Telecommunications & Governance

GOVERNANCE is a word which had, until recent years, fallen out of use. Its original meaning had mostly to do with the exercise of power and the process of governing and had a distinct "top-down" connotation. Today it is enjoying a new popularity, reflecting the rising prevalence of democracy, and may be used in describing administrative and management processes and structures at all levels in fields as diverse as vehicle licensing and social advocacy. It is used in connection with administrative processes and structures which are top down (e.g. government department) and "bottom up" (e.g. community or citizen group) or combinations of both types. The exercise of governance is also recognized as an important component and facilitating factor in realizing the full potential of democracy, and involving citizens in the planning and achievement of national goals in which they can recognize their future. Today's electronic communication environment favours and facilitates good governance. This section of *Telecommunications in Action* will look at some examples of positive governance practices where the availability and targeted use of telecommunication infrastructure are critical factors for success.

GOVERNANCE CAN BE APPLIED to a broad range of concepts covering many fields of human activity. In the sense of nationhood, governance can be fraught with problems for developing countries, especially those with widespread territory, remote populations and poor communications. For citizenship to be real and vital, there needs to be contact between the citizen and the government. And for government to fully merit that name, it has to furnish services to all inhabitants in order to count them as citizens. Building these links may be seen as an essential component of overall national development, and all citizens need to participate if that development is to be sustainable and a dynamic society is to result. This can be achieved by developing an infrastructure which will permit and encourage the establishment of contacts and stimulate participation.

Information and communication technologies constitute an infrastructure over which the links of governance can be established. They also encourage free access for everyone to government information and services. Such open government is discussed in more detail later in this section. While the development of governance infrastructure must facilitate contact with all citizens, it also has a major role in the fields of commerce, transportation, industry, security and other domains affecting the survival and well-being of the nation. Other areas where governance infrastructure plays an important role include regulation of telecommunications and broadcasting, education and health care; these are discussed in other sections of *Telecommunications in Action.*

In this section, developments are proposed that would increase the involvement of ordinary citizens in matters which are of concern to them. Such examples of empowering the people and providing access to information about government activities should not be seen as attempts to remove power from any level of government. Looked at and executed in a positive light, these propositions bring advantages for administrative transparency, project effectiveness, practical democracy and the involvement of citizens in solving tough development problems in a sustainable manner. In fact, the processes involved, used intelligently, can channel the energies of the population, demonstrate what is involved in the development process and give people a stake in deciding and in working for their own destinies.


INMARSAT

Many government activities, such as disaster relief, are assisted by information and communication technologies.

As it is only in recent years that such application of information and communication technologies has been possible, most activity identified in this section is in industrialized countries where the indispensable infrastructure exists and supports the applications. In developing countries the necessary infrastructure to render possible such activities is frequently missing, and where projects exist they are at an even earlier stage than those cited; this partially accounts for the lack of examples from the developing world. But as the necessary infrastructure becomes available so developing countries may be able to leapfrog the experimental stages and use the latest technologies, following the models that have been developed in the industrialized world. The processes of governance enhanced by information and communication

technologies can be applied in developing countries and could, for example, form part of restructuring activity within any particular country, with help in implementation being obtained from industrialized countries which have some relevant experience.

Good governance

There are many ways to look at "good governance" and how it can help achieve sustainable development. It depends in part on the attitude of a state towards democracy, and how it facilitates self-reliance and social justice as essential components of sustainable development. But it also depends on whether a government has the requisite political and administrative structures and mechanisms with the capability to function effectively and efficiently. According to Mr Anand Panyarachun, ex-prime minister of Thailand, commenting recently about financial problems in his and several other Asian countries, what is frequently referred to today as

CORPORATE VIEW

Standby circuits

RECENT strides in the twin technologies of computing and telecommunications have meant that businesses worldwide are becoming increasingly dependent on these systems to communicate quickly and reliably with their customers, business partners and employees. Unfortunately, even the most efficient telecommunication carrier experiences circuit failure and breakdown at some time, disrupting the usually fast transmission of data. ISDN (integrated services digital network) lines, which provide an end-to-end switched data digital transmission path offering users voice, security, scanning, video conferencing, computer communications and back-up circuits for leased lines, are able to overcome these problems.

Controlware, an innovative German telecommunication company, has concentrated its resources and technical expertise on circuit technology, specializing in standby circuits. The result of this research is TAXI, a remarkable piece of software, which provides both back-up for leased lines and on-demand capacity in a single unit. As the unit monitors the leased line, it automatically creates an alternative route over the switched circuit as soon as a fault develops. If it is not possible to establish a link between the two sites, an alternative site is automatically dialled. Data volume on the leased line is monitored by the overflow unit. This automatically adds extra capacity when demand is heavy by using a dial-up circuit connection to supplement the system.

This technology has been put into practice in Hessen, a German state with five municipal computing centres. To implement a metropolitan area network, three centres in the Frankfurt area joined forces to launch Municipal Information Processing which formed a single logical network. As this operation is crucial, it requires a back-up solution should any of the leased lines develop a fault. Controlware was able to provide switches which link the three router networks to the metropolitan area network while the TAXI system allows an immediate transfer to an alternative data path when a fault occurs. Once the permanent line is working again TAXI disconnects the alternative data path, minimizing additional call costs. If the permanent lines overload as a result of too much data, a back-up circuit is automatically called to carry the extra burden until the flows become lighter. Data can therefore continue to be transmitted cost-effectively and cost-efficiently during peak times, bypassing circuit faults and without bottlenecks or logjams.

Businesses worldwide are making use of the technology developed by Controlware to guarantee around-the-clock cost-effective efficiency and reliability.

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For further information see Annex B

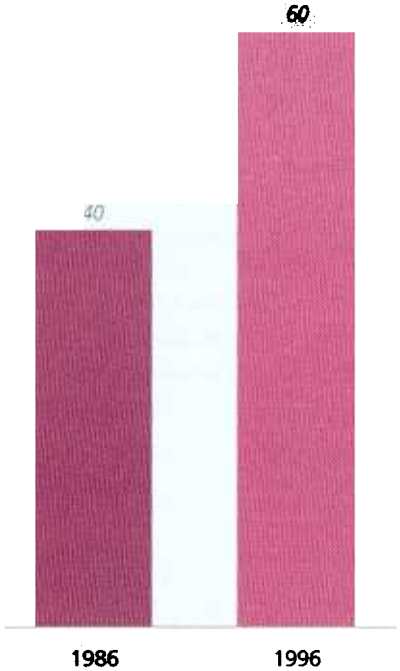
good governance goes farther. He said "Good governance is about more than good government. It is about more than having honest and capable people in public office. Good governance is about putting in place the mechanisms to define what constitutes the public interest and seeing that the public interest is served despite everything else. While leaders are human, susceptible to temptation and other human frailties, good governance makes up for their shortcomings by opening up the policy process to all the people."

Mr Panyarachun recently chaired the Constitutional Drafting Committee that gave Thailand its first truly democratic, anti-corruption constitution which puts transparency and accountability as the most important components of good governance. He commented at the time: "...the decision process must be transparent and open to scrutiny. The people must be given free access to all information pertaining to public policies and projects."[1]

TELECOM APPLICATIONS

Participatory democracy requires careful preparation; citizens cannot be expected to be passionately interested in dry government documents just because they have been made available. Providing open access to government information on the Internet may be a useful first step if the information provided facilitates, for example, an interactive process between authority and the citizen. But to guarantee success, it is indispensable to have preparatory education or training in the technology and the implications of its use for all who will participate: government employees, businesses and the public. For example, the Community Access Program discussed in a case study in this section focuses on training as the first step in empowering communities through Internet use.

PROPORTION OF DEMOCRATICALLY ELECTED GOVERNMENTS *(%)*



Source: *Human Development Report 1997*, UNDP/OUP, New York

Experience and guidance

Guidance in preparatory activities is useful, and international organizations and non-governmental organizations working in the field can help with many aspects of putting in place the necessary infrastructure as well as using efficient methods of transferring knowledge and information. Transparency International, which is present in more than 60 countries and broadcasts its message to a worldwide audience on the Internet (at <http://www.transparency.de>), is a non-governmental organization that is dedicated to increasing government accountability and to curbing both international and national corruption. It is headed by prominent world figures including ministers, industry heads, judges and lawyers, among them Kamal Hossain, lawyer and former minister in Bangladesh, and Tunku Abdul Aziz, industrialist and former Advisor at the Malaysian Central Bank.[2] The focus is on building systems that combat corruption, by exchanging examples of best practice from around the world. The Bangladesh branch of Transparency International, to take just one example, has carried out a survey of corruption in the country, published a number of reports on the Internet, and held a workshop on strengthening integrity within civil society.

Guidance can also be drawn from industrialized countries and the numerous governmental and non-governmental organizations which have in recent years begun harnessing the power of information and communication technologies to eliminate wasteful practices and involve citizens in democratic processes. For example, a pilot project in the United Kingdom has transformed four different government paper forms into one electronic "intelligent" form to avoid duplication of work by the government departments involved. Many government departments practise outsourcing of tasks utilizing information and communication technologies to selected private sector suppliers. This cuts costs and risks for the government department itself and allows it to concentrate on tasks which are strictly in the government domain.

Today, the idea of governance is applicable to processes originating not only from the government side that are implemented from the "top down", but also to processes originating from the grass-roots side that are carried out from the "bottom up".

CORPORATE VIEW

Infrastructure planning

WIRELESS COMMUNICATION technology is emerging as a central element in national telecommunication infrastructure planning, not just for mobile telephone services, but as an alternative to or to complement the traditional wired network infrastructure, bringing modern telephone and other services to fixed as well as mobile users.

The key attractions of a wireless approach to telecommunication development are the speed, economy and flexibility with which telephone access can be made available to new subscribers in both rural and urban areas. For fixed customers, a wireless network development strategy provides fast coverage, bypassing the need for traditional infrastructure. A wireless local telephone network involves the use of cellular radio technology instead of a wired connection. Both wireless and conventionally wired subscriber connections can be combined in the same network. Alternatively, a completely new cellular network could be established for fixed subscribers, while a third option could entail a common cellular network for both mobile and non-mobile subscribers. Wireless networks are able to support the same services as traditional networks. Homes and offices can be fitted with the technology to provide standard telephone, fax and data services. Telephone booths can be linked to wireless networks bringing telephone services to the remotest of communities for the first time.

Wireless technology can be installed wherever it is needed, but it is in rural areas where the cost benefits of this technology are likely to be felt most, as a result of the speed at which subscribers can be linked to the network. Advances in wireless communication systems mean that indoor locations, which have traditionally been difficult for wireless technology, can now be served. Wireless access is today not uncommon in high-rise office buildings, tunnels, underground car parks and metro stations. The same wireless network can offer secure private radio services for police forces, fire departments, taxi firms and utilities. Users benefit from the same facilities as those provided by a traditional private radio system, but without the cost of setting up their own radio network.

Wireless networks already deliver the same services as older networks. New services including video and multimedia will be added, giving wireless users access to a whole range of information, communication and entertainment services. Wireless communication must be thought about in a new way and Ericsson Radio Systems is building on its position as a market leader in this field to provide a platform for a whole range of services to meet the communication needs of people worldwide.

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For further information see Annex B

Telecom applications for governance from the top down

The utility of information and communication technologies in the establishment of governance infrastructure has already been demonstrated although, until recently, their use has been largely an internal matter within government departments. With proven tools, the moves to improve governance have multiplied and spread and are being incorporated into policy at the highest (supra-national) organization levels.

Government On-Line

At the start of 1995, the G7 countries[3] decided, in a conference on the Information Society, to assume the leadership initiative in a project entitled Government On-Line. The purpose of the project is to encourage intergovernmental exchange of experiences and best practice regarding the changing emphasis within governments towards on-line (electronic) business. The overall themes which emerged from the conference are:

- replacing paper-based mail, not only within government itself but also with the public;
- developing on-line transaction processing for the support and delivery of routine services;
- developing fully interactive on-line services available at various locations, including the home.

The following are the general project objectives:

- making appropriate government information widely available;
- improving service to the public;
- reducing the number of paper transactions involved in government operations;
- facilitating information exchange between governments in order to achieve the above objectives more quickly and cheaply.

The Government On-Line project was made intentionally broad in scope to cover the range of situations of countries interested in following the initiative and sharing knowledge. In 1998 the project already had 24 countries participating, including Botswana, Brazil, Egypt, Mexico and the Republic of Korea, while more were following the activities with a view to participation. The project has succeeded in:

- promoting and publicizing the concept of provision of on-line services, and so speeding progress towards them worldwide;
- providing a vision of what can be achieved;
- working electronically through the use of e-mail, listservers and video conferencing; most reports are also made available electronically on the project website.

Countries implementing the project meet twice yearly to exchange experiences. At the 10th Government On-Line Meeting, held in October 1998, progress was reported on a number of sub-projects including best practices and case studies in electronic government and an international clearing house for digital signatures. Information was also exchanged on a number of "hot" topics in the delivery of on-line government services including accessibility for those with special needs and electronic

In the Government On-Line project governments share their experiences in delivering services electronically.

procurement. Between meetings, information is made available on the Internet.[4]

Information sharing and reuse across government is a central concern. In the Republic of Korea, for example, an electronic system for issuing passports has been developed that utilizes and connects existing information systems such as the residents' system of personal information on all citizens over 18 years of age. The new passport system, developed first as a pilot and now available nationwide, allows applicants to submit just one form without the need to prepare supporting documentation. The passport is issued within two hours, rather than two or three days as was previously the case.[5]

Transportation

Rudimentary transportation systems, such as ox carts on unmade roads, do not require control mechanisms. As the transportation system becomes more

CORPORATE VIEW

Public payphones

THE FIRST public payphones in Italy were introduced in the 1960s. Since then, Urmet has been working closely with Telecom Italia to dramatically increase the number of payphones in use in the country, as well as to pioneer major improvements in payphone technologies.

For example, when Telecom Italia, dissatisfied with existing cardphones on the market, asked Urmet to develop a completely new countrywide system in 1982, the company produced a radically different design and the first fully computerized credit card system in the world. The first field tests were conducted in 1985 and the system was introduced commercially a year later.

The company has also enlarged its payphone range to include the latest payment methods (such as prepaid chip cards and electronic purse), designed a new multicard reader for fitting to both existing and new payphones and, using intelligent network technologies, has developed new payphone applications for ISDN (integrated services digital network) systems.

To date, the company has provided close to 500,000 payphones, which take either coins or tokens, throughout Italy, and it also developed the national system for managing them. In addition, it has now delivered more than 250,000 card readers and 250 million encoded prepaid magnetic cards, while worldwide the company has supplied more than 1.4 billion cards to over 30 countries. Continuous monitoring by Telecom Italia's research experts has confirmed there has not been one successful attempt at defrauding the system.

The Urmet group consists of three companies, two based in Turin and the other in Rome, all certified to international standards. It specializes in developing sophisticated electronic technologies, hardware and software, for exchanges and terminals, and is one of the leading Italian manufacturers in the field of telecommunications. The group's product range covers public payphone systems, speech and data applications for public exchanges, ISDN and private subscriber terminals for private telephony systems, wireless telephony, terminals for electronic money applications, and voice and video entryphones for business and/or home security. The group is expanding its involvement in many of the latest technologies, especially in the arena of wireless equipment.

The group has manufacturing and commercial operations through affiliates and/or local partners in Brazil, China, Indonesia, Malaysia, Poland, the Russian Federation and Tunisia, and exports throughout Europe, the republics of the former Soviet Union, southern Asia and the Far East, most of Africa, India, and Central and South America.

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For further information see Annex B

sophisticated, however, the need for control infrastructure such as signalling systems for railways, becomes more apparent. Railways, as the first transport system to be set up in many countries, were pioneers in the use and spread of the telegraph for signalling. Airlines today could not operate without worldwide communication networks to deal with reservations, flight information, accounting and freight handling, to say nothing of the global air traffic control systems that follow aircraft movements.

Transportation systems, therefore, have a tradition of using telecommunications in their infrastructures and operations. The growing sophistication of information and communication technologies adds to their security, efficiency and efficacy. Transportation of goods has also always involved the movement of associated paperwork. This can now be carried out through the electronic system, which is safer and more efficient than sending it separately.

As an example on the supra-government level, the European Union is

CORPORATE VIEW

Countrywide coverage

MAURITIUS Telecom is installing a code division multiple access network to add 50,000 subscribers to its modern digital cable network which already supports 240,000 direct exchange lines. The new network will be able to accommodate additional customers as demand for these services grows. Situated in the Indian Ocean off the east coast of Africa, Mauritius is the gateway to Africa as well as to other Indian Ocean island countries. With the highest telephone penetration in Africa and a fixed telephone service providing an average of 22 phones for each 100 people, its new network will provide customers with even better voice quality, a more reliable service and additional features.

Qualcomm, with its headquarters in San Diego in the United States, is a leading supplier of digital wireless communication products and technology. Based on the signal encoding method called code division multiple access, the system assigns a code to each call, thereby enabling it to identify a particular channel. In this way voice quality is improved, and both voice and data channels are able to carry a larger load.

The company also provides digital cellular networks, personal communication services and wireless circuits based on code division multiple access technology. Mauritius is installing the company's innovative base stations, software and hardware control equipment, and wireless-based local telephones. This multiple access technology will ensure country-wide coverage from cities on the coast to towns in volcanic and mountainous regions, and remote island villages. The industry's most advanced software tool is being used to design the new system which will enhance and improve existing services.

Qualcomm has already used this technology in other African countries, the Americas and Asia. It is also one of the founding partners of Globalstar, a service which provides cost-effective digital communications through a low Earth orbit satellite using code division multiple access technology. The network management centre in San Diego operates an advanced system which delivers a mobile two-way communication service worldwide with the added ability to track fleet vehicles by satellite. A range of software products enables vehicle drivers to receive e-mail and mobile voice communications while the position of the vehicle and the distance it has travelled are logged. Qualcomm has recently announced the development of a new product which will link a sophisticated hand-held organizer and a telephone, greatly improving global communication services to remote places.

Qualcomm
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For further information see Annex B

integrating national transport networks (road, rail, air, sea and inland waterway) to create Trans-European Networks. These will be underpinned by a series of measures, among them the better use of existing networks by modernizing equipment and by an improved flow of information between systems using electronic data interchange and telecommunications. One of the key benefits of electronic data interchange is the exchange of information

CASE STUDY

Publi ·ansport systems

OBJECTIVE

■ To develop software products to help the smooth running of public transport systems, specifically trains and civilian aircraft, in developing countries.

BACKGROUND At its new International Institute for Software Technology (IIST) in Macau, the United Nations University (UNU) is seeking to help communities in the developing world put new technology to practical use. Applications cover management of natural hazards such as floods and earthquakes, rural and mobile health care, small business inventories, and customs and cargo clearance, as well as transport.

DESCRIPTION AND RESULTS

■ Modern railway traffic is controlled by means of zones/domains which cover the whole rail system. As trains pass from one zone/domain to another, their progress is followed electronically and they can enter a zone only after the preceding train has passed into its next zone. A UNU project for the Chinese government involved an analysis of train dispatching in China.

Seven UNU fellows from the Chinese Railways, working on this project in Macau, produced a prototype Running Map tool, for use by train dispatchers, which displays the position of each train. The newly designed electronic control system that resulted allows dispatchers to control the movement of trains more efficiently. This system, which oversees all the zones/domains, and new display and dispatching equipment (electronic charts) have been installed at 28 train dispatch centres along the 500 kilometres of railway line between the cities of Wuhan and Zhengzhou in northeastern China. The project demonstrated that developing country railway software does not always have to come from the industrialized countries.

■ It is now possible on motorways to have fully automatic toll-booths which use a system of automatic recognition of vehicles (which must be specially equipped) so that the driver does not have to stop and pay. The equipment records the vehicle's entry and exit points, calculates the charges and stores the result so that the motorist can be billed by the motorway operating company. In Indonesia, where a motorway is being converted to automatic operation, a UNU/IIST project on road management systems is refining the functions and behaviour of a toll-booth system for the Toll Way System Company. The system is being refined to fit the electro-mechanics of Mitsubishi Electric Corporation's toll-way equipment which carries out vehicle recognition and all the associated operations needed for billing.

The result will be an automated motorway/autoroute which will no longer require vehicles to stop at toll-booths, thus avoiding points of congestion and saving the cost of toll-booth operators. The data accumulated by the system can be analysed and used for other things such as traffic analysis.

■ UNU Fellows from Viet Nam Airlines are working at UNU/IIST on the ABC 2000 project for airline business computing. The aim is to develop software support for the strategic planning and management of aircraft, route networks, staff, ticket agencies and other facilities and finance. The software will also support scheduling, including timetables and daily operations: ticketing, passenger and freight check-in, gate control and flight dispatch.

Once on-line it will represent a big improvement in operations for the airline, bringing it to the level enjoyed by the major carriers in the industrialized world.

COSTS UNU/IIST is a university operation concerned with technology transfer. Fellows from developing countries are taught new techniques so they can then apply them to situations within their own national administrations. Costs are not available for individual projects; overall costs reflect the salary costs of the university staff and other operating costs of the institution.

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and completion of transactions directly between computers, eliminating the need for processing purchase orders, bills of lading or invoices.[6]

Security and governance

In a democratic society, community police services must be, and must be seen to be, beyond the control of any political or private interest. The goal of transparency, and methods to achieve it, are similar to those discussed above for general government procedures. Additionally, in order to combat crime efficiently, police forces should have access to any of today's electronic tools which may serve their needs. On the crime-fighting front, for example, in Halifax, Nova Scotia, Canada, a special police squad has been set up, equipped with laptop computers, portable scanners and digital cameras, and connected with police headquarters via Internet or radio links. Besides passing messages and information on bank robberies or prison breakouts, the Internet graphical interface can rapidly receive or diffuse information on missing persons or wanted suspects. Residents can also subscribe to Net-watch for near-immediate notification of crime and law enforcement activity in their community. The service side can be further facilitated by information and communication technologies. For example, the Lethbridge police in Alberta, Canada, have a volunteer Victim Services Unit which helps victims of crimes who are suffering from trauma and provides them with support and assistance by obtaining information from the police database or elsewhere to help them prepare for testifying in court.

Fighting drug abuse

Drug abuse and its harmful effect on societies has been much discussed in recent years, especially since its association with AIDS and HIV infection became clear. The importance of the drugs issue has stimulated activities at many administrative levels, with information and communication technologies the tools that facilitate these activities and help coordinate them.

The United Nations Drug Control Programme includes a project on the evaluation of commercial, remotely sensed data for the assessment of illicit narcotics crops, and this will evaluate the latest technology developments and analytical techniques for detecting cultivation of narcotic drugs. The United Nations Development Programme and the Food and Agriculture Organization of the United Nations are collaborating in this study. Another United Nations programme focuses on the development of a global drug information strategy, which will increase the quality and quantity of information on-line for Drug Control Programme decision makers; increase the speed of transferring information between programme headquarters and field offices, governments, specialized agencies and international organizations; provide additional services to governments to assist them in faster decision making, including preventing the diversion of legal drugs and chemicals into illicit traffic; and assist national administrations in the establishment of computerized drug control systems which can communicate with and transfer information to the Drug Control Programme.

At the regional level the Federation of European Professionals Working in

Country or corporation	Total GDP or corporate sales *(US$ billion)*
Indonesia	174.6
General Motors	168.8
Turkey	149.8
Denmark	146.1
Ford	137.1
South Africa	123.3
Toyota	111.1
Exxon	110.0
Royal Dutch/Shell	109.8
Norway	109.6
Poland	92.8
Portugal	91.6
IBM	72.0
Malaysia	68.5
Venezuela	59.0
Pakistan	57.1
Unilever	49.7
Nestlé	47.8
Sony	47.6
Egypt	43.9
Nigeria	30.4

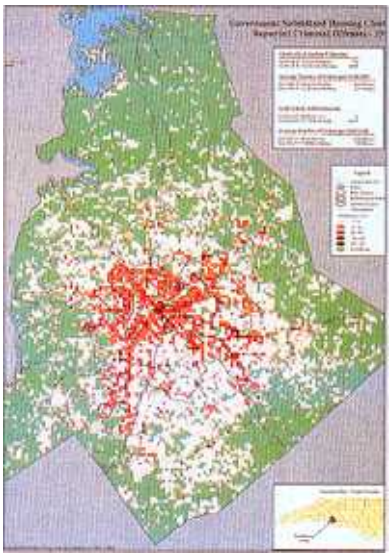
Source: *Fortune Magazine* 1996; *World Data 1995*, CD-ROM, World Bank; and *States of Disarray: The Social Effects of Globalization*, United Nations Research Institute for Social Development, Geneva, 1995

Patterns of crime

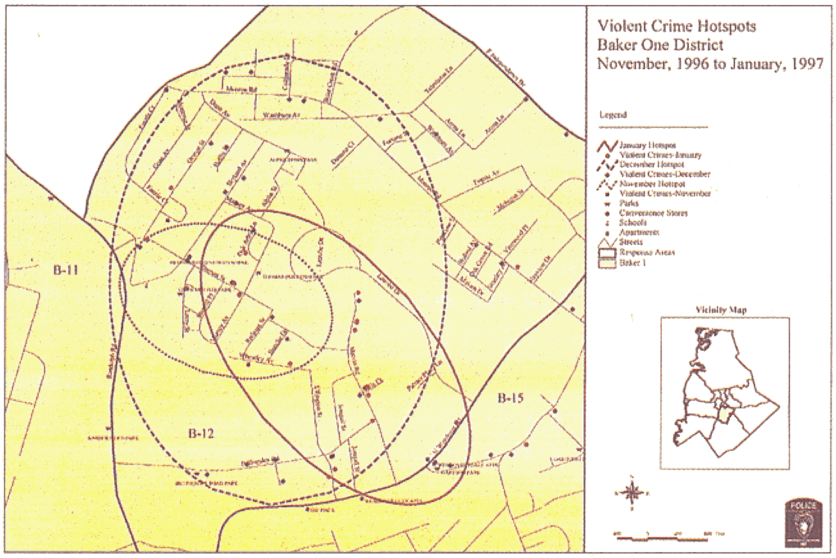
A geographic information system (GIS) is a computer-based tool for mapping and analysing particular geographic phenomena. It displays geographic data as a series of transparent maps which can be overlaid on each other, and which can then be used in a multitude of applications to explain events and assist in planning strategies. In this project in Charlotte, North Carolina, in the United States, GIS was used to examine and understand patterns of crime in the inner city area. GIS is discussed in more detail in the section of *Telecommunications in Action* dealing with the environment.

1. The analysis shown in this map is part of a larger study showing the concentration of crime in the inner city area.

2. Crime and emergency calls to the police are mapped for an area or neighbourhood within the inner city. This information can then be used to help understand neighbourhood dynamics as they relate to crime.



3. Crime mapped relative to government-subsidized housing.



4. GIS is also used to identify violent crime hot spots within each patrol district.

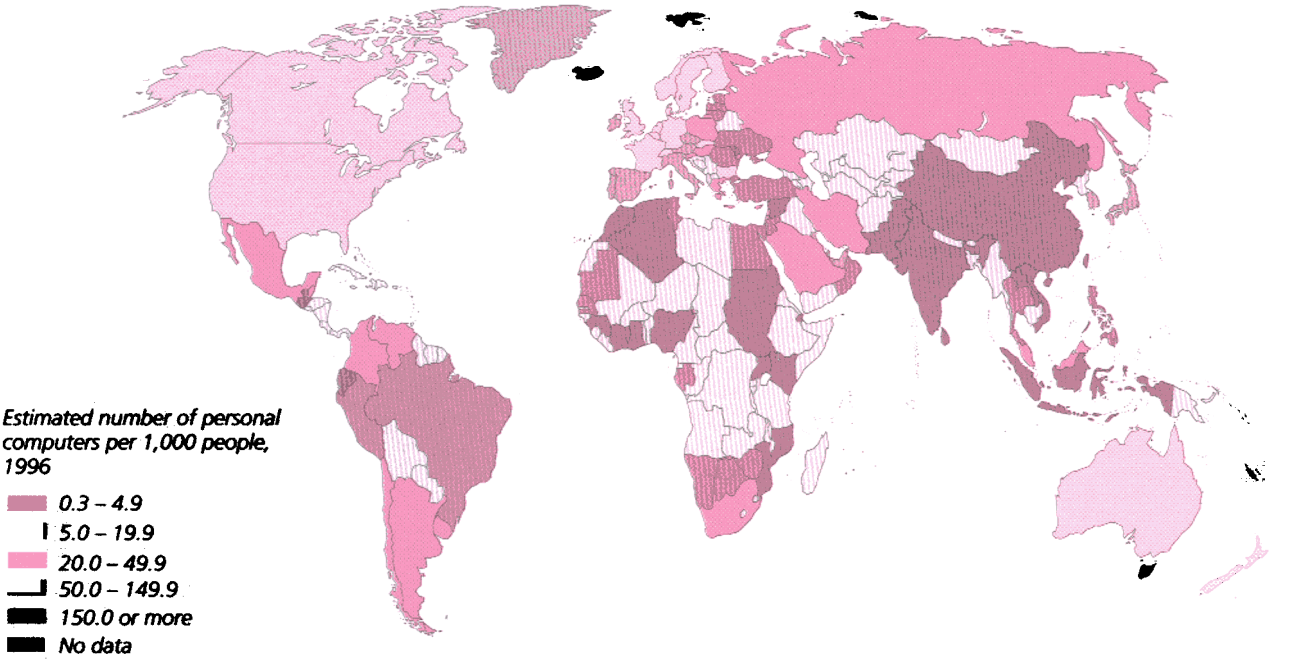
ESRI

the Field of Drug Abuse, made up of 15 component national groups, has a special group which develops use of the Internet to facilitate the multiple contacts necessary for the work of their members. Given the several languages involved there is sometimes a need for translators, but individual professionals are learning and practising through e-mail to improve their language skills and communicate better.

Telecom applications for governance from the bottom up

Information and communication technologies can have a significant effect on social and economic development. Developing countries which make them a priority component of their development plans, with the goal of putting the technologies within the reach of every member of the population, can encourage community cohesion. Communities can be connected in one or more of a number of groupings: social, geographic, economic, racial, religious, legal, fellowship, intergovernmental or ecological. The convergence of telecommunications and computer technologies has brought new opportunities for individuals to share their interests and create communities, so empowering individual citizens and strengthening democracy and good governance. Grass-roots organizations, governments and entrepreneurs are setting up community-based websites which create a communication channel for like-minded people to share experiences. Inner City Access, "the Internet for the inner city", is an example from Boston in the United States. It was started by a collaboration of Boston-area technical and multimedia professionals, with initial funding

Where the computers are



Source: *World Development Indicators 1998/99*, World Bank

CASE STUDY

Affordable public access

OBJECTIVES

- Canada launched the Community Access Program to help rural and remote locations to obtain affordable public access to the Internet and the skills to use it effectively.
- Experience gained will also be shared with developing countries and others who are interested.

BACKGROUND The programme has built on the success of SchoolNet, which has existed for some years and has now connected almost all Canada's 16,500 schools and 3,400 public libraries into the network.

DESCRIPTION This initiative is helping to create new and exciting opportunities for growth and jobs by enabling communities to communicate with each other, conduct business, enhance job skills and exchange information and ideas. Originally launched to create 5,000 Internet access sites in rural Canada, it was expanded in 1998 to create an additional 5,000 sites in urban neighbourhoods and bring a total of 10,000 communities on-line by the year 2000.

The most important approach to ensure success seems to be forming partnerships with chambers of commerce, local businesses, computer equipment shops, local Internet providers, libraries and schools, clubs, tourist organizations, the media, and cafés and bars in the community. A team effort supported by a maximum number of these entities is the best way to ensure viability and sustainability for the site and make it an ongoing tool for vitalizing the community.

Britannia Beach at <http://sea-to-sky.net/britanniabeach/> is a typical site, highlighting community events and history. A community access centre has been set up as part of the project to give residents access to technologies and training they would not otherwise have. Everyone is welcome to go into the centre and surf the Net, use e-mail, or use the computers for word processing, scanning or graphic design. The centre, located in the Britannia Creek General Store, has long opening hours. The usage charge is Can$2.00 (c.US$1.5) per hour, plus a Can$5.00 (c.US$3.75) set-up fee to use the Internet.

COSTS Responsibility for success of the Community Access Program depends on communities taking up the challenge of qualifying for the grants, provided by the Canadian Department of Industry. Grants can reach Can$40,000 (some US$ 27,000) but cannot exceed more than 50 per cent of total costs over three years. Although the government provides help and guidance, community leaders must organize and conduct their campaign and subsequently set up and administer their site – funding for the second and third years is dependent on successful operation.

Start-up costs can be as low as US$2,000 for a computer with modem and telephone line. In some cases private sector sponsors have given computers or reduced the cost of the telephone lines – it is up to each community to raise funds and sponsorship as it wishes. Income to sustain the project comes from membership and usage charges, plus further sponsorship in some cases.

RESULTS More than 2,200 of these community sites are already on-line and have produced their webpages with publicity, local history and course or training offers. To see some of the results live, a number of different local sites can be accessed at <http://cap.unb.ca/press>.

The Vernon River project is just one of the programme's success stories. It offers computer and Internet training programmes, including specific software packages if there is demand for them, with community access to the computers on Tuesday and Thursday nights. There are also summer computer camps for young people and adults. Among webpages developed are one for the Vernon River Lions Club, a local charitable organization, and a community newsletter. The project has encouraged people to overcome their fear of technology and opened new doors towards employment and self-determination.

The Community Access Program is now beginning to share know-how with a number of developing countries including Mexico, South Africa and Trinidad and Tobago. For example, under the auspices of the International Development Research Centre's Acacia project, the experience gained in Canada will be utilized to help schools and communities get connected in the SchoolNet South Africa programme. This new programme aims at developing links between schools, including an e-mail service in partnership with Internet service providers and Telkom, the South African telecom operator; and enhancing public awareness of the use of information and communication technologies through press articles, conferences and the Internet itself.

CONTACT

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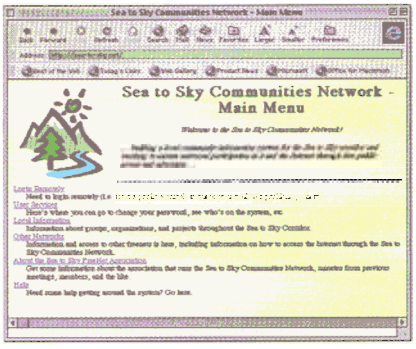
from the private sector. Three, predominantly black, inner-city areas, Roxbury, Dorchester and Mattapan, have been linked to the Internet via a website that gives residents of these neighbourhoods on-line access to resources for and about them <http://www.roxbury.com>. There are listings of businesses from art supplies to television repairs; links to job vacancies locally and nationally; and "cyber neighbors" linking to individuals' home pages. Again, this is an initiative that could be replicated in the developing world as Internet access grows.

Community networking

With a network at their disposal users can create new, or reanimate existing, community organizations in order to share information, knowledge and experiences or pursue common community goals. The networks may remain strictly local or may have access to the Internet, thus enabling others, outside the intended constituency, to tap in and widen the community. They may be run by private entities (e.g. the *San Francisco Bay Guardian* newspaper's on-line service in the United States) or public, volunteer, non-profit organizations (e.g. the National Capital Freenet in Ottawa, Canada), but an important aspect of their existence is the potential for strengthening their community socially, politically or economically. In the above examples, this has been achieved by providing a forum for discussion and debate, in addition to news coverage in the case of the *Guardian* site and interaction with political candidates in the case of the Freenet site. Grass-roots action reminds the government of its responsibilities as well as empowering citizens.

Access requires only a personal computer equipped with a modem (together with the necessary telecommunication connection) which the community organization may provide for public access at convenient points throughout their neighbourhood. This model is therefore reproducible in developing countries, and projects such as the Alternative Information Development Centre in South Africa,[7] as well as initiatives discussed in the Community Access Program case study on the previous page, are starting to work in this way. The educational aspect of community networks is important for any newcomer who can learn to manipulate and navigate this new medium, for the expert user who learns to moderate virtual debates, and for all users who learn the intricacies of community politics and democracy at work.



Communities participating in the Canadian Community Access Program have their own sites and are linked to many others.

It is vital to encourage stakeholder engagement

Community networks can start spontaneously through one or two devoted individuals but efforts to put one in place may meet difficulties. For example, university personnel, during an effort to organize and establish a low-cost, community access, Internet system in a rural community in Canada, found that local public organizations did not respond enthusiastically, although the local network was to be owned and managed by the rural community. They then held public information sessions to introduce the idea to community stakeholders and quickly found that those most interested were organizations

that were already deeply involved in community development or providing meaningful community services.

Through these sessions they were able to identify three leaders of community organizations who came forward to publicly champion the project. These people, with a minimal introduction to community networking, were able to recognize the potential of the project and see that the network would be a tremendous resource for enhancing their work and helping to solve problems in local communication, outreach and information sharing. The legitimacy that they brought to the project did what countless hours of explaining to local government officials could not. Their profile helped foster broad public attention and bring in hesitant community organizations (including local government once the community network began service) to support the project. The community network established is called Wellington County FreeSpace and it can be reached at <http://www2.freespace.net>.[8]

CORPORATE VIEW

Reducing installation costs

SUBSCRIBERS to any newly installed or upgraded telephone network are connected to the company's central office or exchange. Local telephone networks generally demand greater investment per customer than any other part of a growing network. Products and processes which can reduce installation costs while offering protection against expensive future maintenance costs speed the installation process and minimize customer charges.

Harris provides a comprehensive range of services to the telecommunication industry, from manufacturing and supplying network switch facilities and microwave transmission systems to network surveillance management and maintenance. It installs business systems with computer and telephone integration services for governments, security and police forces, for air traffic control, and for aviation, marine, industrial and telecommunication operators worldwide.

Harris designs and manufactures fixed and mobile digital cellular communication systems and both analogue and digital local wireless telephone networks for low to medium-density population areas. These networks are connected to the telephone company's main office by standard 30-channel transmission lines. In this way they are capable of serving an area stretching up to 50 kilometres from the host system. Because the equipment used to build or develop systems of this nature is adaptable, and has such a wide reach, it is an extremely cost-effective way of bringing telecommunication services to rural areas. Harris has used its expertise to bring local wireless telephone systems to Benin, Cambodia, Ghana, Peru and the Philippines.

Existing older underground installations are open to damage as a result of climatic and environmental forces. While the necessary repairs are being carried out, customers suffer from a reduced service, and long-term maintenance costs to networks can be prohibitive. Now, however, new services can be delivered using local wireless telephone networks between subscribers and the existing telephone exchange.

Villages or small towns without modern communication networks can be supplied with a central or solar-powered telephone with access to the Internet. To deliver wireless telephony services to existing customers, a mains or solar-powered terminal is established close to the customer, while the location of the host system is immaterial providing it can be connected to the telephone company's office. A 30-channel circuit may be connected to a remote office, which means old technology exchanges can be phased out and transmitter antennas can be installed where most convenient and not necessarily with the wireless telephony equipment.

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For further information see Annex B

Community networks work

Two examples illustrate how governments, recognizing particular needs, were able to stimulate the establishment of community networks operated by citizens.[9]

In Singapore, government authorities, faced with how to build a sense of community into a new town of some 200,000 people, first installed a coaxial cable network. This provided the physical infrastructure for the community

CASE STUDY

Reconnecting people and government

OBJECTIVES

- To rebuild communities in the poverty-stricken inner cities and rural heartland of the United States.
- To empower people and communities by inspiring them to work together to create jobs and opportunities.

BACKGROUND At the end of 1994, the Secretaries of the United States Departments of Agriculture and Housing and Urban Development announced the selection of 72 urban and 33 rural communities under the Empowerment Zone and Enterprize Community (EZ/EC) Initiative to reconnect people and government and to re-establish federal and local partnerships.

DESCRIPTION The Initiative is working to improve security, job training, the physical environment and overall quality of life in the communities targeted. Businesses are being encouraged to invest in the community by means of direct financial incentives, such as subsidies if they take on new workers from the community. Businesses, as well as the community as a whole, benefit from programmes that assist the zone residents in job training, financial management and general education.

Residents of the EZs and ECs are the prime stakeholders in the revitalization of their communities. To ensure that the community remains the central partner throughout the Initiative, each EZ and EC is developing an independent, community-based governance structure invested with the authority to make key strategic and administrative decisions regarding the implementation of the EZ/EC strategic plan. Communication between all partners and at all stages is carried out using e-mail and through the website. Working in partnership with state and city officials and other community resources is essential to building and maintaining the capacity of the community to produce sustained results.

In order to help them participate in the Initiative, business owners and community leaders are provided with information about specific conditions and characteristics of the community at the neighbourhood level: e.g. census data and information about housing conditions, poverty rates, unemployment and concentration of population groups. The computer software designed for the programme permits the posting of this and other relevant information onto street maps, neighbourhood by neighbourhood and block by block.

COSTS The costs of the whole programme are being covered by multimillion dollar government grants, as well as tax incentives to participating businesses. The costs of the telecom elements, however, are not great. A computer, at around US$2,000, a modem and a telephone connection are necessary as a minimum for partners to be able to communicate with each other. The computer software designed for the EZ/EC project, which permits the posting of the census and other data, is made available outside the project at a cost of US$299.

RESULTS Each community has set up a number of programmes and projects. In Chicago, for example, the Instituto del Progreso Latino is running a three-year programme providing computer skills and employment training, as well as job apprenticeship opportunities to zone residents in the Pilsen and Little Village neighbourhoods. Community webpages have been established and include information for visitors as well as residents. Chicago's pages, for example, feature an interactive map, with links to photographs, addresses and historical information about famous attractions and landmarks.

The implementation process has been designed to avoid the mistakes of past urban and rural development efforts; maximize the involvement of each part of the community; capitalize on the excitement and progress generated by the Initiative and the EZ/EC designations; and produce active, ongoing partnerships between and among the federal, state and local governments. Each EZ and EC is now developing its own performance benchmarks to assure adherence to, and measure the results of, each activity in its strategic plan.

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network called Tampines WebTown which, in addition to a webpage, provided for "chats" between users, made a counsellor available for on-line help, provided a booking mechanism for reserving recreational facilities and set up a virtual community wall where users may post essays, poems and pictures for others to view, read and comment on. This has resulted in intra-community contacts being made among the town's new inhabitants as well as giving access to community leaders and to the local Member of Parliament.

In Amsterdam in the Netherlands, the municipal authorities combined a need to make municipal services and information more accessible with a need to channel the demands of a number of citizens' advocacy groups such as those for homeless people. The network established, called the digital city (*di digitaler stade*), created a forum where active civic politics are discussed and where city and regional meeting reports are posted. Many political and community groups have joined the expanding network, which is subsidized

CORPORATE VIEW

Upgrading the network

LATVIA had one of the highest telephone densities of all the areas in the former Soviet Union. Even so, access to the outside world was poor, limited to a few communication channels (trunks) via Moscow. After independence in 1991, the government realized that the country's telephone network, characterized by old, rundown and poorly maintained equipment, needed major upgrading. Tilts Communication, a company formed by Cable & Wireless and Telecom Finland, won the contract for the project. Alcatel's Norwegian subsidiary had the job of engineering, delivering, installing and commissioning the switches, payphones and related equipment. This involved:

- one international toll exchange with 400 trunks;
- 11 local exchanges with 240,000 lines including four integrated national toll centres;
- operator assistance centres for domestic and international calls;
- 500 coin phones with a management centre;
- 7,000 cardphones with management centres;
- multiplexers to interface with the existing exchanges.

The contractor specified a homogeneous network with full integration of Alcatel's 1,000 S12 digital switches with the existing network of Soviet exchanges of various types and ages. While a challenge, the result provided a superior solution for subscribers: even those connected to the old exchanges could access the international network through new international and national digital toll switches.

The project posed other challenges. For example, most of the existing exchanges did not comply with the signalling specifications which varied from route to route so, rather than incur the cost of altering the exchanges, the engineers adjusted the signalling parameters in the new switches. Coin phones, installed in telephone booths and indoor locations, caused problems because of the wide variety of coins used in Latvia, so the engineers had to make adjustments. They also had to develop countermeasures to overcome numerous schemes to use the cardphones fraudulently.

One particular test arose when President Clinton visited Latvia at short notice. The existing telephone network would not have been able to cope with the huge volume of international traffic generated by his staff and journalists. Alcatel solved the problem by putting the international toll switch into operation two months ahead of schedule.

Today, Latvia has a modern telephone system fully equipped to meet the national and international needs of its 2.7 million population as well as the growing number of international companies which have located there. Local officials say the modernization of the telecom network was a decisive factor in attracting these firms, demonstrating how telecommunications can accelerate development.

Alcatel
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Website: http://www.alcatel.fr
For further information see Annex B

by the government. Politicians from municipal and central governments regularly go on-line to explain and debate policies and projects such as future plans for a regional government and plans to develop a new international airport. People now feel more involved in the work of local government.

People power and information and communication technologies

The Association for Progressive Communications (APC) is a grass-roots organization which was started several years ago by individuals who were involved in justice or environmental advocacy and who decided to harness the power of information and communication technologies in order to increase their effectiveness. APC at <http://www.apc.org/> is the world's most extensive network of Internet service providers dedicated to non-governmental organizations and citizen activists. It is a non-profit association of 25 member networks around the world, representing some 15 languages, working together to provide on-line organizational and collaboration tools

CORPORATE VIEW — Limited budgets

DURHAM Communications is a wireless communication system integration company, based in the United States, which specializes in the provision of cost-effective, medium-sized systems to its clients. Targeting government agencies with limited budgets, the company is an expert in delivering reliable communication networks with lower overheads and licensing fees than some of the larger providers.

By establishing a strong network of quality suppliers, Durham Communications is able to offer its customers quick and efficient solutions to their communication needs. A long and successful relationship with a manufacturer of radio-control equipment for dispatch centres enables the company to supply state-of-the-art systems, which include digital network switches. This combination allows dispatch personnel to control and interact with field personnel through a user-friendly radio link. Widely used by police forces, ambulance control rooms and emergency services, it has widespread implications for the efficient management of other operations.

To enhance coverage, and as a support mechanism, repeater systems for both mobile (mounted in a vehicle) and hand-held radios are an integral part of any dispatch operation. These systems may either be a simple, single-channel repeater providing local coverage or an enhanced, sophisticated system which consists of a number of repeaters on multiple frequencies situated at different sites, all linked and networked together. Networked systems will often use different formats to provide customers with extra features including "follow me roaming", an interconnecting telephone facility and wide area coverage.

Once a signal repeating system has been installed, it becomes necessary to introduce some kind of network control device. Most often, these devices use a trunking format in order to be able to allow for the inclusion of additional features. Several enhanced analogue trunking formats are currently available on the market with rich feature sets which are much more cost-effective than networked digital formats.

Many communication systems also need to have a voice security mechanism. Durham Communications provides a voice coding element for many popular mobile and hand-held radios which uses a specific set of complex digital rules to encode analogue audio. By using analogue transmission technology, network infrastructure does not need to be upgraded to pass digital signals. In addition, simulcast systems (simultaneous transmission on the same frequency from multiple sites) are often required to provide coverage in difficult terrain or high-density urban areas. The company is well equipped to provide simulcast systems, which overcome the common problem of limited channel availability.

Durham Communications
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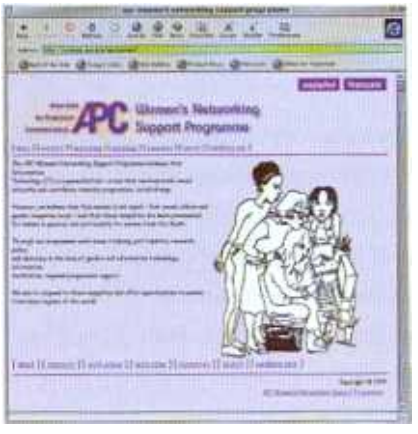
Website: http://www.dcicomm.com
For further information see Annex B



APC members develop information systems to support groups working for change in the world.

and skills for civil society. APC member networks share a common mission: to develop and maintain the information system that allows for geographically dispersed groups who are working for social and environmental change to coordinate activities on-line at a much cheaper rate than can be done by fax, telephone or for-profit computer networks. APC is committed to making these tools available to people from all regions of the world.[10]

APC achievements include working with grass-roots organizations in Ecuador to operate a community-based public Internet access centre, and training a national human rights commission to use mailing lists for internal communication and to maintain a public website of press releases, cases and general information. An APC member association (SANGONeT) hosts Women'sNet <http://womensnet.org.za>, which connects women in South Africa through the Internet to people, information, resources and tools. It has produced an extensive well-explained guide on how to get organized and form a network, and also runs training workshops in basic website design and document preparation.

New communication technologies are making universal communication possible. Nonetheless, these technologies are often controlled by the same groups that control economic and political power and the global media. APC co-organized the International Forum: Communication and Citizenship held in El Salvador in September 1998 which called on the United Nations to convene a world conference on communication. A website, originally created to provide information about the Forum, is being maintained as a permanent space for information, debate and reflection on the issues of communication and citizenship.

HOW IT CAN BE FINANCED

Financing is primarily the responsibility of governments, with the funds for most governance applications coming from national budgets. This is particularly true of the funding of top-down initiatives. There may be more in the way of potential funds to support pilots, trials and development of the infrastructure for community-based bottom-up projects from the World Bank and other development banks. An extensive list of funding agencies and contacts is provided in Annex A. In all cases, it is suggested that contact be made to find out the best way to present an application for funding as this will vary between organizations and according to the type of funding sought.

The World Bank and its agencies provide aid for both government and telecom initiatives in developing countries. Both loans and special grants are available. The Bank manages the Information for Development Program (infoDev) – a global, multilateral donor programme aimed at helping developing countries benefit from information technology. Its objectives include "increasing the efficiency, accountability and transparency of governments" and it encourages applications for funding for pilot projects. Applications can be made to infoDev on an electronic form that guides the applicant through the various types of information that are required.

The International Telecommunication Union (ITU), under the terms of its Special Development Initiative, is planning and carrying out a series of pilot

projects around the world to demonstrate the feasibility of using new technologies to deliver information and communication services. Some US$2.6 million have been allocated to the Initiative, and areas that may be covered include efficient government operations and good governance. The ITU will play a catalytic role in bringing together partners with funds, skills and facilities, and helping them cooperate in management and implementation.

Funding may be available for community-level activities from international organizations such as the International Development Research Centre. Its Acacia project has the overall goal of bringing information and communication technologies to Africa and its initiatives include promotion of community networking, school networks, school to community connectivity and strategic planning for capacity building. Acacia evaluates proposals according to criteria which can be found on its website.[11] Anyone or any organization is welcome to approach the Acacia programme officers

CORPORATE VIEW

No licence required

SAN DIEGO County Water Authority faced several challenges when it decided to provide a high-speed Fast Ethernet connection between two of its buildings in downtown San Diego.

One problem was that its existing wireless system could not cope with the high data speeds needed by the Fast Ethernet switching equipment. An option was to buy a microwave system, but this would have been too expensive, and also would have needed a special licence to operate.

Installing a fibre-optic cable was another option. However, this would have meant running the cable in a trench under a busy downtown street, which would have required special permission, costing additional time and money. And in any case, the authority was planning to move in two years.

Since it was already familiar with wireless point-to-point connectivity solutions, the water authority chose AstroTerra's TerraLink system, which could supply 99 per cent availability without the need for a licence. Another advantage was that the system could go with the authority when it moved to the new facilities.

Installing the system involved configuring the desktop computers, printers and intelligent network switching equipment to enable the network's processor to learn the locations and identification of all the other devices. A high-quality fibre link was connected between the Ethernet switch and the units. Once the units were aligned, the network switch detected the available connections and began transferring the data immediately.

Although fibre-optic cable is usually the first-choice technology for connecting networks, the situation can be complicated by new building projects, temporary leased buildings, licensing restrictions, installation delays and high installation costs, as shown in this case. Narrow-beam laser communication systems offer high speeds, wireless flexibility, extremely secure transmission of information and easy installation – with no licensing requirements.

AstroTerra manufactures a full line of optical wireless data communication systems which provide flexible alternatives to both fibre-optic installation and microwave systems.

It offers various wireless connectivity options between sites, which can be up to two kilometres apart and permit in excess of 2,000 voice channels. AstroTerra is also able to offer significant cost savings by incorporating an optical system designed for short-range use. The system is designed to suit the needs of many users who wish to connect network sites together to exchange data at high speeds, and who are separated by a relatively short distance.

AstroTerra
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Website: http://www.astroterra.com
For further information see Annex B

for more information and/or to give suggestions for a possible project, and this can be done through the website. Acacia believes this is the best approach because the programme officers are well informed about activities happening in their respective regions. The International Development Research Centre also has a partnership and business development branch that can help if an applicant is unsure which part of the organization to approach for funding.[12]

MT&T

Fire fighting and other emergency services can now be much more efficient thanks to mobile communication services.

Cost-sharing arrangements with the private sector should be explored. Additionally, vendor financing for equipment and software through project finance, loan guarantees and export credits may be available. Leasing of equipment can be a financially attractive alternative to purchasing, and as suppliers retain ownership of their computers or other equipment, repair costs are included in the arrangement. Effective procurement procedures such as bulk purchases and grouping of orders are also important for cost reduction and maximization of available finance.

When planning for the use of information and communication technologies for governance it should be borne in mind that the same networks could be used by other sectors. For example, the computers and software at multi-purpose community telecentres (see the section of *Telecommunications in Action* dealing with rural development for more on this) will have different users, including government administrators, health care workers, small businesses, agriculturalists, and perhaps banks or other financial service providers. Sharing the network and computer equipment should generate enough demand and usage to make the shared costs affordable for each user.

If a longer view can be taken, it will be apparent that at least some of the funding for the deployment of information and communication technologies will come from the cost savings that their use will itself engender. Governments in developing countries, wrestling with widespread problems and inadequate budgets, need to find the most cost-effective way to place their resources. This implies the optimal use of their financial, physical and human resources. Information and communication technologies can help meet this challenge.

PLAN OF ACTION

Government service initiatives

Evaluating needs

All government service operations where the introduction of information and communication technologies is being considered should be examined, probably by a special team appointed by each department. Even better would be to set up a special task group, independent of government departments, as this would offer greater possibilities for overall coordination and rational procedures. The mandate of a special group would be:

- to identify specific areas of delivery of government services, as well as any existing problems, which could potentially benefit from the use of information and communication technologies;
- to assign each area a degree of priority;
- to make an inventory of all relevant resources (physical, human and financial, in government services and information and communication infrastructures and technologies) and their geographical distribution;

- to identify constraints, potential obstacles, socio-cultural factors and legal considerations to take into account before introducing new information and communication technologies;
- to coordinate a cost-benefit study of various technological alternatives;
- to make a certain number of recommendations based on the findings of this study.

This is probably the stage which is most critical. Making major course corrections after a service has been put in place, especially one in which the public participates, can affect public confidence and is better avoided. This is no place for a hasty top-down solution, and consultations at all levels can go a long way in avoiding future problems.

The pilot project stage

Once the study phase is completed, a series of pilot projects, designed with the possibility of continued operation after the pilot stage, could be put in place

CORPORATE VIEW

Fast two-way connectivity

BUILDING a reliable, high-capacity communication system in mountainous Venezuela is a challenge. Physical land impediments have ruled out options such as digging trenches for copper or optical fibre. Torrential rainstorms have damaged wired infrastructure causing complete system failure.

This was the challenge facing Fundación para el Manejo de Emergencias (FUNDEM), a government disaster-relief agency. Headquartered in Mérida, an academic city with a strong emphasis on technology, FUNDEM was given the task of finding an economical way to network 250 school and government sites. Scattered across a rugged landscape more than 80 kilometres wide, the network was to include the Governor's palace, the federal courthouse and penitentiary, the University of the Andes and the National Science Foundation.

The solution chosen was Spike Technologies' PRIZM broadband delivery system. The system consists of a high-capacity base station atop a 4,267-metre Andean peak, serving wireless subscribers in 400 locations. Each user benefits from data networking, voice and video conferencing services at rates 300 times faster than conventional modems. A repeater station 40 kilometres away in La Trampa serves users an additional 50 kilometres away.

The system has had a tremendous effect on the region. Connecting via a wide area network, university scientists and students now enjoy fast two-way connectivity instead of depending upon unreliable dial-up lines. The hospital now has access to telemedicine applications, dramatically increasing the quality and speed of local health care.

A full-screen video facility enables the courthouse to hold arraignments with the penitentiary via video conferencing. Helicopters and other emergency equipment belonging to forestry officials and police departments are now fitted with devices that enable them to send and receive video data to evaluate forest fires, mud slides and other natural disasters.

The system has been linked by wireless to the city of Tovar, 80 kilometres from the Mérida base station. Currently under way, phase two involves equipping other key locations in Mérida with high-speed data, video conferencing, telephony and Internet access.

Spike Technologies is the only provider of this advanced technology in Latin America. It was selected after six months of extensive testing and comparative analysis against other wireless solutions and fibre-optic cable. The company designed the system around its own proprietary narrow-beam, compact antenna technology. One base station can provide 7,250 square kilometres of coverage and support high bandwidth connections for up to 22,000 users, depending on the application. Spike Technologies has currently deployed these systems in Africa, Europe, Latin America and the United States.

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For further information see Annex B

Information and communication technologies can keep government and citizens in touch at election time.

and operated for a reasonable time so that possible problems may emerge and be dealt with. Based on public/business acceptance of the services, permanent operations can be put in place.

Community-led initiatives

Agreeing objectives

Where bottom-up operations are concerned, pre-existing community organizations need to agree on their objectives and requirements and be ready to seek support among different levels of government or the business community.

Organizing funding

In order to obtain government funding, or if the proposal is part of a regional or national programme, government will need to decide on establishing guidelines, how much funding can be committed and planning how citizens will be stimulated to participate. If funding can be raised by the community itself, the organizers will have greater freedom on how it can be spent.

Implementation

Once the process has been launched, the direction and nature of subsequent activities will be up to the participants to decide (see, for example, Canada's Community Access Program discussed earlier in this section). Of course, ongoing coordination and possible technical or other support of the programmes will be necessary but the objective is for each community to run its operations in a self-sustaining manner.

Combined initiatives

Deciding objectives

In the case of combined bottom-up and top-down operations, governments must discuss and decide together with citizen and business community groups the objectives of the project, such as stimulating small business enterprises and creating jobs or improving community support for families.

Ensuring sustainability

All those involved will need to take part in reviewing progress at various stages as the initiative develops. To ensure the project's sustainability, all those involved must discuss and agree future plans.

IMPLEMENTATION

Implementation of electronic services does not need to be a major undertaking, but it does require some careful planning so that the overall conversion of services from paper-based to electronic is reviewed before the first new service is implemented. As can be seen in the following working model, provision of electronic services can be an outgrowth or even an integral part of operations' reorganization within one, or several associated, government departments. The new factor that must be taken into account

is that the operation will no longer be strictly internal but will involve provision of services to the public. An important part of the planning process will therefore be establishing a two-way interface with the public, for example through meetings, questionnaires, field trials of equipment or systems, or by interviews. There is a whole process of informing, involving and educating the public which is necessary before any large-scale implementation can successfully take place.

Working model: UK Government Direct: a prospectus for the electronic delivery of government services

The following working model is based on events and trials of systems and services in the United Kingdom over the last few years. The importance of the working model is to demonstrate what can and has been done in this domain where such activities are so recent that very little real experience exists. Following the lead of the banks, with their round-the-clock provision of services, the United Kingdom central government decided to try to provide an electronic portfolio of information and other services to the public. It also aimed to increase coordination and interworking among government departments to improve efficiency and reduce duplication. This decision was conveyed to the public in a green paper "Government Direct: A prospectus for the electronic delivery of government services" published on the government website in November 1996.[13]

Building on experience

Experience had already been gained in the use of the Internet and other networks to provide a number of pilot electronic services which include:

- Government Information Service – a website providing access to information (e.g. contact details and press releases) about more than 300 public sector organizations;
- Automated First Registration and Licensing – a system that permits automobile dealers to issue vehicle licences themselves after electronically submitting manufacturer and new owner information to the licensing authority;
- Customs Handling of Import and Export Freight – an automated system for handling trade declarations permitting faster clearance of goods;
- Patent Office access – gives customers electronic access to the Office's databases for information on patents, trade marks and designs;
- Land Registry access – permits legal and financial institutions to have instant access to the Land Registry's database.

The Driver and Vehicle Licensing Agency is one of the government agencies now "on-line" in the United Kingdom.

Strategic principles

The strategy covered by the green paper is to provide electronic services which are cost-effective and affordable and which conform to the following principles:

- **Choice**: the aim is to have electronic delivery of services become the preferred option for the majority of customers (citizens and businesses) while retaining traditional service delivery as an alternative.

- **Confidence**: information safeguards should be apparent to customers to assure them that personal and other sensitive information is protected.
- **Accessibility**: interactions between government and the public should be simplified and services should be made available how, when and where the customer requires them. This aspect is especially important for those in remote areas, people with limited mobility and people whose first language is not English.
- **Efficiency**: includes streamlining and integration of processes across boundaries between government departments and agencies, simplification and automation of routine processes and minimizing manual operations in information transfer and dissemination.
- **Rationalization**: sharing of resources for functions and processes common to several departments and, where legally permissible, sharing of information.
- **Open information**: all kinds, covering the whole range of government information, except of a personal, confidential or national security nature.

CORPORATE VIEW

Multi-party video conferencing

IN LESS than ten years, Comstar Telecommunications has deployed the TONE network, an integrated digital network in the Russian Federation, with a range of multimedia services. During 1998 the company launched Inter-Tone, a new high-speed Internet access service, and Multi-Tone, the multimedia service. New applications in telemedicine and for business purposes are being developed.

The company set up the first distributed video telephone network in the Russian Federation as part of its digital network and installed the first eight video telephones for the chiefs of Moscow's largest enterprises and organizations in 1998. Multi-party video conferencing sessions have become a part of business life in the capital as a result.

Telemedicine is vitally important in the Russian Federation today. The company's multimedia network is delivering advanced services to this new medical medium. To integrate medical diagnosis, sophisticated information processing systems have been installed, and a 24-hour medical telecommunication channel has been opened between the country's largest heart surgery centres in Moscow and St. Petersburg. The extension of these networks and the introduction of remote telemanipulators will have wide-reaching beneficial effects for both patients and medical professionals in the country.

Video conferences have been held to connect leading health service specialists. Comstar experts believe that because of the cost-effectiveness of digital technology, the consultancy and diagnostic services found in the Russian Federation's best medical centres will become more widely available.

These systems are also having a positive effect on the way businesses are run. An industrial motor plant which manufactures economy cars in Tol'yatti is one of Comstar's remote corporate customers outside Moscow. The plant's requirements in national and international telecommunication services are enormous, with partners, suppliers and customers both at home and abroad.

The inadequacy of the local telecommunication network made it impossible to provide a high-quality, reliable and efficient telephone service. Faxes were unable to be sent or received and it took three or four attempts to complete a telephone call. This lack of essential communication services made it impossible for the company to conduct its business effectively. In order to provide a high-quality telecommunication service link with Moscow, the plant used its own resources to install a fibre-optic cable, 53 kilometres long, which was connected to the telecom provider's line and then through to Moscow. A satellite operator provided the second, back-up route which also gave a number of the plant's customers private network access to Moscow.

Comstar Telecommunications
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For further information see Annex B

■ **Fraud prevention**: ensuring that public funds and assets are protected from fraud and that information cannot be incorrectly accessed or manipulated.

Delivery of services

A key component of the government strategy is to provide the public (businesses and citizens) with the opportunity to send and receive electronically the kinds of information they currently exchange on paper. Businesses with at least one personal computer, equipped with a modem, can directly exchange information. Larger businesses can link their information systems directly with those of the government to permit automatic exchange.

Public information services for citizens will be delivered in public places such as post offices, libraries or commercial centres over special, easy-to-use terminals with touch-sensitive screens. Citizens owning personal computers with modems can deal with government in the same way as small businesses. As technology and markets progress, it is foreseen that simple, "user-friendly"

CORPORATE VIEW

Smart cards

WHILE the first main mobile telephone networks used analogue transmission principles and suffered from variable standards, inadequate security checks and little scope for the development of new services, the second generation of networks is based on the GSM (global system for mobiles) technology.

This worldwide standard, which uses digital technology, provides improved speech quality and high-security elements as well as the facility to add data services such as a mobile fax or e-mail. The technology allows subscribers to make and receive calls anywhere in the world, revolutionizing global communications.

The GSM cellphone network operates with the help of small plastic cards, known as SIM (subscriber identity module) cards. Orga Kartensysteme, a German company established in 1972, has been a leading influence in the development and production of these smart cards for use in the telecommunication and other industries. Similar in size to a credit card, each one has its own electronic chip which is the subscriber's key to the network.

When making a call, the subscriber positions the card in the mobile's handset and follows a security procedure to log onto the network.

The handsets are designed to accept any SIM card. Although small, the card holds all the power of an early desk-top computer, enabling it to control access to the mobile network and personalize the service for the user. The handset is equipped with the subscriber's personal identity number which is checked by the card when a call is made.

If the number is incorrect, the telephone will lock itself after three attempts and refuse the user access to the network. There is a further complex security check between the SIM card and the network before access is granted.

The card can also hold telephone numbers programmed in by the subscriber and be used as a personal telephone directory.

Its high-security programme allows it to operate a pre-paid accounts service, where the network deducts the amount spent on any call, instantaneously displaying that amount on a panel in the handset.

Credit for the card can be bought over the counter. This has particular advantages in countries where only a small percentage of the population has a bank account.

Orga Kartensysteme
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For further information see Annex B

domestic terminals (television with a set-top box) could permit the delivery of government services via a telephone line, cable or satellite.

Security

Banks and other commercial entities have already come to grips with the need to identify customers who contact them electronically by using such devices as personal identification numbers (PINs). As information from government and citizens is frequently sensitive or confidential, the government proposes to use some type of electronic signature such as a "smart card" which has a microprocessor incorporated that contains personal identification information. This is often a PIN but such cards can have biometric data (such as a fingerprint or iris pattern) which can ensure

CASE STUDY

Improving customs procedures

OBJECTIVE

■ To computerize the Philippine Bureau of Customs in order to re-engineer the total customs process for greater efficiency and accuracy and reduced running costs.

BACKGROUND Experience gained from the United Nations Conference on Trade and Development (UNCTAD) Trade Points provided helpful lessons for the Philippines programme (see the section of *Telecommunications in Action* dealing with business for more on Trade Points).

DESCRIPTION Several computer systems make up the Automated Customs Operations System. Developed in cooperation with private sector groups and UNCTAD's Automated System for Customs Data Management (ASYCUDA++), the new systems cover all the automated steps that imported cargoes are subjected to, from the time the import documents are filed (through the designated entry encoding centres at the ports or through direct traders' input from the importers' or Customs brokers' offices) up to the time the operators release the cargoes.

Functions include:

■ automated processes for the release of cargo from the ports;
■ computation and collection of taxes and duties on imports;
■ prevention of technical and other forms of smuggling through ports.

Customs Bureau employees received training in computer skills as part of the programme, and no jobs were lost. Similarly, brokers also retained their positions. Their expertise and authorizations are still necessary, despite the reduction in manual processes.

COSTS The computerization cost c.US$400,000 in total and was funded by a foreign loan (422.5 million pesos) and local appropriations (88.0 million pesos). This amount includes the acquisition of hardware and software, training and installation, but not the costs of related computerized operations developed in the private sector (i.e. payment and reconciliation systems) or the cost of hiring full-time computer experts in the Customs Bureau.

RESULTS The new computer systems and customs processes have totally replaced the inefficient, paper-based manual processes that characterized customs work prior to the application of information and communication technologies.

Benefits and changes from the old system include:

■ Where previously ten or more documents were recorded in 20 logbooks, taking up to 91 steps, the electronic data interchange process now means that important data are entered once and the cargo release process is truly paperless.
■ Cargo release time has dropped from eight days to a maximum of one day and nine hours, and often as little as four hours.
■ Cargo inspection at equipped sites and at definite stages reduces pilferage and other crimes.
■ Electronic transmission of importers' payments data is swift and fraud free because it is queueless, cashless and paperless.
■ Computerized matching of payments and payables is error free.
■ The time taken to confirm remittance to Treasury has been reduced from four months to within ten days.
■ The use of paper documents only at the encoding stage of the cargo release process greatly reduces opportunities for corruption.

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accurate identification by comparison with the characteristics of the person presenting the card. Such a card could be used for the delivery of more than one government service or possibly even banking plus government services.

When personal data must be transmitted over an electronic connection, security of the data will be ensured by using encryption (scrambling) in the same way that banks currently do for electronic financial transactions.

Putting it into practice

Already a number of pilot projects testing the various new concepts and processes foreseen by the green paper have been conducted.

- Touch-screen equipment was tested over a six-month period, using both government and non-government applications, in a network of 200 Touchpoint kiosks. Users were able to use the Touchpoint terminals to book flights and holidays, order flowers, enter competitions and check up on the performance of local schools.
- Another project presented an electronic form which combined paper forms used by a number of different government departments to gather information from applicants. The electronic form, with simplified completion procedures, includes a digital signature, based on capability provided by the National Westminster Bank. Such a signature has been accepted as legally binding for the first time, paving the way for further developments.
- A new service for the construction industry has been developed and tested in a pilot project by the private sector on behalf of the government. The service provides high-level geographic and geological data from six different government departments and agencies via the Internet in an accessible and easy-to-use format.

Overall benefits: a win-win situation

The open government initiatives launched by the United Kingdom government are further steps in making government activities more transparent and accessible to citizens and businesses while trying to reduce the cost of government administration. The principal techniques involve the use of information and communication technologies to eliminate manpower-intensive paper handling activities and interdepartmental duplication of effort, while introducing rationalization and redesign of government processes. The savings can be passed on to taxpayers while the efficiencies and ease of access help businesses to become and remain competitive. In the whole process, government transparency is improved and citizens become more aware and more involved in the democratic process.

Open government initiatives aim to make government activities more accessible as well as reducing costs.

Replicability in developing countries

The activities described above form part of the ongoing United Kingdom Government Direct project. This project was initiated following the G7 Government On-Line (GOL) initiative which is described earlier in this section, and in which some 30 non-G7 countries (including eight developing countries) are already involved. The G7 secretariat responsible for the GOL project made the following statement, encouraging the participation of other countries:

"Under the basic principles of the G7 pilot projects, they are open to all countries (including those that are not members of the G7). The members of the Government On-Line project fully support the principle of open project participation and free flow of information on the project activities. The potential contribution of administrations that are not G7 members but which have embarked on renewal initiatives is well recognized and we look forward to fruitful collaboration with such administrations. To facilitate such collaboration, a set of ground rules has been developed and agreed."

Governmental organizations wishing to participate are asked in the first instance to contact Paul Bird at the United Kingdom Central Computer and Telecommunications Agency on fax +44 1603 704 817.

BENEFITS The development process will only work when all members of the population, at every level, feel that they are involved and are ready to support that process. Transparency and accountability of governance,

CORPORATE VIEW

Multimedia services

REVOLUTIONARY new multimedia systems are being created as telecommunications, information technology and consumer electronics join forces. The result is a television set-top box which connects the latest satellite, cable and digital television systems to interactive services such as home shopping, home banking, interactive advertising and the Internet.

Italtel, the Italian telecommunication company, is spearheading these pioneering advances. Controlled jointly by Telecom Italia and Siemens, Italtel designs, manufactures and installs a wide range of communication networks, including analogue and digital, wired and wireless broadband, cable and mobile systems. In line with the company's research and development strategy, a team of 3,500 specialists is involved in developing a wide range of innovative telecommunication products and services. The company is also participating in over 20 advanced research projects in Europe covering multimedia, mobile and intelligent networks. While focusing on developing the technical aspects associated with telecommunications, the company is reaching beyond supplier and customer relations by working in partnership with its customers to ensure their needs are being realized. Operating in over 100 countries worldwide, the company is the foremost supplier of fixed and mobile networks to China, Iran, the Philippines, the Russian Federation and many Latin American countries.

As well as managing the delivery of Internet and multimedia services for its clients, Italtel has wireless access to the Internet and has developed the telephone exchange and portable personal computer equipment to enable this. Longer term, a project is being developed to link terrestrial digital networks to low Earth orbit satellite networks.

The Linea UT digital system produced by the company has been installed in more than 20 countries with around 20 million telephone, data and video lines in operation, 15 million of which are in Italy. The company has supplied advanced fibre signalling systems to Argentina, China, South Africa and Uruguay as well as microwave radio systems to Argentina, Bangladesh, Bolivia, Brazil, Bulgaria, Greece, Hungary, India, Ireland, the Netherlands, Spain and the United Kingdom. It has also developed new mobile telephone networks in China and Iran.

Tests transmitting high-speed data over normal copper pairs have been successfully conducted in Italy. These results are paving the way for multimedia broadcasting, including teleshopping, telebanking and home working, to be transmitted directly to a personal computer or a television set-top box. Research into Internet for business and switched digital video broadcasts for residential viewers is also under way.

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For further information see Annex B

assisted by information and communication technologies, is one way to help to achieve this.

Information and communication technologies provide a means to perform government tasks more efficiently, effect savings by reducing the use of paper, and permit intercommunication between departments and thus reduce duplication while increasing effectiveness. There will be both direct and indirect benefits as further applications are implemented to provide services to the public by electronic means. One direct effect will be that services become more efficient and user friendly, and another that at the same time a large proportion of the public undergoes a learning experience. An indirect effect should be greater public knowledge and respect for the government which improves its services.

As information and communication technologies are used more widely in government services, benefits for citizens may include:

- electronic access to state employment agencies;

CORPORATE VIEW

High-speed connections

THE GOVERNMENT of Mongolia is anxious to connect the country, which is slightly larger than Alaska but has fewer than 100,000 telephones, with the rest of the world – and it has a four-stage plan to do so. eSat, a satellite Internet company based in the United States, has completed the first phase by installing a satellite Internet system at the offices of the Bodi Group, the largest private business group in Mongolia.

Using satellite transmissions to a dish satellite on the roof of the company's headquarters, a cable connects to the server, which then gives high-speed Internet access to up to 254 users on a local area network.

This solution provides a data delivery rate 70 times faster than can be achieved using a conventional telephone modem. All the users on the network can retrieve real-time information, for example from the financial markets, in fractions of a second. The return communication to the Internet can be through any conventional outbound service as it is low speed and low intensity.

eSat is also carrying out the second and third phases of the Mongolian programme. These involve creating a new two-way communication link and a new network operations centre, which will connect the leading government offices, businesses and stock markets with each other. The final stage will involve a Web-television equivalent dial-up connection.

The company's technology is also benefiting the education sector elsewhere. For example, in the United States, the Longfellow School in Bridgeport, Connecticut, now has true high-speed and unlimited access to the Internet for up to 254 computers simultaneously, using the Satellite Accessed Material for Schools system (SAMS). There is no waiting time to download information. And there is also a managed facility of over 60,000 Web-based pages for students up to the age of 12 years.

eSat has further developed the technology by launching a kiosk for Internet access. The kiosks will be situated in public places, and will allow users such as travelling executives to access their e-mails and/or download files on to a portable computer.

The company is a leader in high-speed Internet connectivity both locally and internationally. It recently announced a major expansion into Asia and the Pacific, where there is a growing demand for high-speed access, creating a joint venture to provide products and services to Australia, China, Indonesia, Malaysia, New Zealand, the Philippines, Singapore, Thailand and other countries in the region.

eSat
E-mail: david@esat.org
Website: http://www.esat.org
For further information see Annex B

- electronic recording of details for vehicle licence renewal that can be dealt with by electronic signature and electronic payment;
- in-home skills training and educational courses on personal computers;
- electronic completion of government forms such as tax returns, utilizing electronic signatures;
- electronic access to personal information files with possibility for correction electronically;
- electronic access to all government, publicly available information.

As citizens even in remote areas begin to feel connected to the government process and rural community life improves, young people will be encouraged to stay in the countryside and develop their communities, while others who had migrated to cities will be encouraged to return. In both cases, there will be a degree of relief from urban migration, overcrowding, pollution and similar problems. The initiative of increasing transparency and involving the public in providing electronic access to government services should result in a public that is more satisfied and probably more concerned and interested by what government is doing and a public more involved in the democratic process.

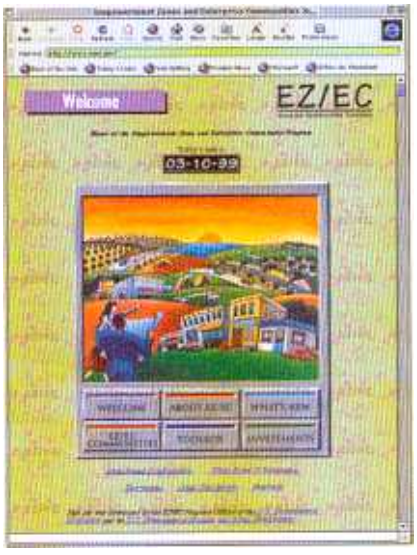
Businesses also benefit through more rapid services with fewer administrative complications. Benefits for businesses could include:

- access to regulatory information from government departments over the Internet;
- on-line information on health and safety in the workplace;
- simplified and reduced-cost taxation procedures through direct access to the tax and Customs departments;
- access to regularly updated overseas trade services information on markets;
- direct access for electronic submission of legally required statistical returns;
- information on registered companies (e.g. annual reports and accounts);
- information that will assist decision making and competitiveness.

Other governance processes involving the use of information and communication technologies – such as encouraging the creation of communities, strengthening citizen involvement in various levels of government and citizen empowerment – have the effect of creating bonds, raising the level of participation of citizens in decisions which affect them and encouraging the creation and strengthening of medium, small and micro enterprises.

In processes where both bottom-up and top-down governance initiatives are undertaken (such as the EZ/EC Initiative in the United States) intergovernmental (federal/state/local) links can be simplified and strengthened while citizens become involved in the process of job creation and community development.

In the overall growth of development, the above processes are an important part of structural adjustment, adding substantially to the transparency of government activities while gaining the support of the national citizenry and building communication channels that provide citizen guidance to decision makers. Development becomes sustainable when all sectors of society and the economy are involved and can support government.



The EZ/EC Initiative aims to simplify intergovernmental links while involving citizens in community development.

African Human Rights Reso ce Cent
<http://www.umn.edu/huma ts/africa
index.html>

nternational Foundation for Election Systems
:http://www.ifes.org/>

War, Peace and Security Guide
<http://www.cfcsc.dnd.ca/links/index.html>
Elections Around the World
<http://www.agora.stm.it/elections/election.htm>

The International Center for Not-for-Profit Law (ICNL)
<http://www.icnl.org>

United States President's Information Technology Advisory Committee, Report to the President, *Information Technology Research: Investing in Our Future*, obtainable at
<http://www.ccic.gov/ac/report/>

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2. Transparency International working paper "Malaysia: Living with Perceptions – The Importance of Transparency" by Tunku Abdul Aziz, Berlin, 21 October 1998.

3. The Group of Seven industrialized countries: Canada, France, Germany, Italy, Japan, United Kingdom, United States.

4. Contacts for G7 Governmer
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GOL Resource Centre
<http://www.open.gov.uk/gc ntro.htm>

5. <http://forum.nca.or.kr:8080/Eng/G7home INFO/info1.html#sum>

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<http://webjcli.ncl.ac.uk/1998/issue3/zekos3.html>

7. <http://resources.bellanet.org/gkaims/acacia acacia_pub_brief.cfm?record_identifier_001 =103&>

8. This example is taken from:
Rural telecommunication services and stakeholder participation: bridging the gap between telecommunication experts and communication for development practitioners, in Paisley L. and Richardson D. *The First Mile*, FAO, 1998.

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9. The Institute on Governance, *Information an Communications Technologies (ICTs) and Governance: Linkages and Challenges*, Ottawa, Canada, October 1996.
Prepared for the International Development Research Centre, Ottawa, Canada.

10. APC may be contacted through:
APC Secretariat, North American Region Office
Presidio Building 1012, First Floor
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P.O. Box 29904-0904
San Francisco, CA 94129-0904, USA
Tel: +1 415 561 6100 x120
Fax: +1 415 561 6101
<http://www.apc.org/>

11 ontact details at <http://www.id

12. Contact information for the branch is at
<http://www.idrc.ca/business/contact_e.html

13. "Green papers" are consultative documents, raising questions and setting deadlines for responses. Only a few months after the publication of the green paper there was an election which changed the party in power but the principles embodied in the initiative continu to guide the field trials of new systems, equipment and services. The new government introduced a white paper (December 1997) as a first step to putting in place necessary "freedom of information" legislation which will provide the legal umbrella for the changes under the previous green paper. As an indication of the seriousness with which this initiative is viewed a the highest level, the Prime Minister is himself receiving training in information technology.