E-Governance : Concepts
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CHAPTER 1

What is E-Governance?

1.1 E-GOVERNANCE—AN OVERVIEW

E-governance is a form of e-business[1] in governance comprising of processes and structures involved in deliverance of electronic services to the public, viz. citizens. It also involves collaborating with business partners of the government by conducting electronic transactions with them. Besides, it entails enabling the general public to interact with the government, through electronic means, for getting the desired services. In other words, e-governance[2] means application of electronic means in the interaction between

1. government (G) and citizens (C), both ways (i.e. G2C and C2G),
2. government or businesses (B), both ways (i.e. G2B and B2G), and
3. internal government operation (G2G),

The aim, ultimately, is to simplify and improve governance and enable people's participation in governance through mail, and Internet.

E-governance is much more than just preparing some websites. It ranges from the use of Internet for the dissemination of plain web based information at its simplest level to services and online transactions on the one hand and utilizing IT in the democratic process itself, i.e. election on the other.

E-governance implies e-democracy[3] (Backers 2001), wherein all forms of interaction between the electorate (i.e. general public) and the elected (i.e. the government) are performed electronically. E-government, as distinguished from e-governance, comprises a pragmatic application and usage of the most innovative technologies in computer and communication technologies, including Internet technology, for delivering efficient and cost effective services, and information and knowledge to the citizens being governed, thereby realizing the vast potential of the government to serve the citizens.

Various manifestations of e-governance initiative will be in terms of the government delivering services to citizens of transacting business, offering general information, or conducting interactions with the general public and business using such IT tools as:

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- E-mail
- Internet web sites publishing (including online interactive transaction)
- WAP application and publishing
- SMS connectivity
- Intranet development and usage
- Promotion of citizen access.

The advent of these other components and of Information and Communication Technology (ICT) as a highly leveraged enabling tool for delivery of services in the public and private sector has now been universally recognized. This has resulted in a redefinition of the fundamental concept of governance and also in recognizing its potential to change both institutions and delivery mechanisms of services for betterment of people.

1.1.1 Why E-governance?

The fundamental motivation for the campaign of e-governance in India and elsewhere is a slogan—**to provide SMART government**--"SMART" being an acronym for Simple, Moral, Accountable and Responsive Government, a laudable ideal, though difficult it may be to achieve in reality. Thus we may conceive a Smart Village or Smart Municipality or a Smart State, all very difficult, but ideal models. Notwithstanding the difficulties involved in achieving this, a clear objective of e-governance can be cutting the cost of governance and also minimizing the complexities of procedures by possible business process reengineering. The concomitant benefit is empowerment of people through what is called 'disintermediation'; in other words, eliminating the middleman or tout between the government and the people. For example, by doing so, property tax assessment and collection system can reduce the element of corruption in the system apart from increasing consumer convenience. The online system based on Internet will reduce contact with mediating officials, thereby reducing the possibility of malpractice. This does not however mean that the primary objective of e-governance is tackling corruption, even though it may be a fallout (though not necessarily).

Evidently, the objectives of achieving such e-governance go far beyond mere simple computerization of stand-alone back office operations in government offices. It should mean a drastic change in the way the government operates, and this means a new and redefined set of responsibilities for the executive, legislative and the judiciary. This requires bringing about a social catharsis, which needs to be done in a comprehensive, concerted and planned manner.

Historically, it was in Chile that a real e-governance initiative was taken up as early as in 1972, when the IT applications were unheard of in government and were limited even in business. They used techniques of IT not to just make government paperless or less of paper (as is presently being done) but to perform government work efficiently. They realized that transparency is the ability to regulate the conditions, not the transactions. Prof. Stafford Beer

implemented for President Allende of Chile, the first e-governance software that would help the government survive a severe crisis. The question that was asked to and answered by the software was whether the government would survive by getting adequate grip and control over the situation in time of a severe inflationary crisis due to economic blockade resulting from stopping of copper exports (which was accounting for 80% of the foreign exchange earnings of Chile). The software which was developed did help in restoring prices back to normal, thus making the government survive. Chile thus became the first country to have successfully implemented e-governance.

Even though the Chile experiment of the real e-governance early in 1972 was a success story, the subsequent efforts in implementing e-governance in various countries, including the developed ones, were not aimed at such profound or sweeping purposes of critical nature. Generally, the e-governance applications have been more mundane, simple and straightforward. As the winds of e-governance and e-government blow widely through public organizations across the world, more and more governments in different countries have been harnessing the Internet and the powers of IT to provide services of varied nature as follows:

- G-to-G (Govt. to Govt.—within and across the Govt.)
- G-to-C (Services by the Govt. to Citizens)
- C-to-G (Interaction of Citizens with the Govt.)
- G-to-B (Services of the Govt. to Business)
- B-to-G (Business interaction with the Govt.)

1.1.2 Issues in E-Governance Applications and the Digital Divide

Initially, the e-Governance activity starts with providing information services by the government departments to the public in terms of State websites. These websites provide information about the department concerned, its aims, objectives, citizens' charters, organizational details, facilities available and services provided to the public along with the fees payable, etc. However, as the role of IT in the specific organization increases, the web sites of government departments attempt at providing more advanced services such as dynamic information and also specific transactions such as making utility payments. Gradually, this e-interaction of the public with the government leads to organizational transformation, transparency of public services, speed of service performance, increased citizen participation in the government, and thereby greater facilitation of participative democracy. Ideally, as the public agencies such as government departments and public sector undertakings begin implementing e-governance and e-government initiatives, their performance improves and they are better equipped to interact with citizens and provide services over the Internet. Thus, the citizens are enabled access to government documents, file taxes, make payments as utility bills, obtain or renew licenses and permits of different kinds, make bookings and reservations for public

services, lodge complaints or file applications for various benefits, and even employment.

How much of these actually happen? What are the problems encountered in achieving them? The enthusiastic initiatives in e-governance and e-government are not without consequential problems, as any technological innovation has. These initiatives have the potential to create a digital divide[4] within the society, especially in the poor and developing countries. While the e-governance initiatives may benefit certain privileged sections of the society, the underprivileged, those who do not have access to Internet or not well qualified or equipped to use Internet will be all the more distanced from the government, leading to disenchantment. Also, this will aggravate even further the existing divide between the privileged and the underprivileged. Thus, it is essential that governments concerned ensure that all citizens of different socio economic and educational strata will have adequate access to the basic skills and infrastructure to participate in an increasingly technological society. As the digital divide becomes perceptible in different countries, public policy makers need to devise policies that would address issues of universal access and educational needs of their citizens, so as to match the requirements of an IT enabled e-government and e-society.

In addition, as the e-governments make Internet as the primary access point for all citizens to interact with the government, the issues that need to be focussed are:

1. How will the performance of the government departments/public bodies be improved by e-governance initiatives?
2. What are the organizational effects of e-government and IT?
3. What are the correct strategies for success in e-governance projects?
4. What are the skills that are required by the government employees in an e-governance environment in the Information Age?

While detailed research is required to address these issues, preliminary indications are already available that e-governance increases efficiency, speed, effectiveness and citizen satisfaction. However, these will be true only if the e-governance services provided to citizens are fool-proof, reliable and inexpensive. The structural effects of e-governance and IT in government departments and public agencies are yet to be identified, and their long-term effects and longitudinal effects are yet to be studied. More research is required to be taken up to answer questions as to whether e-governance leads to decentralized decision making, and whether it results or calls for business process reengineering in the government departments and public organizations.[5, 6]

IT implementations do indicate the required business process reengineering (BPR) within the concerned government department. However, whether such reengineering is viable, can be implemented without any repercussions, what legal changes is required—these issues are open for discussion. Often, the prerequisites for reengineering of the processes in the government are not easy to meet: radical changes in the processes or procedures are not acceptable as they may lead to considerable repercussions, sometimes too radical to be acceptable or implementable, with many side effects.

A number of organizations are involved in studying these issues. The e-governance initiative, a part of National Centre for Public Productivity at Rutgers University, Newark, New Jersey; Centre for Digital Government, a US National Research and Advisory Institute; Centre for e-government, an international body; Centre for Electronic Governance, IIM-Ahmedabad; Centre for Good Governance and also National Institute of Smart Governance, both at Hyderabad, India, Centre for e-governance at Department of Information Technology, and Ministry of Communications and Information Technology, Govt. of India, New Delhi, are some such institutions.

1.2 EVOLUTION OF E-GOVERNANCE, ITS SCOPE AND CONTENT

Even though historically it was Chile which implemented real e-governance solution as early as the seventies, the current interest and attention on e-governance applications all over the world has its roots in the "Information Super Highway" concept initiated by the US Vice President Al Gore in early 1990s. The Information Super Highway was defined largely in terms of the information infrastructure at the national level by many countries including the US, UK, Canada, Australia and India. The focus was then largely on development of components of the infrastructure, such as fibre optic networks across the States or Nations. Subsequently, the interest was widened to include socio-economic considerations encapsulated in the concept of *Information Society* or *Knowledge Society*, which naturally has to encompass e-governance. That is how e-governance concept came into being in a formalized and focussed manner, even though attempts to implement Information Systems in the government departments and other public organizations have been made with partial success in various countries including India. Such earlier attempts did not receive the state patronage on a broad-based manner while individual or stray attempts may be cited to have succeeded.

In general, during 1980s and 1990s, the governments all over the world lagged behind the commercial world in accepting and implementing Information and Communication Technology (ICT). The commercial world, including the industrial world, had gone far ahead of the governments all over the world in harnessing the potential of ICT in their core and also peripheral activities. Commercial enterprises utilized ICT increasingly to reach out to their customers and business partners, thereby impressively enhancing their service quality, speed and convenience. E-commerce thus became a big boom (even though the boom never reached the expected levels). However, visible success cases of ICT application include the 24 hours ATM (Automated Teller Machines) services, 24 hours call centres, electronic shopping on the Web, the use of DTV, integrating cable TV with Internet, etc. The list could be unlimited. Examples can be cited for typical information systems that run the 'back offices' in the financial and other sectors of business and industry. In fact, such 'back office' computerization could be even handled offshore in developing countries like India, where the skilled software manpower and also unskilled

operational manpower have been available at low cost. The cost-effective satellite communication infrastructure facilitated such remote development and maintenance of software of these banking, financial, aviation and industrial sectors. This formed the bulk of the 'software exports' activity in countries such as India, Ireland, Israel, and China. Similarly, in 1990s and 2000 till now, the IT enabled services (ITES) formed the major component of remote services such as call centres, data entry, etc. However, as indicated earlier, all these activities were not concerned with e-governance. Governments were the last in the bandwagon of institutions attempting to harness ICT in their activities. However, though late, the governments all over the world finally woke up to realize the potential of ICT in all their activities.

The initial efforts of e-governance simply resulted in only partial automation of the existing paper based manual procedures and did not result in any significant reengineering or optimization. While implementation of ICT in the business has resulted in good amount of Business Process Reengineering (BPR) as to move away from redundant and inefficient functional business units and to restructure organizations around processes that support core business, in the government enterprises such radical or significant changes have failed to' happen to a large extent. This situation could be traced to various factors in government functioning such as conservatism, resistance to change, and rigidity of legislation which impedes the amendment of rules and procedures.

As a result, ICT based management methodologies[7] such as Business Process Reengineering, Supply Chain Management, Just In Time (JIT) methodologies, which had salutary effects in business and industry had left the government system practically untouched. The scope and extent of e-governance have been largely limited to simple applications with the maximum of computerized MIS and database management within the government departments along with gradually enhanced usage of simple ICT technologies such as e-mail, and limited usage of Internet and video-conferencing for government functions.

In addition to potentially delivering significant improvements in government services, ICT has been visualized by some as having much deeper and wider impact on society and even capable of affecting the quality of life and nature of democracy.

However, the significant issues that has become highly relevant for large scale implementation of ICT in governance are the issues of security, privacy, vulnerability of public ICT infrastructure to crime, potential for abuse, terrorism, and general crime, in addition to issues related to social cohesion, and social exclusion following what is popularly known as the *digital divide.*

Notwithstanding the issue of digital divide which basically refers to lack of access of poor people and rural people to Internet, the indirect benefits to all citizens from computerization and ICT in the government machinery will go a long way in improving the quality of life of people.

Thus, the scope of ICT implementation in government machinery can result in

- improvement of efficiency and effectiveness of the executive functions of government, including delivery of public services;
- greater transparency of government to citizens and business, permitting greater access to the information generated or collated by the government;
- fundamental changes and improvement in relations between citizen and the state thereby improving the democratic process; and
- better interactions and relationships amongst different

  — wings of the same government,
  — state or local governments within a country,
  — countries whose governments are web-enabled.

Any e-governance activity/project involves appropriate

- hardware and corresponding system software,
- networking of the hardware identified above—both the Internet and Intranet environment, and
- application software along with appropriate database management software.

1.3 PRESENT GLOBAL TRENDS OF GROWTH IN E-GOVERNANCE

Press reports (during the end of 2002) indicate a trend of global growth in e-governance utilization by people in different categories. They indicate the following: The proportion of adults worldwide using the Internet to access government services or products during the past 12 months has increased by around 15 per cent, according to the findings of the second Government Online Study published by Taylor Nelson Sofres. Three out of ten citizens (30 per cent) globally said that they had accessed government services online compared with only a quarter (26 per cent) questioned a year ago.

Government online services are most commonly used to search for information (24 per cent of users) and to download information (11 per cent of users). The increased use of government online services is primarily due to the rise in the proportion of people searching for information (from 20 to 24 per cent during the period from September 2001 to September 2002). Globally, online government transactions increased from just 6 per cent to 7 per cent during this period and the percentage of those providing personal details to government increased from 7 per cent to 8 per cent.

In some countries, percentage increase has been significantly higher than in others. Among the most significant increases in the use of government services online are Australia (from 31 per cent to 46 per cent), Turkey (from 3 per cent to 13 per cent), the Netherlands (from 31 per cent to 41 per cent), and the US (from 34 per cent to 43 per cent). In contrast, in Japan, however, government online usage fell by 4 per cent (from 17 per cent to 13 per cent of citizens) between 2001 and 2002.

While security issues about accessing government services online were

the main concern for many countries during 2001, perceptions of safety improved globally during 2002. When 23 per cent of citizens worldwide said that they feel safe disclosing personal information such as credit card and bank account numbers online compared to just 14 per cent of citizens in 2001, representing thus an increase of almost two-thirds (64 per cent). As for the use of government online, the Scandinavian markets (Denmark, Finland, Norway, and Sweden), together with some South East Asian markets (Singapore and Hong Kong), have perceived the highest levels of safety (around one-third of users), in the system. In contrast, the greatest safety concerns were expressed by citizens in Japan (90 per cent said they felt accessing government service online was "unsafe"), Germany (82 per cent) and France (76 per cent).

1.3.1 Other Key Findings

Globally, government online use is more prevalent among men (33 per cent) than women (26 per cent), and among those aged under 35 compared with other age groups.

During the past 12 months substantial increases in government online use have taken place among 35–44 year-olds (from 22 per cent to 36 per cent) and 55–64 year-olds (from 2 per cent to 18 per cent). In contrast, use among those aged 65 and above decreased (from 7 per cent in 2001 to 5 per cent in 2002).

Globally, the proportion of Internet users who have made transactions using government services online is equal to the proportion of users who made online shopping transactions. Fifteen per cent of internet users have made an online government transaction and in addition 15 per cent have made an online purchase at least once during the past 12 months.

The percentage of Internet users who access government online services varies considerably across different countries from 16 per cent in Hungary to 81 per cent in Norway.

Wendy Mellor, Director, Taylor Nelson Sofres commented: The increase in the use of government online services at a global level suggests that the public see the Internet as a more acceptable means of getting involved in government activity at both national and local levels. However, significant differences exist between countries, may be due to, awareness of services, perceptions of safety, relevance of the site to users, and access to the Internet, among others.

In countries such as Singapore, Norway and Sweden, where the use of government services online is high, it is likely that a significant proportion of citizens feel comfortable with this approach of dealing with government. Yet in countries such as Britain, New Zealand and South Korea, where usage lags behind general Internet use, more needs to be done to assess why uptake of online services is slow and what steps need to be taken to address this.

All the above statistics on usage is time bound. Over the years there has been a definite rise in the usage of e-governance all over the world.

Conclusion

While the growth in the use of e-government is encouraging, our research shows that the majority of this growth is from citizens searching for information online rather than making transactions or providing personal information to government. This may be due to perceived security risks but if the use of these services is to increase, messages about the safety of government online services need to be communicated effectively.

E-Governance Models

2.1 INTRODUCTION

In Chapter 1 we have defined e-governance fundamentally as application of ICT to governance activity. However, this can be manifested in multifarious ways and models. Models for e-governance, especially in the developing countries, are essential for a right perspective on e-governance implementation. In this chapter we shall survey some models for e-governance in developing countries.

2.2 MODELS OF DIGITAL GOVERNANCE

Models of digital governance[8] are still evolving in developing countries. A few generic models have shaped up, which are finding greater recognition and are being replicated. These models are based on the inherent characteristics of ICT such as enabling equal access to information to anyone who is a part of the digital network and de-concentration of information across the entire digital network, connecting all sources of information. In simpler terms, information does not reside at any one particular node in the Digital Governance Models but flows equally across all the nodes—a fundamental change from the more common hierarchical information flow model that leads to unequal distribution of information and hence skewed power relations.

Hierarchy is inherent in the government departments. Equity based information flow may not be always compatible with government functioning. Therefore, appropriate administrative reforms and some reengineering may be required before e-governance may be really implemented.

It needs to be noted here that these models of governance are fundamentally different from those which are popular in developed countries due to differences in basic conditions, and perspectives and expectations from good governance. The six generic models of digital governance in developing countries are:

1. Broadcasting/Wider Dissemination Model

2. Critical Flow Model
3. Comparative Analysis Model
4. Mobilisation and Lobbying Model
5. Interactive-Service Model
6. E-governance Maturity Model

These models exhibit several variations dependent on the local situation and the governance functions carried out through these models.

2.2.1 Broadcasting/Wider Dissemination Model

Principle

The model is based on dissemination of information relevant to better governance that is already in the public domain into wider public domain through the use of ICT and convergent media. The rationale behind the model is that a more informed citizenry is able to understand better the governance mechanisms and is more empowered to make informed choices and exercise its rights and responsibilities. Further, there is a greater likelihood that the society in which the individuals are equally informed will ensure that the agenda and forms of governance are not biased to favour a few.

The wider dissemination model opens up an alternative channel for people to access information as well as validate information available in the local domain from external sources. The widespread application of this model gradually corrects the situation of information failure and provides people with the basic government-related information to come to a common understanding and decide upon the future course of action.

Applications

1. Putting government laws and legislation online.
2. Making available the names, contact addresses, e-mails, and fax numbers of local governmental officials online.
3. Making available key information pertaining to governmental plans, budgets, expenditures, and performances online.
4. Putting key court judgements/judicial statements that are of value to common citizens and creating a precedence for future actions online, viz. key environment related judgements, State vs Citizen court rulings, etc.

Project GISTNIC[9] (General Information Services Terminal of National Informatics Centre) is an example of this model. In this project, the government agency (NIC) disseminates general information of about 25 subjects such as Economy, Education, Census, Tourism, etc. to general public. Government Orders (GOs) also are being publicised. However, after the advent and popularity of Internet, almost all government departments have been setting up or maintaining websites providing information about themselves to the public in general. The web sites of government departments can be reached through **www.nic.in**, a general government web site.

Evaluation

This model is the first step to more evolved forms of digital governance models. It is also the most crucial one as it catalyses free access and flow of information to all segments of society and serves as the building block to better governance.

The model, however, loses its effectiveness where free-flow of information is not encouraged or is not an objective. Tight governmental controls and bids to censor the content being transmitted through this model would be the bane of the model. The onus is therefore both on governmental organizations as well as civil society organizations to ensure that such models continue to proliferate.

2.2.2   Critical Flow Model

Principle

The model is based on channelling information of critical value to a targeted audience or spreading it in the wider public domain through the use of ICT and convergent media. The model requires foresight to understand the significance of a particular information set and use it strategically. It may also involve locating users to whom the availability of a particular information set would make a critical difference in initiating good governance.

The strength of Critical Flow Model is the inherent characteristic of ICT that makes the notion of distance and time redundant. This reduces the cases of exploitative governance possible earlier due to time lag between availability of information to different users.

Applications

The applications involve making available

    (a) information on corruption (by an appropriate legal authority) of a particular government ministry or government officials, to its electoral constituency or to the concerned governing body (e.g., the web sites of Central Vigilance Commission);

    (b) research studies, enquiry reports and appraisals commissioned by the government to the affected parties;

    (c) human rights violation and criminal impeachment records against government officials to NGOs and concerned citizens; and

    (d) environment related information to local communities, for example, information on radioactivity spills, effluent discharge in rivers, green ratings of a company, etc.

Evaluation

Critical Flow Model is more focussed in terms of its information content and its intended users. Due to critical aspect of information, the model exposes the weakest aspects of governance and decision-making mechanisms and informs

people about specific cases of state failure and bad governance to build up a case for concerted action. At the same time, by fuelling public unrest, the model exerts pressure on the concerned government institutions and individuals to take into cognizance the interest and opinion of the masses in decision making processes. The onus of creating such models may lie more with the civil society organizations to emerge as an effective watch guard to government policies and actions. The model will not work in cases where government mechanisms do not foster public debates and censure all information of critical nature. It will also fail where the government maintains a tight control over all information. There it remains restricted to top few levels of the government. Inherently the Internet is an open medium. Thus, restricted dissemination is only typical— only those interested may use the critical and subject based information lodged on Internet web sites for public access (as indicated above) as applications.

2.2.3 Comparative Analysis Model

Principle

The Comparative Analysis Model is based on exploring information available in the public or private domain and comparing it with the actual known information sets to derive strategic learnings and arguments. The model continuously assimilate new knowledge products and uses them as a benchmark to evaluate, influence or advocate changes in current governance policies and actions. The comparison could be made over a time scale to get a snapshot of the past and present situation (before-after analysis) or between two different situations to understand the effectiveness of an intervention (with or without analysis). The strength of this model lies in the boundless capacity of ICT to store information in a retrievable manner and transmit it almost instantaneously across all geographical and hierarchical barriers.

Applications

1. Guaging the effectiveness of current policies by gleaning learnings from government policies and actions of the past.
2. Establishing conditions of prior precedence, especially in the case of judicial or legal decision-making and use it to influence future decision-making. This could be useful in resolving patent-related disputes, public goods ownership rights, etc.
3. Enabling informed decision-making at all levels by enhancing the background knowledge and provide a rationale for future course of action.
4. Evaluating the performance record of a particular government official or ministry.

Evaluation

Developing countries can effectively use this model to their advantage as ICT

opens access to global and local knowledge products at a relatively low cost. Watchguard organizations and monitor groups could use the model to track the performance records of electoral candidates and share them in their constituency. The model is, however, dependent on the availability of comparative information sets and the ability of the users to analyze and bring out strong arguments or self-explanatory graphics from the analysis. The model however becomes ineffective in the absence of a strong civil society interest and short public memory.

2.2.4 Mobilization and Lobbying Model

Principle

Mobilization and Lobbying Model is one of the most frequently used digital governance models and has often come to the aid of civil society organizations in developing countries to impact international decision-making processes. The model is based on planned, directed, strategic flow of information to build strong virtual allies to strengthen action in the real world. It takes up the proactive approach of forming virtual communities which share similar values and concerns, promoting active sharing of information between these communities, and linking them with real-world activities.

The strength of this model is in the diversity of its virtual community, and the ideas, expertise and resources accumulated through virtual forms of networking. The model is able to effectively overcome geographical, institutional and bureaucratic barriers to shape concerted action. It also provides a strong virtual arm to several activities such as directing campaigns against a particular individual or decision-making body.

Applications

1. Fostering public debates on global issues, themes of upcoming conferences, treaties, etc.
2. Formation of pressure groups to pressurize decision-makers to take their common concerns into cognizance.
3. Amplifying the voices of marginalized groups such as backward classes or minorities who are traditionally marginalized from the decision-making process.
4. Encouraging wider participation in decision-making processes.
5. Developing global expertise on a particular theme in the absence of localized information to aid decision-making.

Evaluation

The Mobilization and Lobbying Model enhances the scope of participation of individuals and communities in policy issues and debates. The model also creates an effective deterrent for government bodies and individuals to be watchful in their actions lest they turn the opinion of local and global

community against them. This model could be effectively used by the Government to encourage public debates and to gauge public opinion on a particular issue as a part of good governance strategies.

2.2.5 Interactive-Service Model/Government-to-Citizen-to-Government Model (G2C2G)

Principle

Interactive-Service Model in many ways is a consolidation of the earlier digital governance models and opens up avenues for direct participation of individuals in the governance processes. This model fully captures the potential of ICT and leverages it for greater participation, efficiency and transparency in the functioning of government as well as savings in time and costs relating to decision-making.

The Interactive-Service Model makes possible various services offered by the government to be directly accessible to citizens. It creates an interactive Government-to-Consumer-to-Government (G2C2G) channel in various functions such as election of government officials (e-ballots), filing of tax returns, procurement of government services, sharing of concerns and providing expertise, conducting opinion polls on public issues, and grievance redressal.

Applications

1. Establishing an interactive communication channel with policy-makers such as videoconferencing and online dialoguing.
2. Conducting electronic ballots for the election of government officials and other office bearers.
3. Conducting public debates/opinion polls on issues of wider concern before formulation of policies and legislative frameworks.
4. Filing of grievance petitions, feedback and reports by citizens with the concerned governmental body.
5. Performing governance functions online such as revenue collection, filing of taxes, governmental procurement, payment transfers, etc.
6. Carrying out videoconferencing, and online discussion with policy makers.

Evaluation

This model is more embedded in e-governance initiatives in the developed countries and has often been proposed for implementation in developing countries. Such forms of solution transfer may not be very effective. The model is on the higher end of technology reliance as compared to the other models. This makes it difficult to replicate in developing countries in the absence of individual and secure ICT access. Various other issues also need to be considered carefully before such blind duplication can be attempted in the developing countries. However, the trend is definitely in this direction and

sooner or later, this model will be implemented in all the countries with due modifications for local adaptation.

2.3 EVOLUTION IN E-GOVERNANCE AND MATURITY MODELS

The E-governance Maturity Model (EMM—version 1.0)[10] (D.C. Misra and Anjali Dhingra), based on the conventional software maturity models, proposes some levels of maturity, depending on the effectiveness with which the e-governance efforts have been initiated, implemented or successfully completed. The model also provides for identification of key focus areas that need to be concentrated for attaining a specific maturity level as discussed below:

Traditionally, e-governance has been defined as an ICT enabled route to good governance with a view to enhancing transparency in the system and provide prompt and quality services to the citizen. E-governance is an evolutionary path, whose effective implementation requires a complete understanding of its various elements and at the same time taking a holistic view to stay focused on its overall objectives.

E-governance journey encounters several milestones that need to be identified and modelled so that efforts invested can be assessed and an appropriate course of action be taken by the organization to further its way on the path of e-governance. The E-governance Maturity Model (EMM—version 1.0) proposes five levels of maturity, depending upon the effectiveness with which the e-governance efforts have been initiated, pursued, utilized and institutionalized. EMM 1.0 will facilitate government organizations to assess the current level of e-governance initiatives and accordingly make efforts for the future. The model further identifies the characteristics exhibited by organizations at various levels of maturity that will facilitate correct assessment of the current status. The model also provides Key Focus Areas (KFAs) that need to be focused on to attain a particular maturity level.

2.3.1 Five Maturity Levels

The E-governance Maturity Model (EMM—version 1.0) is based on the fact that speed, openness and ubiquity are some of the major capabilities of ICTs, which can be leveraged for generating transparency, responsiveness and accountability in the system, on the one hand and empowering the common man by providing faster access to right information at the right time, on the other. It is also based on a service-oriented approach, where public administration is seen as a professional activity and efficient delivery of services to the internal and external users (customers) is emphasized as a key performance indicator of the government department. The internal customers/ users of an organization are its employees and the external users are the citizens, businesses, other government and non-governmental bodies that the organization needs to satisfy in its e-governance endeavour. However, there

may exist organizations that are performing well even without ICT application to its functions. Even such organizations may gradually take up to ICT for the sake of other reasons and other benefits.

The maturity levels, described below, provide a necessary mechanism to benchmark the efforts invested by an organization in implementing e-governance and subsequently sustaining it to the satisfaction of its customers/ users.

Level 1: Closed

This is the stage when an organization does not use ICT as a facilitator for good governance and has no plans to do so in the near future. This situation may arise due to lack of exposure to ICTs and associated benefits that again may depend upon a number of reasons; remoteness from the mainstream in terms of location is primary, and lack of resources and strategic thinking could be some of the other issues. As a result, the organization is 'closed' in terms of being connected and sharing of information in the context of "e"-governance. However, even in this condition the organization may be efficiently functioning. Given the trend today, all organizations may take up ICT implementation sooner or later.

Level 2: Initial

This level corresponds to the stage when an organization has initiated the automation of its processes but on a ad-hoc basis. No organized efforts are made to undertake the e-governance initiatives. Also, due to lack of direction many such e-governance efforts are abandoned at a subsequent date.

Level 3: Planned

The e-governance initiative, at this level, is undertaken with a systematic approach. The organization has a clearly defined vision, objectives and goals for e-governance. A need assessment study is conducted to prioritize areas of implementation and gauge the extent of e-readiness. Taking input from the need assessment study, extensive planning has been carried out indicating policies, strategies, various activities, stakeholders, roles and responsibilities and resources required in terms of time, money and manpower to undertake the e-governance exercise. However, the organization is yet to enter into the planned implementation of the e-governance exercise, even though all the requisite planning is completed.

Level 4: Realized

This level corresponds to the stage when the organization actually realizes the complete e-governance plan. Consequently, an integrated system is established where all the internal processes of the organization are computerized and there is a seamless information exchange among all concerned entities. The organization starts delivering the services to its external as well as internal customers/users in an effective manner.

Complete realization of the plan, in a single instance, would entail enormous amount of resources in terms of time, money and manpower, which may necessitate adopting a phased approach for operationalizing the e-governance services. Accordingly, a further classification within this level has been proposed that measures the extent of realization of the plan over a period of time. These sub-levels are also indicative of the openness and effectiveness with which the information is exchanged among the various entities of the organization (external and internal).

    (a) **Retrospected.** At this level, the organization has retrospectively studied its business processes in view of its vision, overall e-governance objectives, the service-oriented approach (wherein government is expected to effectively deliver the services to its customers/users), and changes, if required, in the processes are initiated as a constant evolutionary process.

    (b) **E-ready.** In this stage, e-readiness essentials,* which are also the building blocks for e-governance, are ensured by the organization.

    (c) **Partially open.** At this stage some of the e-governance services are operationalized resulting in a partial information exchange among the entities, both within and outside the organization.

    (d) **Open.** This sub-level of realized state implies complete deployment of e-governance services that ensure an integrated system that is open to information exchange. The focus here shifts from acquiring and implementing "e" enabling factors to effectiveness with which the services are delivered. The system gains responsiveness to deal with the customer needs and is accountable for its services.

Level 5: Institutionalized

At this level, the organizations sustain the realized state over a period of time so that e-governance becomes part of its work culture. The e-governance services are effectively utilized and accepted by the users. Several iterations between planned and realized state lead to institutionalization, when e-governance becomes a way of life (Figure 2.1).
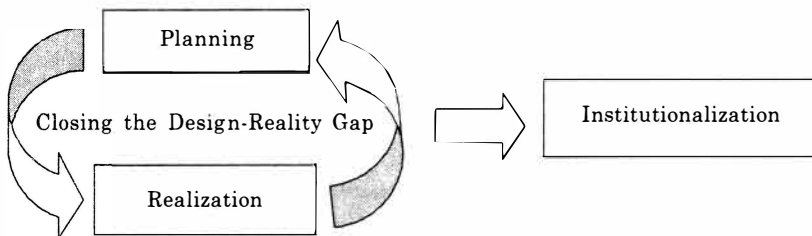

Figure 2.1 Reaching the Institutionalized Stage.

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*E-readiness essentials are a set of prerequisites that act as sound building blocks for implementing e-governance. Most of the e-governance initiatives in the past have either failed or could not commence because of lack of e-readiness.

Following define the e-readiness of an organization:

(a) **Presence of strategic thinking, leadership and commitment among top-level decision makers.** It is necessary to have visionaries at the top level who can put e-governance on the agenda of the organization and are able to carry it through to implementation and effective utilization.

(b) **Institutional infrastructure.** There should also be institutions responsible for creating e-governance awareness among stakeholders and users, and coordinate the e-governance exercise.

(c) **ICT infrastructure.** A sound computing and communication infrastructure is an essential requirement for effective operationalization of e-governance services.

(d) **Human capacities.** It is important to build human capacities in terms of necessary knowledge and skills to initiate, implement and sustain e-governance initiatives. It is equally important to generate right attitude that is receptive to ICT based administration and ICT based delivery of services. All require extensive and intensive training and ICT orientation programmes at various levels of the staff and officers in the concerned government organization.

(e) **Legal infrastructure.** The necessary laws and regulations should also be in place to support ICT as a tool for good governance.

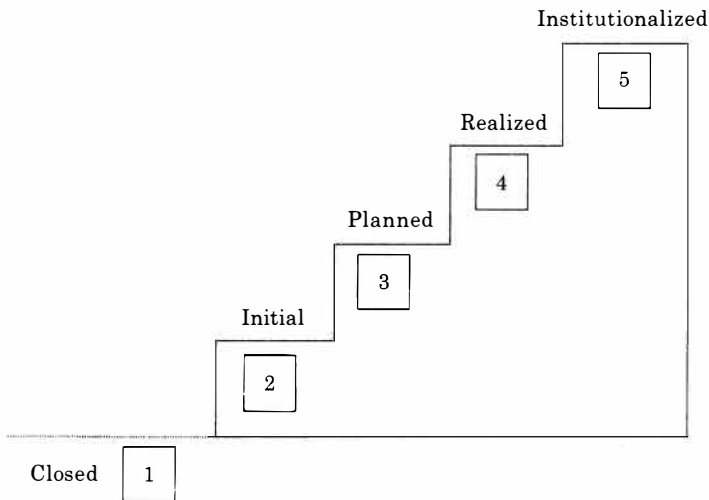E-governance maturity levels can be depicted as in Figure 2.2.

Figure 2.2 E-Governance Maturity Levels.

2.4 CHARACTERISTICS OF MATURITY LEVELS

The characteristics exhibited by the organizations at various levels of maturity facilitate assessing the current level of e-governance attained by an organization. The following sections describe the characteristics of the organizations at various levels:

Level 1: Closed

- Organizations are closed to e-governance. No plans or vision is available. They continue with fully manual and conventional operations.

Level 2: Initial

- Organization lacks strategic thinking and direction for e-governance at top level.
- There are unorganized and isolated efforts of automation in some areas.
- Automation efforts are a result of individual's initiatives.
- The effort sustains as long as the enthusiasm of the individual, who initiated it, remains and is often abandoned due to lack of direction.
- Such organizations generally accumulate hardware without any planning and much of it goes unutilized or underutilized.

Level 3: Planned

- E-governance is a part of organization's agenda.
- Strategic thinking and leadership guide the e-governance initiatives.
- Clear understanding of e-governance needs as projected by the external and internal customers/users.
- Extensive plan is prepared for implementing e-governance, addressing all Key Focus Areas (KFAs) and other related issues.
- All the necessary documents for e-governance planning are in place. These documents include Vision and Scope document for e-governance, Need Assessment Survey document, Policy guidelines, Action Plan and Outsourcing guidelines.

Level 4: Realized

(a) **Retrospected.** (i) Business processes are attuned with the vision and overall e-governance objectives.

(ii) There is awareness about e-governance among all concerned—the stakeholders as well as the customers/users.

(b) **E-ready.** (i) The organization has a sound infrastructure (technological, institutional, legal and human) in place, for implementing e-governance.

(ii) The customers/users are oriented and motivated to use e-governance services.

(c) **Partially open.** (i) Some of the e-governance services are deployed, leading to partial information exchange among the entities.

(ii) Partially open organizations sometimes focus only on their internal or backend processes, allowing an information exchange within the confines of the organization thus remaining insulated from its external entities. In such cases, Government-to-Employee (G2E) interface is visible, whereas Government-to-Citizen (G2C), Government-to-Government (G2G) and Government-to-Business (G2B) interfaces are not yet established.

(iii) Another case of partial deployment of e-governance services results in a conspicuous G2C interface with no emphasis on building G2E, G2B or G2E interfaces. In an enthusiasm to quickly open up its front-end, the organization negligibly focuses on computerization of the supporting backend processes, thus creating hollowness behind the face of static web sites.

(iv) A hybrid of the above two cases is characterized by building interfaces with external entities and simultaneously focusing on computerizing the corresponding backend processes, thus opening a balanced information exchange among the internal as well as the external customers of the organization.

(d) **Open.** (i) The organization has an integrated system, reflective of smooth information exchange within and outside the organization, i.e. Government-to-Employee (G2E), Government-to-Citizen (G2C), Government-to-Government (G2G) and Government-to-Business (G2B) interfaces are well established over a sound foundation of e-governance building blocks (the e-readiness essentials).

(ii) Organization focuses on satisfying the users of e-governance services.

(iii) The internal and external customers/users of the organization start utilizing the e-governance services and become dependent on them.

The necessary documentation for each of the activities under the e-governance exercise is in place (User Requirement Specifications, Software Requirement, Specifications, Design, Test cases, Training modules, Users Manuals, Maintenance guidelines and Impact analysis document).

Level 5: Institutionalized

(i) The e-governance system of the organization is driven by a well established Knowledge Management System that generates an ability in the organization to evolve with time in view of new requirements.

(ii) E-governance becomes an effortless exercise for the organization and it becomes a way of life for the stakeholders and customers/users.

(iii) The organization at this level is completely paperless.

2.5 KEY FOCUS AREAS

Key Focus Areas (KFAs) indicate the areas that need to be focused by an organization and are a set of related activities when performed collectively, help achieving a particular level of maturity. KFAs are defined from level 3 (Planned) onwards, as this is the stage from where e-governance effort is systematically attempted.

Planned

- Define a quantifiable vision for the e-governance exercise.
- Conduct a Needs Assessment Survey in view of objectives covering the following areas:
  - Survey of requirements both within and outside the organization, indicative of the information needs of the internal (employees) and external (citizens, business and other government agencies) customers/users with respect to e-governance.
  - Analyze the requirements to identify priority areas for initiating e-governance exercise.
  - Assess the extent of e-readiness for identified areas and requirements to achieve the desired level of e-readiness.

- Prepare an extensive plan on e-governance that includes the following areas:
  - Define objectives and goals for the e-governance exercise.
  - Design policies and strategies for implementing e-governance.
  - Decompose the e-governance exercise into various activities.
  - Project the resource requirements in terms of time, money and manpower.
  - Identify stakeholders and assign roles and responsibilities.
  - Define implementation methodology.
  - Define measures for creating awareness and change in mindset among the external and internal customers/users of the organizations for effective implementation of e-governance.
  - Define measures for attaining required level of e-readiness.
  - Identify risk factors and propose risk mitigation plan.
  - Define the expected impact and propose an impact assessment methodology.
  - Identify external sources of funds, if required.
  - Define mechanisms (Research and Development, Knowledge Management initiatives) for developing innovative ways of delivering services within the organization and outside it.
  - Define the time for which the plan is valid.
  - Prepare all the necessary documentation including Vision and Scope document for e-governance, Need Assessment Survey document, Policy guidelines, Action Plan and Outsourcing guidelines.

Realized

- Arrange for resources required to implement the e-governance initiative.
- Develop a high level awareness and commitment among decision-makers, stakeholders and users to initiate and carry forward the e-governance objectives.
- Select vendors for outsourced activities and formalize terms and conditions with all the stakeholders, clearly assigning roles, responsibilities and ownership.
- Set up management committees with appropriate representation of all stakeholders for executing and monitoring the e-governance exercise.
- Conduct a detailed study and review of the existing business processes in view of e-governance objectives.
- Initiate the change in business processes wherever required, and bring in suitable legislation to make it effective.
- Acquire and/or design, develop, test and deploy e-governance services with the following issues in mind:

  — Address information needs of common man in local language with easy to use interface.
  — Address the issues related to standardization of content and data to facilitate seamless flow of information among concerned entities.
  — Ensure interoperability in terms of interconnectivity, data integration and information access.
  — Use open standards.
  — Ensure easy accessibility to information.
  — Provide efficient data communication.
  — Build scalable architecture.
  — Ensure wide market support (supply from multiple vendors).
  — Ensure wide product support (interconnection between products from diverse vendors).
  — Ensure cost effectiveness.

- Conduct extensive training for customers/users and administrators for effective operationalization and utilization of e-governance services.
- Collect, compile, validate and update data/content.
- Maintenance activities.
- Conduct an Impact Analysis to assess the effectiveness of service delivery.
- Initiate activities (surveys, research and development, knowledge management initiatives) to devise more innovative ways of developing and delivering e-governance services.

Institutionalized

- Address the *design-reality* gaps, if any, by iterating between planning and realization phases.

- Evolve a mechanism (knowledge management system, research and development initiatives and surveys) to make e-governance an effortless exercise so that the entire system develops an ability to evolve and scale up with time and new requirements.

2.6 TOWARDS GOOD GOVERNANCE THROUGH E-GOVERNANCE MODELS

The digital governance models bring about a transformation in the existing forms of governance as they change the nature of citizen-governance relationship and bring in new agents and mechanisms to influence the governance processes. They foster democratic control over the governments' economic, social and welfare policies by citizens and civil society organizations—a key process requirement for good and responsive governance.

The changes brought about in the citizen-governance relationship through digital governance are fourfold:

1. They open up avenues for flow of information both vertically and laterally to encompass a wider foundation of the civil society. A greater density of information flow is achieved between government and civil society, or within civil society itself. The right to voice and expression gets gradually embedded among citizens through digital means.
2. Information becomes difficult to be capitalized by a few for political gains at the expense of ignorance of citizens. The power equations shift from being concentrated at select nodes to its even distribution among citizens, opposition parties and watchguard groups.
3. There is a greater scope to influence policy-makers and members of civil society through collective opinion, direct participation, participation in public debates and use of advocacy tools.
4. Policy-makers become more aware of the voices of people and can effectively involve them in policy-making mechanisms. They realize that their actions are under the scrutiny of many more watchguard organizations and there are greater avenues available with people to obtain any information. Information also becomes difficult to obliterate and is forever archived to increase the institutional memory of society.

It may, however, be noted that all these features described are applicable only to well established democracies with sound systems in place. This criterion may not be applicable to many developing countries and even some developed countries.

The widespread application of digital governance models synergizes representative forms of democracy with direct participatory forms. This becomes possible because information earlier residing with citizen's representatives in the governance domain is now available with the citizens themselves. People

are therefore more aware of the political issues which interests them, and also about the implication of the actions made by their representatives.

This form of informational egalitarianism creates an effective watchguard system where people watch those who are supposed to guard their interests in the governance mechanisms. This can potentially catalyse popular democracy at local, regional and national levels. Table 2.1 summarizes the nature of people's participation in e-governance.

Table 2.1 People's Participation in ICT-Enabled Governance

	Conventional media	*ICT and convergence media*
Mode of participation	Representative of *ex-situ*	Individual/Collective *in-situ*
Form of participation	Passive/Reactive	Pro-Active/Interactive
Impact of participation	Indirect	Direct/Immediate

As seen from the comparison chart, the involvement of people in ICT-enabled governance mechanisms is significantly different in comparison to traditional forms of governance. The mode of governance transforms from "representative" to "individual based" and from "passive" to "proactive". People are no longer totally dependent on information provided to them by their leaders or policy-makers through conventional media to form an opinion about the issue. They are able to capitalize on different sources of information and can proactively enter into a dialogue with the decision-makers on issues of interest to them.

Since ICT-enabled governance models can directly connect individuals with officials in the government and decision-makers, the impact is immediate, and puts greater access and control over governance mechanism in the hands of individuals. Spaces therefore get created within the existing governance mechanisms that would be democratically informed by citizen's voice. This process makes the government more responsible and accountable to its citizens.

Digital governance models bring with them the potential to bring in far-reaching changes in governance structures in developing countries. The approach to it however has to be cautious and well thoughtout. Simple replication of popular e-governance models of the developed world in the developing world will not be effective and may end up marginalizing people who are on the wrong side of the digital divide. Local needs and priorities should guide the selection and nature of implementation of e-governance models in an evolutionary manner.

Creativity lies in the use of information and blending it with the potential offered by ICT to create customized low-cost digital governance models. Solutions may often emerge by analysis of reasons behind governance failures by the people themselves and then imaginatively using digital governance models to focus on the weakest spot to bring gradual improvements in governance. Small successes are significant landmarks in the path of transformation to good governance.

E-Governance Infrastructure, Stages in Evolution and Strategies for Success

While e-governance is a reality beyond hype even in developing countries, a fact usually not understood is that many e-governance initiatives (if not most) fail before they are well entrenched on a permanent and sustainable basis. What are the reasons for this? What are the issues involved in this high mortality rate? What are the pitfalls and bottlenecks? What is the prescribed solution for this? In this chapter we shall try to answer these questions. Firstly we shall discuss e-Readiness, a key factor for success. Next we will present various stages of evolution in e-governance.

3.1 E-READINESS

As discussed in Chapter 2, developing countries such as India face certain serious constraints and limitations or challenges to fully adopt e-governance. All these are related to the e-readiness of the country i.e. its readiness for e-governance implementation. E-readiness,[4, 11, 12] means the infrastructural pre-requisites for taking up any e-governance initiative. These infrastructural prerequisites or preconditions may be identified as

- Data system infrastructural preparedness
- Legal infrastructural preparedness
- Human infrastructural preparedness
- Institutional infrastructural preparedness
- Technological infrastructural preparedness
- Leadership and strategic planning.

We shall now discuss all these infrastructural prerequisites:

3.1.1 Data Systems Infrastructure

The core of e-governance is e-MIS, the electronic Management Information System. This implies the databases being ready and usable in such e-MIS, as data is the core of MIS. Whatever data conventionally was being procured and maintained manually needs to be computerized or brought into electronic form. This means the preparation of computerized MIS and databases or, in some cases, data warehouses required in e-governance. Data quality and security is extremely important. Usually, in most government environments in the developing world, these infrastructural arrangements are not up to the mark. The fundamental question that can be asked before implementing any e-governance application is: Are all the requisite management information systems, records, databases and work processes in proper place so as to provide the quantity and quality of data to support the move to e-governance? If not, these have to be built up with great effort and patience—This is the core of computerization activity of any government process. It may take several years to reach this stage.

3.1.2 Legal Infrastructural Preparedness

The efforts put in computerization, as described above, result only in automation of the existing manual processes and procedures. The manual processes and procedures in government are usually obsolete, inefficient, bureaucratic and red tape based. Some developing countries still continue their obsolete colonial practices in government. This means that by computerizing the same existing inefficient manual practices and systems we will continue to have poor and inefficient performance, though at a higher speed, by computerization. It is also due to lack of administrative reforms and lack of business process reengineering. It is also due to lack of requisite legislation and legal infrastructure to enable such reforms or reengineering of the existing inefficient, or obsolete business practices and procedure or rules and regulations within the government at various levels. This problem is more accentuated in the developing countries, some of which still have their colonial hangovers. In the developed countries, especially the smaller ones, administrative reforms and reengineering have been significantly successful. In the developing countries too, this has begun to some extent and the future holds hope for this as to enable effective e-governance implementation in these countries.

The fundamental question that needs to be answered in the affirmative before any successful e-governance institution is taken up is: Are the laws and regulations required to permit and support the move towards e-governance initiatives in place? For example, digital signatures are not yet accepted in many countries which lack the appropriate law for this. The Information Technology Act (IT Act) in India, essentially provides an appropriate legal infrastructure for the use of digital signature. The public key infrastructure is being given the legal sanction and support before it can be implemented. Apart from these statutory laws pertaining to IT, individual legal acts and legislation

may be required for enabling smooth and successful implementation of specific e-governance initiatives (e.g.. the legal acceptance of a computer printed document). Many countries have legislated the IT Act (as in India) which needs all there requirements.

3.1.3   Institutional Infrastructural Preparedness

For any government to implement successful e-governance projects, the requisite institutional infrastructure has to be in place. Most governments do not have any. For example. in India the Government of India established National Informatics Centre (NIC) as an apex institution at the national level for catalyzing and coordinating all e-government activities and projects in any government body at the Central. State and District levels. Similarly, many State governments in India have established their own Information Technology Departments which are basically coordinating facilitators for e-government projects within the State.

However. many countries or states still lack this institutional infrastructure. The activities of such institutes are varied from hardware selection and procurement to networking or software development and implementation and also training of the staff at various levels of the government.

3.1.4   Human Infrastructural Preparedness

An institutional infrastructure provides training facilities in addition to other resources. Human resource development by training is an essential requirement. Human infrastructural preparedness comes from well-trained manpower, both technical and non-technical. The technical manpower resources are essential for all the phases of e-governance and related information system life cycle comprising systems analysis, systems design, programming, implementation, operationalization, and documentation. The national public IT infrastructural institutions (such as National Informatics Centre) for e-governance provide manpower for all such activities. Besides, the private corporations also play a major role in this regard in many e-governance activities. In addition to the requisite technical human infrastructure for software development and implementation of e-government projects, there is need for the crucial training and orientation of user personnel, i.e. government staff in e-governance projects. The government employees and staff who are the stake-holders in all e-government projects as the end users and operational users of such projects, are required to be appropriately trained and oriented for change management from a manual government environment to e-governance environment. Only after such training will they be competent and capable of handling such e-governance projects and operational environments. They also play a crucial role in various phases of e-governance information system life cycle in the phase of systems analysis and operational usage.

3.1.5 Technological Infrastructure Preparedness

Technology is fast changing in ICT domain. Rapid obsolescence of hardware and software and the maintenance and support they require results in great financial demands from time to time. Government organizations encounter this situation especially as their procedures to procure hardware, software, etc. are highly inefficient and delayed.

In the case of developing and underdeveloped countries, the latest technological infrastructure including computing and telecommunication is conspicuous by its absence. As a result, software and hardware also may not be compatible or efficient. The reasons are too many—cost of technology, adaptability, obsolescence, so on and so forth. This is a serious limitation for e-governance implementation. Innovative solutions to solve the problem of funding are being explored by these countries. The new technology domains as fibre optics enable low cost Internet bandwidth. Some countries are also making plans for broadband Internet access.

3.2 EVOLUTIONARY STAGES IN E-GOVERNANCE

E-governance evolves gradually from the simplest levels to advanced levels. The evolution may not be the same in all cases. Several stages of evolutionary progress could be identified. The following stages of e-governance can definitely be perceived in any government department or government organization:

Stage 1. Use of e-mail and setting up of internal networking
Stage 2. Creation of Intranets infrastructure for access of internal activities
Stage 3. Allowing public access to information through Internet
Stage 4. Allowing two-way interactive communication with stakeholders to enable Internet enabled transactions (including financial transactions)
Stage 5. Allowing online transactions by the citizens
Stage 6. Enriching digital democracy
Stage 7. Electronically integrated or joined government with Legislature and Judiciary.

Let us discuss all these stages in brief.

Stage 1: Use of e-mail and setting up of internal network

The most fundamental, cheapest and easiest ICT tool is e-mail. E-mail has now become common in all urban areas and some rural areas. Within the government it is the easiest of all options available for implementation. Official orders to accept e-mail communication as valid have been issued in a large number of government, judicial and legislative organizations. Although e-mail can reach outside organizations via the Internet, most government organizations adopt e-mail for internal messagings.

Due to its informality, e-mail can lead to increased lateral and bottom-up communication.

E-mails break the official hierarchy of communication, as anyone can send to e-mail to any other, breaking the hierarchy and other barriers. They allow person-to-person communication can improve information sharing, exchange, coordination and feedback of information.

However, its limitations are its transparency and security risks of the content, unless used with digital signatures or key encryption. Sensitive and critical messages are still best sent over the telephone or in person. However, with the advent of digital signatures and encryption techniques, it is possible to ensure integrity, security, correctness and non-repudiation of the information sent as e-mail.

The internal networking of various departments of an organization linked to Internet for sending and receiving the e-mail is a prerequisite. Most government organizations have already set up desktops in various divisions and sections and internally connected them all for this purpose.

Stage 2: Use of Internet by connecting internal activities to Internet

While e-mail provides the very fundamental mode of communication, the basic and personal use of Internet from offices and houses is now generally a reality in all urban areas and limited rural areas. Surfing of the web is both a business and pleasure. It has been noticed that most government employees spend a few hours a day surfing the Internet whether for official purpose or personal benefit, or for pleasure. The Internet has inculcated an information culture in the people in general and government employees in particular, to surf the Internet, in general, for all purposes of information retrieval. Thus, all sectors of the government such as Agriculture, Finance, Economy, Planning, Rural Development, etc. can be found to have their presence on the Internet in a significant scale and any government activity regarding any information such as policy statements, strategies, technological or scientific information can be obtained from the Internet for the benefit of all levels of people involved in government. For example, the Andhra Pradesh Chief Minister's Office has set up a group of technical and administrative staff only to research and retrieve information from the Internet from time to time to prepare reports and presentations. Similarly, the office has also set up an official web site giving all activities of the Chief Minister and summary of government activities.

Stage 3: Allowing public access to information

Public access to information can be viewed in multiple dimensions.

(a) **Web pages, citizen charters and application forms.** If the government department concerned puts up a web page on the Internet, describing all functions of the Department, it can be accessed by citizens and general public interested. This may be usually static data—the Internet equivalent of a printed brochure. The basic profile and functions of the Department concerned will be on

public display. Content may include the citizen charters, application forms for various purposes, details of fees, deadlines, rules and regulations, etc. (see **http://gistnic.tn.nic.in** for citizen charters and application forms for all departments of Tamil Nadu State Government). This is one-way broadcast of information of interest to all citizens that has become very common today and almost all government departments have already set up their web sites.

The web page can also be dynamic—the contents changing with time. The web site updation process can take place dynamically. As in the case of Industries Department of Government of Andhra Pradesh (developed by NIC), the officials located at various remote areas within the State perform the updation of the Index of Industrial Production based on actual production data of industrial units located at remote areas in the Districts.

(b) **General information services.** In addition to this e-enabling of the basic functionality of the government departments concerned, there could be much greater scope, content and depth of information that can be of interest and use for the people, and the citizens at large, that is the general information requirements. The general information requirement of the public in general can be broadly defined to a very large extent or scope and coverage, in wide ranging sectors such as Education and Tourism, apart from information from Census and the statistical information pertaining to various sectors of economy such as agriculture, industrial activity, plan details, etc. Before the Internet was established and became popular, a pioneering initiative was taken by National Informatics Centre (NIC) in the form of the Project GISTNIC (General Information Service Terminal of National Informatics Centre), the goal of which was to collate, compile and provide a single-point source of information of various sectors of interest to public in general. A wide range of subjects as, for example, Census data of all villages—population abstracts as also details of amenities were provided in addition to information of all tourist spots, information regarding universities and colleges, etc. Subjects such as rural technologies and specialized subjects as traditional sciences and technologies were also covered.

Another dimension of public access to information can be in terms of providing access to integrated workflow in different divisions of the government department concerned. Workflow management and workflow integration in a department can be viewed in terms of the ability to move images, files, documents from one workstation to another (or from one table to another) using specific relevant rules of business to review, authorize, authenticate, validate, enter and edit data and assign tasks. Business processes originally involving movement of paper can now be handled electronically from the very beginning to the final disposition. This is also given in various other names like file monitoring, file movement monitoring, workflow automation, etc. In this context, there exist two different possibilities—file

movement monitoring with or without document scanning, and workflow automation. While in general it may be desirable to have all documents scanned (and thus achieve full workflow automation), this may not be desirable in the long term at least in some situations due to excessively high cost involved in this process of scanning large volume and storing both in terms of large volume disk space requirements and consequent hardware costs. Evidently, the delays associated with manual document processing can be minimized by automated workflow systems. The workflow automation can be further enriched by information management aspects of the file contents and also "knowledge management" activities which largely deal with indexing or retrieving text data such as government orders, notes, procedures, etc. based on key words.

Once the workflow is automated in a government office, the related subject functionalities concerned also need to be automated and integrated with simple workflow automation (file movement). This can be clearly seen in the example of the Case Study on Collectorate 2000 wherein the functions of the District Collectorate are automated and integrated with the workflow automation. This integration required dynamic two-way interface and inter-action between the functional modules and file management system.

In various developing countries, examples of the above type of automation can be seen in claims processing, bid and proposal routing and monitoring, grievances or complaint monitoring, scholarships processing, recruitment, etc. These activities could be of wide range, starting with small domain level as in the case of a District level or village level, to large domain of the entire State Secretariat being covered. Most government departments at various levels require workflow automation to be integrated with functional software. Therefore, could there be specific (single) office workflow automation (as in the case of Chief Minister's Office in Andhra Pradesh). For example, in Korea, the Computerized Tax Integrated System accumulates all tax related information and processing of tax remittances, thereby avoiding manual interaction and helps speeding up the operation.

Finally, in terms of public access to information, while most government departments just post general information about the department, its citizen's charter or its application forms, the Phillipines Department of Budget and Management went much further. It posted on the Internet its major budgetary releases to government agencies in a bid to make transactions transparent to public. The web site provides government accounts payable and the actual amounts released for these accounts. The private contractors and general public can thus verify the reality of claims made by the officials on budgetary releases. The details of accounts payable and amounts released for each contractor is posted on the web site each month. This indirectly increases transparency.

There are many other examples in this regard. In Pakistan the entire tax department is computerized, with an objective to minimize the interaction between citizens and the department officials and bring in greater transparency. In Sri Lanka, the Ministry of Finance and Planning has put up an integrated

software management system with a kind of ERP (Enterprise Resource Planning) to integrate financial data as well as human resources data.

The Agriculture Department in China has collated large agricultural databases from farm statistics. Local governments make available price data and information through kiosks. Staff in the kiosks ensure that farmers get the information required by them to get the best prices.

Again, in Andhra Pradesh and also other States in India, agricultural market prices of various agricultural commodities are made available through online kiosks at the market yards and also through an interactive voice recognition (IVR) system in addition to being available on the Internet.

Stage 4: Allowing two way interactive communication with stake-holders to enable Internet enabled transactions (including financial transactions)

Once a web site is operational, correspondences from the citizens can be allowed through e-mail by providing them the appropriate e-mail addresses. For example, in China, the Beijing city government web site provides e-mail section to citizens apart from other important information such as government regulations, rules, laws or information about services offered by the government. In this e-mail section, the citizens are asked to express their suggestions, ideas, complaints (if any). The appropriate office concerned will be receiving these e-mails. Another approach is to permit citizens to clarify some queries (such as how to move the residence to Beijing) and the response to such queries will be posted on the web site itself.

The two-way interaction need not necessarily be online and web based. In the case of CARD (Computer aided Administration of the Registration Department) Project (executed by the Government of Andhra Pradesh and NIC in Andhra Pradesh State), title deeds are registered in one hour and encumberance certificates are issued in 20 minutes. The entire set-up is within the concerned sub-registrar office and managed by the office staff themselves. The citizens are provided the requisite services by the officers concerned in a very efficient manner.

In Dhar District (in the State of Madhya Pradesh), the **Gyandoot** project, executed with the support of NIC, rural citizens get their information and assistance on a variety of subjects ranging from information and assistance on broken pumps to obtaining land title extracts. This is operated through an intranet linked to the district headquarters. Village committees contract the operational management of kiosks to local entrepreneurs who are poor and recover their costs for the services rendered such as obtaining and filling up of applications forms, etc. social services such as matrimonial information service, and educational services are also made available.

Similarly, in Karnataka State, under the **Bhoomi** project (and its various versions and variations in other States also) rural citizens can obtain the official online land record extract at the kiosk (after online mutation and workflow automation) a small amount payable to the operator of the kiosk.

The above examples point out categories of e-government application.

We have poor countries on the one hand and the middle-to-upper income countries on the other. The middle-to-upper level income countries are replacing manual services by electronic means. For example, in Hong Kong, 70 per cent of government services are already online, while Singapore has almost 100 per cent of the government services online through automatic kiosks and ATMs established in various public locations as local train stations. On the other hand, poor countries such as the ones described above are newly building linkages between people and the Government. Both the groups provide services through public kiosks.

Stage 5: Allowing online transactions by the citizens

In stage 4, the citizens interacted through kiosks, obtained services through online or the Internet, but made payments manually. But now, in Stage 5, in addition to permitting single online enquiry access to information, citizens may be enabled to make payments of fees and taxes, lodge complaints, file applications and perform any other transactions online through citizen kiosks installed at busy public locations. This is a much more advanced stage in e-governance not yet reached in developing countries but already reached in the developed world.

In Singapore, the citizens can transact every government business online and round the clock through specially designed kiosks which can be operated using smart cards. They can transact all government related business such as social welfare claims, tax assessment and payment, visa applications and license renewals, in addition to bank based fund or financial transactions using smart cards. However, this is a very advanced technological scenario, too advanced to be replicated immediately in all developing countries, even though plans are being drawn in developing countries to execute similar initiatives. Of course, limited transactions with the government by the citizens have been made online in these countries. The kiosks in public locations in Beijing, China, are successful; this is true of Korea as well as of India (for land record details).

Still, in these countries the financial transactions have not been made online, even though collections may be allowed alternatively (by an operator collecting money). The main reason for not executing financial transactions on the Internet has been the lack of security—lack of confident and secure financial transactions on the net. With the imminent implementation of public key infrastructure in the entire world, including the poor and developing countries, the confidence on financial transactions over the net may be developed, and with the proliferation of the smart cards, and online payments may be very soon a way of life in the entire developing world.

As regards the G2B (Government to Business) transactions, there have been impressive advances in various developing countries. For example, in the Phillipines, the Customs Bureau has enabled electronic payments of customs duty, electronic processing of clearance of documents and release of shipments. The new online system has resulted in fast and secure transmission of payment details. The time for reconciling of payments collected by banks and remittances to the national treasury has been reduced to a few days from several

months. An information system called "Selectivity" categorizes shipments into high, medium or low risk transactions so that they can be coursed through appropriate examination procedures. This reduces fraud, corruption and other undesirable effects that normally result from the personal interaction of the officials with the business customers of the customs department.

Similar efforts, even though limited, have been made in other countries such as India, Thailand and Korea. In Thailand, the Customs Department has eliminated all manual processing, thus increasing efficiency and transparency. Similar effort is in place in Indian Customs Department which has started implementing Electronic Data Interchange (EDI). In Korea, the Public Procurement Service, a central government organization responsible for procuring commodities and arranging contracts for construction projects, has computerized the purchase process and accounting transactions using the EDI.

Cybershopping or e-procurement a growing trend in all countries, is popular for its ease of operation, efficiency and transparency. Contracting also is largely getting computerized. Databases of supply firms information are being set-up. Also, pre-qualification and cost accounting procedures are also being automated.

In countries such as Singapore, complete Enterprise Resource Planning (ERP) implementation has resulted in making compulsory the supplying firms to be e-enabled and compatible to the ERP environment (such as SAP).

Internet based tendering and contracting process can be designed in such a manner that the documents from contractors including performance records can be obtained using computer networks of relevant organizations directly instead of receiving them from middle men manually. This prevents false documents and data being supplied.

In many of these efforts, there is some scope for the government offloading some of its activities to private contractors who will operate the requisite services and earn their own revenues from the customers who may be individuals or business houses. There are models as Build, Own and Operate (BOO) or Build, Own, Operate and Transfer (BOOT) models. There have been some success stories in this regard all over the world. With increasing public sector reforms and privatization, these models may be more attractive than the conventional government owned operations of services. For example, in Hong Kong, the government web portal is entirely financed and maintained by a private company, thereby reducing the cost and risk to the government. Other governments also are expected to follow the lead and involve private sector in creating partnerships with suppliers and customers together with whom they can find ways to cut costs, improve quality and share benefits. The private partnership of the government should be taken up with caution as some of the information in government may be confidential and sensitive sometimes (though not always); also, the profit motive of private companies may not be always achieved by the government in developing countries. It is preferable that the government uses its own agencies for such purposes.

Stage 6: Enriching digital democracy

Democracy can be strengthened and enriched by ICT in multiple ways and modes. At least two important sets of ICT applications that can potentially support participatory and democratic processes, specially in the developing countries have been identified. These relate to applications that enrich and further empower the civil society organizations, and enable the citizens to express themselves by voting in democratic processes through Internet or by any other electronic means.

Examples of success stories on both these two applications identified above can be cited in developing countries. In the Grameena Bank Project in Bangladesh, a cell phone hand set could be bought by a poor woman (with the help of bank loan) who would in turn rent it out to other poor men and women who work in the fields. Finally, this resulted in a commercially viable rural cell phone service leading to significant economic development.

In Andhra Pradesh, the poor women in villages form self-help groups (called DWCRA Project) with micro credit. They were able to grow big enough to set up their own banks which use ICT to a significant level.

The application of ICT in civil society groups and organizations is of a wide spectrum. Several groups can even combine forces, raise funds and even challenge multinational corporations. These challengers can be as diverse as NGOs, trade unions and other self-help groups. Their networking of people could be achieved through ICT applications.

The Community Information Centre (CIC) Project in North Eastern States of India (set up by National Informatics Centre and Department of Information Technology, Ministry of Communications and Information Technology, Government of India) is a success story of engaging local youth in ICT application development and usage.

ICT has been used by the governments in various countries for strengthening democracy, democratic processes and reforms of democratic processes.

It is expected, in the long term, digital democracy will come to some countries in another form: electronic voting. As in USA and in Japan, voting sites can be set up for Internet based voting in elections. However, this will be very different in developing countries. In India and also in the Phillipines, the Election Commission has used ICT in several ways: the voters' information were kept in its web site along with details of timings and location of polling booths. Dissemination of such information through Internet was enhanced with the help of News Media. However, in developing countries largely the voting process itself is either manual or partly electronic. In India and other developing countries, even though Electronic Voting Machines (EVMs) have been used for voting purposes, the entire operation is still manual, even though Internet was used for purposes other than voting itself. Voting on the Internet has now made a beginning in limited scale in many small polls, especially in the developed countries.

Stage 7: Electronically integrated or joined up government with Legislature and Judiciary

In the final stage of e-governance a comprehensive web portal and a smart card integrates information and services from various responsible government agencies. In this stage both horizontal integration of services across departments and vertical integration of service delivery is expected to take place. As already available in Singapore and also being experimented in many states such as Andhra Pradesh, on a web portal users can obtain services across different geographical levels of government within the same functional area and also access different functions. Thus, in a scenario like this, a citizen could submit a change of address on driving license and such a change would automatically be effected in all other sectors such as health, education, elections, taxation, etc. (thereby avoiding need for multiple filing). This is true of horizontal integration of services in an e-government. Citizens also can use portals to make payments and other transactions, obtain a checklist of enclosures required for an application, find answers to frequently asked questions (faq) and engage the services of relevant commercial enterprises. In Singapore and Hong Kong, such state-of-the-art portals are operational. The Government of Taipei (Taiwan) also has set up a "One Window" service on the Internet for tax administration, public health and e-commerce. Smart cards are gradually becoming functional in several Asian Countries for all such activities.

In Andhra Pradesh the e-seva project offers single-roof service on about 40 different areas such as property registration, taxation, utility bills payment, etc. though not presently with a smart card and also not on a single portal, though attempts are in progress in these directions.

Finally, it can be pointed out that this highest level of e-government—Integrated Services with a smart card—is yet to become operational in most developing countries (Singapore and Hong Kong already have). Further integration of e-governance with e-judiciary and e-legislature is yet to come about.

Applications of Data Warehousing and Data Mining in Government

4.1 INTRODUCTION

Data warehousing and data mining are the important means of preparing the government to face the challenges of the new millennium.

Data warehousing and data mining technologies have extensive potential applications in the government—in various Central Government sectors such as Agriculture, Rural Development, Health and Energy and also in State Government activities. These technologies can and should therefore be implemented.

In this chapter, we shall examine their potential applications in the State and Central Government.

4.2 NATIONAL DATA WAREHOUSES

A large number of national data warehouses can be identified from the existing data resources within the Central Government Ministries. Let us examine these potential subject areas on which data warehouses may be developed at present and also in future.

4.2.1 Census Data

The Registrar General and Census Commissioner of India decennially compiles information of all individuals, villages, population groups, etc. This information is wide ranging such as the individual-slip, a compilation of information of individual households, of which a database of 5% sample is maintained for analysis. A data warehouse can be built from this database upon which OLAP techniques can be applied. Data mining also can be performed for analysis and knowledge discovery.

A village-level database was originally developed by National Informatics Centre at Hyderabad under General Information Services Terminal of National Informatics Centre (GISTNIC) for the 1991 Census. This consists of two parts: primary census abstract and village amenities. Subsequently, a data warehouse was also developed for village amenities for Tamil Nadu. This enables multidimensional analysis of the village level data in such sectors as Education, Health and Infrastructure. The fact data pertains to the individual village data compiled under 1991 Census.

As the census compilation is performed once in ten years, the data is quasi-static and, therefore, no refreshing of the warehouse needs to be done on a periodic basis. Only the new data needs to be either appended to the data warehouse or alternatively a new data warehouse can be built.

There exist many other subject areas (e.g. migration tables) within the census purview which may be amenable and appropriate for data warehouse development, OLAP and data mining applications on which work can be taken up in future.

4.2.2 Prices of Essential Commodities

The Ministry of Food and Civil Supplies, Government of India, compiles daily data (on weekly basis) for about 300 observation centres in the entire country on the prices of essential commodities such as rice, edible oils, etc. This data is compiled at the district level by the respective State Government agencies and transmitted online to Delhi for aggregation and storage. A data warehouse can be built for this data, and OLAP techniques can be applied for its analysis. A data mining and forecasting technique can be applied for advance forecasting of the actual prices of these essential commodities. The forecasting model can be strengthened for more accurate forecasting by taking into account the external factors such as rainfall, growth rate of population and inflation.

A limited exercise in this direction was already executed at a State level (in Tamil Nadu).

4.3 OTHER AREAS FOR DATA WAREHOUSING AND DATA MINING

Other possible areas for data warehousing and data mining in Central Government sectors are discussed in detail as under.

4.3.1 Agriculture

The Agricultural Census performed by the Ministry of Agriculture, Government of India, compiles a large number of agricultural parameters at the national level. District-wise agricultural production, area and yield of crops is compiled; this can be built into a data warehouse for analysis, mining and forecasting. Statistics on consumption of fertilizers also can be turned into a data mart.

Data on agricultural inputs such as seeds and fertilizers can also be effectively analyzed in a data warehouse. Data from livestock census can be turned into a data warehouse. Land-use pattern statistics can also be analyzed in a warehousing environment. Other data such as watershed details and also agricultural credit data can be effectively used for analysis by applying the technologies of OLAP and data mining.

Thus there is substantial scope for application of data warehousing and data mining techniques in Agricultural sector.

4.3.2   Rural Development

Data on individuals below poverty line (BPL survey) can be built into a data warehouse. Drinking water census data (from Drinking Water Mission) can be effectively utilized by OLAP and data mining technologies. Monitoring and analysis of progress made on implementation of rural development programmes can also be made using OLAP and data mining techniques.

4.3.3   Health

Community needs assessment data, immunization data, data from national programmes on controlling blindness, leprosy, malaria can all be used for data warehousing implementation, OLAP and data mining applications.

4.3.4   Planning

At the Planning Commission, data warehouses can be built for state plan data on all sectors: labour, energy, education, trade and industry, five year plan, etc.

4.3.5   Education

The Sixth All India Educational Survey data has been converted into a data warehouse (with about 3 GB of data). Various types of analytical queries and reports can be answered.

4.3.6   Commerce and Trade

Data bank on trade (imports and exports) can be analyzed and converted into a data warehouse.* World price monitoring system can be made to perform better by using data warehousing and data mining technologies. Provisional estimates of import and export also be made more accurate using forecasting techniques.

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*This data is available with the Director General of Foreign Trade, Ministry of Commerce.

4.3.7 Other Sectors

In addition to the above mentioned important applications, there exist a number of other potential application areas for data warehousing and data mining, as follows:

Tourism. Tourist arrival behaviour and preferences; tourism products data; foreign exchange earnings data; and Hotels, Travel and Transportation data.

Programme Implementation. Central projects data (for monitoring).

Revenue. Customs data, central excise data, and commercial taxes data (state government).

Economic affairs. Budget and expenditure data; and annual economic survey.

Audit and accounts. Government accounts data.

All government departments or organizations are deeply involved in generating and processing a large amount of data. Conventionally, the government departments have largely been satisfied with developing single management information systems (MIS), or in limited cases, a few databases which were used online for limited reporting purposes. Much of the analysis work was done manually by the Department of Statistics in the Central Government or in any State Government. The techniques used for analysis were conventional statistical techniques on largely batch-mode processing. Prior to the advent of data warehousing and data mining technologies nobody was aware of any better techniques for this activity. In fact, data warehousing and data mining technologies could lead to the most significant advancements in the government functioning, if properly applied and used in the government activities. With their advent and prominence, there is a paradigm shift which may finally result in improved governance and better planning by better utilization of data. Instead of the officials wasting their time in processing data, they can rely on data warehousing and data mining technologies for their day-to-day decision making and concentrate more on the practical implementation of the decisions so taken for better performance of developmental activities.

Further, even though various departments in the government (State or Central) are functionally interlinked, the data is presently generated, maintained and used independently in each department. This leads to poor (independent) decision making and isolated planning. Herein lies the importance of data warehousing technology. Different data marts for separate departments, if built, can be integrated into one data warehouse for the government. This is true for State Government and Central Government. Thus data warehouses can be built at Central level, State level and also at District level.

Conclusion

In the government, the individual data marts are required to be maintained by the individual departments (or public sector organizations) and a central data

warehouse is required to be maintained by the ministry concerned for the concerned sector. A generic inter-sectoral data warehouse is required to be maintained by a central body (as Planning Commission). Similarly, at the State level, a generic inter-departmental data warehouse can be built and maintained by a nodal agency, and detailed data warehouses can also be built and maintained at the district level by an appropriate agency. National Informatics Centre may possibly play the role of the nodal agency at Central, State and District levels for developing and maintaining data warehouses in various sectors.

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