

Design of Secure E-Governance Model for India

Vaani Jain

Assistant Professor, Mahaveer College of Commerce, Jaipur
jainvani1983@gmail.com

Abstract- Online working of a government or providing its services online to its citizens at their door step is known as E-Governance. E-Governance is E-Commerce technology means online availability of government services. The technology and the methods used in E-Governance project provide a roadmap for efficient delivery of services at the door step. In today's time the development of any country depends on the uses of E-Governance and also their penetration. Development of any country can be judge by the scope of E-Governance in that country. Moreover, today's government has also full faith in E-Governance and its widespread network across the world proves it. E-government security is a key problem to restrict the construction and development of E-government systems in any country over the world.

I. INTRODUCTION

Electronic governance or e-governance is the application of information and communication technology (ICT) for delivering government services, exchange of information, communication transactions, integration of various stand-alone systems and services between government-to-citizen (G2C), government-to-business (G2B), government-to-government (G2G), government-to-employees (G2E) as well as back office processes and interactions within the entire government framework. Through e-governance, government services will be made available to citizens in a convenient, efficient and transparent manner. The three main target groups that can be distinguished in governance concepts are government, citizens and businesses/interest groups. According to the World Bank, e-Governance is defined as "e-Governance refers to the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government. These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits can be less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions." However, the concept of e-Governance has no specific definition; because it is defined by objective of activities rather than by the technology, therefore it requires broad definition and wider understanding for a government to implement it successfully. To guide and benchmark e-

Governance development, researchers and academia proposed different types of e-Governance system development models, so called maturity models.

A. Adaptive E-Government Maturity (AEM) Model

The AEM model is a theoretical model based on sequential multistage methodology. The purpose of the model is to identify the key practices required to make e-government services more user centric through personalization. Additionally, the model aims to define a guide line for a transformation from a regular e-government to a personalized version. The model is composed of the following five stages:

i. Presence: Presence stage is considered as the starting point of personalization after reaching a certain maturity level through any chosen maturity models. However, at this stage it becomes very clear as what type of services and information need to be personalized.

ii. Semantic Adoption: this stage is the backbone of the personalization process. According to the chosen ontology the classification of information and e-services will be identified.

iii. User Modeling: this phase represents the process of building a mechanism to construct a model about users' behavior and characteristics. User models can be constructed on the fly or maintained through a user profile. However, either mechanism will handle the adaptation process based on the defined semantics

iv. Procedures Planning: Procedures planning is a strategic stage where designers of the system plan and design triggers of different life scenarios based on the actors of the chosen ontology to reach certain objective such as, renewing a driving license for a handicapped person. Following the mentioned example, the user model belongs to a handicapped group and has an objective of renewing their driving licenses. Hence, this situation triggers information, e-services and procedures to be followed which are different than renewing a driving license for a fit citizen.

v. Middleware Layer: this is the final stage where the middleware layer assembles all the provided e-services from different agencies and standardizes a vocabulary for exchanging information amongst them. Moreover, this stage provides a meaning for the provided eservices as per the used ontology. This layer represents interoperability for the provided eservices.

B. Citizen Oriented E-Government Maturity Model

The model is simple, and includes the main ideas of previous mentioned models. (Siau, Long 2005) translated the stages within different models into one another and developed a new e-government stage

model. (Using Meta-synthesis method) The new e-government stage model has the following five stages: web presence, interaction, transaction, transformation, and e-democracy.

i. Web presence: This phase is the most basic form of e-government. In this stage, governments typically post simple and limited information through their web sites, such as the agency's vision and mission, office hours, contact information, and official documents. At first, most of the information is static. However, with the advancement of e-government capability, the information posted can be more dynamic, specialized, and regularly updated. The main difference between this stage and other higher stages is that in this stage, governments only provide information on the web sites and no interaction is possible.

ii. Interaction: This phase provides simple interaction between the governments and the users. This includes basic search engines, e-mail systems, as well as official form downloads. Interaction, as the preliminary step of transaction, can be regarded as a transitional period between simple web presence and complete transaction.

iii. Transaction: This phase enables users (including both individual citizens and business) to conduct complete online transactions. Citizens can conduct self-services online such as license applications, tax filing, and personal information updates. In addition, businesses can access online services such as fulfilling tax forms, applying 9 licenses and reporting financial data. Online businesses such as obtaining order and making auctions are also possible.

iv. Transformation: There is a “jump” between transformation and the previous three stages. Rather than automating and digitalizing current operational processes, this stage moves towards transforming the way that governments provide services. The transformation involves both vertical (i.e. governments in different levels) and horizontal integration (i.e. different departments or governments in different locations). For external interfaces, governments build a single and unified portal providing integrated and seamless services instead of separate and distributed services. To achieve this aim, governments should initiate an internal integration to re-engineer existing processes by reducing bottlenecks and intermediaries.

v. E-democracy: This is a long-term goal for e-government development. By offering tools such as online voting, polling and surveys, governments attempt to improve political participation, citizen involvement, and politics transparencies.

C. Quirck's Four Staged Maturity Model

This model offers four stages with different spaces for e-government, which is widely accepted and used in the world. This model gives information at the lower end by Empowering Citizens at the final stage. It outlines different spaces of E-Government for local authorities. Quirk describes

- i. E-Service:** as Interface with customers
- ii. E-Commerce:** as Cash transactions,
- iii. E-Democracy/. E-Decision-making:** as political dialogue between citizen and community, as better informed public interest decisions.
- iv. E-Management:** as improved management of people.

D. Asia Pacific's Six Stage Model

- i. Setting up an email System and Internal Network**
- ii. Enabling Inter-organizational and Public Access to Information:** systems from paper based
- iii. 2-Way Communication:** use of ICT for email, SMS, Fax, Voice, etc.
- iv. Exchange of Value:** online tax assessment, visa application, etc.
- v. Digital Democracy:** participatory processes like empowerment.
- vi. Joined-up Government:** one step web portal without needing to know what/which/how government or agency is responsible

E. Gartner Study- Four Phase Model

Gartner research study (2000) titled “Gartner's Four Phases of e-Government Model” tries to measure E-Government initiatives progress and designing a road map to constituency service achievement. It classifies a distinct four phases identifying where a project may fit in e-Government’s overall strategy.

- i. Presence:** A phase where simply information is provided through a website in passive nature, it is also known as “brochure-ware,” indicating that it merely functions as a printed brochure.
- ii. Interaction:** In this phase, basic interactions are offered between citizen/business and government in forms of e-mail contact and interactive feedback forms that generate a type of responses.
- iii. Transaction:** Project at this phase will enable transactions such as tax payment, license renewals and even applying for contract procurement bids.
- iv. Transformation:** This is the highest phase. Projects at this stage are mature enough to bring changes that reinvent government’s existing process and functions.

F. Laynee & Lee Study – Four Stage Model

As an attempt to help to understand the complexity of e-Government projects Layne and Lee (2001) introduced their four-stage model and proposing ‘stages of growth’ model for full functionality.

i. Catalogue: The main government’s goal at this stage is having an online presence where efforts are focused on the establishment.

ii. Transaction: Government’s initiatives at this stage will concentrate on providing online interfaces that connect and interact with internal systems enabling user transactions.

iii. Vertical integration: Interaction among local, state and federal e-Government systems, connecting and updating higher or level systems once changes occur.

iv. Horizontal integration: Unlike vertical integration, horizontal integration is accomplished by interacting independent systems of different services and functions on the same level. While vertical integration interacts systems of different services and functions across different levels.

G. UN Study – Five Stages Model

Under its division for Public Administration (2001) published a study titled “Benchmarking E-Government: A Global Perspective, Assessing the Progress of the UN Member States” introducing five stages model that helps in determining the progress of e-Government. Furthermore, the study explains how e-Government projects can play as measurements for government’s development level examining deliverables and services available in their official online portals.

i. Emerging: Government’s presence online at this stage is limited to self-reliant, independent and static websites.

ii. Enhanced: Here the effort is increased to make more dynamic and frequently updated websites.

iii. Interactive: At this stage, the user will be able to can provide feedback, contact officials, download forms, apply for services and even request for appointments.

iv. Transactional: This stage is where projects financial transactions are made available online, enabling users to pay for services they obtain.

v. Seamless: This stage assimilates all processes within a department boundary to an integrated e-service providing administrative function.

H. World Bank Study – Three Phases Model

Centre for Democracy and Technology in World Bank (2002) try to provide assistance for policy makers in their E-Governments’ plans and project with their own tree phases model. The phases are conceptual and independent, introducing a distinction between E-Government goals

i. Publish: By publishing an online site, the government is to convey information by broadcast or circulation is the main goal. Uniquely, it serves well if it is merely the purpose.

ii. Interact: Interaction should be two-ways communication. E-Governments sites that enables users contacting officials, submitting forms and express their views on several policies.

iii. Transact: This is a phase where citizen/business obtains the actual government service using its own portals. Transaction-allowed sites are making e-Government more productive and less time consuming by providing direct links to specified services at any given time.

I. IBM Study – Four Waves Model

In order to provide more goal-oriented and flexible e-Government projects, the government needs to understand and upgrade its demand capabilities according to the uprising economic needs. To achieve a demand-ready environment, systems have to implement recent technologies, re-engineer existing processes and scale their infrastructure. In this model by IBM, four waves of e-Government evaluation determine the change. Each wave is simplified by characteristics which group similar activities and deliverables.

i. Automate: In this wave, the main focus is delivering right of information to citizens through an online presence.

ii. Enhance: To reach the second wave, Governments don't necessary re-engineer existing processes and policies. Making certain modifications that enable user interaction is sufficient.

iii. Integrate: Moving towards the third wave will require a radical change, planning more integration of business processes.

iv. On demand: It is a demand-ready wave where a significant leap requires a transformation and reengineering of working culture, infrastructure and business processes to adapt the forecasted demand.

II. LITERATURE REVIEW

To have a better insight in the area of e-Governance and e-Services in general, the review of literature was initiated. A lot of treasure of literature is available, out of which selected significant materials have been incorporated in this. The review of literature proved very helpful in developing theoretical base and preparing questionnaires for the research work.

Dr. Sita Vanka, K. Sriram and Dr. Ashok Agarwal , in their summary of panel discussion “Critical issues in e-Governance” states that, the Government of India’s E-Governance projects should be based on Enterprise Architecture, which defines a set of business processes and Technology standards to be followed throughout the Government enterprise, providing services which are Citizen Centric, Open, Standards Based, Interoperable, Transparent, Flexible, Secure, Result Oriented and Dynamic. Enterprise Architecture addresses most of the architectural issues and leads to following benefits- improves business flexibility, and at the same time, business process and system optimization, it helps reduce process, system, and infrastructure costs and complexity, it helps ensure enterprise security and compliance, and it drives standardization, consistency, and scalability.[1]

Andrew Gilmore and Clare D’Suza , in their paper titled “Service excellence in E-Governance issues: An Indian case study” have identified efficiency attributes, user convenience attributes and citizen-centricity attributes to access service quality with respect to e-Governance.

The efficiency attributes include speed of delivery of service, compliance to committed service time frame, quality of service, simplicity of user action required for obtaining the service and reliability of the service. The user convenience attributes listed are ease of access to the service, user dependence of time (24 x 7) availability, single window access to several services, integrated services enabling access to several agencies through one request, mechanisms for problem resolution, how smoothly exceptions are handled, availability of alternative processes exist in case of serious problem and suitability of service locations to socially and economically backward areas. To access service quality with citizen-centricity attributes author suggests to access the extent to which user requirements are covered in service design, the use of local language in user interfaces, the extent to which attributes of citizen centricity are these new services being offered other than conventional services offered earlier, reduction of visits to higher level offices to complete the transaction and the extent to which the staff of the service provider at service delivery station familiar with the services packaged for different user groups.[2]

Raposo, Mario, Leitao, Joao and Paco, Arminda , in their paper titled “E-Governance of Universities: A Proposal of Benchmarking Methodology” have opined that the method of e-governance assume a special importance in terms of developing governance strategies that are oriented to the sustainability of public institutions and for university in particular.

The one side makes the internal relations (G2G) more efficient and, on the other side, they contribute to the establishment of new kinds of external relations (G2B and G2C). The existence of this kind of platforms should be integrated in institutional information system in order to facilitate the adoption and

the subsequent control of the best institutional practices, both at internal and external level. Also, these platforms should be enough to the proposal of benchmarking tools that are now presented and applied in the University. This helps university identify strengths and weaknesses at an internal level, and to face threats and opportunities at the external level. In order to improve the global quality of services and of the efficiency. It makes the improvement in the institutions for global performance, by following best practices.[3]

Staffan Lindell, Mikael Lind and Olov Forsgren , in his paper “Students as eCitizens - Deriving Future Needs of e-Services for Students” states that, e-services for students are rapidly becoming more commonplace, but there exists a problem with the way that these e-Services are being developed. The e-services are made from the viewpoint of the organization and as such the accessibility for the student is hampered. A student has to remember several different sets of login requirements just to go about the daily life. The problem that is created by this organizational way of thinking is illustrated through the fact that students sometimes forego the e-service and uses a manual variant instead. It takes up a lot of time just to move between the different locations of the e-services and the multitude of logins creates a barrier which the student has to overcome in order to access the e-service they want.[4]

Mrinalini Shah , in her paper “E-Governance in India: Dream or reality?” while discussing the concerns for e-Governance in India listed issues of concern for rural 109 area as lack of infrastructure, less literacy and e-literacy, lack of awareness of the function , fear of bureaucracy, social and economic disparity. The issues she raised for urban area are concern for security and privacy and lack of time.[5]

III. NEED OF SECURITY MODEL FOR E-GOVERNANCE

Dependency on Information and Communication Technology (ICT) for supporting core operations to both government and private sector is increasing. Similarly, organization’s critical information has developed into a key strategic asset in a competitive world. Nevertheless, the pace of ICT advancement such as development, deployment and use of E-Government infrastructures is much faster than the development and deployment of security services, including technical and the existing and new emerging security risks. Technical security aspects include hardware and software solutions such as Access control and Antivirus mechanisms . The application of information security principles in an e-government environment is a complex, multidimensional issue involving people, technology and processes.

E-government security is considered one of the crucial factors for achieving an advanced stage of e-government. As the number of e-government services introduced to the user increases, a higher level of e-

government security is required. In order to get the maximum decrease of data breaches and get the maximum protection of critical data when using E-Government systems in any country over the world there should be a security model to satisfy this purpose. The security models of E-government may be based on layers , cloud computing , based on service-oriented architecture , access control policy , and security system based on information security model .

IV. CONCLUSION

E-Government security models are widely used in the implementation and development of E-government systems. Due to the deference situation of the countries over the world there are various security models applied in each country. The overall aim of this article is to review the available literature , find out the existing E-governance security models , analysis of the available models , try to find out the best suitable model in respect of security in E-Governance and finally to design a new security E-Governance model. .

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