CHAPTER - 1

INTRODUCTION AND OBJECTIVES
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1.1 INTRODUCTION

The use of Information technology and e-commerce is to provide access to government information and delivery of public service to citizens and business partners is the central concept of e-Governance. It is an efficient and effective way of conducting government business transactions with citizens, businesses and within the governments themselves. It is the advent of a new form of government and the birth of a new marketplace. It makes government more transparent to citizens and businesses by providing access to the right information.
Rapid increase in stake holders, government polices and citizen requirement demanded the immediate services of government online. The implementation is amalgamated with latest technological revolutions supported with fourth generation software. The data mining methods mothered with various statistical techniques catalyzed the services. The satellite communication intensified the speed and quality of service and is at door step with finger touch.

Yet, the swift emergence of technology is mismatching the needs and wants of public, sprouting to various issues which are to be addressed and unless a précised methodology is adhered, the Government, business and citizen will be subjected to lot of inconvenience. Further, the art of literature examination confirms the fact that there is no established framework defined for e-Governance and its diversified applications. Here at this juncture the author opines the urgent need in establishment of a précised e-Governance framework, which very fact is probed, analyzed and presented in the thesis. This senses the author for problem definition and investigates the solution via novel framework erection.

1.1.1 GENESIS

The roots of e-Governance are so deeply penetrated in the society, without which cannot imagine comfortable society. The genesis way backed to 1950’s where the United States regime processed the citizen’s data with tabulating machines and punched cards. Latter with the technological advancement and memory augmentations by John Von Neumann, the processing methods incorporated various peripheral devices and networking came into picture [61].
Many non-Internet "electronic government" technologies gained their service popularity in 1970's includes telephone, fax, PDA, SMS text messaging, MMS, wireless networks and services, Bluetooth, CCTV, tracking systems, biometric identification, road traffic management and regulatory enforcement, identity cards, smart cards and other applications. Even polling station technology, TV and radio-based delivery of government services are quotable[47].

With introduction of internet, the public interaction with government bodies gained focus. The e-Governance is often thought as "online government" or "Internet-based government". In early 1980's internet based email, online community facilities, newsgroups and electronic mailing lists, online chat, and instant messaging technologies were introduced. The society relished the e-Governance and huge demand made the rapid spread in day to day activities[34].

1.1.2 PIONEERS

Past, the royal view of the Government used to be as a 'controller' and 'ruler' but present it is of a 'coordinator' and 'provider'. Government is responsible for providing certain services to the citizens, just like an organization is responsible for managing a value chain that leads to output[26]. Building e-Governance for Development of the Society, by Donor and Richard[23] pioneered the work. The contribution of eminent personalities Piyush Guptha, R.K.Bagga on compendium of e-Governance[51], A Vision of Citizen-centric e-Governance for India of A. P. J. Abdul Kalam[04] are inspiring. The concepts proposed by Gupta.P and SriDevi[51] on e-Governance approach in India laid payment for smooth functioning of e-Governance. The
Challenges and Role of Standards in Building Interoperable e-Governance Solutions featured by Renu Budhiraja[54], Approach and Methodology for Project Assessment by CSI Nihilent[09] felicitated with e-Governance Award in the year 2007.

Network security shadowed e-Governance at every stage with its authentication, firewall, honey pots, honey nets, encryption, decryption, security tokens and other concepts. The contributions of various technocrats and authors referred by 'e-gov' magazine in connection with establishment of data centers for e-Governance is colossal. The 'Role-Based Trusted Network Providing Pervasive Security and Compliance' work of Jayshree Ullal[36], senior VP of Cisco is incredible. The 'Social Software development program' work of Julian Fredian[39] and 'Net security' of Simmonds[65] is fabulous.

1.1.3 APPLICATIONS

The Indian government is extending its services to society with various e-Governance applications. To quote some are Computerized Dealer Service Centre, e-Governance in Petroleum and Explosives Safety, VAT Information System. The popular e-Governance application 'Samadhan Ek Din Me' gained heart of public which deals with information act. Web-Based 'Rail/Air Reservation' is servicing the public with internet ticket reservation. The 'Centralized Allotment Process for the Professional' is the application deals with the transfer system of central government employees across the country. RACE - Revenue Administration through Computerized Energy billing, SARTHI - Stamps And Registration automation with Technology and Information, eSeva are few trendy applications[51,26]
1.1.4 OBJECTIVES

The department of Information technology has designed the following objective in regard to e-Governance[19].

1. Identify priority functional areas in every Ministry / Department to be taken e-Governance applications at the earliest.

2. Make an inventory of existing applications/packages both (domestic and international) facilitating e-Governance.

3. Initiate moves to encourage Central and State Governments to link databases to the public domain.

4. Initiate and develop Data Warehouses in every Ministry & Department.

5. Leverage resources and activities in the various State Governments for Data Base building activity.

6. Initiate and develop pilot projects in applications that are currently not available so as to reap the full benefit of IT.

7. Develop and integrate suitable models in areas of Electronic Governance where systems are being developed independently by Central or State organs.

8. Encourage both Central and State Governments to prescribe knowledge of computers as an essential qualification for recruitment/promotion at various levels.

9. Ensure wide participation of existing staff in computer literacy programs.
10. Develop systems for seamless transfer of information between offices dealing with public administration both in the Central as well as the State governments.

11. Set up and or facilitate specific communication networks for the Government sector up and or

12. Assist Central and State Governments in the identification and implementation of suitable hardware and software packages for Electronic Governance.

13. Establish links worldwide with institutions engaged in similar activities so as to optimize the interchange of ideas & experiences.


15. Establish organizations for advising Government regarding development of strategies for use of Information Technology by Government so that latest technologies and best practices are harnessed.

16. Develop special pilot projects on Paperless Government-On-Line through an extensive use of Electronic Forms and Data Entry Interfaces enabled by web and Internet technology.

17. Build convergence into connected Services Delivery programs.

18. Develop commercial and governmental systems for issuing and managing digital signatures/electronic signature smart cards.

19. Identify measures for suitable protection of data during compilation and transmission and against alterations by
using a combination of security measures.

20. Launch the 25% target of Electronically-delivered services widely and enable its monitoring.

21. Establish Industry Consultative Committees (ICC), Citizen Consultative Committees (CCC) and Ministries Consultative Committees (MCC) to provide platform to various users and implementation groups and organizations to contribute towards the 25% goal and beyond.

22. Develop existing Facilitation Centers already established in various departments for One Stop Shop (OSS) giving One Click Link (OCL) to all information required by the citizen through convergent use of linking and a multiple data entry mechanism.

23. Coordinate activities of Information Technology - Citizen Interface set up by the National Task Force on Information Technology and Software Development, as also the High Powered Committee on Improving Efficiency in Government through use of IT.

24. Establish Government Information Services (GIS) and facilitate the setting up of National Information Infrastructure.

Indian Government anchored the above objectives as standard for e-Governance implementation.

1.2 e-GOVERNANCE

e-Governance is the use of information technology in general, to provide citizens and organizations with more convenient access to government information, providing delivery of
public services to citizens, business partners, and those working in the public sector[51]. Various paybacks are listed.

1.2.1 BENEFITS

The benefits of e-government include efficiency, improved services, better accessibility of public services, and more transparency and accountability [42,11].

1.2.1.1 SOCIALIZATION

One of the goals of e-governance is the greater citizen participation in the nation's capital. Through internet, people can interact with politicians and make their voice heard. Interactive surveys will allow politicians to see the views of the people they represent. The technology created more transparent government and moves closer to true democracy. The transparency gives insight to public on decision making. The degree of public influence amplified healthier governmental activities.

ECOLOGICAL BONUS

Significant savings in paper saves environment, preventing deforestation. Online government services would lessen the need for hard copy forms. Environmentalist, media and public made government to insight internet services preventing paper utility.

SWIFT, COMPETENCE AND CONVENIENCE

e-Governance allows citizens to interact online, achieving objectives any time from any location, eliminating the
necessity for physical travel to government desks. Improved accounting and record keeping can be noted through computerization and information can be easily accessed, equaling quicker processing time. On the administrative side, access to files and linked information can be stored in databases implementing distributed database technology.

CITIZENS APPROVAL

Citizens’ participation in online discussions of political issues with increasing frequency and number is drawn to e-voting procedures.

1.2.2 TECHNOLOGICAL CATEGORIES OF e-GOVERNANCE

Technology specific sub-categories of e-governance are

- m-Governance (mobile governance)
- u-Governance (ubiquitous governance)
- g-Governance (GPS applications for e-Governance)

1.2.3 CATEGORIES OF e-GOVERNANCE

The authors core concentration is on categories of e-Governance and are identified as[51]

A. Government-to-Citizens, (G2C)
B. Government-to-Business, (G2B)
C. Government-to-Government, (G2G)

A. GOVERNMENT TO CITIZENS (G2C)

e-Governance category that includes all the interactions between government and its citizens is G2C. The basic idea is
to enable citizens to interact with the government from their convenience. G2C applications enable citizens to impose questions on government agencies and receive answers, pay taxes, receive payments and documents and so forth. Example, citizens can renew driver's Licenses, pay traffic tickets and make appointments for driving tests. Government can also disseminate information on the web, conduct training and help netizens find employment and more.

Screen shot of Government to citizens - A government of India web site

B. GOVERNMENT TO BUSINESS (G2B)

G2B category includes interactions between government and business. The symbiotic activities are Government selling requirements to business and providing services, business selling products and serving the government[51].

e-PROCUREMENT

The Government buys large amounts of Maintenance, Repair and Operation items (MRO) and other materials direct from suppliers. In many cases, law mandates a request for quotation
or tendering system. For years, these tendering were done manually, the systems are now moving online. The local housing agencies of HUD (Housing and Urban Development), which provides housing to low-income residents, are moving to e-procurement.

GOVERNMENT AUCTIONS

The government auctions surplus or other goods, ranging from vehicles to foreclosed real estate. Such auctions used to be done manually, and then were done electronically over private networks. These auctions are now moving to the Internet. Governments can auction from a government Web site or they can use third-party auction sites.

TAX PAYMENTS

Every year millions of individuals file tax reports. Similarly, hundreds of thousands of businesses do the same. Businesses in the United States must file quarterly reports. Electronic filing of taxes is now available in over 100 countries, from Thailand to Finland to the United States. In addition to personal and income tax, it is also possible to pay online sales tax and value-added tax.
C. GOVERNMENT TO GOVERNMENT (G2G)

The government-to-government (G2G) category consists of electronic communication and commerce activities between units of government, including those within one governmental body and those between governments. Examples include Intelink - an online service shares information among numerous intelligence agencies. The procurement websites apply innovative Web-based procurement methods to government buying within Government bodies. The applications designed for department of Health and Human Services helps state governments locate information about child support, including data of parents[47].

GOVERNMENT TO EMPLOYEES (G2E)

The further categorization of G2G is G2E. This deals the activities and services between government units and their employees[15].

- Various training programs are given to employees online.
- The government orders (G.O's) are circulated to employees timely.
• Present day the leave sanction process is done online using G2E technology
• The grievance of employees to higher authorities is done using online G2E technology
• The electronic fund transfer for employees is done online
• The payment process, pension settlements and other financial benefits that employee gets from government is done online.

1.3 APPLICATIONS

e-Governance applications gained momentum with technological progress coupled with mathematics and statistical applications. It makes use of technologies such as Wide Area Networks (WAN), Internet, World Wide Web and mobile computing by government agencies to reach out to citizens, business and other arms of the government to
- Improve delivery of services to citizens
- Improve interface with business and industry
- Empower citizens through access to knowledge and information
- Make the working of the government more efficient and effective [52]

1.3.1 CATEGORIES

The applications can be discussed under different categories like

A. Educational applications
B. Business applications
C. Administrative applications
D. Service applications

A. EDUCATIONAL APPLICATIONS

VIDYAVAHINI

The portal provides opportunity for schools, teachers and students all across the nation, to express and share their creative and academic potential via the internet. The portal aims at creating such an environment by providing facilities for Content Development and collaboration. Shiksha India is a non-profit organization launched in December 2001 to equip schools with the 5 Cs: Computers, Connectivity, Coaching (teacher Training), Content and models of Commercial sustainability. Its mission is to spread better education, uniform quality of education across India to develop their creativity and problem solving skills.
The Ministry of Information Technology in the project Vidya Vahini and Ministry of Human Resources aims to connect 60,000 schools across the country in next five years. The beneficiaries are students all over India.

**COMMUNITY LEARNING CENTER PROJECT**

The Community Learning Centre (CLC) is a joint initiative between the Azim Premji Foundation (APF) and the State government of Karnataka. The government contributes towards hardware and other related expenses per CLC and the Foundation take care of management and the training of Young India fellows (YIFs) who manage the CLCs. Each CLC is housed in a separate room in the school and is equipped with five to eight computers. The CLCs are used to enhance classroom learning during school hours. The beneficiaries are students of Karnataka.

**B. BUSINESS APPLICATIONS**

**TARAHaAT**

This project, named "TARAHaat" stands for village bazaar, comprises a commercially viable model for bringing relevant
information, products and services via the Internet to the unserved rural market of India. This gained popularity and returns are more than expectation. The subsidiary units include

- **TARAdhaba** - will provide the villager connectivity and access to a new world
- **TARAbazaar** - will provide access to products and services needed by rural households, farmers, and industries
- **TARAvan** - will deliver goods ordered
- **TARAdak** - will connect the rural families to the daughter married far off and to the son posted on the front
- **TARAguru** - a decentralized university will provide mentoring and consultancy to village-based mini-enterprises
- **TARAscouts / TARAreporter** - will collect relevant information for the portal
- **TARAvendor** - will run the store that will cater to products available at Tarabazaar
- **TARAcard** - will enable the villager to order goods and services on credit

The beneficiaries are rural people

**e-PROCUREMENT**

The government of India calls for tenders from various business communities for services or purchasing of goods. The previous manual system is made online and the transparency of tendering process increased. Because of its easy operation and reliability, the revenue generation for both government and business accelerated. The beneficiaries are both business sector and government[51].
C. ADMINISTRATIVE APPLICATIONS

CARD

The Computer-aided Administration of Registration Department - CARD in Andhra Pradesh is designed to eliminate the administrative problems affecting the conventional registration system by introducing electronic delivery of all registration services. The activities of the department are simplified as it is initiated to meet objectives to demystify the registration process, bring speed, efficiency, consistency and reliability, substantially improve the citizen interface etc. Six months following the launch of the project, about 80% of all land registrations in AP were carried out electronically.

AARAKSHI

Aarakshi is an Intranet based system that has been developed and implemented for Jaipur City Police. This innovative system enables the city police officers of Rajasthan to carry out online sharing of crime & criminal data bases, carry out communication and perform monitoring activities. This cut down the administrative issues of the department. The Software provides a facility to update & perform queries on database of FIRs, Latest News of criminals & crimes, Telephone Directory of Police Officers, Messaging, Instructions of Police Control Room on Real Time basis, Habitual offenders details along with photo gallery, Description of criminals, Missing Persons, Police Personnel, Property Details, Numbered / Unnumbered property, Vehicle theft / Seizure.
D. SERVICE APPLICATIONS

eSEVA

Launched on the 25th of August 2001, electronic seva (e-Seva) is the improved version of the TWINS project launched in 1999, in the twin cities of Hyderabad and Secunderabad in Andhra Pradesh. There are currently 36 eSeva centres spread across the twin cities of Hyderabad and Secunderabad and Ranga Reddy district. 70 centers are in operation at different municipalities covering thirteen districts.

eSeva centres offer 118 different services like payment of utility bills/taxes, registration of births/deaths, registration of applications for passports, issue of births/deaths certificates, filing of Sales Tax returns, Trade licenses of MCH etc. The public services are immense and are in limelight. The beneficiaries are public of Andhra Pradesh.

JAN MITRA

Jan Mitra is an Integrated e-platform through which rural population of Rajasthan can get desired information and avail services related to various government departments at kiosks.
near their doorsteps. To achieve this end, a system has been integrated using IT tools. This project has been successfully implemented on pilot basis in Jhalawar, Rajasthan. Jhalawar is the first district among five project location districts in India, where the project has been implemented ahead of schedule.

Screen shot of www.rajasthan.gov.in

Services provided are

- e-Governance Services - Public Grievance Redressal System, Online Submission of Application forms and Land & Revenue Records.


The beneficiaries are rural People of Rajasthan[108]

The above are few successful applications and the concern of the author is on the unsuccessful activities for which the research is probed.

1.4 DATA AND INFORMATION

e-Governance applications are meant for data processing and servicing the needy stack holders. Providing information and satisfying the needs can be done by only data maintenance and manipulation. Data is fact, gathering characters, numerals or combination of both which is raw in nature. The data itself cannot give any meaning and by gathering related data, constructs database from which information is obtained from which the plan of action is decided.

The various forms of data representations are Binary, Octal, Decimal, Duo Decimal, Hexa Decimal form etc[69].

Binary form: The data represented with base two number system, contains only two digits ones and zeroes. Any higher number is formed with combination of ones and zeros. This system is widely used in electronics for signal processing. Zero represents low voltage and one represents high voltage.

Octal form: The numeric data is represented with base eight number system, contains numbers from zero to seven. This form is widely used in communication sector.

Decimal form: This is the regular numeric data representation. The number system with base 10, with digits from zero to nine. The weight of each digit of a decimal number depends on its relative position within the number.
**Duo Decimal form:** The number system with 12 count. For example dozen apples, time in 12 digit form, calendar with 12 months, measuring unit with 12 inches as one feet etc.

**Hexa Decimal form:** This is the data representation with base 16. The characters used are from 0 to 9 and A to F. This is extensively used in computer industry.

### 1.4.1 DATA FORMATS

Different systems make use of different data formats to process data. Computers processes data using different codification systems like ASCII code, EBCDIC, Gray Code, BCD (Binary Coded Decimal forms), UNICODE (Universal Codification system) etc.

**ASCII:** It stands for American Standard Code for Information Interchange. It is developed by ANSI (American Nation Standard Institution). This code is used to represent the data in small computers, peripherals, instruments and communication devices. It supports 8 bit code with which totally 256 characters can be represented.

**EBCDIC:** It stands for Extended Binary Code Decimal Interchange Code. This is the standard character code for large computers. It is 8 bit code. It supports 256 characters. The data can be represented as positive or negative or unsigned.

**Gray Code:** The data of gray code is represented as binary code. These are generally used in shaft encoder and other electronic equipment. The binary bits are arranged in such a way that only one binary bit changes at a time when we make a change from any number to the next. Its usage reduces the error. The largest possible error will be one least significant digit. This is also called as Mirror reflecting code.
**BCD:** It stands for Binary Coded Decimal. This is binary representation of numbers. The each digit of the decimal number is represented in four bit binary form. This is mostly used in electronic equipment. For example, the decimal number 53 is represented as binary number of 5 as 0101 and the binary number of 3 as 0011. So the BCD of 53 is 0101 0011.

**UNICODE:** It stands for universal codification system. The ASCII code supports 256 characters. The problem with ASCII is it supports only English characters. Then what about other international standardized language characters? The solution is given by UNICODE. It supports rich set of 65535 characters, which accommodates all international language characters. It even provides space for new characters which may be developed in future[53].

**1.4.2 DECISION MAKING**
Decision making is the crucial activity in any organization. Depending on which the escalation depends. The colossal data leads to information through which abundant knowledge enhances the intelligence. This leads to decision making, the ultimate activity for any organization to flourish. Decision making gained importance in the modern activities. The concept of information system evolved for better decision making process[76].

1.5 MANAGEMENT INFORMATION SYSTEM

1.5.1 INTRODUCTION

The e-Governance applications are meant for data processing and servicing the needy stack holders. Many a times, the information we have, is not what we want - the information we want, is not what we need - the information we need, is not available. Managing and providing the right information in right time as per the requirement of end users is the striking feature of e-Governance which needs Management Information System(MIS).

MIS can be defined as the systematic way of providing informational support to the managerial function of an organization. The system utilizes computer hardware, software, manual procedures, models for analysis, planning, control and decision-making and databases. MIS is an automated system which presents information both internal and external to the government body that aids in making a specific set of routine decisions. The key purpose of the MIS is to aid decision making and not to automate the decision-making process itself.
1.5.2 CHARACTERISTICS OF MIS

The author in the due course of establishing the relation between e-Governance and MIS, the required characters of MIS are elevated and discussed. The data collection and data analysis is the prime character of MIS through which the citizen data is gathered to serve them better. This leads in providing the valuable information to the managers in decision making process. The decisions are the outcome of report analysis, where the reports can be in detailed form or in aggregated form. For easy understanding and analyzing the graphical reports with bar graphs, pie graphs, drill down graphs etc are generated timely with regular interval frequency. It is necessary to generate event triggered reports to tackle special events. The decision support reports are to be generated whenever required. Distributing the reports to right ward is a crucial activity in MIS.

1.5.3 INFORMATION LAYERS

The information required by the citizens, public servants differ in the development and implementation of e-Governance applications. MIS takes responsibility of providing information to managers at various levels, changing from level to level depending on their needs. The low level management is responsible for gathering data and the required information is submitted to middle level management. They Intern filter, concise the information and its summary is submitted to top level management who are responsible for decision making.[25]
1.5.4 VIEWS OF MIS

The functioning of MIS in respect of e-Governance can be seen in three different dimensions. The first view focuses on incorporating the MIS functions in e-Governance applications which includes strategic planning, management control, operational control and transaction processing. The second view combines the first view with different functions of e-Governance applications together with a database management system (DBMS). The third view identifies the different levels of activities and then looks at the type of information required at the different levels and identifies the characteristics of the information. The three views combine to provide clarity for system developers in creating an MIS that meets the needs all of the users of e-Governance applications.
1.5.5 NEED FOR MIS

The planning and execution of MIS with respect to e-Governance is increasing day by day because of the complex business environment with factors like increased government regulation, globalization and liberalization policies, wider variety of products and services offered by government, increased citizen expectations leading to the very dynamic environment. In this scenario, the decision making process must be accelerated with MIS techniques which provides sophisticated and timely information.

1.6 QUALITY, SECURITY AND RELIABILITY

The wide spread of e-Governance in society made its eye strong on its quality, security and reliability. The governmental activities should pave path its easy, comfortable operations and stand as model for its stakeholders[57].
1.6.1 QUALITY

Quality is not a property of something but a judgment relative to some purpose. e-Governance generally have many stakeholders, who have quite different views on quality. Government wants a system that delivers a maximum benefit at minimum cost, where benefit is defined in terms of the operational effectiveness and functionality. End users want e-Governance system that delivers a maximum benefit at minimum cost, but benefit is defined in terms of satisfaction. The engineers who build and maintain the system see the government and end user quality judgments as objective functions on which to make design tradeoffs.

The important quality characters of e-Governance information system are its functionality, reliability, usability, effectiveness, maintainability and portability.

**FUNCTIONALITY:** The information provided should always cater the need of its user. The required information should be available at required time.

**RELIABILITY:** Extent to which the information provided is genuine is dealt by reliability factor. The accuracy, presentation and clarity are the important factors of reliability.

**USABILITY:** Level of effort needed for users to exploit the information in their daily activity is called usability. Ease of usability increases quality of information system.

**EFFICIENCY:** Level of resources consumed in order to generate the information is called efficiency. If the system consumes fewer resources and gives more effective information, it is considered the efficient information system.
**Maintainability**: Level of effort needed to maintain the information obtained is maintainability. Lesser the effort, greater the quality of information leads to effective maintainability. Low effort with good quality of information will always lead to fewer budgets and hence leads to low cost resulting in precised maintainability.

**Portability**: Extent to which the information can be transferred from one area of work to another area of work is called portability. The information gathered for one department can be used for the same department as well as other departments. Even the information can be used by different branch offices which are located geographically at distant locations through networks. More portability of information leads to increased quality of information system.

1.6.2 **SECURITY**

The e-Governance information system introduces new dimensions to security problems. The information should be confidential and secure with free from hacking problems. e-Governance in application monitors, large number of computing systems must be free from proliferation problems and every care has to be exercised by security principles not to create iota of security problems in implementations[31][46].

Physical security protects the physical information systems assets like personnel, hardware, facilities, supplies and documentation where as the Logical security protects data/information and software.
Security administrators, the specially trained and experienced persons take care of physical and logical securities to peruse the controls over information system assets. They design the Security program which is a series of ongoing, regular, periodic reviews conducted to ensure that assets associated with e-Governance applications safeguarded adequately.

1.6.3 RELIABILITY

The information provided by e-Governance applications should be reliable, trustworthy and accurate. The features of reliability of are availability, Correctness, Clarity, Rapidity[24].

Availability: The data processing department should provide required reports to the stakeholders and the government when needed avoiding delay factor. The availability of information is the critical factor of reliability.

Correctness: Accuracy is obtained by cleansing the data before converting the data into information. The datum from various sources is gathered, ordered and the unwanted incomplete data is removed.

Clarity: The reliability factor solely depends on accuracy and also on the clarity of data projections. Though the data is accurate, if it lacks clarity of reporting, it leads to
confusion in decision making. The reliability factor of information is directly proportionate to the clarity of presenting the data.

**Rapidity:** The quantum of time in which the required report is available plays an important role in deciding the reliability factor. Rapidity below 99.9 percent of expected speed is usually unacceptable.

Keeping in view of the very important facts mentioned, a through probe is undertaken during the course of this study in presenting précised security and reliability aspects in designing the proposed framework for e-Governance applications.

### 1.7 INFORMATION SYSTEM AUDIT FOR e-GOVERNANCE

Audit is a studious process for e-Governance applications. Transparency of governmental activities in terms of work, work environment, managerial hierarchy, abstract and non-abstract assets, investments is mandatory. Government is accountable and answerable to public for any means of e-Governance activity [57].

#### 1.7.1 INFORMATION SYSTEM AUDIT

Information systems audit is the process of collecting and evaluating evidence to determine whether a computer system safeguards assets, maintains data integrity, allows e-Governance goals to be achieved effectively and uses resources efficiently.

**Asset Safeguarding:** The information system assets of e-Governance include hardware, software, facilities, people (knowledge), data files, system documentation, and supplies.
Like all assets, they must be protected by a system of internal control.

**Data Integrity:** This is the fundamental concept in information systems auditing. Attributes of data are completeness, soundness, purity, veracity.

![Functions of information system audit frame work](image)

**System Effectiveness:** To evaluate whether a system reports information in a way that facilitates decision making by its users, auditors must know the characteristics of users and the decision-making environment.

**System Efficiency:** An efficient e-Governance uses minimum resources to achieve its required objectives. It consumes various resources like machine time, peripherals, system software, labor and network.

1.7.2 **PILLARS OF e-GOVERNANCE AUDIT**

Many of the principles that underlie the practice of e-Governance auditing have their roots in other disciplines,
such as traditional auditing, computer science, management and behavioral science

**Traditional Auditing:** The knowledge and experience with internal control techniques of traditional auditing had an impact on the design of both the manual and machine components of an e-Governance audit. Perhaps most important, traditional auditing brings to e-Governance auditing a control philosophy.

**Computer Science:** Computer scientists also have been concerned with how asset safeguarding, data integrity, system effectiveness, and system efficiency objectives might be better achieved.

**Information Systems Management:** Improper management leads to some spectacular disasters and leads to failure to achieve their stated objectives. As a result, for many years researchers have been concerned with identifying better ways of managing the development and implementation of e-Governance systems.
Behavioral Science: Technology most of the times fail because their designers do not appreciate the difficult human issues of e-Governance that are often associated with the development and implementation of a system. Auditors must understand the conditions that can lead to behavioral problems and system failure.

1.7.3 NEED FOR AUDIT FRAMEWORK

e-Governance has become instrumental in every walk of life and uncontrolled use of computers can have negative impact on society. Government must control and audit computer based information systems because the cost of errors and irregularities that arise in these systems are high. The ability to survive can be severely undermined through corruption or destruction of its database, decision making errors, computer abuse, hardware, software and personnel losses, the high costs of computer errors, failure to maintain the privacy of individual persons.

The information systems audit framework has been established to safeguard assets, to maintain data integrity, to achieve system effectiveness and to achieve system efficiency. Evaluating the reliability of controls in computer system is often more complex and to set right it, a framework is highly demanded.

1.7.4 DEMANDING FACTORS FOR e-GOVERNANCE AUDIT

Cost of data loss: Critical resource for an e-Governance for its regular activity is data. If this is accurate, the applications increase their abilities to adapt and survive in a changing environment otherwise governance can incur substantial losses.
Cost of incorrect decision making: High-quality decisions depend on the quality of the data and the quality of the decision rules that exist within e-Governance information systems. The types of decisions involve detection, investigation, and correction of out-of-control processes.

Cost of Computer Abuse: Computer abuse is any incident associated with computer technology in which a victim suffered or could have suffered loss. Some major types of computer abuse that an e-Governance might encounter include Hacking, Viruses, Illegal physical access, Abuse of privileges. Computer abuse can lead to consequences like Damage of assets, Stealing of assets like Hardware, software, data, documentation etc, Alteration of assets, Privacy violations, Disruption of operations, Physical harm to personnel.

Costs of Computer Error: Computers automatically perform many critical functions within our society. For example, they monitor the condition of patients during surgery, direct the flight of a missile, control a nuclear reactor, and steer a ship on its course. Consequently, the costs of a computer error in terms of loss of life, deprivation of liberty, or damage to the environment can be high. The costs of computer error in financial terms can also be high.

The above problems demanded for the immediate introduction of information system audit frame work and government implemented it in ambitious way for smooth functioning of e-Governance.

1.7.5 e-GOVERNANCE AUDITORS

e-Governance auditors are the persons who are responsible for collecting and evaluating evidence to determine whether the system safeguards assets, maintains data integrity, allows the
goals to be achieved effectively and uses resources efficiently. The information system auditors possess traditional auditing skill as well as computer skills with networking flavor[31].

AUDITOR ABILITIES

Auditors should process various inherent cognitive strengths and limitations. The cognitive abilities affect the quality of the judgments. Representative heuristics makes in building strong teams and relations. Adjustment heuristics makes to tune the fundamental stage of problem to reach the final stage of e-Governance implementation. The Availability heuristic makes the availability of past experiences to implement for the present e-Governance applications. The factors that influence auditors are the experience and training they received.

TYPE OF AUDITORS

The two categories of auditors are internal auditors and external auditors. The Internal Auditors participate in the development of e-Governance applications and in post implementation reviews. The External Auditors undertake general audits rather than concurrent or post implementation audits of the systems development process.

AUDIT APPROACHES

The three types of audits of the systems development process are Concurrent, Post implementation and General audit. The concurrent auditors are members of the systems development team. They assist the team in improving the quality of systems development for the specific system they are building and implementing. The Post implementation auditors share their
experiences in the development of a specific e-Governance system. The General auditors evaluate systems development controls overall. They reduce the extent of substantive testing needed to form an audit opinion about management's assertions relating to the financial statements or systems effectiveness and efficiency.

For any e-Governance activity, the audit process is mandatory to keep things straight and make smooth functioning of applications. The author discusses the audit procedures in detail in chapter 4, with the elements identified for e-Governance framework are discussed in chapter 5 for successful functioning.