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UNIT-1

Introduction to E-Government and E-Governance

* Difference between E-Government and E-Governance :

E-Government	E-Governance
i) E-Government refers to the implementation of information and communication technology (ICT) like internet, to improve government activities and process.	i) E-Governance refers to the utilization of information and communication technology (ICT) for providing government services, disseminating information, communication operations with the general public.
ii) E-Government is a system	ii) E-Governance is a functionality.
iii) It uses ICT as a tool to make better government.	iii) It uses ICT in transforming and supporting functions and structures of the system.
iv) It is a one-way protocol.	iv) It is a two-way protocol.
v) E-Governance is the part of E-Government.	v) E-Governance never comes alone.

* E-Government as Information System:

E-Government is defined as the implementation of ICT to improve government activities and process. The objective is to improve public services, support democratic processes, share information to public mass and support public policies. A System is a collection of elements that works and has a purpose. E-government to be a working information system, it must be seen to consist of technology plus information plus people who give the system purpose and meaning plus work processes that are undertaken rather than just the technical elements of IT. We can therefore produce an initial model of an e-government system.

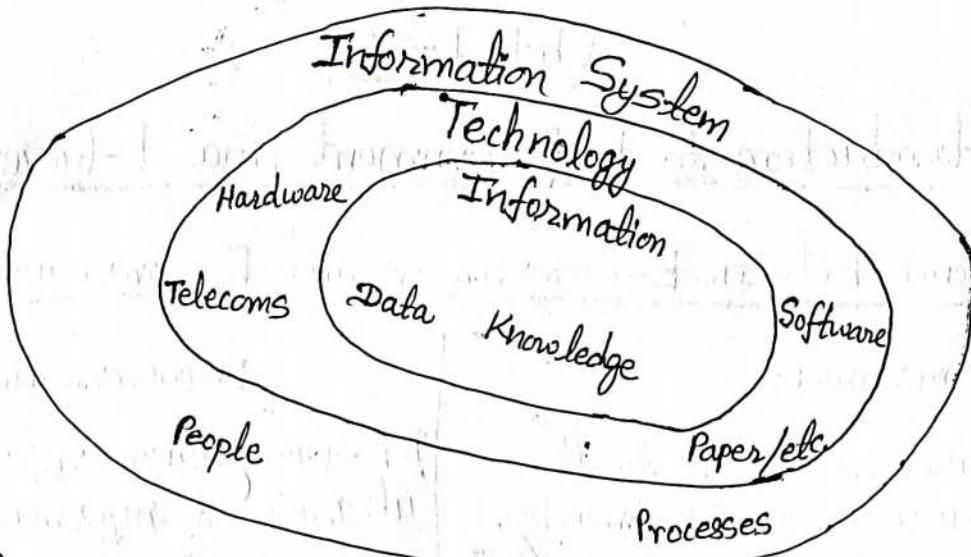


Fig: E-Government systems as information systems, (Structural view)

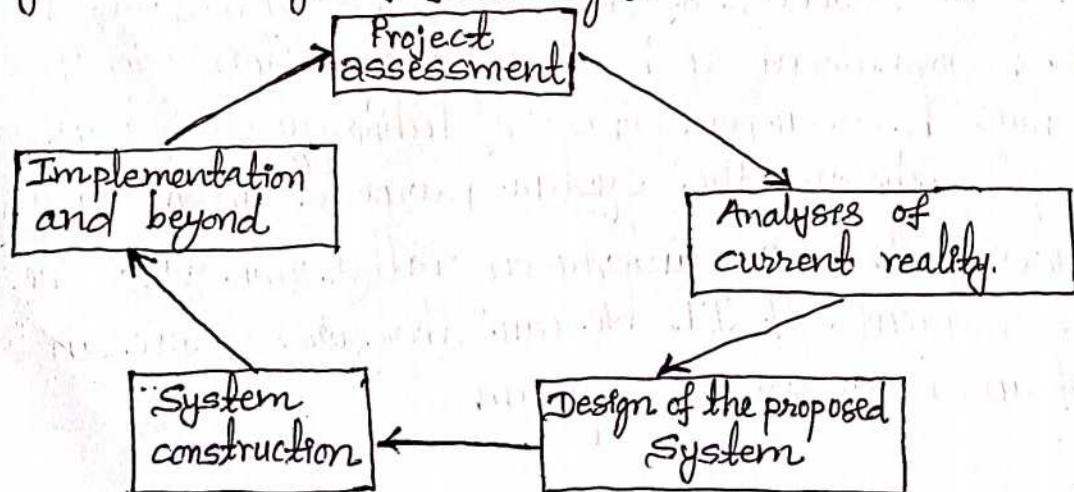
④ Benefits of E-Government:

Ans for why do we need E-governance?

- Better provision of government services.
- It ensures the transparency in the operation of government programs.
- It ensures greater level of efficiency and effectiveness in government activities and operations.
- Improved interaction with different groups and citizen.
- Efficient government management.
- It helps in improving the quality of public services.
- Easy implementation of Right to Information.
- Increases communication between various government agencies.

⑤ E-Government Life Cycle:

Design of e-government technology typically deals first with software and then the hardware. E-Government projects typically involve a cycle of five stages:



i) Project Assessment: A project assessment is an authorize planning and evaluation process. It is intended to ensure the environmental, social, cultural and economic well-being of residents and communities is protected from any significant adverse effects that may be caused by a development project.

ii) Analysis of Current Reality: Another important part of the project is analysis of current reality. Low project management experience, ad-hoc project management, unclear scope, ad-hoc staffing etc. are the major problems of an organization. To get overcome from those problems, need analysis of the current situation and choose the suitable modularity.

iii) Design of the New System: When we develop the system we need to be on the base on our audiences or user. Same here in e-government, system need to be familiar and easy with public. Same time it need to focus on legal challenges as well. System need to be simple with high output.

iv) System Construction: The result from previous stages help to construct the system. It should cover the requirements, a combined focus on information technology, processes and end users.

v) Implementation and beyond: At this stage end user interact with the system. Main focus at this stage is focus on system maintenance and clear responsibilities. We get the output of the system and kind of result which is useful to upgrade the system and analysis user demands as well as requirements.

④ Online Service Delivery:

Online service delivery is an effective way to build closer relationships with customers, partners, and the public while simultaneously cutting costs and reducing delays. These services not only allow subscribers to communicate with each other, but they also provide unlimited access to information. Online services can range from simple to complex.

Benefits:

- We can keep choosing for days until we get the right product we are looking for.
- Don't have to reach out the shop and search for one, we can simply order staying at our home.
- It is fast and reliable.
- We can pay when we get our order.
- It saves our time in visiting the store.

Drawbacks:

- Online delivery could be more expensive sometimes than self-visiting the store.
- Sometimes we get wrong and unmatched products during the delivery.
- Delivery charge might add up the product expense.

④ Electronic Service Delivery:

Electronic Service Delivery is the process of providing government services through the internet or any other electronic media. It is related to e-services and e-government. E-service is highly generic term usually referring to "The provision of service via the internet".

The three main components of e-services are: service provider, service receiver and the channels of service delivery (i.e., technology). For example, as concerned to public e-service, public agencies are the service provider and citizens as well as business are the service receiver. The channel of service delivery is the third requirement of e-service. Internet is the main channel of e-service delivery while other classic channels (e.g., telephone, call center). It may also include e-commerce and also non-commercial services provided by the government.

Evolution: The evolution of e-governance is examined in terms of five interrelated objectives:

- i) A policy framework: Information-related rulings and policies are the essential validate foundation for e-governance. They set policy goals and specify the rules and conditions under which information is gathered, used, protected, and shared by government, individuals, and the private sector to achieve them.
- ii) Enhanced public services: E-governance goals for service enhancements embrace a commonsense approach that replaces an organizational outlook with a customer orientation, providing access, convenience and choice to citizens and businesses seeking information or services from government.
- iii) High quality and cost-effective government operations: A wide array of administrative, professional, and technical improvement goals address not only efficiency but also infrastructure investments, information management and use, organizational revolution, risk management etc.
- iv) Citizen engagement in democratic processes: It is often called "e-participation", engagement covers the range of democratic processes. It includes accessibility and usability of technologies and information content, public interaction with government etc.
- v) Administrative and Institutional reform: With the emphasis on accountability, transparency, and trust, reform apply to the structures and processes of government as well as the roles and responsibilities government delegates to the private and non-profit sectors for carrying out public functions. Reform also addresses the culture of government and the way the public service perceives its role with respect to governance, citizens and society.

④ Scope and Content of E-governance:

Scope:

- ↳ Improvement of efficiency and effectiveness of the executive functions of the government, including delivery of public services.
- ↳ greater transparency of government to citizens and business, permitting greater access to the information generated or collected by the government.
- ↳ Fundamental changes and improvement in relation between citizen and the state thereby improving the democratic process and better relationships among different:
 - wings of the same government.
 - state of local governments within a country.
 - Countries whose governments are web-enabled.

Content:

- ↳ Hardware and corresponding system software.
- ↳ Networking of the hardware identified both the internet and intranet.
- ↳ Application software along with appropriate database management software.

⑤ 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 include the following:

- The proportion of adults using the Internet to access government services increased by around 15 percent.
- 30% citizens globally said that they had accessed government services online to search for information or download information.
- The increased use of government online services is primarily due to rise in the proportion of people searching for information.
- Globally, online government transactions increased 6 to 7 percent during this period.
- Security issues about accessing government services online were the main concern for many countries during 2001, perceptions of safety improved globally during 2002.

UNIT-2Models of E-Governance① Introduction:

Digital-Governance or E-Governance can be defined as the use of information and communication technology by the government to provide the quality information and services to citizens, businesses, voluntary organizations and other government agencies in an efficient, cost effective and convenient manner.

A model of an object is a physical representation that shows what it looks like or how it works. A model is a system that is being used and that people might want to copy in order to achieve similar results.

② Models of Digital Governance:

E-Governance models keep growing and developing as new applications of information and communication technology (ICT) and to deal with new issues in the area of governance. Developing countries are experimenting on their own to find which models will work best to serve their needs. Some of these models may be technologically simple but are changing the way information is distributed and used in the society.

Few important models of e-governance have been identified, which can be used as a guide in designing e-government initiatives depending on the local situation and governance activities that are expected to be performed.

1. Broadcasting/Wider Dissemination Model.
2. Critical Flow Model
3. Comparative Analysis Model
4. Mobilization and Lobbying Model
5. Interactive-Service Model.

1) Broadcasting/Wider Dissemination Model:

Principle: The information which is already available in paper, and by using the ICT or other media to broadcast that information to the citizen is known as broadcasting or wider dissemination model. For example, if the government announced the new rules or regulation in the state or nation they organize press meet and the different media broadcasting that news via television, radio, visual reports or online websites.

Broadcasting model is based on mass dissemination of governance-related information which is already available in the public domain into the wider public domain using ICTs. This raises awareness among the citizens about ongoing governance processes and government services that are available to them and how they benefit from them.

Applications:

- Provide governmental laws and rules online.
- Making available the names, contact addresses, emails, mobile numbers of local/regional/national government officials online.
- Make available information such as governmental plans, budgets, expenditures, and performance reports online.
- Putting key legal decisions which are of value to general citizens and create a precedence for future actions online, through key environmental decisions, state vs. citizen decisions etc.

Projects based on this model:

1) Nepal: Department of Information Technology <https://doit.gov.np/>

The goal is to provide all government services through automated system by maximizing the use of IT and Establish good governance, poverty alleviation and realize national development targets by utilizing the advantages of technology.

i) Brazil:

Brazil's official national E-Government website: <http://www.brazil.gov.br>.
The website provides comprehensive information on Brazilian government as well as links to integrated citizen services.

Website url रहना नियमित नहीं।
गवर्नमेंट ने शामिल किए वेबसाईट के नाम।

ii) India: Directory of official websites of Government of India: <http://govdirectory.nic.in/ministry.html>.

National Informatics Centre (India) is the official website of Government of India. It makes available information on government ministries, its projects and schemes, Indian laws and rules etc.

iii) Global:

Earth Negotiations Bulletin: <http://www.iisd.ca/voltoe.html>.

A reporting service that keeps citizens around the world informed about global environmental negotiations, processes and decisions. It has immense value for people and government officials alike in developing countries to keep track of global negotiations.

Evaluation:

- It is the first step to more evolved forms of digital governance models and flow of information to all segments of society.
- National Governments therefore need to aggressively adopt this model if they want to create an environment for enhanced participation of its citizens in the governmental processes.
- The model however loses its effectiveness where free-flow of information is not encouraged or is not objective.
- Tight governmental controls and bids to censor the content being transmitted through this model would be the bane of this model.
- The responsibility is therefore both on governmental organizations as well as civil society organizations to ensure such models continue to proliferate.

2) Critical Flow Model:

Principle: This model is based on channeling information of critical value to a targeted audience or spreading it in the wider public domain through the use of ICT and convergent media. It requires foresight to understand the significance of a particular information set and using 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 idea of distance and time redundant.

Applications:

- Making available corruption related data about a particular Ministry/Division/Officials online to the concerned regulatory body.
- Making available Research studies, Enquiry reports, Impact studies commissioned by the Government.
- Making available Human Rights violation and criminal charge records against government officials to NGOs and concerned citizens.
- Making available environment related information available to local communities.

Projects based on this model:

⇒ India: Central Vigilance Committee: <http://cvc.nic.in>

An initiative on e-vigilance, the website provides free-access information to citizens about government officials who have been indicated on judicial charges relating to corruption and have been advised penalty. People can also file case complaints against any public servant who fall within the jurisdiction of the Commission.

⇒ Bangladesh: Human Rights Portal: <http://www.banglahrts.net>

This actively promotes Human rights reforms both within Bangladesh and across geographical and political boundaries, and supports women, childrens in resisting social abuse.

iii) Global: Transparency International's Corruption News:
http://www.transparency.org/press_releases.html.

A trial service run by International Transparency International, called the "The Daily Corruption News" which reports on corruption from around the world.

Evaluation:

- It is more directed in terms of its information content.
- It exposes the weakest aspects of governance and decision-making mechanisms.
- It informs people about specific cases of state-failure and bad-governance to build up a case for concerted action.
- The model will not work in cases where government mechanisms do not promote public debates and criticize all information of critical nature.
- It will also fail where the government maintains a tight control over all information.

3) Comparative Analysis Model:

Principle: It is one of the least-used but a high potential e-governance model for developing countries. The model can be used to empower people by comparing cases of bad governance with those of good governance and how the situation can be improved. The model is based on using huge capacity of ICT and social media tools to explore given information sets with comparable information available in the public or private domain. The strength of this model lies in the infinite capacity of digital networks to store mixed information and retrieve and transmit it instantly across all geographical and hierarchical barriers.

Applications:

- To learn from past policies and actions and derive learning lessons for future policy-making.
- To evaluate the effectiveness of the current policies and identify key learning in terms of strengths and flaws in the policies.

- Enabling informed decision-making at all levels.
- Evaluating the performance record of a particular government official or ministry.

Projects based on this model:

1) India: Green Ratings Project: <http://www.oneworld.org/cse/html>
It is an attempt to provide an independent and fair evaluation of the comparative environmental performance of companies which supports poor performers to improve. Performance reports of companies are shared over Internet and people's opinion is taken.

2) Philippines: Vote.ph: <http://www.vote.ph>.
It is online directory and quick reference center on Philippine elected government officials and election candidates for both national and the local levels.

3) Gilobal: Human Development Indicators <http://www.undp.org/hdro/indicators.html>

It makes use of statistical information to literacy, health, national income etc. to know the progress made by different countries with regards to their Human Development Index.

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.
- Watch guard 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 reliant on the availability of comparative information sets and the ability of users to analyze and bring out strong arguments.
- The model becomes ineffective in absence of a strong civil society interest and short public memory.

4) Mobilisation and Lobbying Model:

Principle: This is two-ways or multiple-ways communication model, where particular group collect the information from the audience and modify the policy as required. For example we can build the online forum and collect the opinions from public and finalize the policy or decisions. This is most frequently used model and is based on setting-up a planned, directed flow of information to build strong virtual partners to complement actions in the real world. This model builds the momentum of real world processes by adding the opinions and concerns expressed by virtual communities.

Applications:

- This model could be applied in the following possible ways:
 - Encouraging the public debates on issue of larger concerns, namely on the themes of upcoming conferences, agreements etc.
 - Formation of pressure groups on key issues to force decision-makers to take their concerns into awareness.
 - Making available opinions of a suppressed groups who are not involved in the decision-making process into wider public domain.
 - Catalyzing wider participation in decision-making processes.
 - Building up global expertise on a particular theme in absence of localized information to aid decision-making.

Projects based on this model:

i) India: Panchayats: <http://www.panchayats.org>

A discussion list run by Indian professionals to discuss policy issues and case-studies relating to local livelihood strategies and decentralized natural resources management.

ii) Global: Independent Media Centre: <http://www.indymedia.org/>

The Center was established by various independent and alternate media organizations to provide grassroots coverage of WTO-Seattle in 1999.

Evaluation:

- The model has grown tremendously since the onset of debates for the Seattle round of World Trade Organization (WTO) in 1999.
- It enhances the scope of participation of individual and communities in policy issues and debates.
- The model also creates an effective restriction for government bodies and individuals to be watchful in their actions in case they turn the opinion of local and global community against them.

5) Interactive-Service Model / Government to Citizen to Government Model (G2C2G):

Principle: This is also two-ways or multiple-ways communities model. Interactive Interactive-Service model is the action or process of making something stronger or more solid. This model establishes communication between government to citizen or consumers and citizens to government. For example, if the government built the web application about the income tax, public use that website to pay their tax and they will get the receipt. This established the relation between government to citizen to government.

Applications:

- This model could be applied in the following possible ways:
- To establish an interactive communication channels with key policy-makers and members of planning commissions.
 - To conduct electronic ballots for the election of government officials and other office bearers.
 - To conduct public debates on issues of wider concern before formulation of policies and laws frameworks.
 - Establishing decentralized forms of governance.
 - Carrying out video conferencing, and online discussion with policy makers.

Projects based on this model:

① Philippine: Philippine Custom Reform:

The Philippine Customs Bureau has developed an online system to process clearance of imports, payment of duty, and delivery of release of orders for shipments to leave the docks.

② India: Gyandoot:

Gyandoot is an intranet in Dhar, district of Madhya Pradesh connecting rural cybercafes catering to everyday needs of the masses. The site offers several services to the local people such as providing copies of land-maps, online registration of applications etc.

Evaluation:

- This model is more embedded in developed countries and has often been proposed for replication in developing countries. Such forms of solution-transfers 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 absence of individual and secure ICT access.

③ Evolution in E-Governance and Maturity Models:

E-Governance is an evolutionary path, whose effective implementation requires a complete understanding of its various elements and at the same time taking a full view to stay focused on its overall objectives. E-governance journey encounters several milestones that need to be identified and modeled. The E-governance Maturity Model (EMM-version 1.0) proposes five levels of maturity, depending on the effectiveness.

Level 1: One way communication/simple website/Information:

Initial stage and someone announced the rules and public must have to accept it. There is no any place for modify the statement by collecting feedback and reviews. Applications like static web sites are use on this kind of e-governance.

Level 2: Two ways interaction / Online Government / Interaction:

Requirements are increased and realized about two ways communication which is necessary for good government. Dynamic web applications are implemented, where public can able to fill online application and registrations with online payment system.

Level 3: Centralized system / Integrated Government / Transaction:

The concept of the portal is fulfilled on this stage. Information manipulated from central department, it means it save time, cost and be more efficiency. The transaction phase offers online operations like a driver's license renewal, a car registration etc.

Level 4: Transformed Government / Transformation:

In this level auto processing, report about online transaction and refund process are the major activities.

④ A Maturity Model:

A maturity model is a method for judging the maturity of the working process of the organization. Identifying the weakness of the system and find out the solution to increase the maturity of the system and process.

The maturity model provides a mode to measure the methods and processes being used, against a clear set of external benchmarks. A maturity level assessment may provide the following benefits:

- Ability to compare Maturity level with other government ministry/departments.
- A known Maturity level, with precise recommendations for improvement.
- An independently held set of "benchmarks".

⑤ Five Maturity Level of E-governance:

Many maturity models have been used to judge or rank e-government portals. In order to judge electronic services provided to the citizens, an appropriate e-government maturity model should be selected. Following are the five maturity level of e-governance:

Level 1: Closed

This is the stage when an organization does not use ICT as a driver for good governance and has no plans to do so in near future. This situation may arise due to lack of knowledge about ICT and associated benefits that again may depend upon a number of reasons. As a result, the organization is 'closed' in terms of connected and sharing of information in the context of e-governance.

Level 2: Initial

This level corresponds to the stage when an organization has initiated the automation of its processes but on for certain time till particular project is completed. No organized efforts are made to start the e-governance initiatives. Also, due to lack of direction many such e-governance efforts are uncontrolled at a subsequent date.

Level 3: Planned

This level involves systematic approaches with clearly defined vision, objectives and goals for e-governance. Judgements of need are made to prioritize the areas of implementation and measure the extent of e-readiness. Necessary input from judgements of need study are taken.

Level 4: Realized

This level corresponds to the stage when the organization actually realizes the complete e-governance plan. Therefore, an integrated system is established and organization starts delivering the services to its external as well as internal customers/users in an effective manner. This level has following sub-levels:

Retrospected: At this level, organization studies its business processes in view of its vision, overall e-governance objectives, and changes if any required.

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

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.

Open: This implies complete deployment of e-governance services that ensure an integrated system that is open to information exchange.

Level 5: Institutionalized (established)

At this level the organization maintains 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.

Following define e-readiness of an organization:

- Presence of strategic thinking, leadership and commitment among top-level decision makers.
- Institutional Infrastructure
- ICT Infrastructure
- Human Capacities
- Legal Infrastructure.

Characteristics of Maturity Levels:

Level 1: Closed

- Organization are closed to e-governance.
- No plans or vision is available.
- Continue with fully manual and conventional operation.

Level 2: Initial

- Organization lacks strategic thinking and direction for e-governance at top level.
- Unorganized and individual efforts of automation in some areas.
- Generally accumulate hardware without any planning and much of it goes unutilized or underutilized.

Level 3: Planned

- E-governance becomes 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 users.

Level 4: Realized

Retrospected:

- Business processes are altered with the vision and overall e-governance objective.
- There is awareness about e-governance among all concerned - the stakeholders as well as the users.

E-ready:

- The organization has a sound infrastructure in place.
- Users motivated to use e-governance services.

Partially Open:

- Such organization sometimes focus only on their internal processes, allowing information exchange confined to the organization. In such case G₂E is visible whereas G₂C, G₂G₁, G₂B is not yet established.

Open:

- The organization has integrated system, reflective of smooth information exchange within and outside the organization.
- G₂E, G₂C, G₂G₁, G₂B are well established.

Level 5: Institutionalized

- E-governance becomes an effortless exercise for the organization and it becomes a way of life for the stakeholders and customers.
- The organization at this level is completely paperless.

④ Towards Good Governance through E-Governance Models:

E-Governance is the key to the Good Governance for the developing countries to minimize corruption, provides efficient and effective or quality services to their citizens. Over last fifty years, the world has been carving for more innovations in the field of governance. But later on various scams underscored the lack of transparency in the governance mechanism. Therefore there is need for "A Government which is responsive to the needs of people, whose transactions have clearly defined time bound accountability and whose decisions are readily available for public". In order to ensure good governance for the country, the E-governance system will have to follow various principles:

- Accountability: To manage complex tasks, clear accountability is required. The governance system must define the personal and the stakeholders who are accountable for the provision of services.
- Daily Administration Problems: Common man in the society faces these problems. This ensures that the citizen is empowered to know whom to question and when to expect the service from the government.
- Interdepartmental Problems: These problems would require greater amount of time, but E-governance systems can still fix the accountability if departmental jurisdictions are clearly defined.
- Policy level issues: These are the most complex issues which arise with the changes coming up in the society and require thorough analysis. The solutions are of long-term.
- Transparency: E-governance systems should be intelligent enough to automate the decision making process so that the transactions are highly transparent.
- Responsive: E-governance systems must ensure that the systems created by them are responsive to the requirement of the different sections of population.

UNIT-3E-Government Infrastructure Development⊗ Network Infrastructure:

Network infrastructure is the hardware and software resources of an entire network that enable network connectivity, communication, operations and management of an enterprise network and establish the connectivity to all the entities of digital governance. It provides the communication path and services between users, processes, applications, services and the internet. Network infrastructure is typically part of the IT infrastructure found in most enterprise IT environments.

The entire network infrastructure is interconnected, and can be used for internal communications, external communications or both. A typical network infrastructure includes:

Networking Hardware:

- Routers
- Switches
- LAN Cards
- Cables

Described at last of
this chapter

Networking Software:

- Network operations and management.
- Operating systems
- Firewall
- Network security applications

Network Services:

- T-1 Line
- Satellite
- Wireless protocols
- IP addressing

Computing Infrastructure:

Infrastructure is the foundation or framework that supports a system of government or organization. Computing Infrastructure provides management and support for end-user computers, servers, storage systems, operating systems, databases, middleware and ERP (Enterprise resource planning) systems. There are three groups that make up the Computing Infrastructure team:

i) Database and ERP Administration: It manages and supports the main database infrastructure for core applications used by staff, faculty and students, based on Oracle Database software. It also manages and supports Oracle and MySQL databases for variety of administrative and academic needs.

ii) End-User Computing: The End-User Computing group consists of two teams that provide personal computer management, support and assistance to faculty and staff. The End-User Computing infrastructure team provides back-end management and support for a number of key applications. End-User Computing group, as a unit, works very closely with other groups within CCS and other departments, to ensure that the best solutions and services are delivered in a secure and manageable way.

iii) Server and Storage Services: The Server and Storage Services group is responsible for the CCS managed data centers, servers and storage systems that provide infrastructure resources to applications and services used by staff, faculty and students. The Server and Storage Services group is also responsible for establishing standard server and storage platforms and for the management of the hardware and software required to integrate these platforms to deliver an efficient, scalable and cost-effective infrastructure.

Q. Data Centers:

Data centers are simply centralized locations where computing and networking equipment is concentrated for the purpose of collecting, storing, processing, distributing or allowing access to large amounts of data.

Need of Data Center: Despite the fact that hardware is constantly getting smaller, faster and more powerful, we are an increasingly data-hungry species, and the demand for processing power, storage space and information in general is growing and constantly threatening to leave behind companies abilities to deliver.

Any entity that generates or uses data has need for data centers on some level, including government agencies, educational bodies, telecommunications companies, etc. Lack of fast and reliable access to data can mean an inability to provide vital services or loss of customer satisfaction and revenue.

What are the core components of a data center?

Data center design includes routers, switches, firewalls, storage systems, servers and application delivery controllers. Together they provide: Network infrastructure, Storage infrastructure and Computing resources.

How do data centers operate?

Data center services are typically deployed to protect the performance and integrity of the core data center components. Network security appliances include firewall and intrusion protection to safeguard the data center. Application delivery assurance maintains application performance, these mechanisms provide application flexibility and availability.

Q. E-Government Architecture:

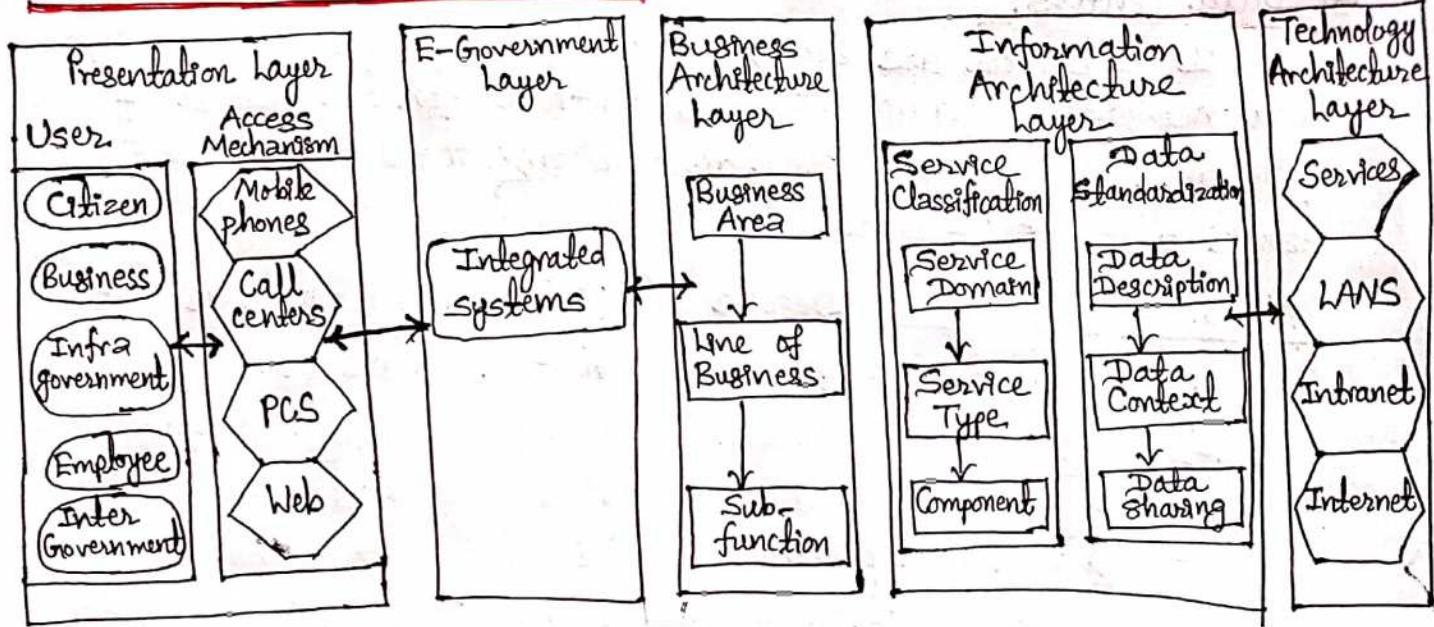


Fig: Overall E-Government architecture structure.

Presentation layer: The presentation layer identifies and describes the system users, who require access to government information at different capacities, and the channels through which information can be accessed. It manages the user's interface with the system.

E-Government layer: The main goal of e-government layer is to achieve a government that;

- ↳ does not ask for information it already has.
- ↳ is focused on better services
- ↳ will not allow its facilities to be misused
- ↳ is well informed.

Business Architecture layer: It provides a functional rather than organizational view of the government's lines of business including its internal operations and services for citizens. It describes government around common business, thus promotes agency collaboration.

Information Architecture layer: It can be divided into two: Service classification and Data standardization. Service classification include Service Domain, Service type, and component & Data standardization include data description, data context and, data sharing.

Technology Architecture Layer: It categorizes the standards and technologies that support and enable the delivery of service components and capabilities. It also unifies existing agency technologies and e-government guidance by providing a foundation to advance the reuse and standardization of technology and service components from a government wide perspective.

④ Interoperability Framework:

Interoperability framework is set of standards and guidelines which describe the way in which organizations have agreed, or should agree, to interact with each other. Set of standards and guidelines should be followed by public sector information systems and processes, in order to achieve technical, organizational and semantic interoperability during service provision. An IFFGI (Interoperability Framework for E-Governance) involves a common structure which comprises a set of standards and guidelines.

Levels of Interoperability:

- Organizational Interoperability (like process-re-engineering including Government-Orders, Process Changes, Organizational Structures).
- Semantic Interoperability (Enabling data to be interpreted & processed with the same meaning)
- Technical Interoperability (like technical issues in interconnecting ICT systems and services, information storage, security etc.)

The Multilateral mechanism for IFFGI is influenced by following key sub-areas:

- i) Political: For strategy related issues.
- ii) Legal: For issues like IPR/Copy Right, privacy etc.
- iii) Managerial: For issues like training, motivation.
- iv) Economic: For funding related issues.
- v) Social/Cultural: For social cultural factors like differences in culture, working practices, issues of trust, timings etc.

④ Cloud Governance:

Cloud Governance is a framework to govern the use of cloud services, not block them from using these services. A cloud framework includes people, processes and technology while ensuring security, cost management, and deployment acceleration. It helps in regulating and controlling the use of cloud services by defining process, standards, and policies to be followed in planning, operating and managing cloud services.

Key Benefits of Cloud governance framework:

i) Controlled Access: By selecting who owns each area of asset and software management, our cloud governance plan will build necessary limits on who can access and impact our cloud ecosystem. Controlling access to critical assets is vital and will enhance the reliability of our cloud processes.

ii) Reduced Security Risks: Our cloud governance plan will help us to identify vulnerabilities in our system, and establish metrics to measure the impact of security measures.

iii) Enhanced Compliance Readiness: Developing a cloud governance program allows us to build compliance review and standards into our processes and architecture.

iv) Lowered Costs: Cloud governance shifts workflows from analog to automated. Automated workflows reduces manpower, and reduced manpower means reduced costs.

Risk of Poor Cloud Governance:

- Cloud Security Risks
- Cloud Integration.
- Cloud Portability and Interoperability
- Cloud Vendor Lock-In
- Cloud Applications Governance
- Lack of Incentives for Consumers,
- Shadow IT and Hidden clouds.

Elements of Cloud Governance:

- ⇒ Cloud Business Office (CBO): It ensures alignment of cloud vision with business vision and ensures that governance is enforced across the enterprise. CBO is also responsible for demand management, cost optimization, and prioritization.
- ⇒ Cloud CoE (Center of Excellence): It defines processes, regulates and standardize cloud adoption, migration and operation across the enterprise.
- ⇒ Cloud governance organization structure and roles and responsibilities.
- ⇒ Cloud governance processes around the cloud service lifecycle.
- ⇒ Cloud foundational components like cloud reference architecture, standards, templates, guidelines etc.

④ E-readiness:

E-readiness (electronic readiness) is defined as a degree to which a country's economy may be ready, willing or prepared to obtain benefits which arise from information and communication technologies. It is the ability to use information and communication technologies (ICT) to develop one's economy and to foster one's welfare.

E-Readiness is one of the important factor for the digitizing Society. The calculation of e-readiness deals with many kinds of social aspects related with Economical matters, Cultural matters, literacy rate, Poverty etc. E-readiness, means the infrastructural pre-requisites for taking up any e-governance project. These infrastructural pre-requisites or preconditions may be identified as:

1. Data system infrastructural preparedness
2. Legal infrastructural preparedness.
3. Human infrastructural preparedness.
4. Institutional infrastructural preparedness.
5. Technological infrastructural preparedness.

1) Data Systems Infrastructure:

The core of e-governance is e-MIS, the electronic Management Information System. The data that were managed manually need to be computerized or brought into electronic form which means that the preparedness of computerized database or data warehouse is required. Data quality and data security are of prime concern here as most of the government infrastructures are not up to the mark in developing countries. This is the core computerization activity of any government process which may take several years to reach this stage.

2) Legal Infrastructure Preparedness:

They lack necessary laws and legal infrastructure to enable reengineering of the existing business practices, rules and regulations within the government at various levels. This seems to be highlighted in developing countries while developed countries have been significantly successful in administrative reforms and business reengineering. The fundamental question that arises here is "Are the laws and regulations required to permit and support the move towards e-governance initiatives in place? E.g. Digital Signature Act.

3) Institutional Infrastructure Preparedness:

For any government to implement a successful e-governance project, the required institutional infrastructure must be in place which most of the government lack. The government body has to establish a separate IT department which basically coordinates with e-government projects within the nation. The IT department works out for the hardware selection and acquisition, network or software development and implementation and also the training of staff at various levels of government. Many countries still lack the institutional infrastructure.

4) Human Infrastructural Preparedness:

Human resource development by training is an essential requirement which 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, design, programming, implementation, operation and documentation. Both private and government institutions should play a major role in this regard. Apart from technical human infrastructure, there is a need for training and orientation of user personnel. Such training will make them capable of handling e-governance projects.

5) Technological Infrastructural Preparedness:

Technology is fast changing in ICT domain and there is a requirement of great financial support time for software and hardware. Government organizations encounter this situation especially as their procedures. The technological infrastructure in developing countries including computing and telecommunication is absent. As a result software and hardware may not be compatible.

④ Need of E-Readiness:

The concept of e-readiness is important because its level can be a strong predictor of how well a country can perform in the new economy. An e-readiness judgement would provide policy makers with a detailed score card of their economy's competitiveness relative to its international counterparts. Further, a breakdown of indicators allows policy analysts to pinpoint areas of strengths and weaknesses, thus providing a balanced perspective in guiding a country through the digital transformation.

MIS: A management information system (MIS) is a computer system consisting of hardware and software that serves as the backbone of an organization's operations. An MIS gathers data from multiple online systems, analyzes the information, and reports data to aid in management decision-making.

MIS is the study of people, technology, organizations, and the relationships among them. MIS professionals help firms realize maximum benefit from investment in personnel, equipment, and business processes. MIS is a people-oriented field with an emphasis on service through technology.

Networking Hardware:

Networking hardware are electronic devices which are required for communication and interaction between devices on a computer network. Specially, they mediate data transmission in computer network.

- 1) Routers: The router is a physical or virtual internetworking device that is designed to receive, analyze, and forward data packets between computer networks.
- 2) Switches: A switch is a hardware device that connects multiple devices on a computer network. The switch contains the updated table that decides whether the data is transmitted or not. Switch delivers the message to the correct destination based on physical address present in incoming message.
- 3) LAN cards: A LAN card connects a computer to a network. LAN cards are typically built in our computer.
- 4) Hub: A Hub is like switch that divides the network connection among multiple devices. When computer requests for some information from a network, it first sends the request to the Hub through cable.
- 5) Cables: Network cables are used to connect and transfer data and information between computers, routers, switches, and storage area networks.

④ Networking Software:

Networking software is a foundational element of any networks. It helps administrators deploy, manage and monitor network.

1) Network operations and management: Network operations management Manage, Automate, and Ensure Compliance for physical, virtual, and Software-Defined Networks.

2) Operating Systems: An operating system is the most important software that runs on a computer. It manages the computer's memory and processes, as well as all of its software and hardware.

3) Firewall: A firewall is a system designed to prevent unauthorized access to or from a private network. We can implement a firewall in either hardware or software form, or a combination of both.

⑤ Network Services:

A networking service is a low-level application that enables the network to perform more than basic functions.

1) T-1 line: It is a communication transmission service that uses 2 twisted pair copper wires to transmit and receive data or voice traffic. A T-1 line can transmit data at a speed of 1.544Mbps.

2) DSL: It stands for "Digital Subscriber Line". It is a communications medium used to transfer digital signals over standard telephone lines.

3) Satellite: A satellite is an object in space that transmits data.

4) Wireless protocols: They are used to connect computers, laptops and smartphones. The more widespread and standardized protocols are wireless LAN or Bluetooth.

5) IP Addressing: IP address is a numerical label assigned to each device connected to a computer network that uses Internet Protocol for communication.

UNIT-4Security for e-Government

E-government has become a popular focus of government efforts in many countries around the world. To provide trusted services, e-governance needs to focus on effectiveness, efficiency and flexibility. If the citizen is to derive maximum benefit from the provision of e-services through e-governance, the e-service must possess following attributes:

- The users must know the information about the available e-services.
- The users must be aware of the benefits of these services.
- The user should be able to locate the e-services easily.
- The e-services must be accessible to all members of the intended target groups.

Information security is determined in terms of confidentiality, integrity and availability.

Confidentiality: Protecting sensitive information from unauthorized disclosure.

Integrity: Safeguarding the accuracy and completeness of information and software.

Availability: Ensuring that information and vital IT services are available when required.

In context of Security, services provided by e-government program are categorized with respect to functional processes as:

- 1) Publishing: Publishing involves simply posting information on a publicly accessible Website.
- 2) Interactive processing: It involves citizens reading instructions published on Websites and following those instructions to submit reports, applications etc.
- 3) Transaction processing: It involves processing of information submitted via interactive e-government Websites.

iv) Service delivery: It involves actual execution of actions approved on the basis of e-government interactions.

④ Challenges and approach of E-Government Security:

Threats to the security of information in an e-government environment can include natural and accidental events (e.g. flooding, fire, storms, human error etc.) and deliberate threats (e.g. fraud, information theft, hacking, viruses etc.). Confidentiality, Integrity and Availability, also known as the CIA triad, is a model designed to guide policies for security.

1) Availability: Availability is the process of ensuring that information and vital IT services are available when required. Availability concerns affect: publishing, interactive processing, transaction processing and service delivery e-government activities. Following are some availability concerns:

i) Fault-related availability concerns: It includes hardware faults, changes in program or data structures, and failures in other system facilities that are not computer based.

ii) Intrinsic availability concerns: It includes use of storage and recovery mechanisms, failure of magnetic media, and loss of facilities due to physical damage.

iii) Denial of service concerns: Government services are attractive targets for malicious activities. Denial of service attacks can be launched from a variety of sources and can take a number of forms.

iv) Individual or informally organized hackers: Most denial of service attacks against e-government services have been launched by individual or informally organized hackers. Some of these have resulted in significant disruption and expense to the taxpayer.

2) Integrity: Integrity is the process of safeguarding the accuracy and completeness of information and software. Integrity concerns affect: publishing, interactive processing, transaction processing,

and service delivery e-government activities. Following are some integrity concerns or issues:

i) Data Content Integrity issues: Data content integrity issues are associated with unauthorized modification or destruction of e-government information content. This can involve modification or destruction of
 → information electronically published by the government;
 → information associated with reports, applications or other service requests.

ii) Intentional modification of data: Data may be modified or destroyed within e-government processors (e.g. Web servers). Penetration may be accomplished by defeating identification and authentication mechanisms.

iii) Connection integrity issues: Successful implementation of e-government services requires some degree of confidence on the part of private citizens or other user entities that information being read originated only with the assumed government source and that information being provided goes only to the appropriate government destination(s).

iv) Confidentiality: It is the process of protecting sensitive information from unauthorized disclosure.

v) Impacts or consequences of unauthorized exposure: The consequences of unauthorized exposure of information via e-government resources depend in large part on the specific information that is exposed.

vi) Loss of confidence in institutions and service delivery mechanisms:
 Public disclosure of e-government confidentiality breaches can result in loss of public confidence in e-government mechanisms and in the institutions they serve.

④ Security Approaches for E-Government:

- 1) Cryptographic Mechanisms: Cryptography is one of the best methods in security. They give the power to hide the information during network traverse or stored. There are many methods like 16-bit, 32-bit, 128-bit, 256-bit encryption or many algorithms like AES, DES, RSA etc. In these methods the original message is converted into non-readable form called ciphertext.
- 2) Database Design: Some e-government services include provision of data that are derived from aggregation or analysis of information that is subject by law to privacy protection. A number of database design and management approaches have been developed to address this problem.
- 3) Anti-virus system: There are many types of viruses that occupy disk space, corrupt our valuable data or storage medium. So to protect a system from virus anti-virus system can be kept.
- 4) Firewalls: Firewall is a system designed to prevent unauthorized access to or from a private network. Firewall is a security device which can be hardware or software or both. We have several firewall techniques such as Packet filter, Application gateway, Proxy server etc.
- 5) Analysis tools: There is strong need for analysis tool because of the increasing sophistication of attacker rules and the bugs/ errors/loopholes present in used application/system.
- 6) Monitoring tools: Regular monitoring of network activity is essential if a web portal is to maintain a highly confidential data on network. If monitoring tools find any suspicious activity in network then automatic alert system alerts the system.
- 7) Biometric technology: Biometric technology is process of verifying or identifying a person with two different approaches: physical characteristics (which examine fingerprint, Iris, face etc.) and behavioural characteristics (which check keystroke, signature, voice etc.).

④ Security Management Model:

A security management model is meant to be a generic description of what an organization should do to provide a secure environment for itself. It is generic in that it describes what should be done, but not how to do it, which makes it flexible enough to be used by many kinds of organizations. We should choose a model for our organization to follow that is "flexible, scalable, robust, and sufficiently detailed".

1) Access Control Models: Access controls regulate the admission of users into trusted areas of organization - both the logical and physical. Access control is maintained by means of a collection of policies, programs to carry out those policies, and technologies that enforce policies. The general application of access control comprises four processes: identification, authentication, authorization, and accountability.

2) Security Architecture Models: It illustrates information security implementations. It can help organizations quickly make improvements through adaption. Some models are implemented into computer hardware and software, some are policies and practices, some are implemented in both.

3) Bell-LaPadula Confidentiality Model: It is a state machine-based multilevel security policy. The model was originally designed for military applications. State machine models define states with current permissions and current instances of subjects accessing the objects. The security of the system is satisfied by the fact that the system transitions from one secure state to the other with no failures.

4) Biba Integrity Model: It is a formal state transition system of data security policies designed to express a set of access control rules in order to ensure data integrity. Data and subjects are ordered by their levels of integrity into groups or arrangements. Like other models, this model supports the access control of both subjects and objects.

5) The Clark-Wilson Model: It is integrity model which focus to protect integrity of data. It consists of subject/program/object triples and rules about data, application programs and triples. The Clark-Wilson security policy model seeks to formalize the principles of accounting security that have collected over centuries of experimental bookkeeping.

6) The Graham-Denning access control model: This is a computer security model that shows how subjects and objects should be securely created and deleted. It also addresses how to assign specific access rights. It is mainly used in access control mechanisms for distributed systems. There are three main parts to the model:

- A Set of Subjects,
- A Set of Objects,
- A Set of Eight Rules.

7) Harrison-Ruzzo-Ullman Model: The security model proposed by Harrison, Ruzzo, and Ullman (HRU) is a flexible access control model. In HRU, the current set of access rights at any given time can be represented by a matrix, with one row for each subject and one column for each subject and object. Each cell in table contains the list of access rights. The components of HRU model include:

- A set of subjects,
- A set of objects,
- A set of access rights,
- An access matrix.

8) Brewer-Nash Model: The Brewer and Nash model also known as Chinese wall, was constructed to provide information security access controls that can change dynamically. It was designed to provide controls that mitigate conflict of interest in commercial organizations, and is built upon an information flow model.

E-Government Security Architecture:

The security architecture of E-governance is a high level document that set the security goals of e-governance project and describe the procedure that need to be followed by all the e-governance hierarchy such as users, business operations etc. Appropriate legal framework is absolutely essential for the systematic and sustained growth of e-governance.

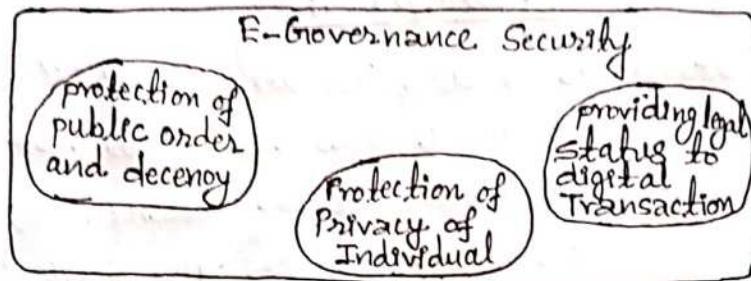


Fig: E-Governance Security

E-governance Security Architecture Reference Framework:

e-Government Security Architecture forms part of the Technical Reference Model (TRM). TRM supports and enables the delivery of ICT Security Standards Domains and capabilities and provides a foundation to advance the re-use and standardization of technology and service components. The TRM has been structured hierarchically as:

- i) Service area: Each service Area aggregates the standards and technologies into a lower-level functional area. Each Service Area consists of multiple Service Categories and Service Standards.
- ii) Service category: Each service category classifies lower levels of technologies and standards with respect to the business or technology function they serve. In turn each Service Category is comprised of one or more service standards.
- iii) Service standards: They define the standards and technologies that support a Service Category. To support Public Institutions mapping into the TRM, many of the Service Standards provide illustrative specifications or technologies as examples.

④ Security Standards:

Security Standard represents a set of requirements that a product or a system must achieve. Assuming the conformity of a product or system with a certain standard demonstrates that it fulfills all the standard's specifications. There are currently some primary standards in place governing information security.

Need/Importance of Security Standard:

The use of standards is accepted without any exception and gives the possibility of comparing a personal security system with a given frame of reference adopted at an international level. Standards ensure desirable characteristics of products and services such as quality, safety, reliability, efficiency etc, at an economical cost.

Organizations can benefit from common best practice at international level, and can prove the protection of their business processes and activities in order to satisfy business needs.

Some of Security Standards:

1) ISO/IEC 27000 standards series: This involves information security standards published jointly by the International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC). The series provides the recommendations on information security management, risk handling and controls implementation within the context of an overall Information Security Management System (ISMS).

2) The SP800 standard series: It is the oldest of all the information security standards. It consists of over a hundred documents covering almost every aspect of information security. The most representative among all these documents is the computer security handbook ~~is~~ SP800-12 which provides a good idea of the NIST approach.

3) ISF Standard of Good Practice for Information Security:

The Information Security Forum (ISF) is an international, independent, non-profit organization dedicated to benchmarking and best practices in information security. The Standard of Good Practice (SoGP) released in 1996 represents a detailed documentation of best practice for information security.

4) Control Objectives for Information and related Technology (COBIT):

COBIT is a set of best practices for information technology management created by Information Systems Audit and Control Association (ISACA), and the IT Governance Institute (ITGI). Its mission is to "research, develop, publicize and promote an authoritative, up-to-date, auditors etc."

UNIT-5

Applications of Data Warehousing and Data Mining in Government:

⊗ Introduction: Data warehousing is a collection of tools and techniques using which more knowledge can be drawn out from a large amount of data. This helps with the decision-making process and improving information resources. Data warehouse is basically a database of unique data structures that allows relatively quick and easy performance of complex queries over a large amount of data.

Features / Characteristics of Data Warehouse:

i) Subject Oriented: A data warehouse is subject-oriented. It provides useful data about a subject instead of the company's ongoing operations, and these subjects can be customers, suppliers, marketing etc.

ii) Time-Variant: The different data present in the data warehouse provides information for a specific period. Historical data is kept in a data warehouse. For example, one can retrieve data from 3 months, 6 months, 12 months, or even older from a data warehouse.

iii) Integrated: A data warehouse is built by joining data from heterogeneous sources, such as social databases, level documents etc. It is constructed by integrating data from heterogeneous sources such as relational databases, flat files etc. This integration enhances the effective analysis of data.

iv) Non-Volatile: It means, once data entered into the warehouse cannot be changed. The data resided in data warehouse is permanent.

Advantages of Data Warehouse:

i) Delivers enhanced business intelligence: By having access to information from various sources from a single platform, decision makers will no longer need to rely on limited data, and can be applied to a business processes.

ii) Saves time: Executives can query the database themselves with little to no IT support, saving more time and money.

iii) Enhances data quality and consistency: A data warehouse converts data from multiple sources into a consistent format. This will lead to more accurate data, which will become the basis for solid decisions.

iv) Generates a high Return on Investment (ROI): Companies experience higher revenues and cost savings than those that haven't invested in a data warehouse.

v) Streamlines the flow of information: Data warehousing facilitates the flow of information through a network connecting all related or non-related parties.

Applications of Data Warehousing:

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none">→ Financial services→ Banking services→ Consumer goods→ Retail sectors→ Information processing | <ul style="list-style-type: none">→ Analytical Processing→ Data Mining→ Real Life→ Various Industries→ Decision making |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Database vs. Data Warehouse:

Data Warehouse (OLAP)	Operational Database (OLTP)
ii) Online Analytical Processing.	ii) Online Transactional Processing.
iii) The number of users is in hundreds.	iii) The number of users is in thousand.
iv) It provides summarized and multidimensional view of data.	iv) It provides detailed and flat relational view of data.
v) The database size is from 100 GB to 100TB.	v) The database size is from 100MB to 100GB.
vi) It contains historical data.	vi) It contains current data.

Q. Data Mining:

Data mining refers to extracting knowledge from large amounts of data. The data sources can include databases, data warehouse, web etc. Data mining refers to the analysis of data. It is the computer-supported process of analyzing huge sets of data that have either been compiled by computer systems or have been downloaded into the computer. In data mining process, the computer analyzes data and extract useful information from it. Data mining aims to enable business organizations to view business behaviours, trends, relationships that allow the business to make data-driven decisions.

Applications of Data Mining:

1) Data Mining in Healthcare: Data mining in healthcare has excellent potential to improve the health system. It uses data and analytics for better insights and to identify best practices that will enhance health care services and reduce costs. Data mining can be used to forecast patients in each category.

2) Data Mining in Education: Education data mining is a newly emerging field, concerned with developing techniques that explore knowledge from the data generated from educational environments. An organization can use data mining to make precise decisions and also to predict the results of the student.

3) Data Mining in Manufacturing Engineering: Knowledge is the best asset possessed by a manufacturing company. Data mining tools can be beneficial to find patterns in a complex manufacturing process. Data Mining can be used in system-level designing to obtain the relationships between product architecture, product portfolio, and data needs of customers.

4) Data Mining in CRM (Customer Relationship Management):

It is all about obtaining and holding customers, also enhancing customer loyalty and implementing customer-oriented strategies. To get a decent relationship with the customer, a business organization needs to collect data and analyze the data.

5) Data Mining in Fraud detection:

Billions of dollars are lost to the action of frauds. An ideal fraud detection system should protect data of all the users. A model is constructed using data, and the technique is made to identify whether the document is frauded or not.

⑧ National Data Warehouses:

The National data warehouse allows researchers and policy makers to view historical data sets and extract data across different groups. The large number of data warehouses can be identified from the existing data resources within the center government ministries. In Nepal, big corporate organizations like Data Center of Singh durbar, Agriculture Bank Development, Nepal Telecom, Nepal Stock Exchange etc. have been seen to make extensive use of data warehouse.

Census Data: Census data is an official count or survey, especially of a population. A census is the procedure of systematically acquiring and recording information about the members of given population. The term is used mostly in connection with national population and housing censuses; other common censuses include agriculture, business, and traffic censuses. The Census is also an important economic tool. At national level census information is used to plan the provision of health care, education, employment, transport etc. It is used to help determine where to build new schools, roads, health care facilities, child-care etc.

Prices of Essential Commodities: Commodities are extremely important as they are essential factors in the production of other goods. A commodities future price is determined primarily by the supply and demand for the commodity in the market. Since commodities are traded on exchanges, their prices are not set by a single individual or entity. Data warehouse help and analysis to find out the lacking problem of commodities, destruction, storing and stocking process.

④ Other areas for data warehouse and data mining:

Agriculture: The Agricultural Census performed by the Ministry of Agriculture, Government of Nepal, 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. Data on agricultural inputs such as seeds and fertilizers can also be effectively analyzed in 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. Thus there is substantial scope for application of data warehousing and data mining techniques in Agricultural sector.

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 program, can also be made using OLAP and data mining techniques.

Health: Community needs assessment data, immunization data, data from national programs on controlling blindness, etc. can all be used for data warehousing implementation, OLAP and data mining applications.

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

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

* Data warehousing vs. Data Mining:

Data Warehousing	Data Mining
i) Data warehousing is the process of compiling and organizing data into one common database.	i) Data Mining is the process of extracting meaningful data from the database.
ii) A data warehouse is a database used to store data.	ii) Data Mining is actually the analysis of data.
iii) It is a process of transforming data into information and making it available to users for analysis.	iii) Data mining is a logical process that is used to search through large amount of data in order to find useful data.
iv) Data warehousing is a process which needs to occur before any data mining can take place.	iv) Data mining can only be done once data warehousing is complete.



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