Social, Educational, and Governmental Change Enabled Through Information Technology

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1 Introduction

The ability to store, access and disseminate large amounts of data has altered the social, educational, and governmental landscape throughout the world. The developments in technology, policy, and the economics of computing have been observed by some governments as providing a means to make government agencies more responsive to each others' as well as citizens' needs and also make government actions transparent and accountable to citizens. This panel brings together technocrats who are at the forefront of decision making, creating visions for the future, and exploiting the new technologies. After a brief look at what has been accomplished already, panelists will discuss the challenges that lay ahead from their respective perspectives.

In this panel statement, we shall try to give a glimpse of the various activities that some of the governments around the work have embarked upon in order to harness the power of information technology. This statement does not intend to provide uniform treatment to the various uses of IT, nor does it attempt to paint a picture pertaining to the different geographical regions of the world using similar brush strokes. Instead, its goal is to give the reader a feel for the types of activities governments around the world are focusing on and the dynamics that drive some of these activities.

Realizing that information is key to socioeconomic development, many governments have committed themselves to comprehensively develop modern information repositories. We discuss some of these efforts in Section 2. Most countries are also aiming to use IT to streamline the management of internal governmental processes. We discuss such efforts in Section 3. Section 4 concludes the paper by discussing some of the challenges that lie ahead.

2 Enhancing the Availability of Information

Modern information repositories can be exploited by governments to provide timely and accurate information (about population registry, company registers, motor vehicle database, property registry, etc.) for planning, monitoring and operational activities. This information can be used by all sectors of the society to achieve a multitude of goals. For example, government agencies can use the information about population distributions in order to plan for services such as education and medical care. It can help provide a clear, accurate and up-to-date picture of the society, allow personal, family and statistical information to be made available to individuals as well as public and private organizations to aid in planning, administra-

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tion and identification issues related to socioeconomic development, and in improving the services provided by government agencies to individual citizens.

Allowing government agencies and citizens to access basic information relieves the pressure of information requests on government, firms and citizens; Beyond this, it will be valuable to provide for the automatic distribution of information to government departments and interested citizenry by triggered "live events" such as changes in civil status, judicial events, etc.

2.1 Egypt's Civil Information System

In Egypt, the Civil Status Organization (CSO) provides services in registration birth, marriage, divorce and death and also handles transactions for change residence and of occupation. Based on its records the CSO issues identification cards to persons above 16 years of age. In addition it furnishes statistical and aggregate information to a number of Government Organizations for their own use. But, because of the limited resources available to CSO and the increasing population of the country, the manual system was becoming cumbersome, slow, inaccurate and incomplete. Hence, Egypt has begun to upgrade the organization functions and services by employing modern information technologies. For example, the manually issued id cards are being upgraded to create a unique identification (numbers and cards) for citizens to be used in all their dealings with society in order to facilitate identification and exchange of information across different organizations.

In order to achieve these goals, Egypt has begun a number of specific actions geared towards satisfying the following immediate objectives:

- Build a national database for civil information that contains personal information that is continuously updated to reflect any changes in the society through birth, marriage, divorce, death and other events.
- Build an integrated automated system for maintaining the national civil information database and managing its use.
- Create a comprehensive system for producing reports for individuals, groups such as families, voting blocks, etc. and for the population at large.

2.2 India's National Information Repository

The Indian government set up the National Informatics Center (www.nic.in) in 1975. Its charter was to bring the benefits of information technology and networking to serve the needs of the government and of the nation at large. Towards this end, NIC developed the NICNET, a satellite-based computer communication network with over 1400 nodes connecting the National Capital, the State Capitals and the District Headquarters to one another. Using NICNET, NIC helps the government collect information of various types, from weather to crop yields. Thus, NIC serves as an information provider to more than fifty ministries in the central as well as state governments for planning and forecasting. NIC is also charged with the collection and analysis of India's population census and in handling the complex task of managing India's general elections.

GISTNIC (General Information Service Terminal - National Informatics Centre, www.nic.in/gist) is an on-line database service of NICNET. GISTNIC offers on-line retrieval of information pertaining to the Indian economy, population, village amenities, rural technologies, tourism, district profiles, universities and colleges, as well traditional sciences and technologies of India. For example, the database that monitors the economy provides a detailed monthly review of the Indian economy in the form of a time series of over 10000 parameters, covering both the state level and national level, and sectors such as agriculture, infrastructure, industries, health, education, employment, housing, and public finance. At the other end of the spectrum, the database on traditional sciences and technologies of India provides details of over 5000 items in over one hundred subject areas such as traditional Indian medicine, yoga, medicinal plants of India, traditional Indian practices and methodologies, architecture, town planning, metallurgy, agriculture, irrigation, and textiles. Most provincial governments are now making information more readily available through special portals.

2.3 The Federal Statistics Repository of the United States

More than 70 agencies in the United States Federal Government produce statistics of interest to the public. The Federal Interagency Council on Statistical Policy maintains a portal (www.fedstats.gov/) to provide easy access to the full range of statistics and information produced by these agencies for public use. From this portal one can obtain vast amounts of raw as well as aggregate information.

For instance, it is possible to obtain a statistical abstract of the United States from the National Data Book. It contains a collection of statistics on social and economic conditions in the United States. Selected international data are also included. The abstract serves as a guide to sources of other data from the census bureau, other Federal agencies, and private organizations. The State and Metropolitan Area Data Book contains a collection of statistics on social and economic conditions in the United States at the State and metropolitan area levels. Selected data for component counties and central cities of metropolitan areas are also included.

3 Enhancing Government Processes

3.1 Unitary Network of the Italian Government

In 1993, the Italian government created a new agency named Autorit‘ per l'Informatica nella Pubblica Amministrazione (Authority for IT in the Public Administration, or AIPA – www.aipa.it). AIPA's charter was to promote technology innovation in the information systems of the government, and define criteria for planning, implementing, managing and maintaining them. AIPA designers preferred not to force administrations to carry out a specific re-engineering strategy against their legacy information systems. So, an Integration approach was chosen so that it allowed access to legacy data by integrating old and new applications without requiring substantial modifications. This was achieved by adopting a three-tier client/server architecture to model the "business" relationships among domains.

AIPA's main communication infrastructure, the Unitary Network, was initiated by the Italian Government in 1995. Rete Unitaria della Pubblica Amministrazione (Unitary Network of the Italian Government) or RUPA, was set up to provide administrations with a single point of provision of network services at a lower cost. The RUPA is the government Intranet which caters to most of the internal and external networking needs of administrations, enabling them to co-operate. The RUPA network model is designed as a confederation of highly autonomous and heterogeneous co-operating systems. Projects aimed at workflow automation, integrating the main government Geographical Information Systems, building a network of registry offices, improving personnel information systems, particularly for human resource management, and developing norms for digital signature usage are being conducted under the auspices of AIPA.

The Italian experience has demonstrated that the concept of a federation of interoperable and co-operating information systems can be used to reform public administration with modest financial resources, with the potential for immediate progress. It has shown the feasibility of redesigning interdepartmental working procedures and automated information flows using available interoperability services.

3.2 Israel's Direct Democracy Project

With the view of advancing information technology in Israel and with the idea of experimenting with *direct democracy*, a pilot project has begun in Israel with the goal of bringing the proceedings of Israel's Knesset to the public and allowing citizens to be active participants in the proceedings, where possible. The website being constructed (www1.knesset.gov.il/itcommittee) for this purpose is based on the following principles:

- All the Knesset Committees' activities, including internal administrative activities, will be carried out digitally and "paperlessly".
- All the Committee's activities will be carried out over the Internet and, with the exception of matters relating to individual privacy and/or security limitations, will be totally visible to the public. (Actual Committee meetings will occur only rarely and will be presented online, in real-time on the Committee's website, allowing online responses to the discussions).
- The public will have the opportunity of actively participating in the work of the Committee and special tools have been developed for this purpose.
- The Committee and the website draw their strength from the Knesset and are bound by the Knesset charter and the constraints resulting from the safeguarding of the rights of the Members of the Knesset and its factions.

Using appropriate tools, members and incidental visitors to the web site can submit background material or opinion, queries, or motions for legislation, and participate in polls and chat rooms devoted to various topics. The tools will be simple and and based on existing popular applications. The real innovation is the amalgamation of these tools in the work of the Knesset and the willingness to put these tools at the disposal of the public and through them to bring the work of the Knesset to every home in Israel, not in the form of single directional media, which presents de facto details, but rather by means of an invitation to a process of joint and mutually fruitful work between the elected and the electorate.

Will the Israeli public actually respond to an invitation from the legislative body and actively participate in the managing of the affairs of state? It must be remembered that only 12% of the Israeli public has access to the Internet, a fact that in itself creates disproportionality in many areas, and will influence the volume of participation. The world will be watching!

3.3 India's Emerging IT Strategy

As a developing economy, India in recent years has been attempting to use the modern Information Technology as a core around which to build a modern nation. It has formulated an IT strategy that hopes to capitalize on the high global demand of IT services and products. The strategy also envisages a much larger usage of this technology within the country to create an information-enabled society. E-Commerce, e-governance, IT-based education and services are expected to become the corner stones of future national development. For these advances to be useful, the Indian society must create the necessary infrastructure as also an ethos of information usage that will permit proper absorption of these technologies at all levels. As a starting point, the necessary telecom and networking infrastructure is being rapidly put into place by the federal government as well as most state governments. Furthermore, the recently formulated Indian IT strategy calls upon all Government and public sector organizations to spend a minimum of one per cent of their annual budget on IT enabled systems. These strategic measures are expected to fuel a rapid growth of IT industry in the country and along with it the exploitation of IT towards better governance at the federal as well as provincial levels.

3.4 The Digital Government Program of the United States

Today, the United States government has embraced the IT infrastructure in a big way. Examples include Thomas, the Congress' Web site, and the US Internal Revenue Service's interfaces for electronic tax filing. Looking into the future potential of IT, the US National Science Foundation's Digital Government Program (www.digitalgovernment.org/) aims to support innovative projects that effectively and broadly address through research the potential improvement of agency, interagency, and intergovernmental operations and/or government/citizen interaction. Such research is expected to enable the generation and use of a continuous stream of advanced information technologies for early adoption and integration into the government information systems community.

4 Conclusions and Challenges

IT Education and Human Resource Development:

A very rapidly burgeoning IT industry will make highly skewed demands on human resource development: For example, India by itself estimates that from the current work force of about 200,000 people, it will need over 2.5 million IT professionals by the year 2008. There are several hurdles in this ambitious road map including the production and nurturing of such a large pool of professionals. While computer science graduates alone can not be produced in sufficient numbers, schemes for converting bright students of other disciplines to the field of IT, as also continued education programs to constantly update and upgrade the knowledge base of working professionals, will need to be addressed adequately. Fortunately, the Cyberspace and the e-commerce world do appear very exciting and have been greatly hyped in the recent years. Because of the adverse demand supply ratio, the IT industry routinely absorbs, and is able to absorb, good students from other branches of learning. The Indian educational System at the school level is known to be highly competitive and fairly rigorous. The basic mathematical abilities coupled with English medium for university education permit students to migrate to IT with comparative ease.

Finally, quality in CS and IT related mass education needs a corresponding number of high grade teachers and academicians. This is a very major problem and does not seem to currently offer any easy solution. The problem is exacerbated by two phenomena: the large gap in salaries, especially in developing countries, between academics and industry; and, the huge demand for CS and IT trained faculty and professionals in developed countries.

The IT Divide: The proliferation of IT has created a new *divide* of information-haves and have nots. This is particularly significant for developing countries. Thus it is of utmost important that education systems in schools be significantly spruced up using IT as the modern enabler. In addition to this, Internet spread in all but a few countries is currently at a low level, the only solace being that it is growing exponentially in almost all parts of the world. Together with the free-market competition that is increasingly spreading in developing countries, the basic infrastructure and operational efficiencies should soon achieve a world class status.

Also, given that the internet is growing fast, there is a great need to create contents on the net that are in native languages and which cater to the local needs of school and college students. fg This should be in addition to good internet access at reasonable prices. India, for example, has formulated a proposal for an "Indian-Internet", combining the above features, but that is workable under existing legal service provisions.

Privacy and Authentication Issues: For citizens to feel comfortable about contributing to government-managed information repositories, high levels of privacy and security must be guaranteed with respect to civil information by ensuring proper authorized access to different types of data and by implementing measures against the destruction or loss of data. Several steps are being contemplated, for example, through out the world, laws defining the legality and technological context for digital signature have been enacted. The salient aspects of the laws developed, for example, in Italy last year include full legal value of electronic signature, use of open standards for digital certificates, clear conformance requirements for signing devices (including smart cards), and co-existence of multiple certification authorities subject to public registration.

In spite of these seemingly un-surmountable difficulties, the world at large has clearly seen the tremendous wealth generation potential that IT has, and hence feels highly optimistic about addressing these issues. It has also seen and sensed that a more comfortable and honorable life style is possible through the effective use of IT in all aspects of human life. So even countries which missed the fruits of the industrial revolution are now ready to firmly embrace the emerging cyber world.