volume of these machines should enable unique scale economies in manufacture. Also, OLPC is a non-profit association, so our mission of providing high-quality laptops at the lowest possible price does not conflict with the more typical, profit-making responsibility of increasing shareholder values.

From the government-customer point of view, moving from paper to bits will also help to offset costs. Under OLPC, governments can distribute texts digitally and update them at a fraction of the cost of printing and shipping hard copies. Plus there will be even greater private savings because students will gain access to important books that only comparatively rich families can afford. These include encyclopedias, full dictionaries and professional-quality atlases, as well as personal subscriptions to periodicals.

Throughout the world, computing and communications technologies are sparking a new entrepreneurial spirit; the creation of innovative services and increased productivity. The importance and value of a well-educated, creative citizenry has never been greater. At the same time, the very meaning of 'well-educated' is fundamentally changing. It is no longer sufficient to know as much as your teacher knows, and it is unrealistic to expect teachers to know everything that their pupils — not to mention the rest of us — need to learn.

The USD100 laptop makes a new learning equation possible, one in which every child and adult is both learner and teacher. We are talking about transforming society. And this, of course, is what education should be about.

# From pilot projects to a mammoth national programme: the story of Mission 2007

*Subbiah Arunachalam[1], M S Swaminathan Research Foundation*

SAM PITRODA, TELECOM pioneer and chairman of India's Knowledge Commission, said: "True knowledge can empower people at all levels. It can make our people aware of their rights and responsibilities. It can also provide them tools and techniques to be productive and meaningful in the information age. To achieve this, the best brains in the country will have to focus urgently on solving problems of the poor and the underprivileged at the bottom of the pyramid."

India is home to a number of development initiatives. We will see how one of them, which uses access to knowledge as a key to holistic development, has led to perhaps the largest ever scaling up operation in the history of the telecentres movement.

## ICT makes a difference to a fishing village

Veerampattinam is a fairly large village ten km south of Pondicherry on the eastern coast of southern India. A clean village with rectangular roads and a wide beach, it has a population of about 6 200 people, most of whom belong to fishing families. At the centre of the village is a reputed temple, a clean square-shaped water tank paved with granite stones on all sides, the village school, a few shops, the marketplace, and the office of the local Panchayat (the traditional village government).

Seven years ago the villagers requested the M S Swaminathan Research Foundation (MSSRF) to set up a knowledge centre similar to the ones it had set up in nearby villages with financial support from the International Development Research Centre (IDRC) in Canada. The villagers provided space for the knowledge centre in one half of a rectangular room that serves as the Veerampattinam Panchayat office. Within months of its inauguration, the knowledge centre started providing, among other information, forecasts of wave heights and wave current directions in the Bay of Bengal 48 hours in advance. These forecasts, based on information downloaded from a US Navy website, proved to be a boon. Ever since this service was started, not one person from the village has died while fishing at sea. Before then, up to half a dozen lives were lost every year when fishermen were caught in rough weather while fishing far away from the shore.

In the case of the fishermen of Veerampattianm, lives could not have been saved without the intelligent use of a combination of old and new technologies. The US Navy gathers the information on weather conditions in the Bay of Bengal through its own satellites and puts out the information on its website. MSSRF has set up, in cooperation with local communities, about a dozen knowledge centres in villages within 30 km of each other, all of which are connected to a hub at a central village through a hybrid wired and wireless local area network. Each knowledge centre, managed by local volunteers trained by MSSRF, is provided with a few personal computers with a solar powered battery backup to ensure an uninterrupted power supply, a printer, and a web camera.

One computer in each centre is connected to the server at the hub through telephone-and-modem or spread spectrum technology or a Motorola very high frequency two-way radio to enable them to receive and transmit data, text, audio and video files. The staff at the hub download wave height forecasts from the US Navy site once a day and transmit them as a multimedia file to Veerampattinam. The transferred message consists of a weather chart in colour indicating wave heights as a function of the distance from the shore and current ocean directions, a written statement and a voice announcement. At Veerampattinam a local volunteer downloads the message, puts up the weather chart and the written statement on the notice board and broadcasts the voice announcement several times a day over the public address system so everyone in the village can hear it through strategically located loudspeakers.

All the knowledge centres, including the one at Veerampattinam, distribute the twice-monthly local language community newspaper called *Our Village News*, edited and produced by a consortium of knowledge centre volunteers and provides news on employment opportunities. A number of able-bodied village youths from Veerampattinam have been selected as firemen and a couple of them have joined the security forces. Many school kids visit the knowledge centre to learn to use computers. The centre has helped a woman's self-help group to make and market ready-to-wear clothing.

## During and after the tsunami

The knowledge centre at Veerampattinam played a key role in saving lives on 26 December 2004, when rumblings of the earth off the coast of Aceh in Indonesia sent the deadly tsunami waves to its shores. On the day of the tsunami, Mani, one of the Panchayat members, was on the shore mending his net when he saw something unusual — the sea receding hundreds of feet. He thought that something awful was going to happen and rushed to the knowledge centre along with a few others, broke open the door and started warning over the public address system using everyone in the village to vacate their homes and rush to safety.

By the time the giant waves struck the village and dragged boats from the shore half a kilometre into the village, everyone — including women, children, the old and infirm — were already in safe areas. The villagers lost some of their homes, boats, nets and other valuables, but there was hardly any loss of life. And when the relief supplies came, knowledge centre volunteer Mr Elumalai used the public address system to request people to come street by street and collect rice, cooking oil, kerosene and other supplies. Whereas in most other tsunami-affected areas the supplies did not reach the

right people and there were chaotic scenes, the distribution of relief materials at Veerampattinam was orderly. Clearly people who are used to a culture of sharing and communicating information in their daily lives are better able to deal with disasters.

**A knowledge centre managed by women**

If the knowledge centre at Veerampattinam saves fishermen's lives, the one in the agricultural village of Embalam has helped women acquire a certain level of gender equality. Like all knowledge centres set up by MSSRF, the Embalam centre was also set up after detailed negotiations with the people of the village — men and women, old and young, landed and landless. Although a variety of technologies are used, the focus of the Information Village Research Project, funded by Canada's IDRC, is people, their contexts and their needs. As in other villages, the bottom-up programme started with a needs assessment. About a third of the population in most of these villages has an income of less than USD25 per month and there is a great need for implementing poverty reduction programmes. The Embalam knowledge centre is managed by an all-women team selected by the women self-help groups in the village. The information provided is wide ranging and pertains to agriculture, education, healthcare, animal health, government entitlements, employment opportunities, market information and livelihood opportunities.

Thanks to a training programme offered through the knowledge centre, volunteers at this centre check villagers' eyesight for vision and cataracts. They then transmit pictures taken with a web camera along with their observations as email attachments to doctors at the nearby Aravind Eye Hospital, who provide free treatment to those who need it. Some women have set up small-scale business operations, such as knitting sweaters and growing mushrooms. All the self-help groups use accounting software specially developed for the purpose by MSSRF scientists to maintain their micro-finance programmes. This software is loaded in computers in all knowledge centres.

**A holistic approach to development**

The project is designed to provide knowledge on demand to meet local needs, and it does so through a bottom-up process. The process starts with volunteer teams that help poll the villagers to find out what knowledge they want. MSSRF provides the villages with hardware and maintenance for the communication system, and specially designed websites in the local language that convey the requested information.

After visiting some of these knowledge centres Professor Bruce Alberts, former President of the National Academy of Sciences of the US, observed: "Drawing on this concept, I envision a global electronic network that connects scientists to people at all levels — farmers' organizations and village women, for example. The network will allow them to easily access the scientific and technical knowledge that they need to solve local problems and enhance the quality of their lives, as well as to communicate their own insights and needs back to scientists". Note the emphasis on two-way communication.

In villages where they have established knowledge centres, a group of MSSRF scientists are helping people to learn new skills. For example, a self-help group called Rani Jhansi, consisting of women from the historically marginalized Dalit communities, is making and marketing hand-made paper and paper products. Other women, with eight years of schooling or less are making biopesticides, the production of which requires a certain degree of sophisticated skills. While the paper unit has yet to reap big profits, the biopesticide units are doing well. What is important is not just the money these women have started earning but the way it helps them to make their



Farmers reading 'today's headlines' at Thirupalanam in the Cauvery delta

children's lives better. Independent evaluation has shown that ICT-enabled knowledge centres can indeed make a difference to the lives of rural communities.

It is not enough to provide useful information. It is important to see that the people who receive the information are empowered to use it to their advantage. Poverty will persist so long as a large proportion of the rural population is engaged only in unskilled work. Knowledge centres should bring about a paradigm shift from unskilled to skilled work and from on-farm to value-added non-farm activities. For that to happen, people may need to acquire new skills and funds. Also, we should learn to use ICT to bridge gender, social, economic and technological divides. The challenge is in adopting a holistic information access-enabled development strategy and using ICT as a cross-cutting instrument in different aspects of the strategy.

The project is people centred and participatory, and technology is seen as an enabler. It is holistic and ensures the timely provision of information and enables people to take advantage of information through capacity building, formation of self-help groups, facilitating micro-credit and setting up micro-enterprises.

### From a small beginning to a mass movement

MSSRF has embarked on extending these benefits to other regions of the world. This is primarily through two communication initiatives, the annual South-South Exchange Traveling Workshop (SSE) and the Open Knowledge Network (OKN).

So far three SSEs have been held and each had 20-25 development activists from Asia, Africa and Latin America as participants. Participants travel from village to village in Pondicherry and Tamil Nadu, where MSSRF has set up knowledge centres, and engage in a dialogue with the local people and knowledge centre volunteers.

They share their knowledge and learn from one another's experience. After a week-long journey covering about ten villages, the whole group analyze the lessons learnt and how they could use the experiential learning in their own work.

In collaboration with OneWorld International, MSSRF formed the OKN, a human network, which collects, shares and disseminates local knowledge and is supported by flexible technical solutions.

Conceived by Peter Armstrong, OKN is a fabulous idea and one day it will become the equivalent of the Internet for poor people in the world. Its aim is to empower the poor through the creation and sharing of local content. What people need is space to communicate, to express their ideas and their voices. OKN helps them acquire the skills to develop content. People in rural areas of India and Africa are partners in this network and partners from countries such as Sri Lanka and Nepal are joining in. Trained volunteers gather indigenous knowledge by talking to people and upload the information along with metadata on to a central portal. While the main content could be in any language, the metadata is in English. Anyone anywhere can download the content and using the metadata tags choose what is relevant to one's needs.

MSSRF has now launched what is perhaps the largest ever scaling up programme in the history of ICT-enabled development. This is called Mission 2007: Every Village a Knowledge Centre. The idea is to reach out to all the 637 000 villages of India by the 60th anniversary of India's Independence on August 15, 2007.

### Winning support

As a first step to win support, MSSRF set up the MSSRF-Jamsetji Tata National Virtual Academy for Food Security and Rural Prosperity (NVA) in August 2003, with financial support from the Tata Social



People of Veerampattinam queueing up to collect relief materials

Welfare Trust. Unlike the major science academies of the world, the NVA is an academy of grassroots workers who have distinguished themselves by their commitment to public good and community welfare. The Mission of spreading the knowledge revolution cannot succeed without the support of a very large number of such committed grassroots workers spread all over the country. The idea is to select more than a million such Fellows, with at least one man and one woman from each of India's 637 000 villages.

MSSRF followed this up through a series of consultations where they invited government leaders, bureaucrats, academics, civil societies and industry. They discussed building on the experience of MSSRF and others by taking ICT-enabled knowledge provision to resource-poor families. Having won support for the formation of Mission 2007: Every Village a Knowledge Centre to facilitate the setting up of village knowledge centres throughout rural India to generate knowledge-based livelihoods, MSSRF formed a National Alliance for carrying out the Mission. Currently, there are more than 160 partners in the Alliance, which is perhaps one of the largest multi stakeholder partnerships in development. They include ministries and departments of the government, academia, NGOs, industry, research institutions, international organizations and financial institutions.

Initially, there was considerable diffidence about achieving such a huge task in less than three years. But subsequent developments on many fronts have led to greater confidence. Together with OneWorld South Asia, MSSRF organized the first convention of Mission 2007 in New Delhi in July 2004, where partner organizations agreed upon a common goal and a joint action framework. The workshop highlighted the need for policy intervention, such as de-licensing and making the highly regulatory environment more people friendly. The Mission would be implemented on the principles of social inclusion, social relevance and gender equality, and transaction costs would be kept low. An ICT-SHG movement would be fostered to give a sense of ownership to the people. The Alliance would work with Panchayats, self-help groups, common interest groups, and community-based organizations.

The Alliance would also promote entrepreneurship in the villages and address the growing concern about adverse social, economic and political implications of the expanding urban-rural divide in knowledge, skills and technological empowerment. The National Alliance would be a coalition of the concerned and would function like the Consultative Group on International Agricultural Research (CGIAR), without a formal structure. The Alliance would have informal organizational structures at national, state, district and local levels to plan and implement the objectives of the Mission. Several task forces would be constituted to deal with connectivity, content, capacity building, coordination and management. These task forces have since submitted detailed reports that were discussed in July 2005 at the second convention of Mission 2007.

Inaugurating the convention, the President of India, Dr Abdul Kalam, said the connectivity of village complexes to provide economic opportunities to all segments of people was needed to bridge the urban-rural divide, generate employment and enhance rural prosperity. He was immensely pleased to hand over the Fellowships to the first batch of over 130 Fellows of the NVA. The Finance Minister of India, Mr Palaniappan Chidambaram, announced his readiness to allocate start-up funds to the tune of USD1.5 billion to implement the programme. The Minister for IT, Mr Dayanidhi Maran announced that his ministry would join the Mission by setting up 100 000 community service centres. The Minister for Panchayat Raj, Mr Mani Shankar Aiyer, offered the support of his ministry and suggested that the village knowledge centres could be set up in Panchayat office buildings throughout the country. The union minister of state for planning, Mr Rajasekharan, suggested that banks should provide youths funds to establish village knowledge centres.

In addition to connectivity and access issues, the Mission will address content. A consortium of content providers will be formed to build a location and language-specific knowledge base. There is also a need for capacity building for content provisioning, as well as building a framework for learning-by-doing by practitioners. The Mission is also focusing on gender mainstreaming of content; assured and remunerative market-linking of producers and purchasers; outsourcing of work from towns to villages; ICT-SHGs at low transaction cost; organising financial, technical and infrastructure resources; and training and capacity building.

Mission 2007 is keen to promote community radio and Internet radio to unleash the creativity of rural people. Banks will have to play a catalytic role to introduce new schemes through rural knowledge centres. There is also a need to undertake cost-benefit analysis and to document best practice and success stories.

The time is ripe for ushering in the knowledge revolution in rural India. The Telecom Regulatory Authority is now building strategies to accelerate the growth of telecom infrastructures and to cut communication costs. Many national institutions, such as state open universities and the National Informatics Centre, are keen to reach out to the rural masses. State governments are interested in harnessing ICT for sustainable development. ISRO has launched a satellite called Edusat that is dedicated to education as well as the knowledge centers programme. The Ministry of Health is keen to use ICT infrastructure to take healthcare to rural areas.

It is significant that the Mission talks about every village being a knowledge centre and not a knowledge centre in every village, thus recognizing the enormous resource of indigenous knowledge native to village people.



Knowledge workers at the all-women knowledge centre at Embalam

# Multi-stakeholder partnerships for tackling the digital divide

*Yeongi Son Ph.D, CEO, The Korea Agency for Digital Opportunity and Promotion*

INFORMATION AND COMMUNICATION technology (ICT) has been a powerful tool in providing developing countries with new opportunities, to enable them to catch up with more developed countries by strengthening their capacity to drive social, economic and human progress. However, the fact that 80 per cent of the global population does not own a mobile phone suggests that developing countries enjoy relatively fewer benefits from ICT than developed ones, and that a digital divide has emerged that reflects the wealth gap between countries. In terms of global internet use, wealthy countries account for only 16 per cent of the global population but have 70 per cent of the world's internet users. However, mid to poor countries account for 80 per cent of the world population but only 24 per cent of internet users.[1]

The term 'digital divide' signifies the differences in access to ICT and use of the internet in various socioeconomic activities among individuals, families, companies, regions, and countries, based on distinctive social and economic status. The digital divide restricts digitally underserved populations in terms of social participation and financial opportunities because it limits people's access to knowledge and information. But it also discourages social integration because it aggravates social and economic inequalities.

Various domestic and international organizations have been working since 1990 to raise awareness of the global digital divide and its dangers, and a variety of initiatives have been carried out in an attempt to diminish the gap. The United Nations has stated that ICT will play a key role in realizing the Millennium Development Goals (MDGs) adopted at the Millennium Summit in 2000. It is working towards the goals through organizations such as the United Nations Development Programme (UNDP) and the United Nations Education, Scientific and Cultural Organization (UNESCO). As a means of achieving digital equality as well as other MDGs, the International Telecommunication



Korean volunteers in the community, Phnom Penh, Cambodia

IT education is provided by Community Technology Learning Centres

Union (ITU) holds the World Telecommunication Development Conference. Among the many other ITU projects is the Connect the World initiative, a global multi-stakeholder effort aimed at building up existing development-oriented connectivity projects and stimulating new partnerships. Its founding partners vary from global businesses to governments, and all of them are undertaking concrete activities that contribute to reducing the digital divide with a strong commitment at the CEO/Leader level. They are working towards the goal of connecting all communities by 2015.

**Multi-stakeholder partnerships**
The digital divide is a complicated problem involving multiple issues, and it cannot be resolved without the concerted efforts of diverse constituents. Multi-stakeholder partnerships allow individual organizations to achieve goals that would be difficult to attain with their own resources or efforts alone. A cooperative partnership comprising public, private, civic, and international parties can accomplish a common goal if each party successfully fulfils its respective responsibility. In essence, in a multi-stakeholder partnership, the different capacities and resources of participating organizations complement each other and create a synergy that enables shared goals to be accomplished.

The World Summit on the Information Society (WSIS) stresses that the digital divide is a complex social and economic issue that can only be solved through cooperation and mutual reliance between different organizations in a variety of fields. The projects, which governmental agencies, private corporations, international organizations, and civic groups respectively implement to bridge the digital divide, can only succeed through cooperation with other organizations. For example, a public organization would need a significant amount of human and financial resources to build a network and provide the many services essential to reduc-

ing the digital divide in rural and poorer urban areas, and those necessary resources can be raised by contributions from the business community. Similarly, a private company might require the government to ensure fair competition and transparency in the market, elements that are crucial to efficient investment and development in the ICT sector.

Recognizing the importance of multi-stakeholder partnerships in bridging the digital divide, KADO has been carrying out its programmes through cooperation with diverse entities. KADO was established on the basis of the Act on Closing the Digital Divide. It is a leading agency pioneering the domestic and global attempt to move toward a knowledge and information society by reducing the digital divide, building a digital welfare society, creating a venue for a future Information Society, and promoting a healthy cyberculture. Working together with multiple participants including central and local governments, post offices, IT companies and non-governmental organizations (NGOs), KADO aims to realize a digital world where anyone can benefit from information and communication services.

KADO is currently involved in many projects aimed at bridging the digital divide by fostering an environment of equal access to information. Between 2000 and 2003, 986 Information Access Centres (IACs) were established and operated for local governments throughout the nation. In 2004, 30 multi-functional IACs offering residents e-learning classes, multimedia lessons and digital resources were established for 28 local governments. In addition, for the purposes of reducing the digital divide between social classes and making information access a part of daily life, 80 552 used computers were collected from public organizations, private corporations, and individuals. Of this total, 61 906 computers were repaired and distributed free of charge to 3 911 organizations and 21 280 individuals through the Used PC

Distribution Programme that started in 1997. KADO also operates programmes to distribute special software and assistive technology to help people with disabilities, and to develop content for underprivileged sectors of the population. Through various educational programmes, KADO offers ICT education opportunities to people with disabilities, senior citizens, and low-income families. KADO also conducts policy research and development projects to assess the effectiveness of digital divide alleviation programmes and monitor the state of the digital divide.

For the promotion of a healthy information culture and lifestyle, KADO is currently conducting programmes to prevent the ill effects of informatization, promote the use of positive information, and prevent internet addiction. KADO set up the Korea Internet Volunteers Programme in 2001 to bridge the global digital divide. As of 2005, 1 026 volunteers in 270 teams have been sent to 52 countries. KADO also developed a plan to provide two IACs per year to developing countries. Beginning with the IAC in Cambodia in 2002, it has established seven IACs in seven countries so far, and another IAC will be added by the end of 2005. Through the Korea IT Learning (KoIL) programme, designed to nurture IT talents in developing countries, 1 500 policymakers and technicians representing 84 countries were trained as of 2004. Most of KADO's projects and programmes are executed with the cooperation of numerous partners. In order to ensure success all the partners, whether they are private corporations, public institutions, government agencies, or international groups, are striving to do their best in their respective fields.

**Unlimited potential**
The Unlimited Potential Programme demonstrates KADO's endeavours to bridge the digital divide through multi-stakeholder partnerships. This programme, headed by Microsoft, aims to address computer literacy in order to promote balanced social development. As Microsoft's partner in this endeavour, KADO provides IT education for the elderly in Korea with the aim of narrowing the digital divide between generations, expanding social and economic participation by senior citizens, and fostering utilization of the elderly workforce. After signing a memorandum of understanding (MOU) with Microsoft in July 2004, KADO established Community Technology Learning Centres (CTLCs) for the elderly at university campuses and 20 senior citizen welfare centres across the nation for the purposes of promoting elderly participation in the information society and developing information utilization skills among the elderly population. Since its creation, a total of 1 661 students have been educated at the CTLC. In 2005, plans are underway to transform the existing basic learning centres to specialized learning centres and to nurture 140 elderly teachers at each facility.

KADO and Microsoft have also signed a letter of intent to further develop their partnership. Adding to the joint Microsoft-KADO Unlimited Potential IT skills training project for silvers, both parties



KADO and Microsoft are helping the elderly to learn ICT skills

have agreed to work as partners on the UNESCAP Development Centre, which will soon be founded in Korea to focus on IT skills development. They will also explore areas of potential collaboration and partnership, including the donation of refurbished computers to CTLCs, use of the Unlimited Potential curriculum in KADO's international training programmes, and participation in other major events focused on digital inclusion and bridging the global digital divide.

Another example of KADO's successful multi-stakeholder partnerships is the Intel® Education Programme toward the Future. It was initiated in 2002 with the participation of the Ministry of Education and Human Resources Development, Korea Education and Research Information Service, city and provincial offices of education, and other related organizations. With the firm belief that education is the key to preparing for the future and that we must cultivate the talents of tomorrow in order to lead future social changes, KADO signed an MOU with Intel, and started an education programme to increase teachers' ICT access skills and specialities. Between 2002 and 2004, over 18 000 educators in primary and secondary education in Korea received training through the programme. This programme aims to improve ICT access abilities and the knowledge of teachers so that they can integrate ICT and related projects into the classroom and improve the quality of learning and education. Helping students to develop improved cognitive abilities will allow them to become active, successful participants in the knowledge-based economy of the 21st century. For these goals, KADO and Intel will continue to work together and invest in education.

**Creating synergies**
As the aforementioned programmes illustrate, a multi-stakeholder partnership results in more diverse and dynamic programmes, and synergistic relationships provide greater results than the sum of their efforts. The interests of each individual organization may differ, but when different organizations can work together towards a common goal, share information, and adjust their interests, then those organizations can achieve greater results.

When executed properly, a multi-stakeholder partnership may result in synergistic effects from the creative tensions and the variety of parties involved, but significant problems can arise in the management of the project. Different interests can come into conflict with catastrophic results. Therefore, it is crucial that each party clearly sets forth respective duties and rights and has a clear understanding of its goals before initiating any project, in order to achieve a successful multi-stakeholder partnership. In addition, each organization must accept the responsibility of project ownership, so that the strengths of each can combine to create a synergistic effect.

Caused by inequality in access to information, the digital divide can result in social and economic disparity between and within nations, and can seriously threaten the economic structure of the information network. In an information society where knowledge and information equates to capital and competitiveness, the disparity in access to information can aggravate problems such as inequality in industrial society. The digital divide comprises various social and economic issues and cannot be resolved through the efforts of one organization alone. Through multi-stakeholder partnerships, various organizations can take the first steps towards resolving the economic and social problems brought on by the digital divide by cooperating, sharing information and working towards a common goal.


KADO and Intel are helping to educate teachers in ICT
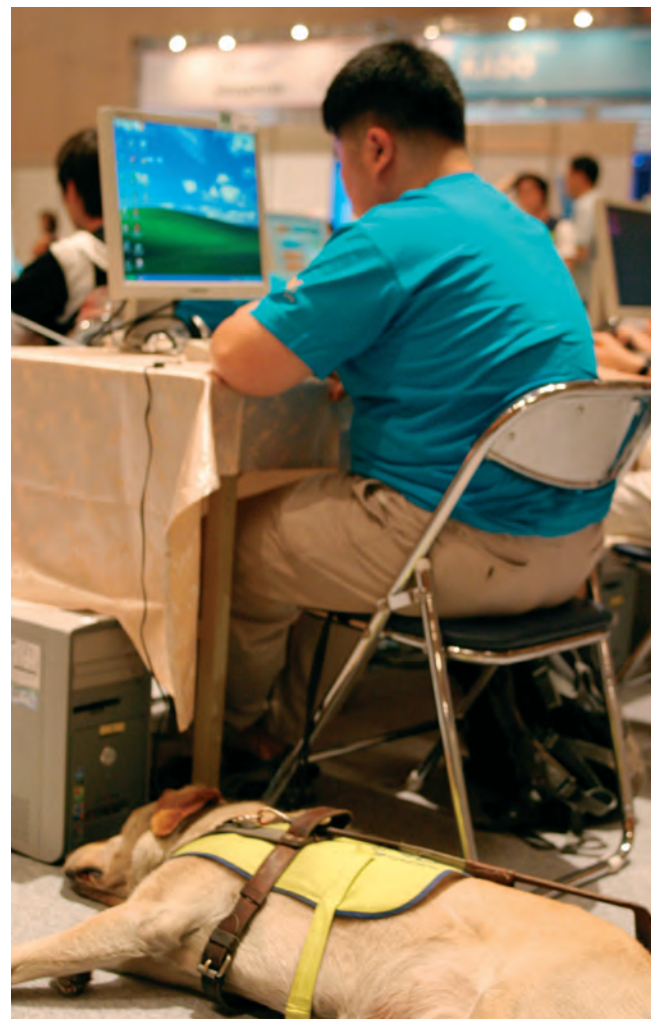

A visually impaired boy uses assistive technology to access ICT

# Building partnerships to educate the world: the UNU/GVU strategy

*Sven Åke Bjørke and Harald Holt, Arendal, Norway*

GLOBALIZATION IMPACTS MANY aspects of our lives: our economy, our workplaces, how we produce and consume, how we interact and communicate, and how we develop and deliver education are some examples. The main driving forces behind globalization are increasingly open global markets and rapid technological developments. Information and communication technology (ICT) have facilitated communication around the globe, and made possible instantaneous contact between persons, organizations and businesses situated on different continents for a reasonable price.

The number of people with access to the Internet in the world approaches a total of 80 per 1 000, with as many as 400 per 1 000 in high-income countries; but only 1.8 persons per 1 000 in the least developed countries.[1] This elite group has the opportunity of synergetic collaboration; has access to goods, services and updated information in all areas, and can work more or less independently of governments and national laws. Those who do not have access are inevitably excluded.

The dividing line goes between the industrialized countries and developing countries. Rapid population growth and lack of qual-



Together in a face-to-face-session, but working with different groups in a virtual classroom. Deep concentration is necessary when learning to function in this new setting

Photo: Åke Bjørke

ified teachers in developing countries make the need for education ever more urgent. Sub-Saharan Africa is the worst off with poor infrastructure, lack of expertise, poor bandwidth capacity if any, excessive Internet connection costs and a rapidly growing population combined with dwindling resources for education.[2] The digital divide is real, and accelerating. Leaders in developing countries are aware and are concerned: "The overwhelming majority of developing countries, despite difficulties, problems and fears, seek as far as possible to take part in the formation of the global educational community."[3]

Unless the international community commits itself to change this development, the poor countries of the world will be left behind. There is an increasingly urgent need for measures that includes, not excludes, and for a gradual closing of the digital divide instead of accelerating it.

The Global Virtual University (GVU) under the auspices of the United Nations University (UNU) is an international consortium of universities offering study programmes and courses intended to be 'global', where students from different continents learn collaboratively and online, with a UN perspective on the learning content.

## E-learning for a sustainable future

The vision of GVU is to contribute to a sustainable future with a focus on developing countries making use of the latest e-learning pedagogy and technology.

The mission is to increase people's sensitivity to, and involvement in, finding solutions for environment and development issues. This shall be accomplished by mobilizing a network of universities in developed and developing countries to participate in creating online educational programmes in global environmental and development studies and to provide support to these universities.

The global markets, where multinational corporations dominate, tend to expose increasing numbers of people to a westernized consumer lifestyle. Multinational corporations also compete for scarce natural resources. In this situation, good governance is a key for achieving a more sustainable development. Increasing awareness, changing attitudes and above all appropriate knowledge and skills are decisive factors.

The eight Millennium Development Goals (MDGs) — which range from halving extreme poverty to halting the spread of HIV/AIDS and providing universal primary education by the target date of 2015 — form a blueprint agreed to by all the world's countries and the world's leading development institutions.

United Nations Secretary-General Kofi Annan has commented: "We will have time to reach the Millennium Development Goals

— worldwide and in most, or even all, individual countries — but only if we break with business as usual.

"We cannot win overnight. Success will require sustained action across the entire decade between now and the deadline. It takes time to train the teachers, nurses and engineers; to build the roads, schools and hospitals; to grow the small and large businesses able to create the jobs and income needed. So we must start now. And we must more than double global development assistance over the next few years. Nothing less will help to achieve the goals."

To achieve universal education for all children, it is imperative to educate enough teachers and train them according to real needs. This is a formidable task, especially when bearing in mind that many teachers in Sub-Saharan Africa have died from AIDS. Most teachers also need regular updating on their subjects as well as in new pedagogical approaches to effective learning.

There is an increasing demand to acquire not only subject-specific skills but also generic communication skills, ICT skills and collaborative skills. To meet "the needs of mass education cost-effectively, provide learning experiences of percieved quality for a disparate student group, develop generic skills as well as subject-specific knowledge and foster a culture of life-long learning" there are basically two major strategies.[4] The first is to increase access to education. This can be done by making education offers more flexible and open, modularize it and increasingly offer it as distance online learning. Developing efficient ICT infrastructure with satellite communication and broadband capacity in urban as well as rural areas in developing countries is crucial to increase access to cost-effective mass education. The second strategy is to help students take more responsibility for their own learning. Students must learn to be more self-reliant and self-directed. Learning how to learn is the main concern for independent learners.

A third strategy is cooperation between educational institutions in sharing educational material and other educational resources. An increasing number of educational institutions now cooperate



Photo: Åke Bjørke

Judith Irene Nagasha from Uganda and Kristin Hvideberg Tobiassen from Norway collaborating on problem-solving together with the rest of their group in the virtual classroom

in joint study programmes, student and staff exchange and on the pedagogiocal use of ICT. The EU has worked intensely on developing a system for making mutual accreditation easier and course development and implementation more transparent and standardised through their European Credit Transfer and Accumulation System (ECTS). Several African educational institutions have adopted the system in order to harmonise their education systems to global demands. This development paves the way for networks of international collaborating educational networks, such as the GVU.

**Strategy for the information age: individual education for many**

To meet the challenges of the dynamic knowledge society of the 21st century, we must understand how people learn and how ICT can assist in the learning process. In the last 200 years our society has been transformed from a relatively static one to a society where the only constant is change. The knowledge base in some areas is said to double every 16 months. There is an abundance of perspectives on everything, even on basic science.

The globalized world asks for creative, critical thinkers with collaborative skills, the ability to communicate cross-culturally, using ICT and with an intrinsic motivation for dynamic, lifelong learning. The future graduate will be characterized as having:

- The ability to convert theory into practice
- The ability to define her/his own problems
- The skill to collaborate cross-culturally
- The skill to systematically seek solutions to new problems
- The skill of efficient dialogue and communication
- The ability to efficiently search for, find, assess and use relevant and reliable information
- The ability to manage his/her own time efficiently
- The dynamic attitude of a learner with systematic reflections on own learning.

To achieve this, the students of tomorrow must be given opportunities to study in collaboration with others. To keep costs down, he or she should be able to combine studies with a job. The studies must be flexible enough to accomodate the individual needs of the student and his or her employer as well. This cannot be achieved in a mass scale without using the appropriate technology.

When choosing among electronic media, the choice should be based on the technology that most efficiently facilitates 'deeper learning' which makes learning more effective, i.e. the students gain deeper insight and understanding in less time. What is more, the learning process should be pleasurable, thereby motivating the student to go for more and becoming a lifelong learner.

Joint development of courses and study programmes between the south and the north must be part of the solution. Network partners in the south must feel ownership and that they are equal partners, contributing subject content in course development. Preparing courses in the US or Europe and imposing these on students in Africa for example, will only enhance the perception of globalization and development as a continuation of colonial relations. In contrast, joint development and delivery to a global audience of students, perceiving courses from Africa and Europe as being of equal value because of agreed harmonization and standardisation procedures, will enhance the global cooperation. International, easy-to-follow quality assurance systems will make mutual recognition of competence possible.

The present situation with regard to connectivity is often characterized by a situation where in some cases an entire African

university with tens of thousands of students may only have Internet capacity similar to a small business or even a private person in the industrialized world. Allowing this situation to continue could have severe consequences with respect to access to information, inter-university collaboration between universities, distance learning and the web presence of African institutions of higher education. Many developing countries do not have the economy, infrastructure and expertise to take part in globalization, except maybe in pockets in the bigger cities, accessible to small elites with the money and skills necessary to use ICT.

Several indicators have been developed to objectively measure the digital divide. These display clearly that the digital divide is very real and substantial. African countries remain clustered towards the bottom of the distribution, so that the overall contribution of Sub-Saharan Africa is to maintain the status quo, with no major contributions to reducing inequality.[5]

While appreciating that the situation in developing countries is complicated by factors such as economy, technology, competency and slow liberalization of the telecommunication markets (resulting in high prices, low investment in future oriented solutions, a difficult climate for international cooperation etc.), it is assumed that a policy of positively promoting African academic development would result in high returns for the region and the rest of the world.

Building on the successful design and operation of university networks in industrialized countries over the last decades, it is assumed that the task of creating an African University Network (AFUNET) is achievable. These university networks established three decades ago still play an important role as network and service providers in developed parts of the world.

The idea of an African University Network was presented at the World Summit on the Information Society (WSIS) in Geneva 2003, UNU consulted with ITU and other institutions to seek advice. Informal talks were held with institutions such as AVU (African Virtual University), Oracle, Uninett and a number of



One of the skills to learn and practice according to GVU course objectives is cross-cultural communication. All students are divided in groups with students from at least four countries, collaborating in virtual classrooms

satellite service providers. Later on the idea was discussed with representatives of the Norwegian and Japanese governments. The conclusion from these consultations was that the idea should be developed into a more concrete concept. A step-by-step approach will need to be laid so that by 2015, all African universities will have good connectivity. Lessons drawn from the successful implementation of this initiative could be applied to other parts of the world (particularly for Central and South America and in the Asia Pacific Broadband Programme).

AFUNET is therefore a joint initiative of ITU and UNU addressing the digital divide issues. AFUNET is a practical response to the WSIS Plan of Action. It is designed to enhance the capabilities of African universities to take advantage of opportunities associated with the emergence of the global Information Society. Investment in African universities today would constitute a critical building pillar in the development of an African knowledge economy whose dividends will be knowledgeable young leaders and professionals equipped to confront and tackle challenges facing Africa today and in the future.

The global objective of this project is to explore and implement various measures to provide network connectivity and extend affordable and easy ICT access and services to African universities starting with a few countries and gradually extending to cover the whole continent.

The GVU study programme will take advantages of ICT and e-learning in order to reach out globally at a reasonable cost. The value creation of e-learning shows a very positive relationship to volumes. Economies of scale apply to this kind of activity. Students at GVU will benefit from the cost efficiency of online learning and at the same time be able to participate in an international study program from their home location.

**Support to students from developing countries**
The need for funding varies with the situation of the students. Some of the students will come under national systems, and thus be eligible for full or partial funding. This is the case for Norwegian students enrolled at a Norwegian university. In other cases the situation may be more difficult. As a consequence there is a need for a bursary system in order to accommodate students in poor regions of the world.

The GVU offers a masters degree programme in environmental and developmental studies called Global Environment and Development Studies (GEDS), which currently includes two areas of specialization: Development Management and Environmental Information Management. These two-year programmes are designed to provide students with knowledge in dealing with the complexity and interdependence of environment, development activities and decision-making processes.

The GEDS students will as a rule have educational backgrounds from anthropology, development studies, socioeconomics and geography at bachelor's level and come from various continents, with a present focus on Africa. Most of the students will have some work experience. The students are of both sexes with an age range between 22 and 40 and use English as their second or third language.

The GVU offers courses in addition to the GEDS. All credit-giving courses must have one academically responsible institution giving credits. Study programmes and separate courses given through the GVU system must have a common quality assurance and control system. The quality issues, challenges and assurance systems described below therefore apply to all GVU related study programmes and courses.

Micheal Tsegay Assefa from Ethiopia and Karianne Hansen Heien from Norway share a physical desk at the face-to-face session, but may work in different groups in the virtual classroom

Students entering the GEDS should have at least a bachelor's degree in a social science discipline, with at least an 80 ECTS concentration in a relevant major area. Relevant fields of specialisation are business and public administration, other areas of management or development studies, geography and other fields of social science, such as political science, sociology or anthropology. In addition, applicants need to have a strong oral and written command of the English language. They must be familiar with the use of PCs and Internet communication. Students who do not have the necessary experience with ICT tools and who are otherwise qualified may take a preparatory course in the use of computers. Preferably students should have relevant work experience, for example, within administration, management, teaching, research or relevant project work. Students from developing countries have priority.

The tutor's role is essential. While subject professors have planned the course modules and study guides in detail, and to some extent will be available for subject-relevant questions and giving guidance to tutors, the tutors will implement the course in the virtual classroom, unless the professor wants to take a lead in the virtual classroom him or herself. Student retention will largely depend on the tutor's ability to give sufficient support throughout the study period. Tutors will provide essential parts of the 'scaffolding', helping students to interact well with peers, define the course, explain and sort out misunderstandings, guide and moderate the discussions, assess and give feedback to hand-ins. The tutor will help develop online learning skills, assist in study progress and pacing and, when relevant, enrich the discussions with new perspectives.

Quality standards are crucial for a network of partner institutions. The partners must be confident that for example, a ten credits course is recognized as such by all partners. They must also know that students are assessed according to the same criteria, and that students are given appropriate student support regardless of where in the network they take the course. Without such confidence, the network cooperation may fail.

Quality factors of particular interest when developing courses and study programmes are meaningful learning situations, contextualised learning, student interactivity, reflection on learning, feedback and evaluation, dynamic updating of course material, authentic learning material, appropriate support, appropriate pacing and workload and efficient online tutoring.

Tutors and students will tend to focus more on good study guides; relevant content; smooth, user-friendly technology; appropriate workload; formative evaluations that can benefit the current learners; fair and consistent assessments and good choice of pedagogy for the online learning environment.

The partnership network will look closely at benefits, duties and costs; course efficiency for example through the number of graduates; standards for course development; standards for assessment; training of tutors; the possibility of course and learning object exchange and accreditation. Of considerable interest to at least some partners is mutual recognition of competence when making joint programmes. With a functioning UNU/GVU quality enhancement committee advising course development teams when writing study programmes and individual courses, obtaining international recognition of competence as well will be easier.

The UN organizations involved will be more interested in the possible impacts on capacity and competence building that is urgently needed in the developing world, with reference to for example, the Millennium Development Goals, such as universal education; ensuring environmental sustainability and developing a global partnership for development.

# Connected development:
# volunteers contribute time and skills online

*United Nations Volunteers*

UNDERLYING ALL THE activities of the United Nations Volunteers (UNV) programme is the commitment to support global efforts to attain the Millennium Development Goals (MDGs) through the promotion of volunteerism, including the mobilization of volunteers. As part of this endeavour, UNV continually challenges itself to create innovative ways to enable more people to engage in this global campaign to end extreme poverty by 2015. One such channel is the Online Volunteering (OV) service, which was launched by UNV in 2000.

By combining the 'anywhere, anytime' connectivity of the Internet with people who want to volunteer for development, the OV service has proved to be an invaluable resource for hundreds of organizations working to improve the living conditions of some of the world's most destitute people.

Now, after five years in operation, the OV service has to date engaged thousands of people who have completed 10 000 assignments for more than 700 non-governmental and civil society organizations. Of these, approximately 55 per cent are based in the developing world, as are 45 per cent of the online volunteers. And for many of the participating organizations, online volunteers present a tremendous and much-needed resource by helping organizations to stretch on-site resources even further, serve more people, and build upon their skills base.

Online volunteers also benefit from this exchange. It is a perfect channel for people who want to volunteer but cannot take time off work or be away from their home country.

Not only do they learn about other cultures and countries, they also gain knowledge about the many intricate issues faced by those living in other parts of the world.

While online volunteers participate in many diverse activities, some examples of their contributions include providing online tutorials in various academic and technical areas, offering professional expertise and advice, researching topics and gathering related data, building databases, editing and preparing press releases and proposals, creating websites, designing brochures and newsletters, managing other online volunteers, and translating documents.

### Diversity of experiences

Yasemin Gunay of Turkey helped research information that led to Nigeria's Mgbala Agwa Youth Forum being able to expand its library on HIV and AIDS by more than 1 150 publications. The library that was originally built to serve a local community is now gaining more regional importance because of its scope and diversity of resources. Ms Gunay said: "Being an online volunteer has made me feel really special because I feel that my efforts are helping many people whom I have never even met. I have also learned that one can achieve anything if he or she truly believes in it."

Kelly (Xiaodong) Zeng of China, now residing in the United States, volunteered online with the Business Information Centre Straldja, a Non-Governmental Organization (NGO) to support unemployed Bulgarian artisans. Using skills learned at business school, Ms. Zeng engaged in online activities to market the organization's website, which sells Bulgarian crafts, more effectively. In particular, she designed an e-mail campaign targeting online craft discussion groups.

A week later, members of two of these online discussion groups had donated USD7 000 — enough to fund the women's weaving and sewing cooperative project of the organization.

Ms Zeng said: "I have a few words to those people who consider online volunteering. Search your soul and find out why you want to apply for that assignment. Think very hard about how your skill set will contribute to the organization, but equally important, what skills you will be able to develop. Be flexible and open-minded. She added that even if some assignments may sometimes sound mundane, they are the "building pieces of big plans. Once we put everything together, you will see how much we can accomplish as a team."



A computer and Internet access enable online volunteers to support development initiatives from just about anywhere

Photo: UNV/Jean-Baptiste Avril

Azhar Qureshi of the Eco-Conservation Initiatives (ECI) scheme based in Pakistan, noted that volunteers "are always ready and responsive. They have the real spirit and dedication it takes to support others. It's very exciting to make friends and create partnerships with people who live all over the world."

Online volunteering has an enormous potential to maximize the engagement of on-site volunteers and NGOs in specific interventions such as providing support to HIV and AIDS initiatives.

A Tanzania-based NGO focusing on youth, the Tanzania Media and Youth Development Association (TAMEYODA), used the OV service to help the NGO with one of its HIV and AIDS prevention projects. These online volunteers, many with HIV and AIDS prevention advocacy experience, advised the NGO on how to conduct youth seminars and debates, researched and provided international institutional contacts, edited booklets on HIV and AIDS, and provided links to online information from other organizations that could benefit the NGO and those it serves. Kaanaeli Kaale of TAMEYODA said: "Through the OV service, I think the UN will achieve the goals to empower people, especially those who live in extreme poverty around the world."

Online volunteers have also proved to be invaluable in times of crisis. Following the December 2004 tsunamis that ripped through the Indian Ocean region, online volunteers answered one NGO's call for support in researching and contacting companies wanting to donate goods. At one point, the Internet-based NGO Global Hand had more than 60 online volunteers assisting in getting lifesaving supplies to people in the affected countries. Global Hand's Mike Tozer said: "Within a few days of the tsunami disaster, online volunteers compiled and enhanced information resources [and] found out who was working where and whether they had any particular needs or offers of assistance mentioned on their website. The impact the online volunteers have had on our work has been phenomenal."

To recognize online volunteers' commitment, each year the OV service solicits nominations for its Online Volunteer of the Year award. In 2005, nine individual online volunteers and one team of four people received the award for their contributions to supporting the work of their host organization. In total, the award winners hailed from ten countries ranging from Madagascar to Pakistan.

One such organization is Shine A Light. Kurt Shaw, executive director of the NGO, said: "Without the support of online volunteers, Shine a Light would be infinitely less capable of supporting Latin American organizations that serve homeless and working children. This service has been invaluable for us, and we thank [OV] sincerely for providing the space in which small NGOs like Shine a Light can find the qualified volunteers we need."

In response to this year's winners, the UNV executive coordinator said the efforts of online volunteers serve as an example of the power of volunteering for development. Ad de Raad said: "This group of dedicated volunteers represents the very best of what ordinary citizens can do online to help overcome poverty, fight the spread of HIV and AIDS, and support the advancement of human development worldwide in general.

"The purpose of this award is not only to recognize their contributions to development, but to demonstrate to others what they can do to support international efforts to meet the MDGs. Online volunteering is a powerful way of making use of ICT to engage people in direct action, to unleash new resources, to get connected, and to foster a new global constituency for development."

*For more information on the Online Volunteering (OV) service, visit: http://www.onlinevolunteering.org*

*To learn more on UNV's activities, visit: http://www.unvolunteers.org, or send an email to: information@unvolunteers.org*



Since the start of the Online Volunteering (OV) service in 2000, online volunteers have completed more than 10 000 assignments for some 700 non-governmental and civil society organizations

# ICT and bridging the digital divide

*Dr Thomas Ganswindt, Member of the Corporate Executive Committee for Siemens AG and President and CEO of Siemens Communications*

THE RECENT LIVE 8 concert still echoes in the background of my thoughts, and it strikes me as odd that the idea of bridging the digital divide remains a controversial goal. Aside from the obvious moral imperative, even in the most pragmatic economic terms, helping to lift our fellow citizens out of abject poverty is a good policy. Some of the chief objections to bridging the digital divide are that only the corrupt local leadership profits, that the funds will be inevitably mismanaged and wasted, or that it simply makes no sense to give poor people cell phones, computers and broadband access. This last argument erroneously implies that if technology is introduced it will be at the expense of 'basic' needs like fresh water, food, healthcare and education. This is of course short-sighted and passively discriminatory. Even worse, this argument subverts the resolve and dignity that our less fortunate citizens consistently display in the face of almost unimaginable difficulty.

The expanse of the digital divide was recently outlined by Jose Maria Figueres Olsen, former Chairman of the United Nations (UN) ICT Task Force, in a recent speech to the UN General Assembly. One third of the world's population has never made a telephone call; 70 per cent of the world's poorest live in rural and remote areas where access to information and communication technologies (ICT), even to a telephone, is often scarce; and even when access is available, most of the information exchanged over global networks such as the Internet is in English, the language of less than 10 per cent of the world's population.

These are eye-opening statistics. So, just because it does not seem feasible or profitable at first glance to help feed, clothe and educate these people by offering them access to the information they need to improve themselves, are we not also dooming them to an interminable cycle of poverty? Are not adequate healthcare, literacy and access to information similarly 'basic' human needs, not luxuries? As the old axiom goes: "If you give a man a fish, he will eat for a day, if you give him a net, he will eat for a lifetime." And if you teach him to make a net, generations will no longer go hungry, but will indeed prosper.

This is not just wishful thinking. The fact is that even in the poorest regions of our world, healthcare and literacy are acknowledged as key aspects of raising living standards as well as being a vital part of any long-term poverty reduction strategy; this dynamic of health and literacy is long-established by the World Bank. It has also been proved that delivery of healthcare and literacy is dramatically improved with the development of local ICT.

So, bridging the digital divide means more than just poverty reduction. Its ultimate objective is 'prosperity creation,' i.e. to raise standards of living through the use of ICT, where generations of people will advance their lives and communities to the point where a hand-to-mouth existence is replaced by participation in the global market place as producers and consumers through the means of information and communication.

Nevertheless, it is important that aid be correctly administered, or the above arguments might indeed have validity. Aid must be directly injected into small clinics, schools, farms and local business in order to succeed. In this way the economic tide will rise from the bottom and lift even the smallest of boats. ICT is uniquely capable of providing just this kind of strategic support, as the following remarkable examples show.

## Healthcare in remotest Africa

Adequate healthcare is the first step to creating prosperity. Ciaran Ryan of the Centre for Digital Government offers a moving portrait of how ICT is already making a dramatic impact on the quality and availability of healthcare in the most remote parts of Africa for the most brittle of patients.

In Ryan's article, *Wireless is the Best Medicine*, a desperate mother arrives with her sick baby at a rural clinic in Tsilitwa in the Eastern Cape province of South Africa. The closest hospital or telephone is miles away. In an examination room, a nurse turns on a web cam that is positioned to take clear pictures of the tiny patient on the examination bed. Seconds later, an image of the baby is visible on the clinic's computer screen. The nurse picks up a wireless phone and calls the nearest doctor at the Sulenkama hospital, more than 50 miles away. The doctor views the same picture of the baby on his PC.

The 'tele-consultation' begins with simultaneous voice and video communication between the doctor and nurse. However, the doctor is still unsure about the diagnosis and asks the nurse to take a picture of the baby using the digital camera. She does so and e-mails a copy to the closest university hospital, which offers even more comprehensive diagnostic resources. The two doctors consult while the mother waits on tenterhooks. It is not long, however, before the video image along with information provided by the clinic nurse enables the two doctors to complete their diagnosis. They immediately convey a treatment recommendation to the nurse via wireless telephone.

This is an example of how an infant, who would likely have previously been doomed by a simple childhood malady, has instead survived by having access to the best medical care available, delivered to the remotest part of Africa via ICT.

## Egypt: vision for e-Learning

Siemens has been an important partner with Egypt for more than 100 years. And just as we have helped this historic and culturally rich nation develop its infrastructure, we have participated in its vision of social progress.

Education is the basis of future welfare in all countries

Most recently, the Ministry of Education unveiled its vision of enhancing the educational process using e-Learning. This was an area where we could again lend considerable expertise. The goal of the project was to foster a classroom environment of educational interaction via a so-called 'virtual classroom solution.' This would offer students self-paced learning materials and help the ministry to generate and distribute a uniform curriculum that also recognized students' specific educational needs.

Young students were able to join virtual online classroom sessions, share information and work on documents together in a live and interactive environment. Led by an experienced teacher, the sessions would typically involve up to 200 students who would gather around a number of PCs from approximately 10 schools located anywhere in Egypt, with the ability to connect to the virtual classroom session. Today, sessions reach more than 450 schools participating in more than 50 daily live sessions. There are more than 90 e-Learning courses now available in the ministry's Content Repository for all K-12 subjects. The self-paced courses were developed by the ministry's 65 content developers, who were trained in instructional design by Siemens content professionals.

Siemens' solution provided students with the ability to study any time, anywhere, via Internet and intranet technologies; this configuration also offers students, teachers, school administrators and parents, as well as the Ministry of Education, the ability to track all student activities including registration, fees, class schedules and equipment.

Siemens provided e-Learning software, professional services, training for the system administrators and content developers, and the communications infrastructure of the project for both the LAN (Local Area Network) and WAN (Wide Area Network).

**ICT supporting education in Anatolia**
Children make up 27 million of Turkey's population of 65 million. So the education and, in turn, the future success of this country

both as a candidate for membership in the European Union and as a gateway to the Middle East is especially important.

At high schools in 12 provinces of Southeast Anatolia, World Bank loans provided the financing to equip computer laboratories. But due to a lack of educational software, the computer learning programme never got off the ground. Siemens took up the cause by equipping the computer labs with our Akademedia e-Education software packages.

The facilities now offer intensive computer and general educational training to a huge number of students each year — more than a thousand students took part in the first year. This enables an equal opportunity for high school students in this less affluent region of Turkey to fully prepare for the national university entrance exam — without which higher education would be out of reach.

The students in the programme were monitored and examined by B_TAV (the Scientific and Technical Research Foundation). Prior to an intense three-month period of use of the educational software, students were found to perform at an average of 35 per cent on a standard test. After using Akademedia for three months, the students' achievement was found to have risen to 60 per cent. Moreover, out of this 600 of the total 1018 students that attempted the university entrance exam, 60 per cent were able to find placement in a university, where 20 per cent placement is the general average for this region.

Following the success of this project, there was a huge demand for Akademedia software from all parts of Turkey. Siemens quickly provided an additional 5,000 Akademedia software packages to the National Education Foundation.

**India: making great strides**
India, once a region of great concern, is now a shining example of how ICT can revolutionize an economy, a culture and of course lift a country from poverty to prosperity, and how bridging this digital divide translates into new market opportunities. India is
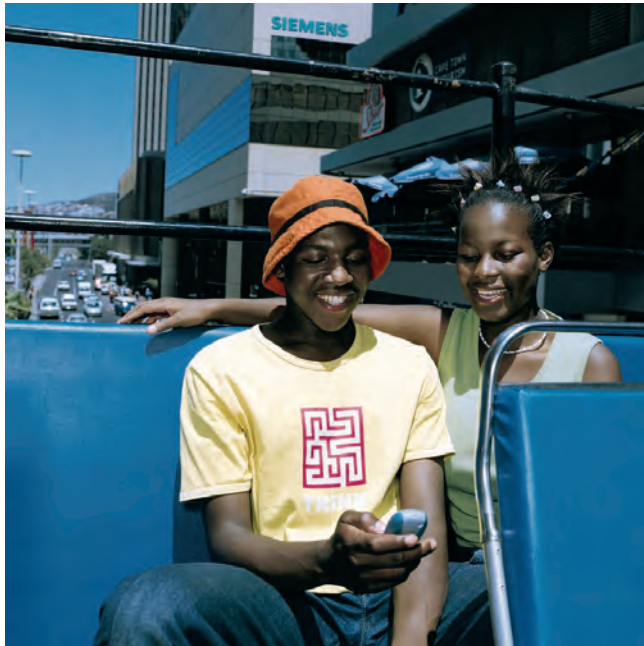
Communication is a basic need of people around the world


e-Learning opens new horizons for girls to be a part of social developments

of course now a major hub for the outsourcing of ICT software and services as well as providing a variety of professional services. It is a best practice showcase for developing countries.

India has in place a three-prong strategy for ICT improvement designed to complete the nation's transition from third world to first world market leader. The plan comprises:

1. A national e-Government designed to streamline the Government's role in core infrastructure projects and policies and the implementation of integrated national, state and service levels, thus fostering a citizen-centric and business-centric environment for governance

2. Understanding the role of health factors in bridging the digital divide, India has implemented a national telemedicine initiative. Indeed, telemedicine has a special importance in a country where 75 per cent of its one billion inhabitants live in rural areas away from the majority of healthcare facilities which reside in the major cities. The Indian telemedicine initiative includes pilot telemedicine networks and standardization activities. A large number of telemedicine nodes have already been set up across the country in more than 200 specialist and peripheral hospitals in India

3. By the same token, the value of education is being reinforced with India's national e-Learning initiative. This programme features an e-Learning methodology and approach integrated with the country's conventional classroom system. This serves to optimize the traditional education system already in place as well as extending its reach to more and more students and adding ICT-related subjects to conventional subjects in the school curriculum. The National e-Learning Plan focuses on technology, tools, standards and content.

Vidya Vahini is the name of a national project to provide Internet access to nearly one million schools in the country. This special ICT project, being undertaken by the Education and Research Network Ministry, is designed to provide for the "equitable dissemination of education through Internet communication superhighways and for many students to help bridge the digital divide and meet their aspirations."

**GSM narrows the gap in Brazil**

It was the technology itself that provided an answer to the cost question regarding an advanced communications system in a society that is economically segregated. When the Brazilian carrier, Telemar Group, decided it was time to bridge the digital divide in its country and connect all of Brazil with the mobile world, it quickly became clear that Global System for Mobile Communications (GSM) technology was the answer.

Through technical and financial collaboration between Siemens and Telemar, the operator was able to commission its own GSM mobile network, the first in the country. GSM technology offered Telemar the means to merge service quality with a price that suited the unique social challenges of this market, yet still to do so at a profit. Indeed, GSM's unique economies of scale and revenue generation features offered Telemar cost advantages without which the project would not have been possible. Today, Brazil has approximately 54 million mobile subscribers, 61 per cent of whom had no previous telephone service, neither a fixed line phone nor a mobile service. Boosted by migration to GSM, Brazil is forecast to have 100 million subscribers across all social demographics by the year 2008. Currently, the company is responsible for providing mobile networks for 450 cities.

**Responsibilities in a global village**

These are turbulent times both in terms of global economics and political conflict, during which the natural reaction of most businesses is to become more conservative. In fact the opposite should be true to solve the problems we all face as world citizens. Our role in prosperity creation around the world in these times is more meaningful and valuable than ever as architects of the ICT infrastructure that has so dramatically changed the world. Indeed our corporate identity is inextricably linked to our responsibility as a citizen in what is rapidly becoming one global village. And as the Dalai Lama once said: "Responsibility does not only lie with the leaders of our countries or with those who have been appointed or elected to do a particular job. It lies with each of us individually." I believe that ICT lends each individual the power to change the world.

# The end of poverty — the ITU[1] and the Navajo nation

*David Stephens, Chief Executive Officer, OnSat*

EIGHTY-FIVE YEARS ago, in the midst of the Great Depression, British economist John Maynard Keynes also envisioned the end of poverty in Great Britain and other industrial countries towards the end of the 20th century, and that Keynes, too, was acutely aware of the role of technology in underpinning continued growth.[2]

This same logic can be applied to ending extreme poverty for the two billion people who still earn less than USD2 per day. The United Nations Millennium Project has identified three things that can bring the world's poor to the first rung of the economic ladder: information, communications and technology (ICT). The Navajo nation is using ICT to deliver distance education, economic opportunities, distance healthcare, e-Government and security to its remote communities. For the past five years, the International Telecommunication Union (ITU) has been holding planning and discussion meetings across the world to find out how best to use ICT to end poverty.

**The Navajo nation**

While the UN and ITU have been working on pilot development projects, the Navajo nation has been implementing its own nationwide ICT plan, involving the entire 27 000 square mile nation. The goal is to make ICT available to all Navajo people, not just the ones that are near a phone line and have a power supply.

The Navajo nation has successfully developed connectivity among all local governments (Chapter Houses) and communities, integrating an ICT system for equitable and self-sustainable development, oriented towards special applications including the improvement of distance education and e-learning, health services, telemedicine, creation of economic opportunities, e-Government, e-governance, security and safety ICT systems.

The Navajo Nations works within the framework of the Istanbul Action Plan (ISAP), a special ITU initiative to assist indigenous people.

The Navajo nation has combined the implementation of ICT with maintaining its values, language and sovereignty. "We were able to provide this connectivity without harming our mother earth," said President Joe Shirley "We did not dig any ditches, nor did we bury a foot of cable. Nothing was done to destroy our sacred land to achieve the goal of bringing information, education, health, government and opportunity to our people."



Each Chapter has a number of public access computers that also have high speed, broadband Internet via OnSat satellite services

When the Navajo nation began its satellite and wireless technology project a few years ago, 22 per cent of its people had telephones, 15 per cent had computers, and 10 per cent had Internet access. Unemployment was around 50 per cent. Now, satellite and wireless communications connect all the Navajo nation's community centres, other facilities and many homes.

Community centres, called Chapters, give the Navajo nation free access to computers and the Internet for distance learning and communication. Many Navajo nation people are developing new e-commerce opportunities that are in turn creating jobs.

One of the most important developments is that of a two-way communication stream between the people of the Navajo nation and their government. This was achieved despite the fact that some Navajo nation sites are so remote that solar power had to be used.

The Navajo Nation ICT Community Development objectives are:
• Provide a stable telecommunications environment
• Increase the visibility of technology projects in the community and stimulate participation by community members
• Catalyze increasing technology-related activities throughout the Navajo nation
• Provide Chapter staff with the skills and knowledge to make the transition to self-governance
• Provide training in technology-related fields for regional technology professionals
• Establish regional support centres to provide training for Chapter staff and community members in surrounding Chapters
• Form a group of community information gatherers to create a database of community resources and statistics
• Develop and offer leadership and management skills training opportunities for Chapter staff in finance, property management, personnel management, government development, and land use planning
• Retain the skilled workforce on the Navajo nation and spur the emergence of a viable technology job market
• Provide an online business site for local entrepreneurs to market their products
• Promote self-sustainability of technology projects.

In order to meet these goals, the Navajo nation Division of Community Development (DCD) understood that it must first establish a single, connected network providing stable Internet delivery services for the Chapters. If some Chapters were connected and others left out, then the digital divide would only widen in the Navajo nation.

The DCD, with the Bill and Melinda Gates Foundation (BMGF), initiated the technology plan by installing at least two computers at each Chapter and establishing seven regional training labs across the Navajo nation. Computers and labs are networked locally and connected to the Internet by the OnSat Native American Service's two-way broadband satellite network. Training was provided by both the DCD and BMGF, to establish or enhance basic technology skills for chapter employees relating to application usage, Internet browsing and searching, e-mail usage, and website maintenance.

In order to increase visibility and participation, the DCD established websites for all 110 Navajo nation Chapters, incorporating e-commerce functionality so community members can buy and sell products and services over the Internet.

## Navajo nation Head Start

The DCD also entered into a partnership with the Navajo Nation Department of Head Start[3] (NNDOHS), allowing Head Start offices to tap into the OnSat satellite networking system using local loop wireless connectivity. In turn, Head Start installed wireless access points at each Chapter to provide a local wireless loop, enabling Head Start offices and other organizations to access the Internet via the Chapter/OnSat network. Communication possibilities now extend beyond local facilities to the entire Chapter region.

The NNDOHS is one of the largest Head Start organizations in the US today, with five agency offices. The central administration is located in the heart of Navajo land at Window Rock, Arizona. Currently, 4 013 children aged between three and five years are enrolled in 205 Head Start centres and Home Base programmes. Each year the birth-to-five-years population increases, and with it the need to increase the number of accredited, technically capable teachers and facilities providing Head Start and Early Head Start services.

NNDOHS is taking on several initiatives to improve services to children, families, and communities. The I Care Curriculum aims to involve parents in the classroom as volunteers as well as in the home; the Fatherhood Initiative aims to empower the role of fathers in families; STEPS Literacy is a curriculum designed to enhance language and literacy skills and improve teaching performance in the classroom; Positive Child Outcomes is a framework intended for Head Start programmes to design ongoing assessments throughout the child's enrollment in Head Start. The Head Start Family Information System (HSFIS) is a set of tools via the Chapter/OnSat satellite and wireless network, which aid the NNDOHS in monitoring and assessing the progress of each enrollee. The entire Dine' College Curriculum is undergoing revision to incorporate these initiatives.

NNDOHS is working with staff and parents in Early Childhood Development classes at Dine' College, University of New Mexico, San Juan College, Highlands University, Coconino Community College, Northern Arizona University, Fort Lewis College, and Northland Pioneer College. But staff and parents seeking to benefit from higher education programmes face the major issues of transport, financial aid and family support.

A collaborative process among the Navajo nation's schools system identified literacy as the most vital area in need of improvement. The Department of Head Start served 6 436 Head Start families, of which 515 were identified as needing education or literacy assistance. Fathers in the STEPS programme are being encouraged to read to their children regularly.

Professional development is also a critical need in many schools. Teachers have begun to create individualized, three-year professional development plans. The Department of Head Start's 2000-2001 Programme Information Report indicated a total of 167 teachers, 369 teaching assistants and 58 home-based teachers. But only 33 teaching staff had associate degrees in early childhood education, while 128 staff members had Child Development Associate (CDA) credentials, and many others are working towards a CDA or intend to do so. A high percentage of NNDOHS teachers' assistants are also young parents, and it is imperative to improve their qualifications without them having to leave their children in order to attend classes that are often over four hours' drive away.

## Next steps for Head Start

NNDOHS has dedicated its energies over the past two years to closing the digital divide, committing more than USD1 million to providing broadband connectivity and satellite technology to all Head Start sites. This would have cost over USD10 million had

they not been able to leverage the existing Navajo nation Chapter/OnSat network. NNDOHS is now ready to close the educational divide that has existed due to the low economic status and rural isolation of its population.

Head Start is seeking grants that will use the existing satellite and wireless infrastructure to prioritize several challenges:

- Most NNDOHS teachers are not fully accredited. Many are studying for degrees but are challenged by distance and financial problems, among others. More pre-service teachers need to become fully qualified
- All Head Start programme centres have computers and high-speed satellite Internet connections, but many teachers have had little or no training in using or teaching with technology
- Much student assessment is done via routinely filled out paperwork. Many teachers do not know how to use available software or interpret results
- Because of the remote locations, teachers need to be able to communicate through technology to form a supportive and collaborative community of learners
- With many programme houses situated miles from possible centres of learning, colleges, and each other, alternative professional development options are needed
- Turnover of teachers on the programme is high. A technology-based professional mentoring and support system would help retain those working in remote locations.

### Significance of the NNDOHS project

Excellent, credit-bearing, teacher-preparation Internet courses could become one of the most significant applications of networking and support systems in the Navajo nation. E-courses can be created and delivered to remote centres at any time. The tech-

nology capacity will offer new content and educational programmes to all pre-service teachers.

The success of the OnSat technology has potential impact far beyond the Head Start community. Schools will be able to expand course options for students and professional development opportunities for teachers.

The local government and other factions of the Navajo nation are pushing for Navajo language and customs to be taught in schools. By building courses and programmes that take into account the 'Navajo factor,' the Navajo nation promises to lead the way in supporting education while validating the importance of cultural heritage. The Navajo Head Start Organization plans to produce a daily, live video broadcast programme to be distributed worldwide over the Internet. The programme will be a Native American-style Sesame Street that will teach language, traditions and values alongside the standard curriculum.

### The Navajo Nation Web Warrior Programme

The Navajo creation story tells of the Navajo people being destroyed by monsters, and how two warriors used tools and weapons to defeat them. Today, a new set of monsters is hurting the people, among them poverty, lack of education, lack of hope, lack of jobs, drink, drug, and other health problems. Defeating these monsters calls for new tools and weapons, and for new warriors.

The Office of the President and Vice President is working with the Division of Community Development, the Division of Dine' Education, the Division of Public Safety and the Boys' and Girls' Club to create a joint programme that will help Navajo youth to become the new 'Web Warriors' by leveraging computers and Internet connectivity to help others learn these skills. They will help others to sell arts and crafts to the rest of the world, using
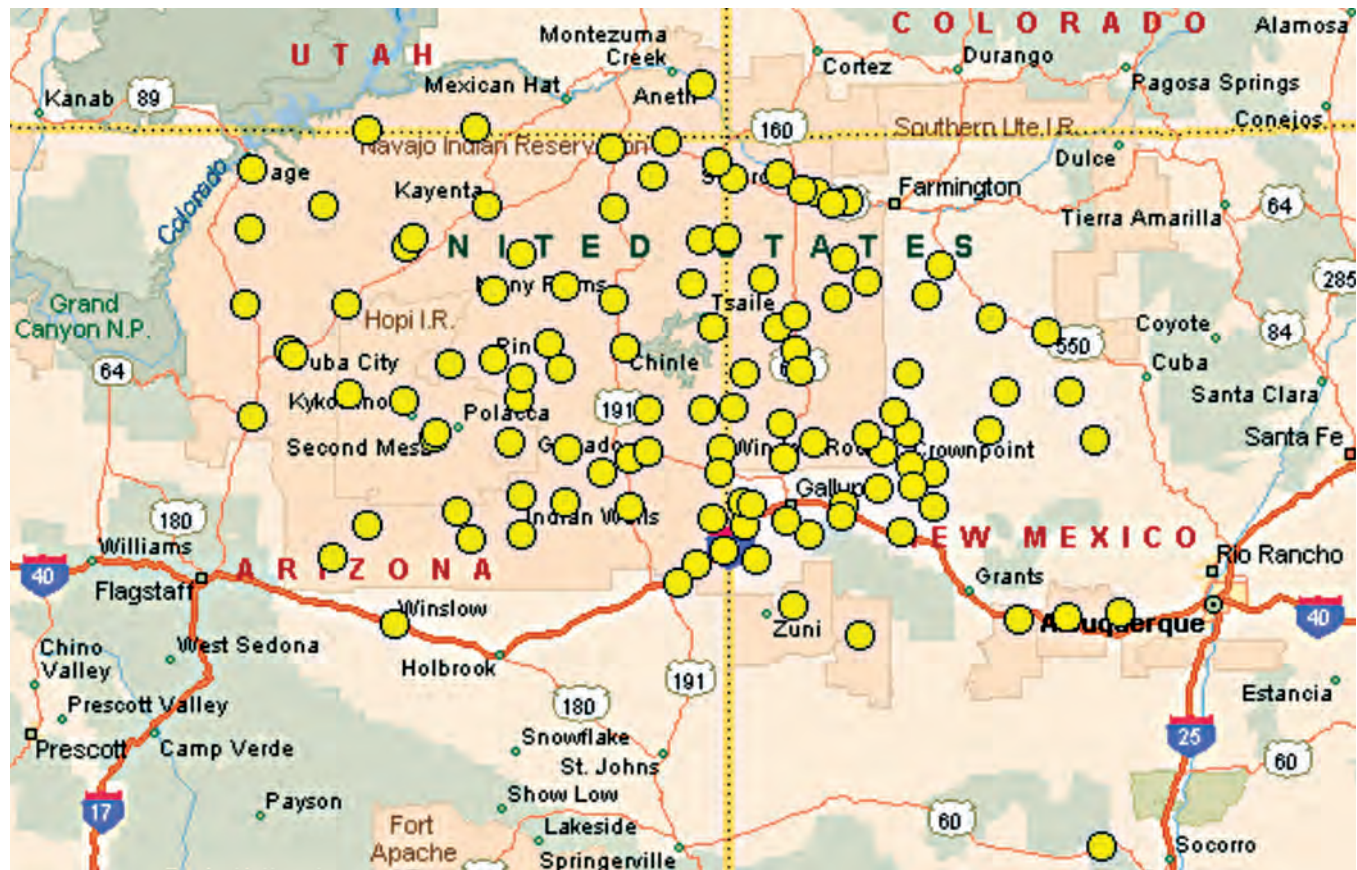


The Navajo nation

computers in their own Chapters. They will help the Navajo nation to obtain funding for scholarships and grants, and will themselves learn new skills that enable them to compete in a global market place without having to relocate.

Building on the Bill and Melinda Gates Native American Access to Technology Programme, and now the Navajo Nation Library Consortium, the Navajo nation is working to implement the Web Warriors programme at all 110 Chapters and the Window Rock Library, where Gates-granted computers and broadband satellite Internet are operational. The Web Warriors programme will hire two high school students to help others at the computer centres.

Web Warriors will maintain the Chapter websites and will help to input important community data for the DCD. They will also function as communications specialists in the event of an emergency. In order to remain a Web Warrior, students must adhere to a code of values and maintain good grades in school.

The Web Warriors programme aims to allow longer hours of public access, so local members can access distance learning courses over the Internet at the Chapter outside normal hours. An adult supervisor will be hired for the Chapter, who will take online training classes and help adults with Internet skills.

The DCD and the Division of Dine' Education, as part of a technology consortium, jointly applied for funding for continued telecommunications services for the Navajo nation library and Chapters as extensions of the library system, helping to ensure the continued Internet access at the Chapters.

## GIS and project management

The DCD is also implementing a project management and Geographic Information Systems (GIS) integration system to help provide better tracking and management of all construction projects and to migrate all project data into an electronic database with standardized fields so it can be integrated with geographic map data.

The interface is user-friendly, and software and data are structured to make the system extensible and able to be integrated with other projects. The Design and Engineering Services Department, Community Development Block Grant Programme, and the Capital Improvements Office are spearheading this project.

DCD Capital projects are mainly funded through allocations from the three States (New Mexico, Arizona and Utah), various Federal Government funding entities, and Navajo nation appropriations. Each of these sources has its own set of reporting requirements that includes the monitoring and accountability of allocated funds.

Today, Navajo communities are increasing their skills and benefiting from sound planning that includes the following:

- Teaching people to contribute to the community's decision-making processes
- Developing the Navajo nation Infrastructure Capital Improvement Plan, an important step toward rational, long-range capital planning
- Teaching the community to use the web-based database provided by the Navajo nation to create a planning document that can be printed for presentation to funding entities
- Developing data that can be forwarded to the Navajo nation and to the New Mexico State, Local Government Division for publication in the Infrastructure Capital Improvement Plan (ICIP) website
- Teaching communities to publish planning priorities on the Navajo nation ICIP website, adding credibility to a community's bond rating and funding opportunities.

## Public safety

The Navajo nation Division of Public Safety (DPS) is leveraging the Chapter/OnSat wireless and satellite system to provide the policy framework for successful utilization of technology to improve public safety. The system connects all users to a reliable, secure, private network that allows users secure connection to DPS data and information, regardless of location.

Officers have wireless, video-capable and upgradeable ruggedized laptops, and can take advantage of video conferencing and distance education programmes. Users' technology skill levels and academic achievement will be assessed on an ongoing basis. Staff will have lifelong learning opportunities and the scheme will build on the established base of DPS access connectivity to local, state, regional, national and worldwide resources. A comprehensive technology disaster recovery plan will also be developed.

## Overall ICT goals

This is just the beginning of leveraging ICT to bring self-sustainability to the people of the Navajo nation. The overall goals are:

- Maintain established, reliable, secure communications with all communities (not just the ones with a phone service)
- Educate Chapters on what technology is available and how to use it
- Build technical support within the local community
- Develop a community inventory including human and physical assets
- Implement the Local Governance Act which returns local control to the communities
- Open the Navajo nation to the world. Since trade and investment are the real engines of economic growth, the Navajo nation is working to open its society to commerce and investment while using technology to maintain its culture, language, values and sovereignty.

## Working with other communities

The Navajo nation is working with other communities to bridge the digital divide. The Observatory for Cultural and Audiovisual Communication (OCCAM) in Italy has agreed to establish an office at the Navajo nation in Window Rock, Arizona. OCCAM is an international non-governmental organization with a vision of utilizing culture and ICTs for development and to fight poverty with the support of the Infopoverty Network System. The agreement will help give voice to Navajo and indigenous issues on a global basis.

In October 2005, the Navajo nation will sign an historic agreement with the indigenous people of Brazil, the Indigenous Culture Nucleus (NCI) and GRUMIN/Indigenous Communications Network, aimed partly at promoting regional dialogue, exchange of experiences, adoption of best practices, community-driven sustainability, spirituality, sovereignty, respect for languages, values, traditions, habits, culture and the environment.

The agreement will address Millennium Development Goals by dedicating itself to ICT projects in Brazil, including sourcing financial funding and using models to achieve self-sustainability in the benefited communities. The projects will support education, health, technology transfer, electronic government, security, micro-credit, territorial management and access to international financing and cooperation for self-sustainable development.

With ITU, OCCAM, the Brazilian Government and other organizations, the Navajo nation will provide the same type of ICT services that it delivers to it own communities via satellite and wireless. While helping others to become sustainable, the Navajo nation will improve its own sustainability.

# V

## PERSPECTIVES

# The NEPAD e-Schools initiative

## The New Partnership for Africa's Development

"It is a firm belief of the Government of the Republic of South Africa that ICTs offer significant opportunities for the improvement of the quality of people's lives, particularly on the African continent, where South Africa's foreign policy is prioritised. The South African Government is a founder member of the e-Africa Commission, the ICT special task team of the New Partnership for Africa's Development (NEPAD). The NEPAD e-Africa Commission is hosted by the Council for Scientific and Industrial Research (CSIR) in South Africa, with additional major support for its core activities provided by the Swiss Development Agency.

I am pleased to present the following article focussing on one of the flagship programmes of the e-Africa Commission, the NEPAD e-Schools Initiative." **Lyndall Shope-Mafole, Director General, Department of Communications, South Africa**.

- Algeria
- Benin
- Cameroon
- Egypt
- Gabon
- Kenya
- Mali
- Mozambique
- Rwanda
- South Africa
- Angola
- Burkina Faso
- Republic of Congo
- Ethiopia
- Ghana
- Lesotho
- Mauritius
- Nigeria
- Senegal
- Uganda

IN MARCH 2003, the NEPAD Heads of State and Government Implementation Committee (HSGIC) adopted the NEPAD e-Schools Initiative. This priority continental undertaking is aimed at ensuring that African youth will graduate from African schools with skills that enable them to participate effectively in the global information society.

The NEPAD e-Schools Initiative is led by the e-Africa Commission, the special task team of NEPAD responsible for the structured development of the ICT sector on the African continent. Over a ten-year period the initiative will develop all African schools (estimated to be in excess of 600,000) into NEPAD e-Schools. These will be provided with necessary infrastructure and information and communication technologies (ICT), with appropriately trained teachers and access to appropriate applications and digital content, to ensure that ICT plays a meaningful role in enhancing education and health conditions on the African continent.

Specifically, the objectives of the NEPAD e-Schools Initiative are:
- To provide ICT skills and knowledge to primary and secondary school students that will enable them to function in the emerging information society and knowledge economy
- To make every learner health-literate
- To provide teachers with ICT skills to enable them to use ICT as tools to enhance teaching and learning
- To provide school managers with ICT skills so as to facilitate efficient management and administration in schools.

The NEPAD e-Schools Initiative will be implemented in three phases, with between 15 and 20 countries in each phase. The countries that constitute the phase one are:

Implementation of the NEPAD e-Schools Initiative is progressing apace, with all activities expected to converge in a large-scale rollout in 2007. There are several phases involved in the initiative:

*Development of the business plan* — After a rigorous process, the e-Africa Commission has selected Ernst and Young to develop a detailed business plan for implementation of the NEPAD e-Schools Initiative in the phase-one countries. The draft business plan will be compiled in consultation with the governments of participating countries, and will be completed by March 2006.

*Establishment of the satellite network* — Given the relatively poor state of connectivity on the African continent, a satellite network is being established to provide communications to all NEPAD e-Schools. Through a request for identification (RFI) process, detailed information has been received from around thirty global satellite service providers. This information has recently been analysed, and will be used to design the NEPAD e-Schools satellite network.

*Setup of national implementation agencies* — The approach adopted by the NEPAD e-Africa Commission for this initiative is one of 'Continental Coordination — National Implementation.' It is therefore necessary that each participating country formally establishes and capacitates the NEPAD e-Schools National Implementation Agency, which will be responsible for all operational aspects of implementation.

### NEPAD e-Schools Demonstration Project — a public-private partnership

The NEPAD e-Africa Commission has identified the NEPAD e-Schools Demonstration Project (Demo) as a critical initial step in the continental implementation of the NEPAD e-Schools Initiative.

The Demo will provide a continental learning mechanism, based on real-life experiences of implementing ICT in schools across the African continent that will serve to inform the rollout of the broader NEPAD e-Schools Initiative. To this end, the Demo

is establishing, monitoring and evaluating six NEPAD e-Schools each, in up to twenty African countries.

The NEPAD e-Africa Commission has put together an innovative public-private partnership to ensure the most effective and expedient implementation of the Demo:

*Country governments* — While coordination of the Demo takes place at a continental level, implementation is carried out at a national level. Each participating country has formally appointed a Country Liaison Person (CLP), who is responsible for facilitating all aspects of implementation at the selected schools. The CLPs are assisted by an interdepartmental National Implementation Team, and work closely with the principals of participating schools.

*Private Sector* — The following consortia led by HP, Microsoft, Oracle and Cisco, are each responsible for providing, deploying and operating an appropriate education and health ICT solution for approximately twenty schools at their own cost:

*Development Partners* — The partnership has been further strengthened by the support and contribution of a number of development partners including the Council of Scientific and Industrial Research in South Africa which is making available the skills and talent to undertake the continental management of this project. The Commonwealth of Learning and the World Bank InfoDev Programme are responsible for implementation of the monitoring and evaluation plan, and the International Telecommunication Union is supporting the teacher training programme as well as other aspects of management and coordination. The Medical Research Council is assisting with the development of 'Health Points' in NEPAD e-Schools.

This multi-stakeholder partnership and implementation approach, adopted for the NEPAD e-Schools Demo, is producing rapid results with full-scale implementation already underway in a number of countries. The partnership has also contributed in no small measure towards the NEPAD e-Schools Initiative winning the accolade of Visionary of the Year at the Intelligent Community Forum Awards Ceremony, which took place in New York in July 2005.

| Microsoft Consortium | HP Consortium | Oracle Consortium | Cisco Consortium |
|---|---|---|---|
| Cisco | Eskom | Multichoice | Microsoft |
| UNDP | Transtel | DHL | Intel |
| Learnthings | Edutouch | Sentech | HNR |
| Intel | Mindset | Mecer | Learnthings |
| Mustek | Sasani | Fujitsu - | Multichoice |
| Fujitsu - | Mergent - | Siemens | Worldspace |
| Siemens | Technologies | Intel | Computainer |
| Mindset | Multichoice | Computainer | Agile - |
| Multichoice | Edupac | Astra | Learning |
| Worldspace | Intel | Xerox | Learnscapes |
| Computainer | Canonical | Learnthings | Seven Seas |
| RDL | | Cambridge- | i-Linx |
| Lexmark | | Hitachi | Inveneo |
| MRC | | | |
| HNR | *Note: The e-Africa Commission has recently welcomed a fifth consortium for the NEPAD e-Schools Demo, led by AMD. | | |
| Text100 | | | |
| UTI | | | |
| Agile -Learning | | | |
| Omega-Smart | | | |
| Siemens BS | | | |





His Excellency, President Yoweri Museveni of the Republic of Uganda presides over the launch of the NEPAD e-Schools Demo at Bugulumbya Secondary School, in the Kamuli District.

# Towards an Algerian Information Society: operation OUSRATIC

*Operation OUSRATIC: one PC per household*

W ITHIN THE FRAMEWORK of the process of building the Algerian Information Society and of the recommendations of the e-Commission, chaired by the Chief of the Government and installed in Apri1 2004, the Minister of Post and Information and Communication Technologies announced operation OUSRATIC in July 2005. OUSRATIC plays on the terms 'ousra', meaning 'family' and 'TIC', an acronym for information and communication technologies (ICT). Together, they form the word 'ousratic', which translates to 'your family'. The stated aim of operation OUSRATIC is 'one PC per household'.

The e-Commission is mandated to draw up the report e-Algeria, including a set of sectoral projects and guidelines for the cyber-law framework. This operation is a response to the Declaration of Principles and the Plan of Action adopted by the Geneva phase of the World Summit on the Information Society (WSIS).

## One PC per household

In addition to the actions carried out towards State institutions and businesses, operation OUSRATIC will enable each family to have access to the Internet and its knowledge sources. This project will constitute the central component of the process of building the Algerian Information Society, since it is a question of providing each family with a micro-computer from the end of the year 2005 until the year 2010.

This computer will make it possible to each family to reach the Internet, the objective being to reach 40 per cent of Internet connectivity and of 20 per cent of PC penetration by 2010.

## The stakeholders and their roles

The public-private partnership (PPP) comprises many state-owned bodies and private companies. These include:

- PC suppliers that assemble the PCs in Algeria – at least 30,000 PCs per year from each
- Internet service providers that provide broadband access to the Internet
- Software publishing companies offering software licenses
- Manufacturers of processors
- Postal operators to transport and distribute flyers
- Banks, which grant loans without requiring initial cash contributions
- Insurance companies, which cover the risks incurred by the banks
- Communications companies, which ensure a widespread broadcast of television and radio advertising spots.



Poster of the official announcement for "OUSRATIC, one PC per household"



OUSRATIC, one PC per household, signing Ceremony, chaired by HE Boudjema HAICHOUR, Minister of Post and ICTs, July 18, 2005

It is important to note that the Algerian State does not have any financial contribution in this operation, which is covered exclusively by the PPP. The PC suppliers propose four configurations of PCs, two desktop versions and two portable versions. They offer a three-year guarantee for the desktop version and a two-year guarantee for the portable version.

The software publishers offer the guarantee of functionality for the operating and office software, and will update the software while it remains under guarantee. Processor manufacturers will also take care to maintain well-functioning processors during the period of guarantee. The postal and telecommunication operators convey the advertisement flyers free of charge.

The banks grant loans with very advantageous financial conditions, and these can be repaid over 12, 24 or 36 month periods. Applications for credit will wait no longer than eight days from the date of depositing the application for it to be processed. Once the request is accepted, the citizen can immediately take his or her PC. The insurance companies apply reduced insurance rates to banks concerned with this operation.

The stakeholders signed an Outline Agreement during a ceremony chaired by the Minister of Post and ICTs on 18 July 2005.

Operation OUSRATIC consists of putting on the market five million PCs between the end of 2005 and 2010, which makes a total of one million PCs per year. The new market created by this project will have a value of more than USD4 billion. Each family will be able to buy a PC thanks to the conditions put in place. Nine million schoolboys, high-school pupils and students will take part in shaping the success of this operation and the good use of PCs.

**Implementation of operation OUSRATIC**

Operation OUSRATIC will be launched in October 2005. All the provisions have been made for its success. A follow-up committee, comprising representatives of the families of the stakeholders, has been created and put in place. It will take care of the good implementation of the operation, from its launch until 2010. The committee is mandated to examine and approve the requests made by new stakeholders. It will modify, where necessary, the configurations of PCs in relation to technological progress. A report on the evolution of the operation will be produced each month, and actions will be taken according to the results obtained.

Operation OUSRATIC will be a catalyst for capacity building in the manufacture of ICT and content. Indeed, the telecommunication operators will have to offer access to the information infrastructures in terms of capacity and affordable cost. A major effort will be made to achieve the objectives of connectivity.

It is important to specify that the ICT sector profits from state aid, which amounts to around USD1 billion thanks to the five-year support plan for growth (2005-2009), which mobilized national resources of USD55 billion for the whole sector. In addition, more than USD3 billion in foreign direct investment has been accomplished in the ICT sector since 2001.

Several thousand jobs will be created thanks to operation OUSRATIC. Skills related to ICT will be developed, and the focus will be laid on the development of software and electronic applications in order to meet the needs of society.

The activity of the Sidi Abdallah Cyberparc (30 kilometres west of Algiers) in particular, with its incubator TECHNOBRIDGE, will reinforce the output of the ICT, the training of ICT-related skills, and research and development for software and applications. In addition, specialized higher education establishments will convey their knowledge in the development of open software and informatics applications.



OUSRATIC, one PC per household, poster containing the signatures of The Stakeholders, July 18, 2005

Public institutions such as libraries and museums are preparing right now make their stores of information available online for the 'linked' families of the future. It will be the same for institutions in the sectors of justice, health, urbanism and housing.

**Regional cooperation**

Operation OUSRATIC will enable Algeria to gain experience that it can then use to the benefit of developing countries, making possible a framework of cooperation between them. This cooperation will address the organization put in place as well as the manufacture and sale of sets of PCs with broadband (ADSL) Internet access.

In fact, the PC providers will reach their optimal production from the first year of implementation of this operation, and will have sufficient quantities available for export to countries that make an application under advantageous conditions.

Regional cooperation will offer a framework of experience-sharing and exchange of expert knowledge, thus supporting the economic development of the region's countries and easing the burden of 'brain-drain,' from which Algeria and many other developing countries currently suffer.

# How Belgium is computerizing state and society

*Peter Vanvelthoven, Minister of Employment for e-Government, Belgium*

THE BELGIAN FEDERAL Government's computerization policy consists of two pillars: classic e-government and the computerization of society. Both are closely linked: developing e-government applications that allow for faster, more efficient and simpler services is only relevant if enough people can make use of them via their computers and through the Internet.

Belgium defines e-government as creating a more customer-friendly public service by thoroughly and intelligently computerizing the state. A public service that is ready to help people and companies, a public service that works more efficiently using the right ICT.

In order to truly implement e-government, the Belgian Government has chosen a number of cornerstones, on the basis of which concrete electronic applications can be developed for citizens or companies. By using this method, there is no more need to start every new application from scratch.

The fundamental cornerstones are Fedman, the secured network linking all public services, the Universal Messaging Engine (UME), which is responsible for bringing the right data to the right persons, the federal Government's portal, www.belgium.be, and the electronic identity card.

From these cornerstones several e-government applications have been developed in the past years. The electronic tax declaration web site, www.taxonweb.be, is one of the first major applications

for Belgian citizens: the project started in 2003 and saw its number of users grow from 80,000 to 600,000 in 2005. The federal public service Justice has begun computerising its entire workload: all files will be in electronic format and will be stored in a central management system, enabling magistrates, lawyers and citizens to consult these files much more rapidly. Be-health, the health care computerization platform, will offer health care providers and patients alike the opportunity to consult all information and use all applications of the health care sector electronically.

Many other electronic applications are already available. These include:

- Electronically applying for an automobile number plate
- Dimona: the immediate electronic declaration by the employer of the beginning or end of an employment relationship
- The DMFA declaration enabling the electronic quarterly declaration to the National Office for Social Security. It is currently used by 230,000 employers for 3.8 million employees
- E-notification as part of e-procurement: companies can be informed by mail about those public contracts that could be of interest to them
- The Deus module for newly started companies, allowing the companies of the hotel and catering industry to apply for the necessary licences in a very rapid and efficient manner
- Intervat, which makes it possible for companies to send their VAT declaration via the Internet on a monthly or quarterly basis. EDIVAT is a nearly identical project but is meant for accountants, bookkeepers and tax specialists who submit periodic VAT declarations on behalf of their clients
- Fisconet offers its users free access to a bilingual fiscal database via the Internet
- The Crossroads Bank for Enterprises (KBO) enables putting the identification data of enterprises at the disposal of all public services in a uniform and centralised manner. An enterprise only needs to submit its identification data to the authorities one single time. Once the enterprise receives its identification number, all it has to do is mention this number, after which the public services will be able themselves to retrieve the necessary identification data from the Crossroads Bank for Enterprises.

## The electronic identity card

The electronic identity card is probably the true cornerstone allowing for high quality e-government. With it, citizens and companies have thoroughly secured access to the Government's electronic counter and to numerous data files or applications of private organisations and companies.

Belgium is one of the first countries in the world to issue an electronic identity card to all of its citizens. The country is also



Spike and Suzy sensitize young people to chat and surf safer

making this an obligatory practice. The first of these cards were issued in January 2005. By 2009, each Belgian aged 12 or more (a total of 8.2 million people) will have an electronic identity card. This amounts to the issuing of two million cards per year, or about 10,000 cards per day.

The main difference from the identity card of the past is the presence of a chip on the current electronic version. This chip contains three elements that correspond to the three advantages or three basic functions that the card has. First of all, the chip is used to store the same identity data that are featured on the card itself, as well as the address. Electronic storage of the identity data on the chip enables electronic transfers. An electronic transfer is much faster than manually transcribing or typing the identity data and moreover, it is completely faultless. As a result, forms can be filled in and sent with just a couple of mouse clicks. This translates into an important reduction of paperwork for public services, companies and citizens alike.

The chip also contains an authentication certificate. Citizens, companies or public servants can use this certificate to authenticate themselves electronically. As it is a highly secured key, the eID is able to offer a secure access to infinite numbers of data files and applications.

Finally, the chip also holds a certificate which allows the user to sign with a digital signature that has the same value of a handwritten signature. The fact that a contract can now be made or that an order can now be placed without the contracting parties having to be physically present naturally makes for a huge gain in time.

Since the Belgian federal government decided to issue the card to all of its citizens, more than 400 companies have begun developing applications for it. The following points briefly describe a number of applications that were already available in the first months after the distribution of the eID started in Belgium:

- Thanks to the eID, citizens can use the site, https://mijn-dossier.rrn.fgov.be, to consult their own identity data stored in the State Register. In order to do this, they, of course, need to have a PC connected to the Internet and a card reader. Citizens also have the opportunity to find out which public servants have consulted their records and for what reasons
- The eID can be used to sign electronic text documents, mails and PDF documents. As a matter of fact, the electronic signature expires as soon as the signed documents are in any way changed
- The eID enables the sending and receipt of registered mail through the Internet
- The eID allows citizens to electronically fill in and send in their tax declaration, by using the website www.taxonweb.be
- In some municipalities, residents in possession of the electronic identity card can request and obtain certain official documents from their homes, so that they no longer need to go in person to the counter in the town hall. These documents include the certificate of nationality, a certificate regarding the composition of one's family and the certificate of residence
- Members of parliament can electronically sign and introduce laws, decrees and parliamentary questions
- Trust2 is a programme that enables users to decide who is allowed to use their eID to read, change and/or print an electronically sent text
- Employers can use their eID to fulfil their social security obligations electronically. A number of international ICT companies are implementing the eID in their systems (access to the



Peter Vanvelthoven, with a 12 year old teen who can chat safer with a card reader and an eID

company building, access to the computer network, consultation by staff of their own human resource data such as holidays and pay).

At the moment, many other eID applications are being developed. Not only can the eID be used as a key to access computer networks, it can also function as a key to office buildings. There is already a number of companies using eID in this way. Municipal administrations are considering implementing it too. Libraries want to use the eID as a library pass to allow people to log in from their homes and reserve and lend books.

**Computerizing society**

The ongoing computerization taking place both at the state level and in society as a whole threatens to leave a number of people out in the cold. Not everybody understands how to work with a computer and not everybody can afford a PC with an Internet connection. When people decide to get a PC and connect to the Internet, they may become discouraged: a lack of knowledge of the PC or too many security-related problems such as spam, spyware and viruses can lead to people giving up on computers altogether. The government faces an important task in seeing to it that these people are not left behind and that the digital gap is bridged.

That is why Belgium is concentrating on improving four strategic elements: access, security, knowledge and the number of applications. The initiatives that go with these aims are:

1. Promoting the electronic identity card: Belgium is making a concerted effort to promote the eID as a way of securing the Internet. ICT companies integrating the eID in their systems bring the Internet to a higher, safer level.

2. The National Action Plan: the government has drawn up a National Action Plan with about 30 actions to counter the digital gap. The main goal of this Plan is to reduce the digital gap by a third in the next five years. Besides the provision of household and public access to the Internet, initiatives meant to target specific groups such as the underprivileged, the disabled, women and the elderly will be launched. The next two initiatives are an essential part of this Plan and are actual examples of the actions undertaken.

3. The 'Internet for Everyone' logo: to boost PC and Internet, a sensitizing and promoting campaign has been started. This campaign uses a logo which shows that the government, together with its partners, is committed to spreading the message as broadly as possible.

4. The 'Internet for Everyone' package: a cheap package consisting of a PC, an Internet connection and basic training will be offered in shops from 2006. Through negotiations with the ICT sector, the package will be EUR 500 euros cheaper than any available today.

5. Safer chat rooms for seniors: provided that they use their eID, seniors can get access to chat rooms secured especially for them.

6. Safer chat boxes for minors: in association with Internet Service Providers, chat boxes secured with the eID (and pin codes) have been developed. The launch, in September 2005, was accompanied by a commitment to provide all 12 year olds a free card reader during the year in which they receive their first eID.

7. Asking the Belgian population: for the first time, public opinion — of Internet users as well as computer illiterates — has been surveyed to find out what they expect from e-government.

8. Computerization of the disabled persons allowance awarding procedure: this will bring about a substantial decrease in the time taken to handle files.

9. S-Days: on 14 October 2005, a large-scale information and sensitising campaign was launched. This federal government campaign is largely sustained by the ICT sector, the Education and the Employment offices and aims to awaken the Belgian population about the issues related to communication security.

10. Consultation platform for information security: to provide an answer to ICT issues such as spam, spyware, viruses, botnets and the theft of electronic data, the federal government has created a consultation platform for information security. This platform is made up of nine actual federal institutions.

11. Spike and Suzy: a comic book for children dealing with safe Internet practices, and featuring the famous Belgian characters Spike and Suzy will be spread among young people at the end of 2005 or early 2006. The content has been drawn up in association with Child Focus.

# Laying foundations for digital inclusion

*Telecommunication Company of Iran*

A T THE FIRST phase of the World Summit on the Information Society (WSIS) in Geneva, His Excellency Mr Mohammad Khatami, President of Iran, spoke of "the historical sufferings of human beings caused by 'distances' and 'separations'" reflected in different languages and fields of knowledge. Noting massive changes in communications, he described entry to the information society as "a new opportunity for the entire world population."

The second phase of WSIS continues this focus on using information and communication technology (ICT) to bridge the digital divide, enabling countries and individuals to access the information they need when they need it and compete in global commerce. ICT is becoming more accessible to many groups of people, and is being used to address the digital divide between different countries, and between individuals within them.

ICT has become the fastest-growing scientific technological sector of society, and the most important. Across the world, governments have been urged to boost investment in ICT, to make the benefits it promises accessible to all levels of society in all countries. Through proper investment and building secure foundations for ICT services, a reliable platform can be established that will enable the prosperity and development of all countries.

President Khatami said: "In order to ease and reduce the sufferings and historical distances, we should place the empowerment of human beings at the forefront of our efforts." Thus, Iran aims to use ICT to empower all individuals. It has worked to lay practical and consistent groundwork for ICT services. The availability of ICT has become a more urgent matter to address, and several programmes and ICT development and restructuring plans are underway. This commitment is reflected in the recent renaming of the Ministry of Post, Telegraph and Telephone (PTT) as the Ministry of ICT.

Two inter-organizational councils have been established: the IT Supreme Council and the Space Council, backed by two ICT-related organizations, the Organization for Space and the Organization for Communications Regulations. In line with the renaming of the Ministry of ICT, three new subsidiaries have been launched. The Mobile Company, Data Company and Backbone Company each have special areas of focus within ICT, enabling improvements to be made in each area. In order to see the work of Iran to bridge the digital divide, it is worth taking a brief look at the development of the Iranian telecoms industry.

## Telecommunications in Iran

Iran's telecoms system developed slowly at first, with a telegraph line between Tehran and Chaman Soltanieh in 1857. The line was extended to Zanjan, Tabriz, and Julfa two years later, and was connected to the Russian telegraph network as it expanded worldwide until Iran became a member of the International Telegraph Union in 1869. The relevant department of this union was promoted to the Ministry of Telegraph in 1876, as the use of telecoms services became more prevalent.

The service expanded in 1890, with the first telephone line in Iran. But the network's development only began in 1941 when the Allied Forces left the country and Iran bought the network of new phone lines they had laid. Progress continued with a move to an automatic system, long-distance and satellite capabilities, and the establishment of the Iran Telecommunication Research Centre before the Telecommunication Company of Iran was set up in 1971.

Although the war between Iraq and Iran impeded network development, over 351 000 lines were established between 1979 and 1984, connecting 1 363 villages to the national network. Optic fibre cables arrived during the 1980s, and in 1991 the Data Communication Company of Iran was commissioned to set up phase one of the Iran Public Data Network (PDN), or Iran Pac.

In 1996, rapid progress was made as provincial telecoms companies began to operate. Mobile phone networks were expanded to 35 cities, to support over one million mobile phones. Ninety cities were connected to the national data network and the VSAT network was expanded by up to 70 per cent.

Alongside these domestic achievements, TCI has worked extensive to export technical and engineering services, and has shared its experiences with other countries within the framework of consulting and contracting agreements. It carried out all phases of the Trans Asia Europe optic fibre cable project in Turkmenistan.

## A solid base for inclusion

Iran's focus on developing its ICT systems has put it among the first five countries to achieve a growth rate of over 20 per cent for development in telecommunications. The country hosted the High Level Asia-Pacific Conference for the WSIS in Tehran from 31 May to 2 June 2005, to define a regional course of action for building a people-centred, inclusive and development-oriented information society in Asia and the Pacific.[1]

The participants of the Tehran conference reaffirmed the need for joint efforts to ensure "universal, inclusive and non-discriminatory access to ICTs," and emphasized the importance of both international and regional cooperation alongside national efforts in building an inclusive information society.[2]

One important aspect of creating an inclusive digital world is the need for partnerships between governments, the private sector, and civil society from both developing and developed countries, and from organizations on regional and international levels. The Tehran delegates recognized the role of such partnerships as vital. This principal of inclusion on a large scale in order to furnish global inclusion on an individual level, wherever that individual is located and however much money they have, has featured in the development of Iran's ICT infrastructure. Building on the foundations laid by countries like Iran in developing a solid ICT infrastructure, it might at last be possible to open up ICT to every population, no matter how remote.

# A global operator serving the development of ICT and economic and social growth in Morocco

*Maroc Telecom*

A GLOBAL OPERATOR and a leader of its sector, Maroc Telecom (MT) has shaped the communications landscape of Morocco. Today, the company offers fixed and mobile telephone and Internet services to over nine million customers.

Maroc Telecom is a listed company in Casablanca and Paris. Its major shareholders are Morocco (34.1 per cent) and Vivendi Universal Group (51 per cent). In 2004 the company was floated on the stock exchange and success followed, both with national and international investors, as well as its ISO 9001 certification. This demonstrated the quality of performance by the operator and its ability to live up to the most demanding international standards in terms of management.

Maroc Telecom decided at an early stage to give top priority to the development of information technologies and telecommunications and to narrowing the digital divide.

The company has equipped Morocco with modern and highly reliable telecommunications networks. This has been possible due to a sustained investment policy aimed primarily at building capacities and enhancing coverage. Today, almost all the population can be reached through the mobile network whereas the fixed telephone network, which has been totally digitalized, covers all cities, communes and main localities. This has helped in opening up remote or land-locked areas. Banking on proximity, Maroc Telecom has developed a very dense commercial network comprising of 269 agencies, and at the end of 2004, was backed by more than 30 000 call shops and 15 000 independent distributors and retailers, enabling more and more people to access modern means of telecommunication.

Maroc Telecom has contributed a great deal to democratizing the telephone by designing cost effective offers that are adapted to everyone's requirements. This explains the dramatic development of telephone services in Morocco, especially the mobile phone. The introduction of prepaid services and the substantial drop in access rates, mobile and fixed networks alike, have offered all social categories in both urban and rural areas the possibility of using a means of communication that is adapted to their way of life. Hence, the telephone is no longer viewed as a luxury in Morocco, but as an everyday tool that is accessible



Internet Cyberspace designed specifically for children in Marrakesh

**Maroc Telecom mobile customers (000's) and mobile penetration rate in Morocco**

| | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|
| Maroc Telecom mobile customers (000's) | 3 663 | 4 597 | 5 214 | 6 361 | 7 441 |
| Mobile penetration rate | 16.30% | 20.90% | 24.90% | 31.20% | 35.90% |



- Maroc Telecom mobile customers (000's)
- Mobile penetration rate

that Morocco needs to strengthen its international band with capacity to 9 gigabytes before the end of 2005.

As access to knowledge is essential for young children and teenagers, Maroc Telecom grants preferential rates to schools and high schools. Also universities benefit from rates that are below public tariffs to access the high debit network MARWAN. This enables them to have quick access to information and exchange knowledge and experience with the rest of the digital world. On the other hand, MT contributes to the success of projects designed by the government as part of a national cyber strategy and efforts to measure ICT indicators.

Maroc Telecom is also involved in developing content through, among other things, the Menara Portal, which is managed by its affiliate Casanet. Menara, the first bilingual (French-Arabic) Portal ever, has become the first African Portal with 27 million pages and more than 2 million Internet users every month. Today, the operator is examining the possibility of launching a "triple Pay" offer comprising unlimited phone, ADSL and an array of channels based on ADSL.

Thanks to such action, at least 3.7 million Moroccan Internet users now surf the Web, according to a recent survey published by The National Authority of Telecommunications Regulations.

MT follows and actively contributes to regional and international initiatives involving the development of ICT, especially as part of the various activities of ITU of which it is a sector member. MT fully subscribes to the objectives of reducing the digital divide and is utterly convinced of the crucial role of the development of the Information Society in social and economic development.

to almost everybody, and which plays a decisive role in the development of individuals, as well as in the fight against exclusion.

MT offers major support to SME-SMI and larger companies, where efficient and cost-effective telecommunications are a crucial element of competitiveness in the global economic environment. MT has backed the development of call centres and off-shoring projects through upgrading and enhancing the reliability of international networks. To support this development, and given the crucial significance of the price of International leased lines for their competitiveness, MT regularly reduces the rates of International leased lines to foster Morocco's attractiveness as a host country for call centres.

To meet the growing needs of international business relations, Maroc Telecom continuously enhances the capacity of its network. Its strong connectivity relies on two international transit centres, three submarine fibre optics cables and three satellite links. Moreover, MT has signed roaming agreements with 324 operators.

Aware of the essential role of the Internet in the development of the information society, Maroc Telecom has been a pioneer in introducing new technologies like GPRS, ADSL and the Wi-Fi ADSL in Morocco.

To allow the widest possible use of the Internet and participate in reducing the digital divide in Morocco, MT has undertaken a multi pronged action. This consists of significant and regular reductions in price, especially the ADSL, promotions to reduce the acquisition cost of computer hardware and security packs to enable parents to monitor the content viewed by their children. Access to ADSL has more than doubled between December 2004 and June 2005, and has reached 135 000 to date. This means

A multi-media terminal in a public park. Note the futuristic design

# The role of the private sector in mainstreaming ICT4D

*Romeo Bertolini, BMZ and Geraldine de Bastion, GTZ*

THERE HAVE BEEN tremendous advancements in recent years to extract the benefits of information and communication technologies for development (ICT4D). ICT gurus and pundits are looking at the new technologies as a means to bridge the oceans. However, much of their potential remains untapped — especially with regard to public-private cooperation.

The German Government believes mainstreaming ICTs will contribute to the efficient and timely achievement of international development goals. In the thirty-year tradition of promoting technology for development, the German Federal Ministry for Economic Cooperation and Development (BMZ)[1] therefore integrates ICT components into bilateral development activities and supports multilateral development initiatives, such as infoDev[2] and the Development Gateway.[3]

The BMZ's conviction lies in the fact that public private cooperation is necessary in order to mobilize the full potential of ICTs for development: international and regional digital divides can be overcome by introducing partnerships at various levels which are duly supplemented with capacity building measures, promotion of local content and ownership.



Supplying rural areas with ICT-infrastructure: Wire-less can be more

## Partnerships for development cooperation — sharing benefits and responsibility

Such partnerships rely on a continued process of mutual trust where partners share a common goal and pursue this by distributing responsibility and benefits equally. In recognition of the efficacy of combining public long term planning and private entrepreneurship to produce significant leverage effects, the BMZ supports development orientated private sector initiatives: Long-term investment capital is supplied to private enterprises in developing countries by the DEG. In addition, the BMZ launched a strategy to integrate public-private partnerships (PPPs) into its development activities in 1999 and commissions German development organisations such as the GTZ and InWent, the German development bank KfW and the development foundation SEQUA to implement jointly financed projects with private sector companies.[4]

*How can the private sector — which seeks business returns — and the public sector — which seeks social and economic prosperity, complement each other to increase the benefits of ICT for the poor?*

Engaging in development partnerships with the private sector is about creating synergies and amplifying the impact of development activities. In the past, PPPs have:
- generated additional funds for development projects
- created new employment opportunities in developing countries
- set free additional, economic expertise, knowledge and technology transfer
- increased the sustainability of development projects.

Ideas for PPP-activities are audited carefully to see whether they coincide with the development principles set by the German Government, including a focus on developmental impacts, ecological and social sustainability. The German Government intends to sensitise companies to developmental aspects and their role in the creation of social and economic parity. In joint ICT projects with the private sector, added shareholder value is not the primary target, but the provision of solid solutions towards development issues, the creation of jobs, access to markets and fair prices.

However ICT4D partnerships also benefit the private partners as ICTs are a profitable area and offer a wide range of business opportunities. PPP are not only attractive for large enterprises, but also cater towards small and medium businesses. For the private sector stakeholders, PPPs offer a means to reduce investment risks and market entry barriers. Private investors are given the chance to pioneer in new markets that offer room for innovation and creativity. Experience has shown that, by engaging in a PPP, the private stakeholder benefits from the:

[ 176 ]

- financial and personnel support from experienced development organizations in project planning and implementation
- easier access to governmental, academic and civil sector institutions and decision makers, including local networks
- access to expert knowledge on partner countries, development sectors and legislative structures.

Although a number of successful project examples prove the suitability of the model, there are still areas where a vacuum for the provision of economically viable solutions remains to be filled. The BMZ highly encourages partnerships where the private sector takes responsibility for the provision of ICT benefits. The following three PPP case studies present two good practice examples and one outlook to future endeavours.

**The Africa Drive Project — improving the quality of education**

The Africa Drive Project (ADP) is improving the South African education system by means of ICT. The GTZ initiated this blended learning project along with the North West University, SAP Research, Siemens Business Services, eDegree and a number of other local partners in response to the shortage of qualified primary and secondary school teachers in South Africa.

According to President Thabo Mbeki: "Special attention needs to be given to the critical shortage of mathematics, science and language teachers and to the demands of the new information and communication technologies."[5] In order to alleviate this shortage, the project partners introduced ICT into teacher training.

Apart from improving the competencies of secondary school educators in subject areas such as science, mathematics, business studies and English, the ADP curriculum addresses the role of the educator with regard to issues like HIV/AIDS and ecological conservation. Furthermore, the project aims to improve ICT literacy among teachers and students, to offer affordable "quality educa-

tion to people, even in rural areas" and to create new business opportunities related to the education training sector, as Christian Merz, SAP Research and Development Germany explicates.

The Africa Drive Project started its implementation in July 2003. Since then a learning management system has been installed and a number of learning centres have opened around the country. Formal learning, preceded by basic computer training, commenced in July 2004. According to the project partners, the PPP has already proven to be successful, as Dr Ngoato Takalo from North West University explains: "Our conviction of developing the skills of our teachers using technology has come true with the support of national and international partners." Private sector project partner SAP agrees that "ICTs have been accepted as a useful supplement to existing methodologies. Participants apply the lessons learned in their own classroom." SAP sees its engagement as an investment in future business areas and emerging markets in the developing world. Merz believes that by considering the needs of developing societies, SAP can improve its software products, for example, with regards to usability or robustness.

The ADP is an example of successful ICT mainstreaming in the area of education. Often, however, basic infrastructure impediments hinder the rollout of such projects. The provision of ICT infrastructure is thus another important development issue where private sector involvement is indispensable.

**Celtel — creating business solutions that work for the poor**

Founded in 1998, today Celtel is the mobile phone operator with the largest footprint in Africa, connecting 30 per cent of the continent's population in 13 countries, including Malawi, Burkina Faso, Uganda, Kenya and Sierra Leone. The example of Celtel demonstrates that ICT projects can be both effective in terms of development impact and profitable at the same time.

Celtel was a pioneer in meeting Africa's need for communications infrastructure: In 1998 there were only two million mobile



The teacher Philip Tsimanes' appraisal echoes a number of positive assessments of the Africa Drive Project: "Getting into dialogue with people across the world via the Internet was an eye-opening exercise."

phones in Africa. A number of shareholders invested a total of USD3.4 billion into Celtel, including the Deutsche Investitions- und Entwicklungsgesellschaft. The (DEG) began supporting the network in 2001 and increased its equity funding in 2004 in order to enable the network to provide attractive products that were affordable to people with low incomes. The motivation behind this investment is the belief that mobile telecommunications are a vital means to promote development, especially small-scale trade and agriculture through more transparency in price-structures and market development.

With the help of international development finance institutions, Celtel has managed to achieve a developmental impact in the countries it is active in. Today, Africa is the first continent with more mobile phones than fixed line connections. So far more than 120,000 Celtel distribution outlets have opened around the continent; over six million people now have phones. Enabling people to communicate via telephone has had social as well as economic impacts. Trade and craftsmen are raising their incomes using mobile phones directly and indirectly, for instance, by selling Pre-Paid Cards or renting out mobile phones. According to Celtel, over 3,000 high quality jobs and some 30,000 indirect jobs have already been created. In addition, governments are profiting through the collection of tax revenues and licence fees.

The sale of Celtel to MTC in May 2005 has brought an attractive return to Celtel's investors.[6] Matthias Goulnik, Senior Investment Manager at DEG, believes this shows that "investments in Sub-Saharan Africa can provide a lot of economic benefits to everybody if one has the right business model and the right partners." According to Marten Pieters, Chief Executive Officer, one of Celtel's greatest achievements has been "the substantial extension of our network to reach hundreds of thousands of new customers, some in remote locations without access to any telecommunications infrastructure before."[7] This would not have been possible without the initial public and private investments "The excellent backing we have received from our existing and new shareholders puts us in a strong position to fulfil both our commitment to Africa as a long term investor and also our brand promise: 'Making life better'," states Dr. Mohamed Ibrahim, founder and chairman of Celtel. The success of Celtel can be partialy attributed to the fact that the business model is closely inclined to people's needs. Here, the ICT industry has managed to produce a business model, products and services that are affordable, available and operable to people with low incomes. This recipe is not only applicable in the area of infrastructure provision; software development, for instance, also needs to consider local demands.

### Promoting free and open source software in Asia

The current dependence on proprietary software licences and international software manufacturers is encumbering small and medium-sized enterprises (SMEs) in South East Asia. As a result, the demand for open source-based systems has increased. The stability of open source systems, their adaptability and possibility for further development based on the needs of the local economy, make them attractive to SMEs. Open source offers new and innovative approaches for the development of new business areas.

In particular, says Balthas Seibold, Project Manager at InWent: "The two fields of customization and service are excellent business opportunities for SMEs."[8] Seibold recently launched the project it@foss for Asia — a three-year capacity building programme funded by BMZ and supported by the European Union EU Asia IT&C Programme. The overall goal of it@foss is to strengthen the Free and Open Source Software (FOSS) development community in the ASEAN region, namely in Cambodia, Indonesia, the Philippines, Thailand and Viet Nam, and thereby advance ICT infrastructure based on open source technology.

The project will offer training for software developers and host FOSS conferences to strengthen regional ties, including the sharing of best practices in the area of open source-based business approaches. In addition, international capacity building events involving European developer communities and open source companies worldwide will create linkages with the inter-



Moblie communications at affordable prices do not only simplify social life but can also create economic opportunities

national community. It@foss is seeking PPPs to increase the innovative potential and sustainability of the project. Project manager Seibold sees a number of partnership opportunities, especially for "businesses dealing with the creation, distribution and use of FOSS, particularly local companies and international businesses wishing to enter markets or reinforce their presence in South-East Asia. However, we are also looking for private sector partners in fields of sustainable business development, FOSS applications or training."9

The project initiators believe that, with the help of the private sector, the combination of open source software and sustainable development can have a significant impact as the two share important principles such as an emphasis on participation, ownership and transparency.

**Beyond WSIS 2005**

The case studies show how ICTs contribute to economic and social development by mainstreaming applications into development sectors such as education and private sector development. In addition, they demonstrate the necessity of providing infrastructure and software applications tailored to the local demand structure. Governments of developing countries, the donor community and private sector stakeholders have all agreed on the enabling role of ICTs. Years of discussions and pilot projects have passed — it is now time to roll out the benefits of ICT4D. Instead of reinventing the wheel at the local and sector level, experiences need to be shared and resources galvanized to ensure the benefits of ICT are made available to all.

From WSIS 2005 onwards, the role of governments will continue to be crucial in creating an environment in which ICTs can be used to encourage economic growth and improve the provision of social services. To this end, the integration of ICT strategies into national development plans is of great importance.

An enabling ICT policy environment includes open access, freedom of expression and the free flow of information, but also investment in local capacity building and service development.



Photo: Romeo Bertolini

A lack of ICT infrastructure often remains a problem, especially in rural areas

The role of the private sector will be crucial if developing countries are to keep up with the dynamic advancements in communication technologies. Sustainable business models that are closely inclined to local demands and long term, socially responsible private sector engagement is needed.

The German Federal Ministry for Economic Cooperation and Development considers it its responsibility to support governments in the creation of an enabling environment and to facilitate partnerships which will promote ICT4D.



Photo: Paul-Matthias Braun

# Extending hope to the endless future

*Internet Society of China*

IN SEPTEMBER 2005, the students of Dashui Village Mid-school in Dafang County — the middle part of Bijie District in north-west of Guizhou province, China — will have their first opportunities to see and touch computers in the newly built multimedia classroom. These computers from the Chinese capital Beijing, have been donated through the '5·18 Internet Charity Day' initiated by the Internet Society of China (ISC).

ISC was inaugurated in May 2001, and has more than 70 sponsors including network access carriers, ISPs, facility manufacturers, research institutes among others. The society has long engaged in the development of China's Internet industry, and has made a significant contribution to the Internet's popularization and application in China. The ISC's responsibility is to make the Internet accessible to everyone, thus creating an Information Society in China.

Internet use in China has continued to develop rapidly this year, with the total number of users now exceeding 100 million and around 50 million computers capable of accessing the Internet. In this regard, China has become the second-largest population of netizens in the world, closely behind America.

### The digital divide

But the growing number of Internet users does not necessarily maximize its popularization and uses. In China, as in many other countries of the world, there exists an information or knowledge gap, a polarization of the rich and poor in the form of the 'digital divide.' Due to the diversity of reach and use of information, and the unbalanced development of ICT and application skills, the digital divide has become a serious obstacle to progress in the globalization process. This is an international issue rather than a phenomenon existing in certain countries or regions.

With the aim of accelerating the shrinkage of the digital divide, the ISC co-launched a proposal with renowned entrepreneurs from domestic industry in the Internet service, telecom and computer sectors to initiate the '5·18 Internet Charity Day.' The first Internet Charity Day in China, held on 18 May 2005, addressed the topic of 'Building the Internet, Benefiting Everyone,' and responded to the theme of the 37th World Telecommunication Day, 'Creating an Equitable Information Society: Time for Action', set up on May 17, 2005. Following this call, Internet practitioners spontaneously and voluntarily took various actions, including donation of equipment, fund sponsorship and special training to promote the popularization and application of ICT in China's least developed economic regions in the west and north, making ICT and digital opportunity easily accessible to disadvantaged and vulnerable groups of people.



Internet Charity Enterprise Prize awarded at China Internet Conference 2005 by ISC



ISC's Chairman Ms. Hu Qiheng and Secretary General Mr. Huang Chengqing met with volunteer Xu Benyu

Volunteer Xu Benyu and the students of Dashui Villiage



Students of Dashui Villiage

## Remote village access

One village to benefit from the 'Internet Charity Day' donations was Dashui Village, Dafang County of Guizhou province, where Xu Benyu, honored as one of the 'People Who Moved China, 2004' by CCTV, worked voluntarily to support IT education. Dafang County, located in the northwest of Guizhou province, is one of the least developed provinces in China. Dashui Village is in the east of the County, about 65 kilometers from Dafang County. A lot of dropouts could be seen everywhere in the village, due to extreme poverty rather than to neglect of education. A university student with major in agricultural economy, Xu Benyu came to the county to conduct a general social survey in the summer of 2002. During his stay there, Xu offered teaching assistance in local schools, helping to equip the students with knowledge that they themselves were not given in this remote mountain area. When Xu had to return to university for the new semester, the students walked many miles to see him off. After his return, Xu always remembered the children's desire for knowledge, and two years later, instead of continuing in postgraduate study, he decided to go back to Dashui Village to support education as a volunteer. News of Xu's action spread through the Internet and other media across the whole nation, and attracted close attention from all parts of society.

Teaching conditions at Dashui Village Mid School were poor: although a new teaching building had been built with social donations, its classrooms lacked necessary hard and soft facilities like blackboards, school desks, chairs and electric lights, and the lab equipment was barely usable. ISC was aware of this, and initiated a proposal that the industry should support this area. In August, donations of computers and stationery collected during the 'Internet Charity Day' were sent to the County. Furthermore, with the support of a local telecom company, ISC has provided the Mid School with a multimedia classroom with Internet accessibility, enabling this isolated mountainous area to share in the world-wide information highway.

## Special needs

Myasthenia is a fatal, incurable disease across the world. Sufferers usually come down with the disease in childhood, and gradually lose power in their muscles. Movement becomes more difficult year by year, until the patient becomes devitalized. This group of people was inspired by the power of the Internet to improve their lives. A determined group of sufferers set up an online Bulletin Board Service (BBS) called 'Jing Cai Tong Xing', which means 'go together on the brilliant trip' in Chinese. (www.jingcai.org/bbs). The BBS enables users to reach a mutual communication platform, learning resources including English language, web technology, graphic design and animation. It has enabled some users to try every means to earn their own living, releasing the burden on their families.

But although the Internet helps myasthenia patients to access the outside world and to build self-confidence, this closely linked online community still faces difficulties due to the lack of financial resources. WSIS' *Declaration of Principles* recognizes that communication is a fundamental social process, a basic human need, and the foundation of all social organization. It is therefore central to the Information Society. Everyone, everywhere should have the opportunity to participate, and nobody should be excluded from the benefits the Information Society offers. ISC has therefore co-launched a donation programme with Internet enterprises, to provide the BBS with a community-maintaining fund, free access to the Internet and network storage, to encourage their splendid creation and life online.

During this ongoing activity, ISC was informed that another university student, Li Huafen, who used to offer support to the Dashui County's dropouts through waste recycling, had been diagnosed with leukemia. Li was born into a peasant family of Nanyang City, Henan province. Li herself was not so rich, but exercised thrift in her own life so that she could make continuous donations to the poor students. However, Li's therapy had used up all of her family's money within only one month of her diagnosis. To extend her life, which she had dedicated to helping others, ISC immediately sent the money needed for Li's treatment. At present, Li is in the condition of recovery and her health indexes have turned to normal.

The '5·18 Internet Charity Day' this year is just the beginning. ISC will continue with its activities with the aim of

building a people-centered, inclusive and development-oriented Information Society. In the face of this broad digital divide, we should remember a Chinese proverb: "All things are difficult before they are easy." We must be confident and determined to make progress in spite of the difficulties, in order to make real the goal of 'Building the Internet, Benefiting Everyone'. The 'Internet Charity Day' is also the first rallying cry to build a harmonious development-oriented Information Society where similar activities should be organized continually, to support the development of poor areas and people in need of help. ISC will adhere to the principle and mission of the organization, following the spirit of dedication and extending the Internet Charity to include the support of informatization.

Under the framework of the United Nations, and abiding by the WSIS *Declaration of Principles and Plan of Action* and the principles of openness, justice, democracy and freedom on the Internet, we hope that we can achieve the goal of ISC, to build a harmonious development-oriented Information Society in China and let the Internet send our hope to you to the endless future.



Setting the computer-based multimedia classroom by ISC



Dashui Village Mid-school's new teaching building built with social donation



The BBS (Jing Cai Tong Xing ) set up by the myasthenia patients and its administrator Mr. Bai Yi



The kind-hearted university student Li Huafen

# Net Dialogue perspectives on international Internet governance

*Lawrence Lessig, John Palfrey and Mary Rundle, Net Dialogue*

THE WORLD SUMMIT on the Information Society (WSIS) began as a response to the major shifts that the Internet was causing in social arrangements. Those same factors persist at the end of the WSIS process: the Internet's growing importance has left the state in a position of reliance on private enterprises for expertise and flexibility in decision-making. Meanwhile, the international nature of the Internet has forced states to recognize their interdependence, with a certain tendency toward international federalism emerging. As individuals perceive this shift, they are asking what this international integration means for their relationship to the state, and their very rights as citizens in the Information Society. Still, many people are simply embracing the Internet and forming new, international communities online, while business opportunities abound. Because these societal shifts were recognized by representatives at the Geneva Phase of WSIS, they agreed on the Declaration of Principles — calling for multilateral, transparent, democratic, coordinated, and multi-stakeholder approaches to decision-making in the networked world.

## Fine-tuning the present

In recent years, more than a dozen intergovernmental organizations have been making rules for the networked world. Because these bodies deal with hundreds of other topics as well, information on Internet-related initiatives is lost amongst other material on their websites and in written reports. In other words, with the current arrangement, the mere task of tracking what Internet governance is taking place, and where, is enormously time consuming. A person has to sift through hundreds of web pages to arrive at this information.

Indeed, participants in the technology development community, academia, the media, government, intergovernmental organizations and non-governmental organizations (NGOs) attest that it has been exceedingly difficult to follow international Internet governance as it occurs in diverse bodies. For example:

- Government representatives are often too busy carrying out their own work to follow the whole range of developments in Internet policy. Large delegations may distribute work in such a way that representatives fail to update each other as they report back to separate agencies in their capital. Meanwhile, small delegations (e.g., from developing countries) are too thinly stretched to cover all the meetings
- So, too, staff of intergovernmental organizations have pre-assigned work, and tracking Internet policymaking in other organizations on subjects beyond their specific duties would seem to go outside their mandate
- Nor can businesses intent on the bottom line afford to employ people to monitor all Internet-related activities of intergovernmental organizations. While these activities may be important, if they are not directly related to that company's current goals, shareholders do not want to bear the cost of contributing to the policy process for the general good
- NGOs and academic researchers focusing on specific aspects of Internet policy are on even more restricted budgets, so despite their interest in following the totality of Internet decision-making, they simply cannot afford to do so
- The media know that reporting on the successive stages of policymaking does not draw large audiences, so they choose to wait until rules are ripe for decision, or until their implementation raises problems, before reporting on them.

In short, no group that is normally involved in international Internet governance has been able to follow the full range of developments. It is not surprising, then, that there has been little appreciation for the cumulative effect of international Internet governance, and negligible public input. Clearly, these intergovernmental processes are not yet adapted to the Declaration of Principles.

To show how the Principles could be incorporated in the near term, Net Dialogue, a joint project between the Harvard Berkman Centre and Stanford Centre for Internet and Society, constructed a web site for presentation during the open consultations of the UN Working Group on Internet Governance. The site is meant to demonstrate how a single web portal can consolidate information on Internet-related rule-making by intergovernmental bodies and offer online discussion tools, in order to make Internet governance more accessible to the public.

Delegates meeting ITU Secretary-General Mr Yoshio Utsumi in the plenary hall at the Palais des Nations, Geneva.

The Net Dialogue site categorizes information according to traditional governance areas — based on the theory that the same types of problems that governmets have had to grapple with throughout history crop up in cyberspace. The site also provides overviews of organizations treating the Internet, and, for summaries of initiatives, it uses language directly from the organizations involved. To help the viewer find original documents, the site also links to official texts. In addition, to enable people to find further details, the site provides background information, indicating the drafting committee or pointing to the terms of reference for a specific initiative. Finally, this one-stop-shop portal features online discussion tools to show how the public can submit comments.

A forum established by the World Summit on the Information Society could easily take on this task in an official capacity. As part of its work, the forum could simply pull together what already exists through organizations' individual online coverage. Then, to garner public input, the site could offer a request for comment process to enable direct public participation in pending decisions. The site could employ simple tools like RSS feeds to facilitate the transmission of feedback directly to the specific committees involved in formulating new rules.

**Anticipating the future**

Of course, by the time an Internet-related topic reaches an inter-governmental body for rulemaking, the technology is already well on its way to making an impact. In past years this delay was perhaps tolerable; however, today, and more so in the future, the pace of technological change will greatly outstrip the ability of rules to keep up with developments. For this reason, it is imperative that policymakers be equipped in advance with an understanding of the technology around the corner so that they may anticipate change and accommodate it.

Indeed, with technology developing at an exponential rate, the next ten years are projected to revolutionize the way people live. Web services and other oncoming advancements promise to make the Internet all pervasive in life, with electronic agents continually exchanging and analysing information without individuals' even being aware of it. Moreover, whoever wields the power of quantum computing when it arrives (estimated by some to be in five to seven years) will have an enormous "first mover" advantage geopolitically in the networked world.

On the one hand, the Information Society is on the cusp of a renaissance, where high-performance computing is opening new scientific frontiers in fields like biotechnology and high-energy physics, and is awakening a love for the arts in an expanding universe of multimedia creations. On the other hand, the world risks decline, as information is consolidated and claimed, so that even people's location and spending patterns, or their communications with others, become restricted commodities. With these divergent possibilities, policies pertaining to the ownership and control of information will dramatically determine whether free society flourishes or withers.

In other words, there is an urgent need for policymakers to prepare for the future and not just focus on problems of the past. To do so, they need to maintain better dialogue with the technology community, and they need to employ procedures that are appropriate for this fast moving realm. More than ever before, the Declaration of Principles, espousing multilateralism, transparency, democracy, coordination, and multi-stakeholder input — coupled with a lean and nimble process — can help the networked world harness technological change for everyone's good.



Delegates at the WSIS PrepCom-2 Sub-Committee meeting at the Palais des Nations

# The Regional Internet Registries: managing Internet addresses for 12 years

*The Number Resource Organization (NRO)*

PART OF THE success of the Internet is that it allows us to take addressing for granted. We can send an e-mail, read a foreign news site, or make a voice over Internet protocol (VoIP) phone call from an Internet cafe, and generally be confident that our messages will reach their destinations and that the data we need will find its way to our computer. But the simplicity of using the Internet belies a complex addressing system dependent on technical and policy considerations. This article aims to introduce and demystify Internet addressing and explain the organisations and structures which have evolved to manage and protect the Internet addressing system, particularly the Regional Internet Registries (RIRs).

**What is the Internet?**

The Internet, once an obscure academic project, is today a vast, ubiquitous global network, which has changed the lives of hundreds of millions of people. It has provided new opportunities for business, leisure, and human development and has become the single greatest catalyst for the new vision of an information society. Yet its potential remains largely untapped and, in future, it is expected to provide much, much more. The Internet is the infrastructure upon which tomorrow's society will be built and on which are pinned, in a very real way, the collective hopes and aspirations of the current World Summit on the Information Society (WSIS) process.



The Internet is everywhere. This Internet telecentre in Laos provides valuable educational and training opportunities

The expansion of the Internet has astonished many of us. However, it is important to understand that it did not 'just happen'. Its success — both in its own right and in competition with the many alternatives that have existed — can be attributed not to good luck, nor simply to nearly three decades of development, but in fact to a set of very specific characteristics. The Internet is:

- An open network, which anyone can join and use, for any purpose they choose
- A free network, whose fundamental operating protocols are available without charge for anyone to adopt, use, and improve
- A distributed network, comprising very few centralized administrative or management functions
- An end-to-end network, allowing any point to connect to any other, no matter where they are located
- A global 'inter-network' (as its name implies), comprised of many separate networks, all of which can operate independently, yet communicate freely.

Together, these essential features define the Internet.

**What is an IP address?**

An IP address is an Internet identifier, which includes information about how to reach a network location via the Internet routing system. Every device directly connected to the Internet must have an IP address, whether it is a home computer, a PDA, a router, or an ISP's web server. Every IP address must be unique for these devices to connect to the Internet and to each other.

IP addresses are available for use, on a non-permanent basis, by anyone who needs them. But, as a finite common resource, IP addresses are never owned by their users and are not commodities to be traded. There are two types of IP addresses in use on the Internet – IPv4 and IPv6 – for example:

- 205.150.58.7 (IPv4)
- 2001:0503:0C27:0000:0000:0000:0000:0000 (IPv6)

IP addresses identify not only the device itself, but also the location of the device, as a member of a particular network. IP addresses contain a prefix which identifies a network, much like a phone number prefix identifies a country or city. They are allocated in large blocks to individual networks, just as blocks of phone numbers are allocated to countries or regions.

However, the telephone analogy does not extend far. While the phone network comprises a few hundred separate countries and a few hundred network providers, the Internet is independent of geography and includes over a hundred thousand separate networks, linked by a complex set of interconnections.

Figure 1: By a three-step process, DNS provides access to a web site, using a domain name



Figure 2: Address resources are managed by the five RIRs, under policies developed by their respective regional communities



| Registry | Region |
|----------|--------|
| AfriNIC | Africa |
| APNIC | Asia Pacific |
| ARIN | Canada, United States, several islands in the Caribbean Sea & North Atlantic Ocean |
| LACNIC | Latin America, Caribbean |
| RIPE NCC | Europe, the Middle East, parts of Central Asia |
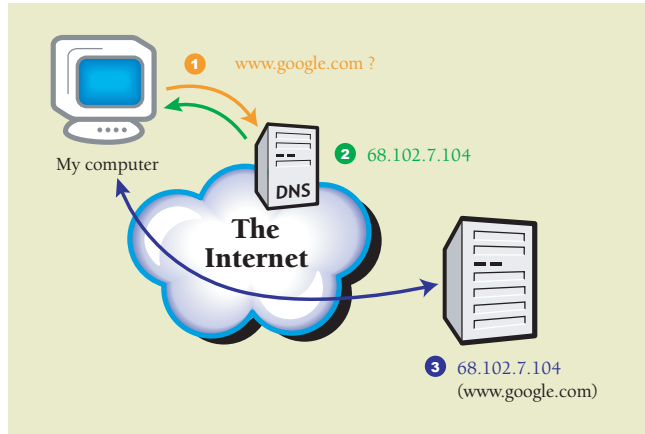
While the phone network is highly controlled and generally static in terms of new countries, Internet networks may come and go in rapid succession, extend or alter their connectivity, partition or merge their operations — all of this on a daily basis — and all without centralized control.

### What is a domain name?

For Internet users, the most familiar forms of addresses are e-mail and Web addresses and the word-based domain names that appear within them. However, these are quite different from IP addresses. While humans may prefer names, the machines that make up the Internet need numbers. Thus, the purpose of the Domain Naming System (DNS) is to allow Internet services to be referenced by their domain name.

The DNS comprises thousands of servers across the Internet. As Figure 1 shows, the DNS operates in a three-step process. Typically, a computer may query the DNS about a particular name (for example www.google.com); the DNS server will provide the IP address that corresponds to that domain name (in this example, 66.102.7.104). From there the computer and the remote service can communicate directly.

While IP addresses are fundamental to the operation of the Internet infrastructure, the DNS is, in fact, a service which operates on the Internet. Although the DNS is an essential service in today's Internet, it could be removed or replaced without the need for changes to the underlying infrastructure. In fact, even if the entire DNS suffered a catastrophic breakdown, it would still be possible to connect to any service on the Internet, provided its IP address is known.

### IP addresses management

The Internet started life as an academic and research network, linking a close community of collaborating organizations and institutions. Although the early pioneers had no way of predicting the speed and spread of their creation's growth, they created an environment that allowed for outrageous success.

A fundamental principle of Internet design is that it is a layered network that is 'dumb' at its core. Network A does not need to know how Network B is configured in order to talk to it; and whether it connects by copper wire, optical fibre, radio waves, or any other infrastructure is irrelevant. So long as a network is capable of transmitting data according to the standard protocols (such as TCP/IP) it can become part of the Internet. It is not the equipment that defines the Internet, but the protocols by which

communication takes place. A key aspect of those protocols is the system of Internet addressing. Therefore, stable management of the address system is vital to the success of the Internet.

### The early model of address management

Recognising the importance of the Internet's addressing system, its founders established a central registry from the outset. The most basic function of an address registry is to ensure uniqueness of addresses, so that clashes cannot occur. Originally, this registry was just one man — the late Jon Postel — using manual processes to keep track of the addresses allocated to the then small number of participating networks. The address registry function became known as the Internet Assigned Numbers Authority (IANA).

It is easy to forget just how quickly the Internet has grown in the past decade, but even throughout the 1980s the available addressing pool seemed vast. The registration function was straightforward and the allocation mechanisms remained relatively informal. However, as more networks joined the Internet and growth began to accelerate, it became increasingly clear that the original address management function would not scale.

The volume of requests, the linguistic and cultural diversity of requestors, and the complexity of differing regional needs caused a re-evaluation of the central registry model. In 1992, the Internet Activities Board of the IETF considered these factors and concluded: "…it is desirable to consider delegating the registration function to an organization in each of [the] geographic areas." (RFC 1366, 1992)

Another major problem with early address management was that the address technology was based on a crude subdivision of the IPv4 address space into three network "classes", allowing only three potential address allocation sizes, namely: "Class C" (256 addresses), "Class B" (65,534), or "Class A" (16,777,214).

By 1993, a new system had been introduced to eliminate the wasteful practices of "classful" addressing, but even so it was clear that the address pool could no longer be regarded as limitless.

### IP management today

Around the same time, the first of the Regional Internet Registries (RIRs) formed — as representatives of the regional addressing communities — and commenced registry operations under the delegated authority of IANA.

From the start, the RIRs have worked in a coordinated, cooperative way. An example of this is the document RFC 2050, published in late 1996, which set out common principles for IP address management and articulated the global goals to guide regional IP address policy developments. Those goals include the original IANA goals of uniqueness and registration, as well as conservation (to maximise the lifetime of the address pool), aggregation (to ensure that the global routing system remains scalable), and fairness (to ensure that IP address resources will be available to all those who need them).

The original three RIRs (RIPE NCC, APNIC, and ARIN) also worked closely together to assist the emergence of two subsequent RIRs, LACNIC andAfriNIC. The five RIRs and their regions are shown in Figure 2.

RIRs are not-for-profit organizations, which charge fees for services or membership, not for Internet number resources. RIR membership generally consists of Local Internet Registries (LIRs), Internet Service Providers (ISPs), telecommunication organizations, large corporations, and industry stakeholders such as end-users.

IANA delegates to the RIRs the authority to administer and register IP address space, Autonomous System Numbers (ASNs), and related services, such as reverse DNS delegations (which allow IP addresses to be resolved to domain names). The RIRs are not involved in domain name registration.

### RIR policy process

RIRs operate in an open, self-regulatory manner, facilitating direct participation by any interested party to ensure that the policies for number resource management are defined by all who need and use them. The RIRs ensure that policies are consensus-based and that they are applied fairly and consistently. The RIR framework provides a well-established combination of bottom-up decision-making and global cooperation that has created a stable, open, transparent, and documented process for developing number resource policies. Each RIR holds independent public policy meetings to discuss and develop policy proposals. Public mailing lists allow the entire Internet community to participate in the process.

### The NRO and global coordination

In 2003, the RIRs formed the Number Resource Organization (NRO) to undertake the joint activities of the RIRs, including joint technical projects, liaison activities, and policy coordination. The goals of the NRO are to:
- Protect the unallocated Internet number resource pool
- Promote and protect the bottom-up policy development process
- Act as a focal point for Internet community input into the RIR system.

The NRO does not develop, approve, or implement number resource policies, but it helps facilitate a process by which global address policy can be developed, subject to coordination through all the RIR communities and ratification by the ICANN Board.

### What about IPv6?

Today's Internet is built predominantly around the version of the IP address protocol known as IPv4, which provides a 32-bit address space. While there is no current shortage of IPv4 address space, it is clear that IPv4 will not be sufficient to support the long-term expansion of ubiquitous Internet devices (likely to include phone handsets, PDAs, refrigerators, televisions, home automation systems, cars, appliances, and many other devices not yet conceived). IPv6, sometimes known as the 'next generation' Internet protocol, provides a 128-bit address space, supporting a number of addresses that is hard to even imagine in human terms.

IPv6 first became available for operational use in 1999, distributed by the RIRs under the terms of a policy document that was coordinated at global level and adopted by each of the RIR regional communities. It is now deployed in networks all over the globe and supported by all modern operating systems.

It is important to realise that IPv6 is not a replacement for IPv4. To date, the main deployment model for IPv6 is 'dual stacking' where operators support both IPv4 and IPv6 in their networks. The two protocols both operate across the Internet and most users will never be aware which address protocol is responsible for delivering their e-mails or downloading their web pages.



The RIRs provide a forum for the Internet addressing community

# The role of Internet governance in the use of information and communication technology for development

*Peng Hwa Ang and Shahiraa Sahul Hameed, The Singapore Internet Research Centre*

Now, perhaps more than at any point in human history, we live in an age where human power can be magnified through technology. What the comic book hero Superman can do — run faster than a speeding bullet, leap over tall buildings and stop a moving train — humankind can outdo through the use of technology. We now have the technology to address a larger audience in a day than the average person, just a few centuries ago, ever spoke to in his or her lifetime. This amazing, almost magical power is embodied in information and communication technology (ICT).

It is only trite to say that ICT have drastically changed the way individuals and organizations interact. From the social to the cultural to the political to the economic, there is not one sphere of human activity that ICT has not touched. And with their global reach, ICT is becoming increasingly important for facilitating participation in global markets, the development of local services, developing political accountability and increasing educational, health and safety standards.

This means that ICTs have the potential to play a major role in lifting the quality of life. In implicit recognition of this, as part of its development strategy, the United Nations Development Programme placed focus on mainstreaming the use of ICTs to contribute to the Millennium Development Goals (MDGs) of poverty reduction and enhancing education, health, environment and gender equity. In fact, the United Nations (UN) Millennium Declaration (2000) accentuates the importance of building and maintaining partnerships with the private sector, directed at ensuring that the benefits of new technologies, especially ICT, are available to all. And so goes the theory and the attempted application of the theory.



A gentle reminder to the tech savvy outside a church in the Philippines

Photo: Randolph Kluver

A home away from home for the younger generation an Internet café in Viet Nam

In practice, notwithstanding the superhuman possibilities of ICT, there are still large populations that live on or below the poverty line, barely able to sustain themselves in the essentials of living. And so, although many agree that ICT is an effective vehicle for progress, its use in most developing countries is still limited. Instead, in its place is a stumbling block called the digital divide, a widening gap between the 'haves' and the 'have-nots.' Less than 15 per cent of the world's Internet users are to be found in developing countries, which have more than half of the world's population. So, what can be done?

It is not clear what will work, but it is clear what does not: there is no magic bullet. Clearly, affordability is a factor. So are the political, cultural and social contexts in which ICT is introduced. A friend says that youths from low-income Hispanic families in Texas view the computer as a feminine device used by their mothers. Unless educated otherwise, that superhuman potential of the computer will never be realized by those youths.

Faced with a seemingly insurmountable problem, the only rational response is not to give up, but to work within the boundaries of what can be done. Here is where governance, and for the purposes of this book, Internet governance, at the local and international levels can serve development. The Working Group on Internet Governance (WGIG) has defined Internet governance as follows: "The development and application by governments, the private sector and civil society, in their respective roles, of shared principles, norms, rules, decision-making procedures, and programmes that shape the evolution and use of the Internet."[1]

**Action at the local level**

*Access* — The first barrier to overcome is to allow greater access to ICT in general, and in the context of the present discussion, to the Internet in particular. In general, a competitive environment has been shown to be a structurally sound approach to lowering costs while maintaining quality. At the international level, the issue of Internet connection costs will remain for some time yet, but developing countries can reduce the scale of the problem through regional peering arrangements, which effectively share data traffic.

*Capacity Building* — ICT policies that are adopted at both national and international levels impact all segments of society. Local understanding is therefore important as citizens need to know that the use of ICT use can be directed through sound policies. This issue is best addressed by education and has been the focus of many non-governmental organization projects.

An example of a project that has been developed to address some issues related to this is the World Conference on Harnessing the Potential of ICT for Capacity Building in May 2005 at UNESCO. Besides its theme, the conference also identified the key strategic role of ICT for building knowledge societies and achieving the UN MDGs.

**Action at local and international levels**

*Multilingualism* — Another significant issue in the path of development identified by WGIG is the lack of non-English content on the Internet. Currently, 90 per cent of Internet content is in

one of the 12 major languages of the world; speakers of the other 6 000 languages in the world are thus both directly and indirectly barred from accessing the Internet. As the Internet plays an important role in the dissemination of knowledge, multilingualism on the Internet comes to the forefront as an important issue to be addressed in light of using ICT for development. Furthermore, the very nature of the Internet includes much of the inherent biasness of the more developed world, which inadvertently precludes its use by other groups that do not share similar histories and cultural backgrounds.

The issue of multilingualism needs to be addressed at both the local level — ensuring that more native-language content is produced — and the international level. At the international level, domain names need to be reproducible in the native language. One example of such a project is UNESCO's Initiative B@bel, which is aimed at promoting multilingualism on the Internet to increase equal access to information and the Internet. As part of the overall project, UNESCO has awarded research funds to several organizations including the University of California at Berkeley for the Universal Scripts Project, a project that will support the authoring of 16 Unicode script proposals including languages used by minorities in Asia, India and Africa.

### Action at the international level

*International Forum* — The challenge facing developing countries is unquestionably daunting. One shortcut is to learn from the best practices of others while avoiding the pitfalls of yet others. This is one reason the WGIG report recommended an international forum for Internet governance. Enforcement is difficult and unrealistic, as all governments will want to assert their own sovereignty. But as an opportunity to meet, to network and discuss common concerns, such a forum would be useful for developing countries.

### Finding a way forward

As evident from the examples presented above, there are many different areas and ways in which Internet governance can play a role in helping to implement the ICT for development (ICT4D) programmes, which are intended to improve the quality of life of developing and under developed nations. ICT can help the quicker realization of the UN MDGs. But the use of ICT to that end needs to be directed.

The issues in ICT use and Internet governance differ between developing and developed countries. And while the hurdles facing developing countries may seem formidable, no one is totally helpless. There are actions that developing countries can take to ameliorate the effects of the digital divide. Locally, a competitive telecommunication and Internet environment will help reduce the costs of consumers. Regionally, cooperation among neighbouring countries on such efforts as peering will help to lower the costs of operation for service providers.

Internationally, developing countries need to be actively engaged in discussions on Internet governance. To be sure, the interests of developed and developing countries do diverge. But there are also overlaps between them, and it would be in the interests of developing countries to pursue those common interests. It is, after all, in everyone's interests that the developing world climbs the development ladder. It does not require a superhuman being to do so, but it will always help.



A mobile phone shop-come-Internet café in Viet Nam

Photo: Copyright, Randolph Kluver



Internet café for every purpose — from gaming to chatting (Viet Nam)

Photo: Copyright, Shyam Tekwani

# CAS e-Science and Virtual Lab

*Baoping Yan, Kai Nan, Chinese Academy of Sciences[1]*

T HE 21ST CENTURY has seen the emergence of e-Science as a new research environment.[2] In the past few years, many e-Science related programmes and projects have been launched worldwide. The Chinese Academy of Sciences (CAS), the top research organization in China, has also been carrying out many initiatives in e-Science since 2002.[3]

## What is e-Science?

A new word rich with meanings, e-Science represents a new style of doing research in the Information Society, with the great advantage of information and communication technologies (ICT). John Taylor, Director General of Research Councils in the UK, described e-Science as follows: "e-Science is about global collaboration in key areas of science, and the next generation of infrastructure that will enable it; e-Science will change the dynamic of the way science is undertaken." While more and more countries pay attention to e-Science and take actions concerning it, there are quite a few definitions and statements about what e-Science means. It does not matter which explanation is better than others — a common understanding should be that research is the objective and new technologies are the methods of achieving it.

CAS is the top research organization of China, carrying out all kinds of research in the natural sciences. CAS has more than 100 institutes and about 37,000 researchers. It has made a great contribution to the country and intends to go on playing a leading role in the national development of science and technology. Since the end of the 20th century, the advancement and applications of ICT has vastly changed people's lives, as well as researchers' work. To make sure those scientists have a sound research environment with an advanced information infrastructure, CAS has invested a lot of resources and efforts in informatization construction over the past five years. Along with this progress, e-Science became an objective and an important task of the CAS Informatization Programme 2001-2005. Currently, the next five-year programme for 2006-2010 is being devised. e-Science has been chosen as the main direction in the new programme.

## CAS Informatization Programme 2001-2005

The main object of the CAS Informatization Programme 2001-2005 was to significantly improve the CAS information infrastructure, based on finding a common platform and services on which all institutes and researchers of CAS could run.[4] Some key projects of the programme are the upgrade of the CAS network, the construction of a supercomputing environment, the scientific database and its applications, and a video conferencing system, among others. Table one shows the main achievements of the programme.

## CAS e-Science Initiative 2006-2010

In 2004, CAS started planning the new programme for CAS Informatization Construction under the national 11th five-year programme 2006-2010. At almost the same time, the Chinese Government organized more than 1,000 experts to fulfil a middle and long term national plan untiil 2020 for the development of science and technology. Some experts had worked for both plans. CAS tried its best to follow and match the national plan to its own scheme for the next five years.[5]

The ultimate goal, or the vision, of CAS Informatization is to build a digital CAS, which would be an ideal form of the academy to take in the Information Society. There are two major missions: one is e-Science and the other is Academia Resource Planning (ARP). ARP is a new concept borrowing from Enterprise Resource Planning (ERP). e-Science means scientific research activities in an informatized environment; ARP means administration for scientific research in an informatized environment.

**Table 1: Progress on information infrastructure**

| Infrastructure | Item | By 2000 | By August 2005 |
|---|---|---|---|
| CAS Network | Core Bandwidth<br>Backbone Bandwidth<br>International Links | 1Gbps<br>2Mbps<br>55Mbps | 2.5Gbps<br>N x155Mbps +2.5Gbps<br>620Mbps + 12Gbps |
| Super computing | Peak Perfomance<br>Storage<br>Linpack | 130GFLOPS<br>2.1TB<br>50GFLOPS | 5.5TFLOPS<br>182TB<br>4.2TFLOPS |
| Scientific Database | Member Institutes<br>Number of databases<br>Data Volume | 21<br>180<br>725GB | 45<br>388+<br>13TB |

In the past five years, CAS has made huge progress in informatization construction, especially in upgrading the information infrastructure and a widely accepted understanding of its significance. Applications that could really take advantage of this infrastructure and new technologies will become the focus of the next step. While e-Science represents a whole picture of the effects that informatization brings to academia, Virtual Lab, a key concept and the core component in an e-Science context, would be the most important concrete implementation facing end users, that is to say, thousands of researchers. Figure one shows the framework of the CAS e-Science Initiative 2006-2010.

**e-Science Virtual Lab**
Virtual Lab is not a very new word; however, the 'virtual lab' we're talking about here has its own special meanings in the e-Science context. To be more clear, we also call it "e-Science Virtual Lab" if need be.

In our e-Science framework, Virtual Lab takes key positions between applications and resources. These resources could cover all aspects of research activities, including the information infrastructure, scientific equipment and facilities, and so on. Virtual Lab is the core component to make e-Science a reality as there are so many existing resources in place, but just a few could be brought into full play even now, with an advanced infrastructure ready. The last bottleneck may be the gap between products by computer experts and end users of domain scientists. According to our experience, it would take much more effort than expected to bridge this gap. Therefore, Virtual Lab is proposed to be a basic unit of research activity in the e-Science environment. Virtual Lab is the right user interface between scientists and their e-Science environment. Through Virtual Lab, all kinds of resources could be integrated into a single access point; customized and flexible services would be provided according to the specific requirements of different domains in an easier way than ever before; multi-disciplinary, multi-site and multi-organization collaboration could be carried out on a routine basis.

Virtual Lab should have seven crucial features as follows:
*Ease of use* — It should be much easier to use than current systems. To some extent this is more important than functionality.

*Resource integration* — Virtual Lab should provide the user with a single operating environment under which many kinds of resources, such as supercomputers, mass storage facilities, scientific databases, digital libraries, high bandwidth link, scientific equipment, etc. could be accessed in a seamless way.

*Customized service* — It should provide a user with what he or she wants completely and exactly. e-Science is a comprehensive environment, but each user may need a specific workbench individually. Furthermore, users may like to choose different services at different times or at different prices. This requires not only Virtual Lab, but also the support of a service provider that can customize the service according to the user's demand.

*Ubiquitous research* — It should benefit from state-of-the-art technologies on mobile computing and related technologies so that users can use the Virtual Lab at any time and anywhere.

*Collaborative work* — It should enable a lot of scientists, who are from multiple independent institutions, from multiple sites across the world, and from different professional backgrounds, to work together on a collaborative project or a common problem.

*Scalability* — It should be able to support hundreds of users from tens of institutions, but should work just as well for three or five users.

*Management* — It should interact with other management systems, such as ARP in CAS, to help improve efficiency during the whole lifetime of a research project or other research activities.

As a pilot project, the Avian Flu Comprehensive Information Platform and Foreseeing System (AFFS) has been ongoing since May 2005. Four institutes of CAS (the Institute of Microbiology, Institute of Virus, Institute of Zoology, and Computer Network Information Center) in different disciplines are taking part in this project. A collaborative workbench based on Virtual Lab has been established, dedicated to the group of scientists within this project.

**The science of tomorrow**
ICTs are the product of research, and they are changing the ways we research, making e-Science the science of tomorrow. CAS has carried out some key projects to improve its information infrastructure between 2001 and 2005. CAS researchers have benefited from this informatization programme over the past five years. At the time of writing, the plan for CAS e-Science in 2006-2010 is being completed. Virtual Lab will be the core component of CAS e-Science in the coming years. We believe in and look forward to the continued success of e-Science in the Information Society.

Figure 1: Framework of e-Science initiative 2006-2010



[ 192 ]
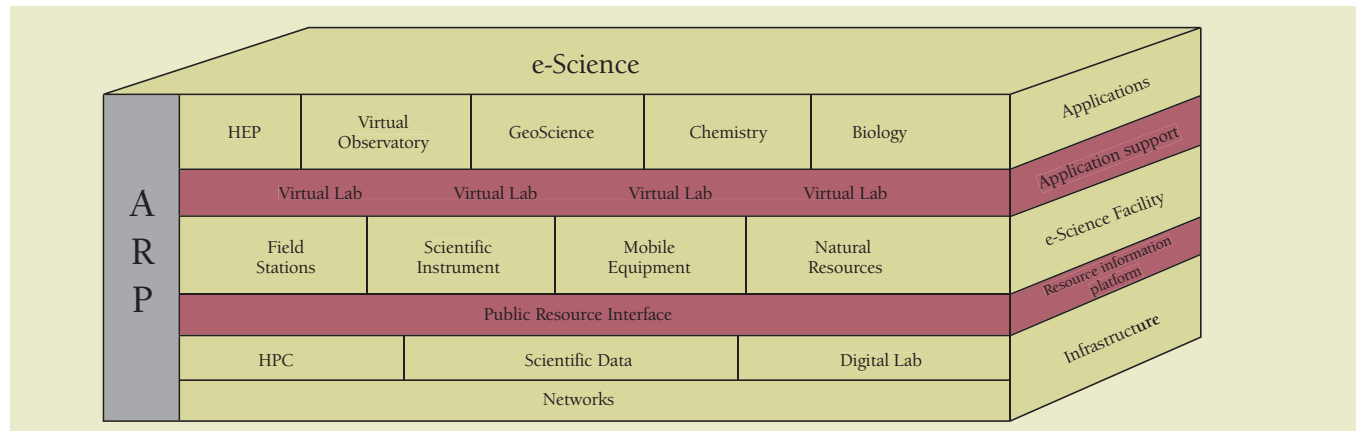
# Virtual Science Museums of China: a success in Internet-based science popularization

*Yun Xiao, Jianhui Li, Wen Li, Yu Chen, Baoping Yan*

SCIENCE COULD SERVE society better if more ordinary people could understand, appreciate and question it. With the spread of the Internet and people's increasing trust in it, internet-based science popularization embraces new challenges and offers new opportunities. Virtual Science Museums of China (http://www.kepu.net.cn) takes measures to transfer the knowledge, methods, procedures and responsibilities of science, promoting exchange and mutual understanding between the science community and the public.

Technology does not inspire, but content will. Virtual Science Museums of China uses information and communication technology (ICT) to make scientific content easier to understand, more enjoyable to receive and fun to play with.

The Internet became very popular in China at the end of the 1990s. Yet there were few websites with comprehensive science-related content. As a leading academic institution with more than 100 institutes and over 40,000 science workers, the Chinese Academy of Sciences (CAS) felt it their responsibility to promote a public appreciation of science. The Computer Network Information Centre (CNIC), the birthplace of China's Internet and a sub-organization of CAS, initiated the VSMC project on 25 October 1999 with the support of CAS research centres and scientists. With 60 virtual museums in the Chinese language and 12 in English, VSMC had counted 42 million visitors in total by 31 March 2005 and nearly 30,000 visitors on average each day since 2002, ranking highly among websites for science popularization in China.
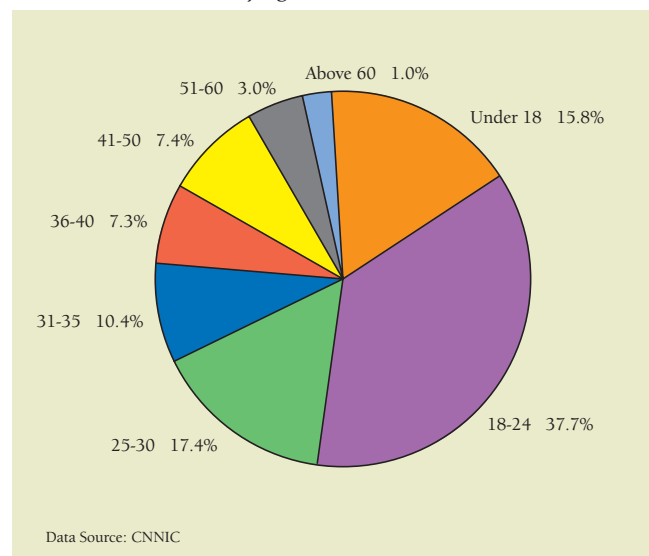
In February 2004, VSMC was selected as one of the most excellent cultural websites by the Organizing Committee for the China Internet Manners and Culture Project and was recommended all over the country. In September 2005, VSMC was recognized as one of the best websites for the public understanding of science by the Union of Internet-based Science Popularization under the China Internet Society.

**The VSMC pattern of Internet-based science popularisation**
According to the *16th Statistical Survey Report on Internet Development in China*, the number of Internet users in China had reached 103 million by 30 June 2005, with the youth holding a dominant position. Seventy-seven per cent of Internet users think the Internet helps them greatly with study. Internet-based science popularization in China has become a new trend with great potential, targeted mainly at the youth.

The table below helps explain how VSMC works to promote the public understanding and appreciation of science. As a producer of science information, over 40,000 science workers in CAS input knowledge and thinking methods into virtual museums (Info 1). A professional information service team of VSMC serves as full-time science popularization workers, who work creatively to produce and transfer Info 2 to Internet users while communicating with science workers and inspiring them to reach their full potential. In order to provide better service, science popularization workers will continuously improve Info 2 by

**Internet users in China by Age**



Above 60  1.0%
Under 18  15.8%
51-60  3.0%
41-50  7.4%
36-40  7.3%
31-35  10.4%
18-24  37.7%
25-30  17.4%

Data Source: CNNIC

**VSMC pattern of science communication**



Science workers

Info 2

Info 1

Info 3

Public

Science popularisation workers

Info 4

V S M C
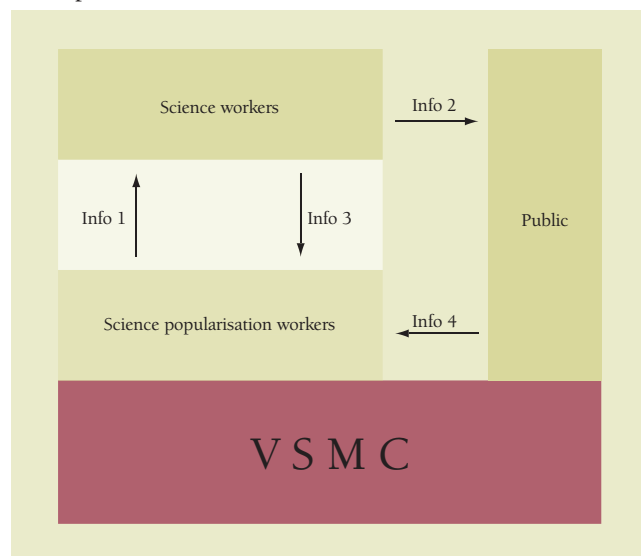
receiving and analyzing feedback (Info 3 from science workers and Info 4 from Internet users). Meanwhile, as a social force concerned about the function of science to society, the public should have a chance to participate in science and understand its influence, power and function. It is necessary to promote communication between scientists and the public, and to emphasize the social responsibility of scientists in scientific research. Therefore, VSMC also serves as a platform on which a virtual society of science is built among science workers, science popularization workers and Internet users.

**The uses of ICT in promoting a public appreciation of science**

Science workers serve as the information source for science popularization. As a CAS-sponsored project, VSMC takes the responsibility to promote the sharing of research equipment and achievements. In traditional animal observation, human interference influences the behaviour of giant pandas. The application of a web-camera gives the scientists convenience as well as more authentic data. VSMC introduced this advanced research method, where Internet users could control a remote camera using a computer and the Internet, make real-time observations of panda cubs, publish an observation diary and take videos. Now, VSMC has a regular live broadcast on national science events and lectures by famous scientists, sends free digital magazines to subscribers with science topics of general interest, and updates "Look into Science" every week with the latest science content relevant to people's everyday lives.

ICT helps to make science easier to understand, more enjoyable to receive and fun to play with. VSMC encourages playful learning through interactive contents like multimedia, flash explaining scientific experiments and procedures, virtual reality technology showing the local environment, and science games such as the Giant Panda Contest, Net a piece of Chinese Ceramics, and Build a Space Shuttle. In 2003, when SARS (Severe Acute Respiratory Syndrome) suddenly prevailed, VSMC immediately designed a game to teach people about SARS and ways to prevent it.

Science could serve the society better if individuals had the opportunity to participate in it and understand its influence, power and function in their lives. VSMC encourages Internet users to share their own data. In VSMC, the audience could write suggestions, submit observation diaries, publish science journals and papers, discuss opinions about science and science events, and ask questions to the scientists. The online Science Forum, involving scientists and researchers, helps build a bridge between the science community and the public.

Every citizen should benefit from the development of the Internet society. VSMC produces and transfers free information to Internet users, with special attention to the youth, children and citizens of low socio-economic status. VSMC designs online curriculums for elementary and middle school students based on virtual museums, and encourages playful learning through interactive content like multimedia. In order to reach people in poor and remote areas, VSMC donates CDs containing science content, and has set up mirror sites in Western China. From September 2004, virtual museums like Ancient Science and Technology and Wild Animals are included in the Children and Early Youth Culture of National Cultural Information Resources Sharing Project, covering all provinces and most cities in China and providing free service for approximately 50,000 rural elementary and middle schools through the National Rural School Remote Education Project.

The Internet makes a smaller world, and promotes dialogue between different cultures and civilizations. As China's leading power of Internet-based science popularization, VSMC builds international partnerships with universities and organizations like Texas A&M University and Sesame Workshop. Twelve museums in the English language, like the Giant Panda Museum, Chinese Nationalities, Chinese Ceramics and Xishuangbanna Tropical Botanical Garden, help people from different cultures to get a better understanding of the natural resources and cultural heritage of China.

**A bridge for communication**

With the spread of the Internet and people's increasing trust in it, the Internet has begun to serve as an important media for science popularization. Most Internet users and non-Internet-users choose to believe the information on the Internet. The proportion of non-Internet-users who choose to believe the information on the Internet is even higher than that of the Internet users. The attitude of non-Internet-users towards the Internet shows the great potential of Internet-based science popularization.

In science popularization, different measures should be taken to communicate the knowledge, method, procedures and social responsibilities of science. Compared with traditional methods of popularizing science, the emphasis in science popularization today is more on the Internet, television, newspapers and other mass media. The purpose of science popularization is to promote the public understanding of science, and to give people more decisive power on their own future. Science will serve society better when more common people can understand, appreciate and raise questions about it.

In the procedure of science popularization, ICT brings the possibility of building a bridge for equal communication and mutual understanding between the science community and the public, by means of live broadcasts of big science events, chat rooms, science forums and BBS, video conferencing between science workers and the public, online lectures by scientists, and so on.

In the community of Internet-based science popularization, professional science popularization workers are the core force and science workers are indispensable.

It is necessary to build a professional team armed with basic scientific concepts, theories of science communication studies, information technology and experience of science popularization, which are the key drivers of Internet-based science popularization. These will encourage other participant forces and promote the efficiency of the whole.

**Screenshot of VSMC, English Edition**

# Artificial intelligence

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*Head of Artificial Intelligence Laboratory;*
*Member of the Working Group on Internet Governance*

THE TERM ARTIFICIAL intelligence (AI) was first coined at Dartmouth Conference in 1956, and since then AI has expanded because of the theories and principles developed by its dedicated researchers. Through its short modern history, advancement in the fields of AI have been slower than first estimated, progress continues to be made. From its birth four decades ago, there has been a variety of AI programmes, and they have impacted other technological advancements.

Nevertheless, this does not mean that all researchers in this domain agree on what AI stands for. What does it mean, in fact, to build an intelligent machine?

We can essentially envision two types of answer:
- A machine will be considered as intelligent if it reproduces the behaviour of a human being in a specific domain or not
- A machine will be considered as intelligent if it models the functioning of a human being.

Currently, it seems that the dichotomy between these two approaches to AI is becoming less and less relevant for two reasons:

- The strength of the computer alone is never insufficient to resolve the most difficult problems
- The cognitive theory seems to gain strength.

**What is artificial intelligence?**

It is the branch of computer science concerned with making computers behave like humans. AI is simply the application of artificial or non-naturally occurring systems that use the knowledge-level to achieve goals. A more practical definition that has been used for AI is attempting to build artificial systems that will perform better on tasks that humans currently do better. It is the capability of a device to perform functions that are normally associated with human intelligence, such as reasoning and optimization through experience and to attempt to approximate the results of human reasoning by organizing and manipulating factual and heuristic knowledge.

It includes:
*Expert systems* — Programming computers to make decisions in real-life situations (for example, some expert systems help doctors diagnose diseases based on symptoms)



Young girls under the spell of the computer world

*Natural language* — Programming computers to understand natural human languages
*Neural networks* — Systems that simulate intelligence by attempting to reproduce the types of physical connections that occur in animal brains
*Robotics* — Programming computers to see and hear and react to other sensory stimuli
*Games playing* — Programming computers to play games such as chess and checkers

AI has two objectives:
• To study the mechanisms of intelligence
• To build programs able to respond to intelligent activities.

## History of artificial intelligence

In 1956 John MacCarthy, regarded as the father of AI, organized a conference to draw the talent and expertise of others interested in machine intelligence for a month of brainstorming. He invited them for "the Dartmouth summer research project on artificial intelligence." From that point on, because of MacCarthy, the field would be known as Artificial intelligence. The Dartmouth conference did bring together the founders in AI, and served to lay the groundwork for the future of AI research. For that purpose, he joined Minsky, Newell, Simon and Shannon.

The 1970s and the beginning of the 1980s were marked by the realization of many expert systems. The seventies were also the years of the first experiments with mobile robots (for example, Shakey the Robot of the SRI at Menlo Park, California). AI first developed in USA, before interesting researchers in Europe and Asia in the mid s1970s.

## Different models of artificial intelligence

Today, three big models are used by researchers and engineers in artificial intelligence:
• Symbolic models (Symbolic AI)
• Neuromimetic symbols (Connectionist AI)
• Statistics models (AI Statistics).

## Fields of artificial intelligence

*Robotics* — Robotics is the field of computer science and engineering concerned with creating robots, devices that can move and react to sensory input. Robotics is one branch of artificial intelligence. Robots are now widely used in factories to perform high-precision jobs. They are also used in special situations that would be dangerous for humans — for example, in cleaning toxic wastes or defusing bombs. Although great advances have been made in the field of robotics during the last decade, robots are still not very useful in everyday life.

Aware of the numerous challenges arising from robotics (cost and heavy weight), the scientists of IMSI (Institute of Materials and Intelligent Systems) are trying to find more practical and affordable ways.

*Learning* — The domain of learning in AI is merely an attempt to simulate with a machine the remarkable aptitude that man has to learn. Hence the importance of theoretical researches which try to provide a formal environment to machine-based learning.

*Speech Recognition* — Many psychological studies based on the child's simultaneous development of language and intelligence and on the comparison between man and the chimpanzee revealed the importance of language in the development of intelligence. In speech recognition, we can distinguish two methods:
• The systems of speech recognition which have the objective of decoding the pronounced sentence word by word
• The systems of speech understanding which have the objective of understanding the pronounced sentence.

*Understanding natural languages* — Progress on building computer systems that process natural language in any meaningful sense requires considering language as part of a larger communicative situation. Natural-language processing offers the greatest potential rewards because it would allow people to interact with computers without needing any specialized knowledge. You could simply walk up to a computer and talk to it. In fact, two essential dimensions are significant: understanding texts and automatic translation.

There are also voice recognition systems that can convert spoken sounds into written words.



Kindergarten children using computers to learn

One goal of AI work in natural language is to enable communication between people and computers without resorting to memorization of complex commands and procedures. Automatic translation — enabling scientists, business people and just plain folk to interact easily with people around the world — is another goal. Both are just part of the broad field of AI and natural language, along with the cognitive science aspect of using computers to study how humans understand language.

*Knowledge representation and reasoning mechanisms* — Representations based on logic or structured like frames, scripts and other representations of this type, like semantics have been also introduced in AI and have been developed afterwards in classical computing applications like Object Programming which retakes the concept of frame, representing entities to which behaviours like data bases are associated.

*Expert systems* — In the early 1980s, expert systems were believed to represent the future of artificial intelligence and of computers in general. The primary goal of expert systems research is to make expertise available to decision makers and technicians who need answers quickly. Portable with computers loaded with in-depth knowledge of specific subjects can bring decades' worth of knowledge to a problem. The same systems can assist supervisors and managers with situation assessment and long-range planning. Many small systems now exist that bring a narrow slice of in-depth knowledge to a specific problem, and these provide evidence that the broader goal is achievable.

These knowledge-based applications of AI have enhanced productivity in business, science, engineering, and the military field. With advances in the last decade, today's expert systems clients can choose from dozens of commercial software packages with easy-to-use interfaces.

Today, the original field has been enlarged to include under the name 'knowledge engineering' the conception of application with the aim of helping the user intelligently.

*Formal calculations* — The areas of research include Computer Algebra (symbolic computation), more specifically polynomial system solving, Axiom and arithmetic of real numbers and algebraic infinitesimals and effective Galois theory. The findings are useful in various fields: robotics, astronomy, image compression.

The study of mathematical reasoning was at the origin of the development of logic in the first half of the 20th century, which led to a precise definition of the notion of effective calculation as the starting point of computing science. With AI, other types of reasoning different from the ones made by mathematicians became subjects of study.

*Problem resolution* — To resolve a given problem, we need to break it up into sub-problems and then break the latter into small ones until we get problems having an immediate accessible solution.

*Computer vision* — Visual perception with the computer is a means of interaction between human beings and computers. Vision involves both the acquisition and processing of visual information. AI powered technologies have made possible such astounding achievements as vehicles that are able to safely steer themselves along our superhighways, and computers that can recognize and interpret facial expressions.

AI programs make possible the enhancement, interpretation, recognition, identification and other processing of partial images. AI vision technology has made possible such applications as: image stabilization, 3D modelling, image synthesis, surgical navigation, handwritten document recognition, and vision-based computer interfaces.

*Human-machine interface* — This represents a key element in the use of any information system and determines its success. In this regard, the human-machine interface must be conceived as an extension of the user short-term memory and must integrate temporal aspects of the interactions. Theoretically, it has to be natural, efficient, reliable and easy to understand and to use. These aspects are very important for the performers of the human-machine interface.

*Artificial neural networks* — A neural network is a collection of processing nodes transferring activity to each other via connections. The clearest example is, of course, the brain.

In computing, 'neural network' refers to a class of models which simulate learning in order to assist us in detecting information, predicting outcomes, and making decisions. Neural nets have the topology of a directed graph, meaning that, like the structure of the brain, connections between nodes or neurons is one-way.

Neural networks, along with other analytical and predictive methods, are today being incorporated into a relatively new field called Knowledge Discovery and Data Mining (KDD). A primary goal of KDD tools is to assist the user in detecting relationships in data which may not be readily perceptible due to the sheer size of data, missing data elements, or certainly lack of time to examine data and infer knowledge from them. Today, they are proving successful in a number of disciplines such as voice recognition and natural language processing.

*Distributed Artificial Intelligence (DAI)* — DAI systems can be defined as cooperative systems where a set of agents act together to solve a given problem. These agents are often heterogeneous (e.g. in a Decision Support System, the interaction takes place between a human and an artificial problem solver).

It is a branch of classical AI which deals with intelligent behaviours as the result of the cooperative activity of many agents. DAI introduced the concept of MULTI-AGENTS whose characteristics are: cooperation, coordination and communication. Every agent is autonomous and can be conceived independently from the others. The advantages are both on the methodological and technical levels.

*Genetic algorithms* — A genetic algorithm (GA) is a search technique used in computer science to find approximate solutions to combinatorial optimization problems. GAs are a particular class of evolutionary algorithms that use techniques inspired by evolutionary biology such as inheritance, mutation, natural selection, and recombination (or crossover). They were formally introduced in the United States in the sixties by John Holland at the University of Michigan.

To use a GA, you must represent a solution to your problem as a genome (or chromosome). The GA then creates a population of solutions and applies genetic operators such as mutation and crossover to evolve the solutions in order to find the best one(s).

The three most important aspects of using GAs are: (1) definition of the objective function, (2) definition and implementation of the genetic representation, and (3) definition and implementation of the genetic operators. Once these three have been defined, the generic genetic algorithm should work fairly well.

*Virtual reality (VR)* — VR provides the experience of perception and interaction through the use of sensors and effectors in a simulated environment. Advances in simulation technology allow computer resources to be interconnected with humans through the use of sensor systems and robotic devices. The goal of the simulation is to have a viewer see only the simulation — as if he or she were inside the simulation itself. Modern interfaces allow you to get into virtual environments, to move and to be exposed to graphical objects created by the computer as if they were real objects and places.

Investment in ICTs is at the heart of the Tunisian education system

There are numerous applications in the domains of healthcare, education and lifelong learning, manufacturing, and other areas where this technology shows great promise for improving productivity. Early results show an increase in productivity and a reduction in cost and resources.

### Case studies

The following four case studies highlight application areas where AI technology is having a strong impact on industry and everyday life.

*Authorizing financial transactions* — Governments employ AI systems to detect fraud and expedite financial transactions, with daily transaction volumes in the billions. These systems first use learning algorithms to construct profiles of customer usage patterns, and then use the resulting profiles to detect unusual patterns and take the appropriate.

*Configuring hardware and software* — AI systems configure custom computer, communications, and manufacturing systems, guaranteeing the purchaser maximum efficiency and minimum setup time, while providing the seller with superhuman expertise in tracking the rapid technological evolution of system components and specifications. Systems currently deployed process billions of dollars of orders annually.

*Diagnosing and treating problems* — Systems that diagnose and treat problems — whether illnesses in people or problems in hardware and software — are now in widespread use. Diagnostic systems based on AI technology are being built into photocopiers, computer operating systems, and office automation tools to reduce service calls. AI-based systems assist physicians in many kinds of medical diagnosis, in prescribing treatments, and in monitoring patient responses.

*Scheduling for manufacturing* — The use of automatic scheduling for manufacturing operations is exploding as manufacturers realize that remaining competitive demands an ever more efficient use of resources. This AI technology has shown itself superior to less adaptable systems based on older technology.

This same technology has proven highly effective in other commercial tasks, including job shop scheduling, and assigning airport gates and railway crews.

### Artificial intelligence in Tunisia

Nowadays, AI is taught in most Higher Education Institutes and Universities in Tunisia. Renowned professors are conducting valuable researches in different domains in AI applications such as education, industry, business, medicine and services.

Within the LIA, ENSI, Tunis University, a laboratory of AI headed by me personally, we published about one hundred articles, papers and conferences in international scientific journals and reviews. We can also notice that more and more students are interested in AI as a subject for their Masters and PhD theses. Besides, many international conferences and workshops relating to AI have been held in Tunisia.

Scientific research could not have reached this stage of development and depth without the full support of the Government which doubled its budget, reaching 1.5 per cent and created many scientific research centres connected to specialized international networks.

### The way forward

AI began as an attempt to answer some of the most fundamental questions about human existence by understanding the nature of intelligence, but it has grown into a scientific and technological field affecting many aspects of commerce and society.

AI researchers remain focused on the big challenges of automating intelligence. Work is progressing on developing systems that converse in natural language, that perceive and respond to their surroundings, and that encode and provide useful access to all of human knowledge and expertise. The pursuit of the ultimate goals of AI continues to have practical consequences in the form of new industries, enhanced functionality for existing systems, increased productivity in general, and improvements in the quality of life.

# Using ICT to fight corruption and save costs

*Jermyn Brooks, Member of the Board Transparency International*
*Written in collaboration with Fabio Annovazzi*

CORRUPTION IS ONE of the primary causes of poverty. Its most profound and deadly impact is on the poor. Corruption makes the eradication of poverty much more difficult by siphoning resources away from their intended purpose and undermining the basic services (security and law enforcement, health services, education, public infrastructure) on which the poor especially count to improve their condition.

Transparency International estimates that in Africa USD148 billion are lost every year to corruption. This figure is equivalent to half of Africa's external debt, which, according to the International Monetary Fund, reached USD284 Billion in 2005.[1] The World Bank estimates the total worldwide cost of corruption is USD1 trillion per year, and emphasizes the potential benefit of effective measures designed to address the problem.

The Word Bank's research has found that there is a '400 per cent dividend' of good governance and corruption control: in the long run, countries that improve control over corruption and establish the rule of law can expect on average a four-fold increase in income per capita. Thus, a country with an income per capita of USD2 000 could expect to attain USD8 000 in the long run by making strides to control corruption. Similarly, such a country could expect, on average, a 75 per cent reduction in child mortality.[2]

Because of the misuse of funds which should be available for general education, it can be argued that efforts to close the digital divide and to promote inclusiveness in the implementation of information and communication (ICT) will be less effective if the problem of corruption is not tackled effectively. Fortunately, ICT can come to the rescue. In addition to being a direct instrument to support development, ICT can have an important role in the fight against corruption by fostering transparency in the calculation and subsequent recording of transactions.

The most important international actions that must be taken to address corruption are policy driven and aim to create an environment that clearly sanctions this practice. These include the ratification and implementation of the United Nations Convention Against Corruption and of the OECD Convention on Combating Bribery of Foreign Public Officials.

One of the main objectives of these conventions is to stem the 'supply side' of the problem by enforcing the laws against bribery and ensure that companies no longer view bribery as an acceptable way to win contracts. The OECD convention, which follows many of the principles set by the 1977 US Foreign Corrupt Practices Act, marks an important step in the international movement to criminalize bribery, in that its signatories account for about two-thirds of all global exports and approximately 90 per cent of worldwide foreign direct investment.[3]

The OECD convention requires that national laws establish the bribery of foreign public officials as a criminal offence and estab-

lish the liability of enterprises for the offence. In practice, a private company can be held liable in its home country if an employee of one its foreign branches engages in corruption activities, even without the knowledge or consent of the head office. There are also important provisions relating to the maintenance of sound internal controls and of properly supported and complete books and records.

The national implementations of the convention — along with other well known pieces of legislation, such as the US Sarbanes-Oxley Act of 2002 — define a clear responsibility and a challenge to the top management of international companies in view of their increased personal exposure in the face of misconduct by company employees or agents/partners, or failure to maintain a truthful record of all business transactions.

To manage this risk, many companies have adopted compliance programmes which aim to avoid and detect non-compliant behaviour and processes. Compliance programmes — based on guidelines such as the Business Principles for Countering Bribery developed by Transparency International — are probably the single most important measure contributing to prevention and deterrence.[4]

In some countries, national laws consider effective and robust compliance programmes as mitigating or liberating factors in case of violation of the law by rogue employees or agents. Transparency represents one of the factors that contribute to the meaningfulness and robustness of a well-structured compliance programme, which requires a proper accounting system to be in place.

An example of how ICT can help foster transparency relates to accounting systems. Modern Enterprise Resource Planning solutions make it much easier to implement effective internal controls, improving the audit trail of business transactions and increasing transparency.

Electronic invoicing — defined as the exchange of machine-readable documents between commercial partners, which allows the automation of the invoicing reconciliation and routing process — represents a further, promising measure to foster transparency and to support the fight against corruption. Invoices received for non-existent transactions represent the usual method to set up the funds out of which to pay bribes, a practice that is much easier to detect and suppress in an electronic invoicing scenario.

Electronic invoicing is an attractive option because it could become pervasive in a comparatively short time, given its potential benefits to businesses and tax administrations. Electronic invoicing can save companies hundreds of millions of dollars in transaction costs worldwide, and can help tax administrations fight tax evasion while allowing for a significant simplification in the administrative tax burdens companies must comply with. This is increasingly recognized by forward-looking companies such as ABB, which has launched an electronic

invoicing project that is expected to deliver substantial savings and help support the company's compliance and corporate governance policies.

It is difficult to estimate the potential savings of electronic invoicing. In any case, it is a very significant figure. The EU talks about EUR50 billion per year for the region,[5] while the Italian CNEL working group has pointed out to a EUR30 billion figure for Italy alone.[6]

Every year somewhere between 10 and 20 billion invoices are exchanged between companies in the US and EU countries alone. The total processing cost of an invoice (which includes both the expenses of the seller and those on the buyer side) is somewhere between EUR20 and EUR30. The estimated saving that can be achieved through automatic processing is generally estimated to be 70-80 per cent of that figure.[7] (Figure 1).

With a few notable exceptions such as Finland, the actual adoption of electronic invoicing in the market has been most disappointing: in Europe at least 95 per cent of invoices exchanged between companies are in still in paper form.[8]

An explanation of the surprisingly low diffusion in most countries can be found in the so-called network effects. The advantages of electronic invoicing are contingent on reaching a critical mass of users as illustrated by the spread of the fax machine.

In 1984 about 80 000 fax machines were sold in the USA. In 1987, when the number of fax machines hit 500 000 units (the tipping point), sales of fax machines exploded, reaching one million per year. The fax machine had suddenly become indispensable.[9]

However, below the level of critical mass a service that obeys 'network effects' delivers a value that, by definition, is less than its cost (Figure 2).

A seller has little or no interest in migrating to electronic invoicing until his business partners do the same, especially considering that the savings of electronic invoicing are greater for the buyer (who can automate a complex and costly process) than for the seller (who saves post and archiving costs) (Figure 3). In this phase the few early adopters are easily discouraged.

For instance, in a number of EU states the migration to electronic invoicing is made difficult by the complexity of the legal requirements. The irony of the situation is all too obvious, if one just thinks that electronic invoicing gives tax administrations a new weapon with which to fight against tax evasion.

The regulatory obligations required by some EU member states (electronic signature, time stamp, electronic invoice archiving rules etc.) can be satisfied by using third party software solutions, which encapsulate the regulatory requirement. The problem is that these solutions are 'black boxes' for the seller, who is still responsible for the correctness of the invoice towards the tax administration. The answer is a proactive role for tax administrations in supporting suppliers of electronic invoicing solutions, to give users certainty of the regulatory compliance of the e-invoicing solutions offered by the market.

Supporting electronic invoicing is also important to assure that electronic invoicing will be equally adopted in developing countries and will not end up making only companies from developed countries more efficient, thus increasing the digital divide. If the network theory is correct, this represents a very concrete risk.

Electronic invoicing is not going to happen without active promotion and support, which is weak or downright absent in developing countries. Furthermore, the regulations covering electronic invoicing in developing countries are often complex or unclear, which puts a further burden on the shoulders of early adopters.

Figure 1: Advantages of electronic invoicing



SELLER
» Lower invoicing costs, no paper,
   no printing, no stamps          = 1-4 €/invoice

» Improved cash flow              = open

» Improved customer relations     = open

BUYER
» Lower costs for invoice receipt
   checking and reconciliation     = 9-30 €/invoice

» Improved cash management        = open

» Better quality of data          = open

Figure 2: Metcalf's law



Utility value of service

Over the "critical mass" the value of the service for the user is greater than its cost

Utility=Users²

Under the "critical mass" the value of the service for the user is lesser than its cost

Figure 3: Savings of electronic invoicing for the seller



Euros

Benefits

Net loss

Savings

Costs

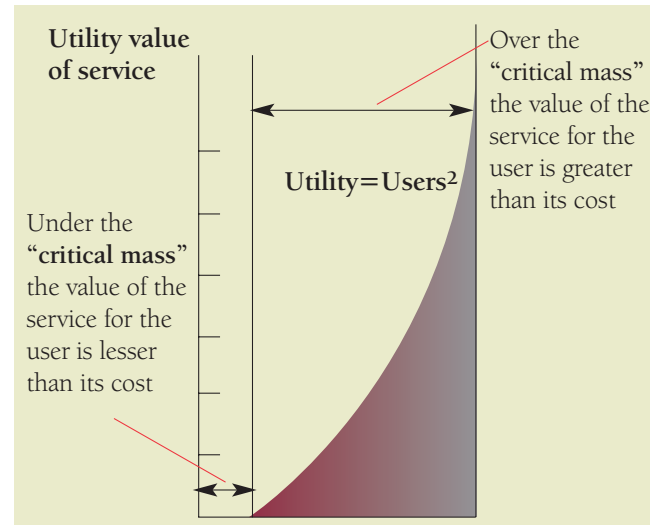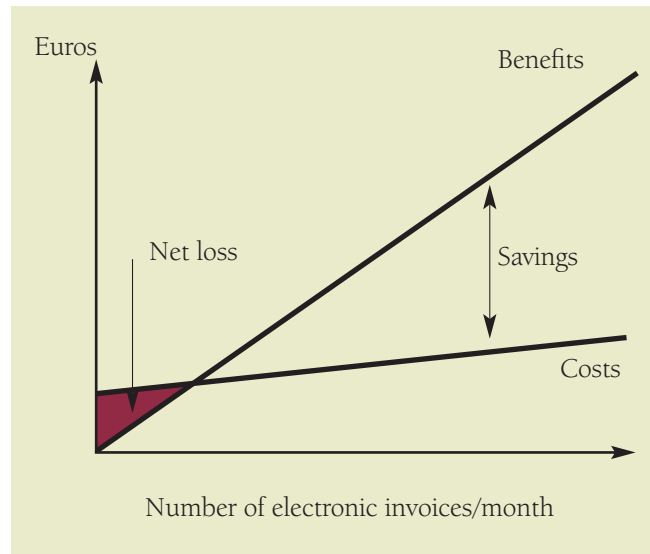Number of electronic invoices/month

# Advancing open standards for the Information Society

*Patrick J. Gannon, President & CEO, Organization for the Advancement of Structured Information Standards*

OPEN, ACCESSIBLE STANDARDS are a vital constituent of the Information Society. OASIS, the Organization for the Advancement of Structured Information Standards, is a not-for-profit international consortium for the development, convergence and implementation of cross-sectoral e-business standards. Based in Boston, USA, OASIS currently comprises 5 000 participants in 100 countries. The consortium is a party to the United Nations Memorandum of Understanding for Electronic Business (UNECE-ITU-IEC-ISO) and a partner of the UN Centre for Trade Facilitation and e-business (UN/CEFACT) based in Geneva, Switzerland. OASIS participated in the first phase of WSIS 2003 in Geneva and looks forward to doing so in 2005 in Tunis.



Patrick J. Gannon, President & CEO, OASIS

Until now, industry-specific e-business vocabularies have been developed using the common eXtensible Markup Language (XML) standard, but, all too often, most have been built within specific industries in a stove-pipe fashion that limits many companies' use of the Internet for e-business. The lack of a unified approach has become a barrier for most companies to achieve service expansion benefits into cross-sectoral lines of business and for governments that seek more integrated solutions. This article describes the problem and presents some solutions for building the next generation of open standards to enable interoperability at the business layer.

The World Summit on the Information Society in 2005 will confirm the commitment of the international community to open, accessible standards for information and communication technologies. OASIS is the principal industry body with a mission to deliver cross-sectoral solutions for the next generation of e-business standards.

The WSIS process has done much to stimulate the more rapid implementation of ICT in all aspects of business, government and increasingly in civil society throughout the world. As techniques and applications for e-business, e-commerce and e-government have proliferated during the last three years, there have been increasing efforts to promote the full participation of all countries and economic groupings into global digital networks which underpin the reality of globalization.

**What's the problem?**

However, significant business problems are occurring in those companies that are implementing the various e-business XML-based vocabulary standards developed by many of the industry associations. Businesses typically find themselves unable to utilize vertical industry B2B vocabulary standards directly out of the box, and experience further difficulty leveraging multiple vertical industry standards and specifications due to differences in both methodology/design and actual content. Interoperability at the business layer continues to be challenging using a single vertical industry's standards, let alone across industries.

The lack of a unified approach has become a significant barrier to achieving service expansion benefits into cross-sectoral lines of business. This is particularly important as more and more businesses and governments implement applications that connect their systems and services to the Internet, and there is a growing awareness of how much more interconnected our businesses are becoming.

Those businesses that have moved beyond simply using the web to promote and sell products and services and which are now working on using the Internet to integrate their operations

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with those of their suppliers and customers are concerned with how Internet software standards can help mitigate the risk of adopting new technologies. Governments too are realizing the limitations of a shortsighted approach to standardized vocabularies, as they find themselves hampered by attempts to share information between agencies and levels (federal, regional/state, local) and by their need to interact with other countries and with businesses covering a wide range of industry sectors. The chaotic communications between public sector agencies in the USA following the tragedy of hurricane 'Katrina' in 2005 demonstrated how emergency management needed to integrate with public safety, law enforcement, healthcare, environmental cleanup, and other disaster response mechanisms — and how difficult this was to achieve in one of the most advanced economies in the world.

Now, in the run-up to WSIS Tunis, governments, business and civil society groups are increasingly calling for open technology standards. These are the digital equivalent of a common gauge for railway tracks and are not the same thing as open source software. Both proprietary and open source software can run on the "tracks" laid down by open technology standards. OASIS members look to WSIS to give new impetus to developing an open, global ICT ecosystem. This is vital if we are to enable the less-advantaged countries, enterprises and other groups to have confidence in the accessibility of digital networks. Open standards are an essential part of the infrastructure of an inclusive, global Information Society.

## What could be the solutions?

International cooperation is absolutely necessary to arrive at a common point of reference against which industry groups and government agencies can map their standards vocabularies. When XML became a recommendation of the World Wide Web Consortium (W3C) in 1998, organizations such as CommerceNet started to evangelize the practical benefits of using XML in business vocabularies and interface protocols. However, industry groups rushed into developing their own XML vocabularies, despite the efforts of visionaries in multilateral organizations, especially the UN, who advocated for cross-industry adoption of a common business language and agreement on element naming design rules.

Since WSIS 2003, many XML vocabulary experts and industry associations have worked on the creation of an open standard using XML for a common business language. The Universal Business Language (UBL) OASIS Standard and the UBL Naming & Design Rules OASIS Standard, together with the UN/CEFACT ebXML Core Components Technical Specification provide a means for cross-referencing some of the industry-specific, XML-based vocabularies.

Researchers are also looking to various combinations of web services with semantic web and grid computing to come up with ways to apply reasoning tools to achieve some level of adaptive information that could be applied to solving some business needs today. They are seeking ways to enable the automated invocation of business functionality through message exchange, which holds the promise of fast progress in this area. There are an increasing number of web services using basic semantics that are starting to appear. Many services, such as travel reservations, book selling, stock monitoring, banking and reporting, which today are generally used manually by human users, could, in the near future, be mediated by computational entities.

For such interoperability to succeed, however, implementation will need to occur within the e-business frameworks that companies and industry groups are building and should be based on some common cross-industry functional elements. Industry adoption of common implementation methodologies and common naming and design rules will also help to reduce cross-sectoral barriers.

An additional approach, based on lessons learned from past mistakes, is beginning to emerge as a way to achieve both cross-sectoral interoperability in e-business semantic frameworks and reduce the time-to-market for development of open standards to use across industries in their e-business frameworks and semantic interactions.

At OASIS, we see another example emerging of how cross-sectoral standards can be developed more quickly and with greater industry adoption on a global scale. The model links open standards development processes closer to university and government-sponsored research efforts. Active involvement of technology vendors, small and large, helps to identify approaches that can be implemented in software solutions. With industry associations and end-user businesses taking an active role in setting requirements and priorities, even version 1 specifications are assured to be usable and readily embraced. With governments collaborating in the process, the results are also more likely to meet public policy requirements and see widespread adoption, especially in many of the global markets where international trade is vital.

To understand our best options for the future, we should try to avoid the mistakes of the past. The lessons learned in the development of XML-based industry-specific domain vocabularies help to chart a path forward for the application of web services standards in the creation of service-oriented architectures for various industries. This path is built upon common web services standards that are applied in a comprehensive fashion, using a set of common web service elements that implement common methodologies.

OASIS and its partners, such as UN/CEFACT at the intergovernmental level, hope to work in the context of the follow-up and implementation of the WSIS to construct an open standards environment. Common standards will help to ensure that all participants in e-business, whether large or small, in public or private sectors, can interpret information in a uniform way and communicate without technical barriers. Open, international standards are an important part of any effective strategy to bridge the so-called digital divide and enable less-advantaged countries to compete in the global economy and Information Society.

**Examples of OASIS standards being endorsed by governments**

Emergency Management Common Alerting Protocol (CAP)
ebXML Messaging
ebXML Collaborative Partner Profile Agreement (CPPA)
ebXML Registry/Repository
OpenDocument Format for Office Applications
Security Assertion Markup Language (SAML)
Universal Business Language (UBL)

For more information please contact:
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# Bringing value added services to new markets

*Sara Holding*

I N THE MIDDLE East, there is a revolution going on. We are not talking about massive political change, or western oligarchs taking over — we are talking about a change of business and private lifestyle through the development of niche opportunities and markets. The small niche suppliers that can adapt quickly to the local markets are starting to gain momentum. Some local telecoms companies are revolutionizing the second tier telecommunications supplier landscape in the Middle East region. Through a strategy of sourcing value-adding service providers in Europe, Africa, Asia and America, impressive portfolios of suppliers are being built that will change the current telecommunications paradigm in the Middle East region. The aim is to follow the European market in providing data products to the mobile telecommunications operators across the region.

The major difference between the European market and the Middle East is simple — common language. From Morocco to Oman, the common language is Arabic, compared with the multilingual environment of Europe. This has a major impact on the economies of scale that can be driven in the technology and telecommunications world. If one looks at the value-added services that are offered to mobile customers, the use of the same applications can be replicated across the region with the same technology deployed in many countries to multiple operators.

One strategy that has been adopted is to source leading edge technology providers from the USA, Europe, Africa and Asia to develop a portfolio of value-adding managed services across the region. The key requirement for such a strategy is that the supplier should be flexible enough to respond to the finer differences in each market or each operator and be able to build services that are tailored to meet their individual demands. In order to do this, a thorough understanding of the local markets is essential, and the only way to do this is through local partners.

Many companies have had their fingers burnt through entering markets without a clear comprehension of how to operate, and this has led to expensive mistakes and has left a bitter taste in the mouth. Over-promising and under-delivering is common feedback from international players, and successful regional players have decided to reverse the situation through such mechanisms as a network of operational businesses reporting to a single entity. The key to success is to retain highly experienced managers from world-leading telecommunications companies, who have a thirst for the dynamic interaction with small- and medium-sized suppliers, but who can interact at authority and large incumbent levels.

As competition sweeps through the Middle Eastern mobile operator community, there are now at least two players in each market. They could compete solely on price, but a better solution would be to find differentiators in order to build a more competitive offering for the customers, be they consumers or commercial clients.

Key areas are consumer content — the range of wallpapers, logos and ring tones are wanted by young consumers worldwide, and commercial applications which are easily managed over a mobile device and are within the budgets of every size of business. In addition, technology solutions can enable mobile users to enter the semi-converged space.

Whilst many markets across the world are regulated with a light touch, the Middle East is still heavily regulated. This is as a result of the recent introduction of competition in many markets, where a 'referee' is now required to manage the relationships between the end customer and the multiple operators, and the operators themselves. Before liberalization, the consumer had to live with the prevailing conditions, whereas today they can make choices. Regulators are giving incumbents, second and third operators the chance to realign or build their businesses before the free market flourishes, and so some of the technologies that are deployed across mature markets would not succeed in the Middle East.

As the regional maturity of the mobile market is a few years behind the markets in Europe, East Asia and the USA, the level of technical expertise has yet to catch up with other regions. As



The new paradigm in mobile retail experience — moving away from the souk to the service orientated model

a result, there are excellent opportunities for the cutting edge technology solution providers to develop and sell their products in the region. However, many potential providers have failed to maximize the opportunity through a lack of understanding of the cultural and market conditions that exist in some countries. For example, one supplier was keen to sell online gambling solutions to the Gulf Cooperation Council countries. The local partner was able to advise that this product would be culturally unsuitable, but the supplier was able to explore opportunities for the rest of its portfolio.

Buyer behaviour is a key element when looking at regional markets. In Europe and the USA, credit cards are a way of life, whereas cash is king in the Middle East. The operating models that are developed for domestic markets will not necessarily fly elsewhere, and this should be considered when selecting potential countries in which to operate.

National security is often an issue. Location-based services (LBS) are a way of life in Europe, albeit with potential concerns of human rights and 'Big Brother' being able to watch the individual. But in some potential markets, LBS is strictly forbidden on national security reasons. The daily culture has to be considered when seeking new markets. For example, many of the wealthy individuals who can afford value-added services would not need some that are very popular in Europe. A direction-finding application would be of little interest to the high net worth individual who has a driver, and the driver does not need it as he knows the streets like the back of his hand.

Perhaps the best example of the clash of culture in the universal mobile telephony field is the ban on camera phones that has recently been lifted in Saudi Arabia. Almost 100 per cent of mobile phones today are fitted, as standard, with a camera. These were strictly forbidden in Saudi Arabia, although widely available through the neighbouring United Arab Emirates. Many a content developer and handset provider would learn that the market for photos was nil, until late 2004.



Cellucom is one of the strategic partners with Sara Telecom

One market that is burgeoning is the entrepreneurial sector, where individuals are seeking to make their fortunes with the opening of developing regions. The state-control has started to diminish, and the entrepreneur can potentially flourish. However, these customers have a universal requirement wherever they are operating. Cash is king, and wherever they can reduce their overhead and their OPEX, they will try to do so. Mobile telephony has allowed entrepreneurs to work on the move, with limited office overheads, and to plan their working lives better.

It is interesting to note that the maturity of the mobile market positively affects the efficiency of business in all countries, but in the wealthier countries, where individuals are cash-rich but time-poor, individuals have become less disciplined in the management of their diaries. Only fifteen years ago, when pocket organizers and diaries were carried by most Europeans, and fixed line phone boxes were accessible to all, a group of friends would meet for a drink and arrange the location, day and time for the next convivial gathering. Everyone would arrive at the right place on the right day at about the right time. Today, there are endless calls, asking "where, what day, when, with whom?" and at least 20 per cent of the potential attendees will be noticeably late. More advanced societies have become personally more inefficient, as their inefficiency is compensated by the flexibility offered by mobile telephony. In developing countries, the mobile phone is still the tool of efficiency, whereby meetings and business can be arranged through the new-found flexibility of the mobile phone.

Applications that are increasingly popular for those with investments in the burgeoning markets are business information applications, whereby the subscriber can browse breaking market news and business information on their mobile. Such applications enable the investor and entrepreneur to stay close to the dynamic Middle East financial markets.

Other potentially useful products include: a push e-mail product, that pushes office and calendar items to the user's mobile and synchronizes the contact lists and task lists with the head office; and instant messaging services that enable teams to stay in contact with each other and pass information wherever and whenever it is required.

As the economic boom of the Middle Eastern region continues, there will always be a need to have a field force that will carry out maintenance and repair tasks. Field services applications enable a field service company to manage its workforce remotely, allocating jobs and resources, managing active tasks, controlling parts allocation, reviewing service status and generating reports and invoices. This will bring a whole new working ethos to many service companies and ensure that efficiencies can be driven through the implementation of such a service.

So, how will the market look in five years' time? Notwithstanding a macroeconomic slump, the pace of change and liberalization in the Middle East is set to continue, driven by the global demand for oil. The large industrial conglomerates have helped build the region, and continue to help the development, but the markets are becoming more service orientated and the consumer is beginning to have a choice. The natural development from the current position is that niche markets will start to develop, with consumers and commercial organizations seeking services that exactly match what they are looking for. Before, a square peg would be fashioned and forced into a round hole, but now there are many shapes and sizes of holes, and the smaller, more agile suppliers can bring their products and services to exactly fit those holes.

# Notes & References

<div style="text-align:center">

I

WSIS: Summit of solutions

</div>

**On Internet governance**

1 The views expressed in this article are personal and should not be attributed to any organization.
2 Paragraph 48 of the Declaration of Principles, WSIS, Geneva.
3 Paragraph 49 of the Declaration of Principles, WSIS, Geneva.
4 Paragraph 13(b) of the Plan of Action, WSIS, Geneva.

<div style="text-align:center">

II

Creating digital opportunities

</div>

**Building knowledge societies**

1 www.ictpr.nic.in
2 www.unesco.org/webworld/portal_freesoft
3 www.unesco.org/isis; www.unesco.org/idams

**Fostering digital inclusion**

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**Citizens and local authorities in the knowledge age: promoting ICT for local sustainable development**

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9 See www.unhabitat.org/programmes/guo/
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11 See www.ovaf.net
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**Bridging the rural digital divide**

1 For more information on the FAO's activities in bridging the rural digital divide, contact: www.fao.org/rdd; digital-divide@fao.org

**From digital divide to use-divide**

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**Redefining communication, transforming India**

1 Reliance Infocomm has over one million R Connect customers today. R World
receives about a billion page view, every month. It receives over seven million
cricket look-ups on the day of a match. Over 10 movies and events have been
covered under its show-time programme, translating to three million hits. The
service has announced some 75 examination results already. Ringtone
downloads are of the tune of 2.5 million every month.

2 Netway is Reliance Infocomm's triple play service, riding on a bandwidth of
100 Mbps. Home Netway will deliver hundreds of television channels to
thousands of homes through a multifunctional, digital set-top box designed
and manufactured in-house. The 40 GB memory state-of-the-art set-top box is
capable of storing nearly 10 hours of programming.

3 Reliance's "Monsoon Hungama" offer of June 2003 is a classic case. It offered
mobile handset and connection at a down payment of Rs 501 (approx. USD
11), almost a tenth of what other operators were charging for the same at that
time. The scheme garnered 10 lakh subscribers in less than a month. In little
more than three yeas, competition reduced per minute charges by 90 per
cent. Access, prepay, roaming, and messaging tariffs, likewise fell," observes
the Shosteck Group.

# III

## WSIS FOR DEVELOPMENT

**The convergence of summits: the 2005 World Summit and the World Summit
on the Information Society**

1 *The Inequality Predicament:* Report on the World Social Situation 2005 (New
York: United Nations Department of Economic and Social Affairs, 2005).

2 Report of the Secretary-General, *In larger freedom: Towards development,
security and human rights for all,* www.un.org/largerfreedom/ (paragraph 27).

**eLAC2007 – Implementing the Geneva Plan of Action in Latin America and the
Caribbean**

1 The ECLAC Information Society Programme receives financial support from
the @LIS project of the European Commission and the International
Development Research Centre (IDRC)-Institute for Connectivity in the
Americas (ICA).

2 See Economic Commission for Latin America and the Caribbean (ECLAC),
*Políticas públicas para el desarrollo de sociedades de información en América
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Declaration of Florianópolis (July 2000), the Declaration of Itacuruçá
(October 2000), the Decision of the Ministers of Foreign Affairs of the Rio
Group to set up a working group on information technologies (March 2001),
the Rio de Janeiro Declaration on ICT for Development (June 2001), Agenda
for Connectivity in the Americas and Plan of Action of Quito (August 2002),
the Bávaro Declaration (January 2003 and the Rio de Janeiro Commitment
(June 2005).

**ICT, poverty reduction and the role of micro, small and medium enterprises**

1 For further information on UNIDO's ICT activities, including their linkage
into the technical cooperation programmes of the organization please contact:

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E-mail: wsis@unido.org

**Financing information infrastructure in the developing world**

1 This article is based on the World Bank report, *'Financing Information and
Communication Infrastructure Needs in the Developing World: Public and Private
Role',* issued in February 2005. This article represents the views of the
authors, not necessarily those of the World Bank, its Executive Directors, or
the countries that they represent. Contact: ckenny@worldbank.org.  Thanks
to Isabel Neto for edits and additions.  The full version of the report can be
accessed online at:
http://lnweb18.worldbank.org/ict/resources.nsf/InfoResources/04C3CE1B933
921A585256FB60051B8F5

2 'WSIS Plan of Action', WSIS-03/GENEVA/DOC/0005 (12 December 2003):
www.itu.int/wsis/documents/doc_single-en-1160.asp

3 See the full report for details of this calculation.

4 We have evidence from surveys that ask entrepreneurs in the developing
world about the constraints to the growth of their businesses, including a
question regarding the seriousness of constraints created by inadequate
telecommunications services.
www.ifc.org/ifcext/economics.nsf/Content/ic-wbes

5 The companies are Vodacom, MTN, Orange, Orascom, Celtel and Milicom.
The data relates to the continent of Africa, and revenues and profits for
Orange were estimated from its share in Africa's subscriber base. Data from
ITU News No. 5 (June 2004).

6 Calculated from data in the PPI database, see http://ppi.worldbank.org/

7 The International Finance Corporation is the primary provider of financing to
the private sector ICI industry in the WBG— through loans, equity, quasi-
equity, risk management products and guarantees.

8 For more information on the Financing Instruments available in the Bank
Group to support ICT, see Neto, 2005.

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**How weather, climate and water information saves life and promotes
sustainable development**

1 www.wmo.int/index-en.html
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3 www.wmo.int/web/www/TEM/gts.html
4 www.wmo.int/web/www/FWIS-Web/homefwis.htm

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1 ILO (2005), *Global Employment Trends Brief 2004,* Geneva.

2 ILO (2004), *World Employment Report 2004-05: Employment, Productivity and
Poverty Reduction,* Geneva.

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Session of the International Labour Conference, Geneva.

4 See www.ilo.org/public/english/fairglobalization/

5 Author, David H, *Wiring the Labor Market.* Working Paper 7959 (2000)
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6 Hadass, Yael S. (2004): *The Effect of Internet Recruiting on the Matching of
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Volume 8, Issue 4 (June 2005) 383.

8 A further reference to this particular case can be found in Carty, Victoria,
'Technology and Counter-hegemonic Movements', *Social Movement Studies*
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An Analytical Model* Working Paper 2001-6, Graduate School of Public and
International Affairs, University of Pittsburgh.

10 Paragraph 5 of the Millennium Declaration.

# IV

## Partnerships to connect the world

Creating transformations: growth and opportunity in the new global economy

1 Craig R. Barrett is Chairman of the Board of Intel Corporation and a member of the National Academies Committee on Prospering in the Global Economy of the 21st Century: An Agenda for American Science and Technology. Intel Corporation is the world's leading supplier of advanced microprocessors used inside PCs, servers and wireless devices, and a leading manufacturer of networking and communications products.

2 For the results in this paragraph, see Gov3 and Intel, *Achieving Digital Inclusion* (2005): www.intel.com/business/bss/industry/government/GovGAPPWhitepaper.pdf

### TradeNet in Ghana

1 This article is based on Luc De Wulf, *TradeNet in Ghana: Best practice of the use of information technology.*

### Connecting people to the digital world

1 NIDA, a statutory organization under the act on Internet Address Resources, has a crucial role in developing Korea's Internet infrastructure and managing Internet address resources.

### From pilot projects to a mammoth national programme: the story of Mission 2007

1 Subbiah Arunachalam (Arun) is Distinguished Fellow at the M.S. Swaminathan Research Foundation (MSSRF), Chennai and an Adviser to the National Virtual Academy. A volunteer with MSSRF since April 1996, he is currently a trustee of OneWorld South Asia and the Electronic Publishing Trust, a member of the Executive Committee of the Global Knowledge Partnership, and a member of the international advisory board of IICD, The Hague. His research interests include science on the periphery, scientometrics, information access, and the application of information and communication technologies in development and poverty reduction programmes. He is an ardent advocate of open access archiving. He can be reached at arun@mssrf.res.in.

### Multi-stakeholder partnerships for tackling the digital divide

1 ITU, *World Telecommunication Development Report 2003:* www.itu.int/ITU-D/ict/publications/wtdr_03/

### Building partnerships to educate the world: The UNU/GVU strategy

1 HDR, *Human Development Report,* UNDP (New York: Oxford University Press, 2003).

2 HDR *Human Development Report,* UNDP (New York, Oxford University Press, 2002) 189.

3 UNESCO, *Open and Distance Learning. Trends, policy and strategy considerations,* Division of higher education, Paris (2002) http://unesdoc.unesco.org/images/0012/001284/128463e.pdf

4 Lewis, R. 'Staff development in conventional institutions moving towards open learning', Latchem C. and Lockwood, F. (eds) *Staff development in open and flexible learning* (London: Routledge, 1998) 24-25.

5 UNCTAD: *Information and Technology development indices: Minimal improvement in sub-Saharan countries.*

### Connected development: volunteers contribute time and skills online

1 *About UNV:* Administered by the United Nations Development Programme (UNDP), UNV is the United Nations organization that supports sustainable human development globally through the promotion of volunteerism, including the mobilization of volunteers. As a part of its activities, UNV opens up opportunities for mid-career professional women and men to serve as UN Volunteers and contribute to the attainment of the MDGs. In 2004, 7 300 UN Volunteers - representing more than 160 nationalities and serving in some 140 countries - supported the activities of governments, UN agencies, NGOs and civil society organizations in key areas such as poverty reduction, democratic governance, energy and the environment, crisis prevention and recovery, ICT and HIV/AIDS. Reaffirming the programme's commitment to promoting South-South cooperation, 75 per cent of UN Volunteers are nationals of developing countries or economies in transition. It also manages the WorldVolunteerWeb.org, a portal that serves as a knowledge resource base on volunteerism worldwide.

### The end of poverty — the ITU and the Navajo nation

1 The United Nations Millennium Project is headed by the International Telecommunication Union (ITU), an international organization and a specialized agency of the UN. The ITU's goal is to facilitate peaceful relations, international cooperation, and economic and social development by means of efficient telecommunication services. One major role of the ITU is the delivery of technical assistance to developing countries, in order to promote the development of their telecommunication networks and services.

2 John Maynard Keynes, *Economic Possibilities for Our Grandchildren* (1930).

3 See www.nnheadstart.org

4 The Brazilian initiative already supports ICTs in approximately 300 communities, in the context of the 'Forest Peoples Network,' through the Indigenous Culture Nucleus (NCI), with support from the Committee for Democratization of Informatics (CDI).

# V

## Perspectives

### Laying foundations for digital inclusion

1 High Level Asia-Pacific Conference for the World Summit on the Information Society, www.aprcwsis05.ir/

2 Tehran Declaration on Building the Information Society in Asia and the Pacific: www.aprcwsis05.ir/Docs/Results/Tehran%20Declaration.pdf

### The role of the private sector in mainstreaming ICT4D

1 German Federal Ministry for Economic Cooperation and Development (BMZ) www.bmz.de

2 Information for Development Programme (infoDev): www.infodev.org

3 Development Gateway Foundation: www.developmentgateway.org

4 Gesellschaft für technische Zusammenarbeit (GTZ): www.gtz.de/ppp ; Deutsche Investions und Entwicklungsgesellschaft mbH (DEG): www.deginvest.de/german/home/unser_Leistungsangebot/PPP/index.html ; Stiftung für wirtschaftliche Entwicklung und berufliche Qualifizierung (SEQUA): www.sequa.de/frames/outer.phtml?IDT=5; InWent - Capacity Building International: www.inwent.org/wirtschaft/ppp/index.en.shtml

5 Cited from the Africa Drive Project website: www.adp.org.za

6 www.mtc.com.kw/index.htm

7 www.celtel.com

8 InWent – Capacity Building International www.inwent.org

9 For further information please contact Balthas.Seibold@InWent.org

### The role of Internet governance in the use of information and communication technologies for development

1 *Report of the Working Group on Internet Governance* (2005): www.wgig.org/docs/WGIGREPORT.doc.

2 United Nations Millennium Declaration (2000): www.un.org/millennium/declaration/ares552e.pdf

### CAS e-Science and Virtual Lab

1 Baoping Yan, Kai Nan: ybp@cnic.cn, nankai@cnic.cn Computer Network Information Center, Chinese Academy of Sciences, Beijing 100080, China.

2 UK National e-Science Centre: www.nesc.ac.uk/nesc/define.html

3 CAS: www.cas.cn/

4 Report of CAS 10th five-year Informatization Programme.

5 Plan of CAS 11th five-year Informatization Programme.

### Using ICT to fight corruption and save costs

1 Transparency International – www.transparency.org

2 World Bank - *Six Questions on the Cost of Corruption with World Bank Institute Global Governance Director Daniel Kaufmann:* http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:20190295~menuPK:34457~pagePK:34370~piPK:34424~theSitePK:4607,00.html

3 www.oecd.org/document/21/0,2340,en_2649_34855_2017813_1_1_1_1,00.html

4 OECD United States Phase 2 Report on application of the convention on combating bribery of foreign public officials (October 2002) 17.

5 'Cheque is not in the post', *Financial Times* (26th May 2004).

6 CNEL, *La dematerializzazione dei documenti nelle attività di amministrazione, finanza e controllo* (April 2005) 5.

7 Electronic Business Group, *Le Livre Blanc de la Facturation Electronique* - (September 2004); Arthur D Little, study for Deskom/Post@xess ; Aberdeen Group, *The Invoice Reconciliation and Payment Benchmark Report* (June 2004).

8 EDIFrance, *Guide de la dématérialisation de la facture* (September 2003), Aberdeen Group, *The Invoice Reconciliation and Payment Benchmark Report* (June 2004).

9 Gladwell, Malcolm, *The Tipping Point* (London, Abacus) 12.

### Advancing open standards for the Information Society

1 The author is continually inspired by the thousands of volunteer hours expended by over 4 000 participants working in OASIS committees every month. For more information, visit the OASIS website, www.oasis-open.org