

## ICTs in the 20<sup>th</sup> Century: Impact on State and Government

All technologies from the age of steam engine to the present computers, through manually handled machine to automatic operating system, through nuclear generated power to wireless satellite cell phones; have been adding to the convenience, comfort and efficiency of human beings in their pursuit of happiness and well-being. What mechanical inventions have been to the industrial societies in the earlier centuries, information and communication technologies are to the present information societies —the societies which increasingly depend upon the collection and storage and processing of information, generation of knowledge and its use to improve the efficiency and well-being of every human being.

In the past few decades, governments have become increasingly responsible for organizing and regulating not only the traditional activities of defence, law and order, and justice but also to social welfare and human resource development. Governments are the single largest takers of people's earnings and the providers of a variety of services to citizens, including dispensing information and welfare. It is therefore natural that ICTs are increasingly used to improve government services. This activity is called e-governance just as commerce, education and books have come to be called e-commerce, e-education and e-books respectively.

### DEVELOPMENTS IN INFORMATION AND COMMUNICATION TECHNOLOGY

Generally speaking, information technology (ICT) means all e-technologies associated with gathering, processing, storing and dissemination of information. However, since the late 1970s the term has acquired a different connotation, in the context of public domain, and is now used to embrace both computer and communication technologies and their common basis — micro electronic technology and all the related software technology. Earlier computer and telecommunication technologies were regarded as quite distinct. However, with remarkable technological changes in microelectronics, software, optics and increased integration of telecommunication with computer technologies, the distinction has become less meaningful. Microelectronic technology has been the common basis both for rapid development and convergence of computer and ICTs. The shift from analogical to digital technologies in telecommunications has led to switching and transmission systems increasingly resembling computers and embedding increasing amount of software. Many communication facilities are now more or less like computers with special uses.

Since the early 1960s when online computer systems were first developed coupled with the development of networking technology, communications between computers expanded greatly. Together, these developments have blurred the traditional distinction between telecommunications and computer technologies and this led to the contemporary term of "information technology".

The evolution of information technology — over the past five decades can be divided into three eras.

1. Mainframe
2. Personal Computer plus Local Area Network
3. Internet Computing.

#### **2. Mainframe**

The period up to 1970s was deemed as the era for organizational mainframe and minicomputer —the era of mainframe. The first microprocessor which was invented by M.E. Hoff,

Jr. in 1971 at Intel, a semiconductor company of California, USA, changed the historical trace of information technology development. The Central processing Unit (CPU) of a computer on a chip was referred to as microprocessor. The first Personal Computer (PC) 'the Altair' was developed in 1975. Two years later, Radio Shack introduced first personal computer with keyboard and Cathode - Ray Tube (CRT) display. This was the first complete personal computer to be marketed to the general public. IBM entered the market with its computer in 1981. The PC became an instant hit with the people and the Times Magazine chose the 'Personal Computer' as its 1982 Man of the Year. After this, the Local Area Network (LAN) revolutionized the way offices functioned.

## **2. Personal Computer plus Local Area Network (LAN)**

The 1980s marks the end of the first (traditional) era of computer systems and the beginning of the second (micro-based) era. The effort that laid the foundation for the internet started in 1969, known as ARPANET aimed at building a computer network enabling researchers to share ideas. The initial plan was to link four sites. The first APRANET link was established between the University of California, Los Angeles, and the Stanford Research Institute in October, 1969. By December 5, 1969 a 4-note network was connected by adding the University of Utah and the University of California, Santa Barbara. There were nearly two-dozen sites by the end of 1971 and more than 200 by 1981 in the United States of America. However, it was not initially an Internet in the present day's sense because it connected hosts rather than networks. It was phased out in 1990 in favour of the more advanced NFSNET, a network established by the National Science Foundation of the United States. NFSNET served as a technical backbone of the Internet.

## **3. Internet Computing**

In the 1990s, the Internet — a network of networks — a huge collection of networks throughout the world, became very popular and embraced by all the people with different culture and background. Users of the Internet communicate mainly via electronic mail (e-mail); via Telnet, a process that allows them to login to a remote host; and via implementations of the File Transfer Protocol (FTP), a protocol that allows them to transfer information from a remote host to their local site. Global internet working and the information super highway were thus put on the agenda and the concepts of national and global information infrastructure, were formulated gradually. Overall, the Internet, as a fundamental framework of global and national information infrastructures, provides great opportunities for improving and reshaping interactions among the three constituents of society — government, citizens and businesses.

In the context of newer and wider responsibilities thrown on the state, the role of Public Administration has become very Important. Public Administration is concerned not only with carrying out policy formulated by the legislative branch, but it also has to assist the legislature and the executive hand in the formulation of policy with its expert knowledge and experience. As such the public administration activity is to a large extent, depends upon data/information processing. Government authorities collect and process various data and information on individuals, families, organizations and companies, and then on the basis of these data and information, produce new information for the public, such as policies, strategies, plans, regulations and then provide various services to the citizens. Information technology is used to support information processing of governments, including data gathering, storing, processing, dissemination and utilization.

It has been recognized that governance and public administration cannot be productive, effective and qualitative without the support of modern information technology. The use of information technology has been an absolute requirement for public administration and management development. Recognizing and tapping the technological changes is very crucial for the leaders of governments to formulate their visions and work out government policies and

strategies for development. There are at least three reasons why information is crucial for any government to reach its objectives of economic and social development

1. Enhanced productivity in the public sector would entail significant gains for the economy as a whole. The public sector accounts for a large percent of total employment, final consumption, expenditure, and gross domestic fixed capital formation.
2. The public sector usually is the biggest and most wide ranging collector of public data and information ranging from economic and social activities to natural and geographic resources.
3. In an increasingly information-intensive global economy, efficient state information systems can facilitate access to global knowledge and international databases and the creation of new options for mobilizing and using local knowledge and resources.

Further, information is key to understand the structure, function, process and policy of government. Flow of information provides the vital relationships between government and citizen, executive branch and legislature, bureaucrat and politician. Information is the life blood of public governance and has to be treated as a 'key resource' to facilitate sharing, exchanging, retaining as well as managing the knowledge input properly.

During the late 1980s and 1990s, the guiding principle in government information management was "re-engineering" — restructuring of its organizations so as to make them computer friendly and implement more appropriate procedures compatible with an IT environment. The main efforts included eliminating layers of traditional management, compressing job categories, training employees and simplifying various processes and streamlining administration to meet the demands of the information age. Hence, governments took advantage of the advanced technology to reinvent the existing modality and organizational structure of government. This was the transformation of the government and to a large extent, a transformation by informatics. In other words, the task was to construct a government structure of the information age by means of modern information technology. Accordingly, the guiding principle and the most popular term in government in the 1990s was 'transformation'. The transformation process is, in fact, the process of development and formulation of e-Government.

Government, beyond a user of ICTs, has to chart out policies and strategies to exploit its information resource, to develop its information infrastructure, and to promote the utilization of information systems for the purposes of achieving more effective growth of public services. Failure to initiate effective and timely action will show effects on the ability of the government to stimulate social and economic development and the formulation of an information society. There are two types of government information systems which have great potential in public administration. They are Document Management and Retrieval Systems (DMRS) and Geographic Information Systems (GIS).

#### **Document Management and Retrieval System**

DMRS has the potential to manage the vast majority of information handled by any organization. It has the ability to manage semi-structured or unstructured information, such as the running text in a word processing file or a bit-mapped pattern in a faxed or scanned drawing.

#### **Geographic Information System**

GIS is a computer system capable of capturing, storing, analysing, and displaying a geographically referenced information, i.e., data identified according to a location. The power of GIS comes from its ability to look at entities in their geographic context and examine relationships between entities.

It gives the possibility of visualizing events at a much more spatially detailed level. New Information Logic to Governance.

Information is the lifeblood of public governance and is critical to understand the structure, functions, processes, and policy making of a government. It is the most revolutionary aspect of the present day communication technologies. The industrial age is being superseded by 'information age'. Information and communication are at the centre of this new economic revolution bringing in new flexibilities into the work place, pushing aside the numerous functions associated with bureaucratic forms of organization.

The ICT revolution has changed the world like never before. Information superhighways are bringing about profound changes in the way people work, learn and live. According to The Economist, "after e-commerce and e-business, the next big thing will be e-governance". New technology has emerged in the academics and society viz., IT and administration ', 'e-government', 'e-governance', 'e-citizen', and lastly 'e-society'.

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