CHAPTER VI

Our e-Governance SDLC Model

Any e-Governance project can be compared to a super fast train. A super fast train initially waits for its passengers, for all the resources like fuel, security personals, and railway staffs etc and then starts slowly towards its destination. In an e-Governance project, the users need to be aware about the project initiated at some bureaucratic level and collection of various resources like proper blueprint; fund, skilled man power, expert panel etc. are to be organized before starting. As a super fast train start its journey from one place and slowly move towards its destination covering many intermediate stations for giving services at those places and halts at some places to change the engine, supervise the machineries, and reenergizes the human resources, the e-Governance projects also need to grow slowly from one place as pilot basis to a huge geographical location. After successful implementation of the pilot project also it need for time to time review of the implementation, customer and citizen’s feed back, supervision of various vital resources of the project before extending it to other territory.

Normally the citizen faces two kinds of harassments when accessing the services from any of the government departments, that is because of inter department and intra department file processing to provide the services. So computerization of those departments and implementation of G2G services is the foundation stone for providing good G2C services effectively and to make them more robust and reliable.

In this study, a dedicated JIG SAW type SDLC Model as shown in figure 6.1 has been designed which implements a hybrid methodology of defined and empirical approach for the e-Governance Projects. The new model provides the
charm of simplicity of linear development and the flexibility of agile process development. Special care has been taken up to address iterative development, change management, GPR, Modular Release Approach etc. In a Jig Saw Puzzle game, there are many small pieces, individually making no sense but combining them together gives a complete shape of a picture. Like that this SDLC Model defines four stage:

- Presentation
- Model
- Assessment
- Consumption

![SDLC Model Diagram](image)

**Figure 6.1: e-Governance SDLC Model**
All these stages are having very loose adhesion between each other and strong cohesion between the sub-processes of each. Any stages can be started at any time irrespective of their order occurrence.

The Process flow control of the New e-Governance Model is shown in figure 6.2 below:

![Diagram of e-Governance Model Flow Control](image)

6.1. Presentation (Online Presence of the Government):

As a basic step, an initiative can be taken up to show the online presence of the Government in a phase wise manner. Also there are no requirements to wait for the
completion of other stages. It gives a primary boost towards next generation of Citizen - Government interaction.

The Government is committed to deploy IT as an effective tool for catalyzing accelerated economic growth, efficient governance and human resource development. The Government recognizes the need of using Web Potential in bridging the gap between the Government and the Citizen. Wherever citizen interface is involved, Web enabled applications will be developed. All public domain information like official gazette notifications, acts, rules, regulations, circulars, policies and programme documents would be digitized and made available for electronic access on Web. The entire effort of developing and hosting websites of different Departments, Boards & Corporations needs to streamlined and integrated. To achieve this, it is important to have common guidelines and policy for the Website Development, Hosting and Maintenance for various State Government Departments, Boards and Corporations.

6.1.1. Informational: Information about Government & Information compiled by the Government are disseminated to the citizen as widely as possible by publishing departmental web sites. It should include informations like:

- **About Us**  General information about the organization, its brief history, area of operation, few general photographs of the organization, Its addresses and location etc.

- **Organization Structure** – If any organization/Dept., which does not have a highly confidential structure, it can put its organization structure with the names and designations of all its officers and their responsibilities in a hierarchical manner.
• **Main objectives and responsibilities** – Under this topic the objective of the organization, working of the organization, their activities in detail, experience in the field and major achievements can be put. The services that a organization provides

• **Basic Statistics** – Basic statistics of the organization, showing its previous years records can be put in a tabular or graphical form.

• **Rules & Regulations/Acts/ Policies** – The organization’s rules, acts and its policies, which it wants to make public, can be published.

• **Forms, Terms and Conditions, Procedures etc.** – All the procedures to follow in order to get some work done through the department and related documents, the forms which people need to fill in order to interact with the department/ organization can be put on the web. This makes it convenient for the public to download all the forms and procedures/ Terms and conditions sitting at home and avoiding visits to the office. This information should be put in a read only format so that the users can not edit the documents after downloading.

• **Plan, Schemes, Programmes and projects**
  The Websites will contain Information related to the plans/ Annual Plans and Budget of the Department or Organisation, with details of Schemes, Programmes, Projects, Externally aided projects, Central Schemes, Centrally Sponsored Schemes etc.

• **Tenders** – The organisation/department can release all its tender notices on the Internet using its own website. These notices should also be put in read only format to avoid misuse.
• **Right to information Act**  Departmental Information required to be published as per the Right to Information Act.

• **Other features**  Any other features which the Departments may deem fit and which are specific to the Department concerned

• **News**  –Latest news/Circulars or press clippings released by the organization, can be put under this topic. This part has to be updated on a regular basis to keep the latest information on the web.

• **What’s New**  – The latest happenings in the organization can be put on a regular basis. This can involve announcement of a new scheme or a plan etc.

• **Contact us**  – Any contact address of the organization

• **Search Engine**  – Website will have Search Engine to enable the users to locate and to access information/contents of the websites and of the database connecting to the website

• **FAQ and Help**  – Department will also consider putting up relevant information under an active link titled "Frequently Asked Questions (FAQ)" providing details in significant areas of focus.

6.1.2 **Interacting:** Development of two way communications through e-mail id of officers, Phone numbers, Feed Back Forms etc is done in this process and can put it on the web by which people who browse the site would fill it and the information filled there will automatically come to a predefined E mail address which can be replied back. This makes a good interface between the public and the department/Organization.
6.1.3 Dynamic: Development of online grievance Submission, Suggestion Box, Blogs etc create a new generation citizen relationship management and creates a platform for efficient e-Government.

6.1.4 Key issues in building a Department Website:

6.1.4.1 Reliability & Authenticity
A Government/Department website is an official source of Government/departmental information. Hence it is very critical that whatever is hosted on the site is authentic and duly verified by concerned authorities, before publishing.

6.1.4.2 User friendly
The Government /Department website must be a user friendly place on the Internet available to citizens for improved access & dissemination of government information and services.

6.1.4.3 Accountable
All citizen interactions in the form of queries/suggestions/grievances etc. must be attended to timely & carefully. Infact, the government/department website must be used as an effective tool for prompt response.

6.1.4.4 Updated information
It is extremely important to keep the contents updated or else users will lose interest after visiting the site once or twice. The visitors expect to get the latest and up to date information about the activities, schemes, programmes etc. even before it is released in press or elsewhere. Hence, whenever any new activity takes place in a department, the news/information must get reflected on the website at least simultaneously, if not earlier than it appears in the Press. The Website may have the following essential features:
1. **Bilingual Support**: The content should be available both in English and local language as far as possible keeping in view that a large number of people are speaking local language. The fonts used should be in Unicode.

2. **Site Map**: Site Map has to be provided for navigation support.

3. **Consistency**: Uniform look and feel is to be maintained in all pages of the website.

4. **Access**: Access to contents should be logical and intuitive.

5. **Layout of menu, icons & hyperlink**: The organisation of hyperlinks on the homepage and in the interior pages has to intuitively reflect the significance of the information or service associated with the link. Floatable and collapsible menus for effective use of space and icons providing cue to hyperlink contents are to be used effectively.

6. **Search Engine**: This is to facilitate the users locate and access information/contents with ease.

7. **Content Structure**: Contents may be organised meaningfully with appropriate metatag/labeling scheme, interfacing with an appropriate uniform electronic record management system adopted in the organisation with features such as version control, information on ownership, storage location, file number, keywords, context description etc.
6.2. Model (Developing e-Governance):

The terms e-Governance and computerization although related to each other but not equivalent. Translating the manual file processing system to its exact equivalent but in an automated and digital environment is called computerization whereas transforming the complex and lengthy departmental procedure to a citizen-centric and easily accessible service using ICT is called e-Governance. Initially the departmental procedures should be identified, which is to be transferred to a simple and easily accessible.

Also, Government money is not the bag of Santa clause. The fund is very limited and within that limited amount and providing best performance, the time frame should be flexible enough to meet the key constraints. If the time is minimized then more manpower is required for which more fund is required, but the fund is limited. So, time should be expanded in a such manner to accommodate best performance with a limited fund. There are a lot of e-Gov applications but the citizens are not aware of them, so some fund should be allocated for awareness of the citizens. Some fund should also be allocated for the infrastructure maintenance on a long term basis.

![Figure 6.3: Key Consideration](image)
This New SDLC Model advise that to optimize size of the project so that sufficient amount of fund and time can be allotted to the project and make it more stable and robust. As there are three vital parameters cost, time and performance for the project which normally the client deals with, so this new SDLC suggest as given in Table 6.1.

<table>
<thead>
<tr>
<th></th>
<th>Time</th>
<th>Performance</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constrain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enhance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accept</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6.1: Optimization of Time, Performance & Cost

Approximate investment to implement the modules is to be estimated, clearly mentioning the investment that is mandatory and those are optional. After getting the approval of the cost estimation report, requirement analysis should be started. Various vital methods required for approximate cost estimation are:

- Similar type of projects implemented earlier, if any.
- Availability of customizable or reusable software for the current project.
- Report of resources required and already available, if any etc

As stated above this stage is also not dependant on the completion of any other stages but it is one of the most important stages in establishing effective e-Government. This involves process re-engineering of the government services, adopting modular release approach, concept of Sprint Development as well as G2G interoperability. As to provide effective G2C services strictly depends on the success of the back end computerization and G2G integration, so technology adoption time should be provided to departmental employees with proper capacity building.
programs. The e-Governance application can be modularized eying the different categories of users, i.e. Core User (Departmental User), Power User (Administrative User), End User (Citizen) to corresponding Core Module, Power Module and Citizen Module. These modules can be released in a linear manner but also should follow a certain developmental life cycle i.e GPR, Sprint Planning, Iterative Sprint Development, G2G Integration and Release.

### 6.2.1 Government Process Re-Engineering:

The traditional Government procedure to provide citizen services is very complex and it is a necessity to re-engineer the process so as to simplify it for easy transformation from Government to e-Government. Minimize the process by eliminating unnecessary formalities, which depends on how much transformation the government can tolerate. GPR should have two boundaries, one end that is limited by departmental law, rules, circulars etc and other that is the cyber law, which must not cross at any circumstances. After making a GPR plan it should be sent for approval by the authority. GPR report should be clearly mentioned the mandatory reengineering process required for implementing the project and those requirements, which are optional to increase the quality of service. A report should be generated clearly mentioning the services name along with various file process with delay in time as shown in Table 6.2.

#### Table 6.2: Report showing Birth/Death Certificate Service before and after GPR

<table>
<thead>
<tr>
<th>Service</th>
<th>Process1</th>
<th>Process2</th>
<th>Process3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth/Death Certificate before GPR</td>
<td>1Day</td>
<td>3Days</td>
<td>1Day</td>
<td>5Days</td>
</tr>
<tr>
<td>Birth/Death Certificate after GPR</td>
<td>1Day</td>
<td>X</td>
<td>X</td>
<td>1Day</td>
</tr>
</tbody>
</table>
The modified and approved version of the GPR report should be communicated to the respective department for their feedback along with information regarding infrastructure. Also data collection format may be redesigned accordingly. After which design phase can be started successfully.

In this model, each Government processes can be broken in to three phase i.e Application, Verification, Approve/Issuanace. The procedure of every G2C services like applying for Passport, Birth/Death Certificate, Marriage Registration, and Arm License etc can also be broken in to three phase and a common frame work can be evolved. Further simplifying each of the process create a single in and single out architecture.

6.2.2 Sprint Planning: Sprint is a set of development activities conducted over a pre-defined period, usually one to four weeks. In simple words a project is combination of many modules and a module is combination of many sprints. In this sub process the user requirements are prioritized and broken in such manner to be completed within 1 to 4 weeks of time span in term of sprint. Sprint speed and intensity are driven by the selected duration of the sprint.
6.2.3 Iterative Sprint Development with consideration of Critical factors:

**Structured Development Process**
- Scrum Framework
- Unit & Integration Testing
- Coding Standard
- Documentation
- Security
- Formal Code Review
- Project Estimation & Planning Poker

**Human Resource Management**
- Team Composition
- Collaboration
- Employee Training
- Lack of Accountability
- Trust & Confidence
- Multiple Responsibilities

**Environmental Factor**
- Customer Involvement
- Working Environment
- Interdependency among Modules
- Social Loading
- Common Tools & Problems

**Information Systems & Information Technology**
- Communication System
- Information & Knowledge Sharing System
- Bug Tracking System
- Management Tools
- Version Control Systems

**Figure 6.4: Developing e-Governance**

The figure-6.4 shows the structure of the module with four critical factors which should be taken care of during development of e-Governance applications.

**6.2.3.1 Human Resource Management Factor**: Reflect the importance of the team composition, collaboration, training, accountability, trust and confidence and multiple responsibilities. In terms of human resource management, the organization should consider what would be the optimal allocation of a limited number of developers. It was obvious that it took more development time and cost when new team members did not interact well with other members of the team [124] or if team members needed more learning and training to complete their tasks. The organization should foster collaboration between developers and QA people so that QA people can test changed code and other areas of code that might be affected by code changed. Assigning an appropriate and technical Scrum master is also
important for the success of the Scrum method. Sometimes team impediments were not taken care of and often needed to be repeated, slowing or even stopping the progress of the Sprint. Scrum masters should elevate trust and confidence levels among developers and between developers and themselves.

Scrum masters also need to have authority to urge developers to work faster or harder. It may not be a good idea to have developers run the team without having a team leader [49] to make right decisions in a timely manner when team members do not know which way to take among several alternatives. New employee training should not be treated lightly. The organization should provide step-by-step formal training with the organization’s systems and software development method to new employees. If developers need to do other projects asked by other departments or project managers have multiple responsibilities, they cannot focus on current project tasks and Scrum won’t work. In conclusion, human resource management issues can directly affect the performance of Scrum teams.

6.2.3.2 Structured Development Process Factor: Reflect the importance of the Scrum framework, unit and integration testing, coding standards, documentation, formal code review, project estimation and Planning Poker, and use cases. In terms of a structured development process, all Scrum frameworks, including Scrum ceremonies and Scrum artifacts, should work together smoothly. The organization should also carefully examine the role of a QA person on each Scrum team or on a QA-only Scrum team. QA people can conduct unit and integration testing, and relieve the burden of developers testing their own code. Having a formal code review and coding standards are critical, but organizations should not put too much weight on developer shoulder. The organization should identify how much documentation is appropriate for each project based on the context of the development environment. The amount and utilization of use cases should also be
determined on the same context. Project estimation using Panning Poker can be easily implemented, but the results will be outstanding.

6.2.3.3 Environmental Factor: Reflecting the importance of customer involvement, working environment, interdependency among modules, social loafing, and common tools and problems. In Scrum, the autonomous nature of Scrum team allows developers to have more control over how and when the development is completed, depending on the consensus of the team, and to have more ownership of the projects they are working on. Therefore, it is tempting to state that an autonomous Scrum team has better control and efficient product management. However, often the developers are not able to fully consider all the dependencies and interconnections among modules, resulting in inconsistent product outputs across team members within the same Scrum team. Further, due to limited communication between different Scrum teams, it is difficult to keep the overall product output consistent across teams. The lack of communication results in them solving common problems, each in their own style and way, though the same solution can be applied to common problems across teams. The inconsistency and duplication across teams negatively affects efficient product management. Regarding the large number of customers scattered in broad areas, a better model should be developed for collecting user requirements and feedback. The research noted that while sharing cubicles with a co-worker improves the opportunity to communicate among team members, it is possible for developers to be constantly distracted by cubicle partners often having conversations with other coworkers. If the organization provides a way to accurately measure the individual’s performance, a social loafing issue within a team might be diminished.

6.2.3.4 Information Systems And Information Technology Factor: Reflect the importance of communication system, information and knowledge sharing system, bug tracking system and management tools, and version control systems.
These systems and tools are indispensable for the success of Scrum. The Scrum method envisions autonomous teams who are given a strong motivation to iteratively and continuously monitor the progress of their projects through interactions and discussions in the daily Scrum meeting and Sprint review meetings. Communication systems, bug tracking systems, and management tools are beneficial in the sense that they help developers visually see and remember what needs to be done on a daily and monthly basis.

6.2.3.5 Iterative Sprint Development: To minimize the communication gap between the different teams, this new SDLC Model suggests merging of manpower as shown in Figure 6.5 among different teams in different stages of software development life cycle.

![Human Resource Utilization](image)

**Figure 6.5: Human Resource Utilization**

So that at any stage of the software development life cycle, interaction will be available between the analysis, development and testing teams where as rest members of each team will work on other modules.
This part of the model as shown in Figure 6.6 is borrowed from the concept of Extreme Programming and SCRUM Methodology of Agile Process. As an empirical approach, the analysis, design and development process in this part of the model are unpredictable or uncontrolled. So, It requires external control to be put on each iteration to avoid chaos while maximizing flexibility. Opposed to defined approach where the requirement being constant, in this approach it has been assumed that, the user requirements are changeable as well as open for improvements. The Analysis, Design, Coding, and Testing are applicable to each sprint and any change in requirements may become as upcoming sprint in the series. This provide two major advantages i.e one is effective change management without huge cost overrun and the other is, project can be stopped when the major important features are done and running short of money. The money has not been invested on those features which don’t need to be in the requirement list any more due to policy change by Government.
Vulnerability in the e-Governance projects is becoming the media interest, so application security is another area, which needs the strong focus during the development stage. Normally this new SDLC model suggest some basic security policy to be taken care of so as to save the project from becoming the soft target of the hackers.

- **SQL Injection**: It is a technique that exploits security vulnerability occurring in the database layer of an application. Steps should be taken to avoid this.

- **Encryption**: Information should be encrypted before passing over the network and stored in the database.

- **Cross Site Scripting**: It is an attack technique that forces a web site to echo attacker-supplied executable code, which loads in a user's browser. Steps should be taken by the developers to recode dynamically generated pages in order to validate output.

- **CAPTCHA**: It is a program that can generate and grade tests that humans can pass but current computer programs cannot. It should be used in every online application form exposed to citizen.

- **Brute Force Password cracking**: software are available in the market which randomly chooses different words from dictionaries, important dates, name of the places, combining arbitrary characters and using those words to login into one’s account. So, the system should be locked for that day after getting limited number of wrong password in the login module.

- **SSL**: Secure socket layer must be used wherever it is required as it does the 128 bit encryption so unnecessary use may affect the performance
tremendously. So whenever the application deals with the vital and secure data exchange then SSL should be used.

6.2.4 G2G Integration:

G2C Services can’t be effective unless and until the backend government procedures are simplified, digitized as well as integrated.

G2G integration on architectural point of views many point to point but for large scale G2G Interoperability, it becomes very unmanaged and uncontrolled. So
in this model, for large scale G2G integration, an “Integrated Data Engine” has been conceptualized as shown in figure 6.7.

6.2.5 Release: The requirements and change can be done during the Iterative Sprint Development phase but when the variable of time, requirements. Cost and quality concur for a new release to occur then a release can be done. But as described in above section release should be on modular basis in linear manner targeting certain group of users. Release should be done from the Core Module targeting Departmental User to Citizen Module targeting end user i.e. citizen through Power Module. This Modular release approach provides the Departmental user a technology adoption timeframe to develop skill and infrastructure as well to be prepared to provided services to a large volume of request after release of Citizen Module. So the time frame between the Core Module Release & Citizen Module Release is termed as adoption Time.

6.3. Assessment Methodologies (Checking the Heart beat):

When we discuss about the assessment stage of any project, then the first concept comes to mind that to check the quantifying parameters to the measure the success of the project. But the question is, after the completion of all the stages and then getting the assessment report is how much worth as the money & man hours already been invested. The assessment can save the tax payer money only if it can be done from the very beginning of the development.

There are various assessment frameworks developed, especially with a focus to address e-Gov projects. These have been developed from different perspectives and mainly address the needs and objectives being important to the institutions undertaking the assessment study. An assessment exercise involves a tedious process, in terms of capacity, time, and resources; if the intention is to assess an e-
Gov project thoroughly. e-Gov projects involve a number of stakeholders, whose expectations from the project needs to be addressed.

There are three kinds of situations that require evaluation in e-Gov. One is the environment; second is evaluating the performance of an e-Gov programme or project; and third is the overall impact of e-Gov on general government functioning, economic development and citizen servicing.

While looking at the challenges and issues, we need to be clear as to what is being assessed and toward what end. One of the prime objectives of assessment is to identify the success and failure factors of the project, for its various stakeholders. At this stage we list potential key stakeholders and consider different dimensions of their perspectives and indicators for assessing the success factor of an e-Gov project.

1. Service users (i.e. the end customers) point of view: Cost of availing the Govt. service; Time for delivery of service; Convenience of availing the service; Compliance of RTI (Right to Information) Act; Transparency in Govt. functioning

2. Government point of view: ROI (Return on Investment); Immediate impact on service users; Internal efficiency – process reforms; Impact on internal employees; Sustainability and long term overall impact

3. Funding Agency point of view: ROI and business model; Immediate impact on service users

4. Public Private Partner point of view: ROI and business model; Compliance to Service Levels; Enhancement of service and Reach
5. Others stakeholders point of view: At National Government level from replication perspective; Academics (arriving at what is optimal assessment)

6.3.1 Issues And Challenges
Classification of the various expectations and views of assessment increases the challenge in targeting a holistic and comprehensive assessment. An interesting issue to look at would be to selectively choose some of the views/dimensions and focus exclusively on them while assessing projects, and achieve the desired objectives of assessment.

6.3.2 Performing Assessment
Presently it is being stressed that an external agency should do the assessment in order to get an unbiased view. This agency is primarily dependent on the project owners for all the project related information. The issue is, why not develop a self assessment framework? In fact, by providing a self-assessment tool the project owners shall be in a better position to assess the projects on an on-going basis. Moreover they have the assessment indicators and attributes as yardstick for assessing the projects right from the project conceptualization phase; thereby developing efficient and holistic e-Gov projects.

6.3.3 Constraints Driving Project Assessment

6.3.3.1 Adequate Time for Assessment: In order to get a really good and useful assessment of the project, sufficient time not being devoted for the assessment exercise is a challenge to be addressed. It is important to understand that a lot of data and information needs to be collected or provided for an assessment. However, in reality adequate seriousness is not given to this exercise by the top policy level officials; and junior officials are given the responsibility to coordinate the assessment
exercise. In absence of quality data and information about the project, the assessment does not provide the correct view of project and thereby the whole assessment exercise merely becomes another routine chore.

6.3.3.2 Lack of a comprehensive assessment framework: One can look at various assessment models being adopted for the eGov projects, which are developed on basis of the objectives set for that specific assessment. Different assessment institutions identify indicators on different dimensions of the project and its stakeholders. Thus, one assessment study report would not give a complete understanding of the project. There is a need to develop an assessment maturity model, maybe based on the Gartner eGov maturity model, and identify only the basic level indicators.

6.3.3.3 Non-availability of base-line data: It is extremely important to have the data on the functioning of the services prior to implementing the new system, in order to see the improvements over previous systems. The base line data is basically the as-is processes studied at the project conceptualization phase. In most of the projects, it has been seen that the base-line data was not captured; hence it is taken as a perception of the stakeholder, thereby giving an in-correct assessment of the impact made by the project.

6.3.3.4 Lack of high visibility for assessment reports
It has been seen that most of the time the assessments are done as part of some mandatory requirement of the project and once the said task requirement is completed, the report is shelved and forgotten. In case there is high transparency and visibility given to the assessment report, it will provide sufficient learning for the project owners.
6.3.3.5 Funds required for holistic assessment
As we have seen earlier that a holistic and comprehensive assessment should require varied degree of expertise. This would also involve quite a lot of time resources for the surveys, travel, interviewing, study of secondary data, and analysis. Normally, an in-depth and holistic assessment study would require quite a lot of funding, which is normally unavailable.

6.3.3.6 Other Challenges

- Often evaluation studies had been done by agencies that may be seen as having an interest in showing a positive outcome.

- Different studies of the same project showed very different outcomes, thus indicating a lack of credibility of the results.

- Part of the reason for different outcomes was the use of very small samples and lack of rigor in sampling in collecting data from clients of the systems. The results could therefore not be easily generated over the entire population of clients.

- The studies evaluated the functioning of the computerized system but were not able to assess the difference made by ICT use, as the need for counterfactuals was ignored.

- Finally, since different studies did not use a standard methodology,

6.3.4 e-Governance Project Assessment Framework Model
There are various assessment frameworks developed, especially with a focus to address e-Gov projects[133][134][135]. These have been developed from different
perspectives and mainly address the needs and objectives being important to the institutions undertaking the assessment study. An assessment exercise involves a tedious process, in terms of capacity, time, and resources; if the intention is to assess an e-Gov project thoroughly. e-Gov projects involve a number of stakeholders, whose expectations from the project needs to be addressed.

There are three kinds of situations that require evaluation in e-Gov.

1. Environment;
2. Evaluating the performance of an e-Gov programme or project
3. Overall impact of e-Gov on general government functioning, economic development and citizen servicing [125].

A cyclic assessment framework model shown in figure 6.8 has been recommended, which encompasses the need leading to improvements in the e-Governance Project.
The key components of the model are briefly elaborated below:

6.3.4.1 **Stakeholders**: An e-Gov project is meant to deliver benefits to its various stakeholders. There would be the internal and external, direct and indirect stakeholders. A stakeholder would be an individual or an organization that is impacted or associated with the said e-Gov project. In such case it becomes important to conduct a stakeholder consultation in the beginning while conceptualizing the project, in order to understand their needs/services from the Government. Similarly, the needs out of the project for the internal stakeholders are also consulted in the beginning.

6.3.4.2 **Expectations**: All projects are intended to meet the needs of its stakeholders; therefore, it becomes imperative to assess the project to meet their expectations. The new assessment framework model lays emphasis on listing the expectation indicators, which are measurable from the various stakeholders’ perspective. The expectations might differ even for similar category of project (e.g. G2C Rural or Urban, G2B), depending on the country and its geographical area of implementation.

6.3.4.3 **Project Benefits**: The expectations are taken into consideration for conceptualization of the service requirement and accordingly built into the e-Gov Project development to deliver the Benefits to its stakeholders. The benefits are the front end component of the project which are visible to the stakeholders, and could be in terms of impact, or return on investment.

6.3.4.4 **Results**: The project in terms of the benefits delivered to the stakeholders can be measured by specific Result indicators.
• The dotted lines in the model indicate the variation of expected results, depending on the category of project, country and its geographical area of implementation.

• The model emphasizes on assessing the result indicators, which will be required to be listed and prioritized based on its importance in the project. However, it is also important to understand that all the result indicators cannot be assessed while doing a specific focused assessment study on the project. This is so, as each indicator could require a different approach and methodology for measurement. The point of concern is to identify the result indicators which are specific to the study owner perspective, and which can be completed keeping into consideration the set of constraints.

6.3.4.5 Enablers: The results are driven by Enablers at the back-end, which would indirectly be responsible for delivering the said outputs.

• The enablers push the project to deliver results, which pass onto the stakeholders.
• The enablers would not yield direct results. e.g. conducting a training course is an important enabler however, the result also depends on the environmental setup he/she is working in.
• The dotted lines in the model indicate the variation of enablers driving the results, depending on the category of project, country and its geographical area of implementation.
• There could be two approaches for identifying the enablers. One could be a set of enablers which are linked to each of the result indicator. The second approach would be to list the broad set of enablers which drive the project for delivering the results. These in turn are further divided into sub-attributes which are then measured on a particular scale.
• The new model illustrates the second approach and lists the key set of enabler indicators, which would further be measured through specific sub-attributes.

6.3.4.5 Feedback: The model further stresses on the Feedback mechanism as part of the outcome of the assessment. This should be supplemented by creating an awareness and communication strategy for all its stakeholders.

6.3.4.6 Improvement Drivers: It is crucial that the learning’s should flow back for project Improvements, and strengthen the week components. The assessment and feedback act as the important drivers for improving the existing project and build capacity for better conceptualization of new e-Gov projects.

The basic Result-Enabler model for one of our eGov project assessment i.e., Urban Module has been done in which the following broad set of generic indicators are identified:

• Selected Result indicators include: Key performance; Convenience to service users; Internal efficiency (to Government); Innovation and Replicability
• Selected Enabler indicators include: Strategy and Policy; Technology; Partnership & Resources; People; Process; Leadership

Each of these indicators was further drilled down to arrive at a set of 3 to 5 attributes for the assessment. The set of indicators were identified keeping the time constraints and objectives. Subsequently, we identified five experts in e-Governance domain and asked each one to give weights to the indicators and attributes. This was evaluated using AHP (Analytic Hierarchy Process) defined by Dr Thomas Saaty [126]. AHP is an advanced method for supporting decision makers in structuring decisions, quantifying intangible factors, and evaluating choices in a comprehensive and rational framework. The AHP provides a structured framework for setting priorities on each level of the hierarchy using relative comparisons, a process of comparing each pair of decision factors at a given level of the model for their
relative importance with respect to their parent. After application of the AHP model the final set of weight ages were arrived for the indicators and attributes. This Result-Enabler framework was used for assessment of the projects and sent to the project owners in advance so that they could do a self assessment under the identified indicators and attributes, prior to the assessment teams. However, at this point it can be shared that the feedback of the approach was appreciated by both the assessment teams and the project owners, since the model gave them a focused assessment of the project.

e-Gov projects at present are being assessed from varied dimensions, mainly from the point of view of the owner of the study. It is quite challenging to undertake an assessment study in a holistic manner which could address the expectations of all the project stakeholders. Therefore, there is a need to develop a broad assessment framework model which could give a direction to the assessment and learning’s which can go back into the project. At the same time it is very important to develop self-assessment models, which could be used at the conceptualization level itself, of the project.

6.4 Consumption (Gateway to Success)

It has been analyzed Non-Consumption leads to failure of the project. Study on the bunch of totally or partially failed e-Governance Application provides a perspective that, Non-Consumption or underutilization of the project leads to failure of the system. Consumption always does not mean to be started after the rolling out of the entire project. In our model the first phase of consumption starts after release of Core module. Consuming services are basically can be experimental before the release for assessment & implemental after release of the module. Implemental consumption can also be Internal (Consumed by the Departmental User) and External (Intra Departmental User or Citizen).
## 6.5 Comparison Chart:

Table 6.3 shows the comparison Chart of the existing SDLC Models with the New SDLC Model.

### Table 6.3: Comparison Chart

<table>
<thead>
<tr>
<th>Existing Model</th>
<th>New SDLC Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Project is divided into module on the basis of function. Ex: Application, Verification, Issuance, Reports etc.</td>
<td>• Project is divided into module on the basis of users. Ex: Core Module (Departmental User), Power Module (Administrative User) and Citizen Module (Citizens)</td>
</tr>
<tr>
<td>• Module is divided in sub Module on the basis of functionality again. Example: Application Module: Online Application, Apply at counter, Apply through Mobile, Web service interface to Application etc.</td>
<td>• Module is divided into Smallest Units called Sprint on the basis on function again. Example: Core Module: Apply at counter (Sprint1), Departmental Report generation (Sprint1), Document verification (Sprint1) and all related task related to departmental user.</td>
</tr>
<tr>
<td>• If Application process/policy changes then the entire Application module which includes Online Application, Apply at counter, Apply through Mobile, Web service interface to Application sub modules also need to be changed.</td>
<td>• If Application process/policy changes then only one sprint of a particular module need to be changed.</td>
</tr>
<tr>
<td>• Application Module can not be released with out the Verification and Issuance modules. Hence affecting the concept of modular release.</td>
<td>• Modular Release of the Core Module, Power Module &amp; Citizen Module enable different categories of users to use the module with out waiting for the release of the next module.</td>
</tr>
<tr>
<td>• There is no adaptation time for the user at Government to adopt the technology and the balance between the supply (Department) and demand (Citizen requests through Online request) damages.</td>
<td>• Time gap between the Core Module and the Citizen module can be treated as Technology Adaptation time for the user at Government to cope up with the new tools. It empowers the balance between the supply (Department) and demand (Citizen requests through Online request).</td>
</tr>
</tbody>
</table>
Figure 6.9 shows the comparison graph by taking various parameters with the existing SDLC Models with the New SDLC Model.

![Comparison Chart](image)

Figure 6.9: Existing SDLC Models with the New Model taking various parameters

### 6.6 Case Study of ULB e-Gov Applications using this New SDLC Model

Using this New SDLC Model, a state level project as shown in figure 6.10 had been undertaken by National Informatics Centre, a Govt. of India Organisation and successfully completed the pilot implementation with integration to many other vendors on PPP mode within the estimated time frame. This success enables NIC in getting the award of “Nagarbandhu Award”[138] and “Pragati Sathi” (Partners of Progress) [137] from the Chief Minister of Orissa, India for one of its prestigious customer in ULB Sector, Bhubaneswar Municipal Corporation (BMC), Orissa, India along with letter of Appreciations from other ULBs. Initially the Scopes have been identified in the below mentioned primary area which has been innovated with the help of cutting edge technology.
These are:

- Grievance Monitoring
- Birth & Death Registration
- Kalyan Mandap Reservation
- Establishment Section
- Holding/Property Tax
- Issuances of License
- Marriage Registration
- Yatri Nivas Reservation
- Old Age Pension
- Vending Zone etc.

Figure 6.10: e-Municipality Project developed using our Model
Approximation Cost has been estimated by comparing the project with other similar type of e-Governance project already implemented in different ULBs (Urban Local Bodies) along with some vital parameters affecting the cost and given the project proposal to the department with an approximate investment required. After getting the green signal from the government or the respective department Requirement Analysis started. In this phase the current manual procedure along with the ideal procedure according to the law are recorded. The input, output parameters and users are identified. To simplify the complex and unnecessary file movement procedures within the department and between the departments, Government Process Reengineering is applied taking care of the jurisdiction of departmental law and Cyber Law (IT Act). After getting the Approved Business Process Reengineering report from the government, it has been forwarded to the dealing person of corresponding departments for their feedback on this report along with asking for the detailed information about the hardware available with them and status of annual maintenance contract. During Design and Development phase special care has been taken to make well balance architecture for legacy system, future extensibility as well as integration by the use of SOA. Format of data structure should match the format previously entered data so that data conversion from old system to newer one will become easier. It enables the department to save money by converting the present data to the newer system rather reentering the same. As in the latter case many different vendors came to picture on PPP mode to access these services through their facilitation centre and provide G2C services to the citizen, the SOA [136] provided the vendor a framework to plug in to these services. Under the “One Day Governance” Service integration s/w developed by SRIT Ltd, under “e-Seva” project Service integration s/w developed by Orissa Online Portal and UNDP sponsored projects developed through different platform successfully integrated with the central system developed by NIC through the Service Oriented Architecture. As the many private vendors get accessibility to the
business logic so the application security was also under the strong focus developer team to avoid being hacker’s soft target.

At the time of implementation the project being started on pilot basis, a computer literate person from the customer side became the project coordinator for smooth implementation of the project in the departments. Currently Services are being delivered to citizen through various facilitation centers through PPP mode along with departmental counters

**Presentation (Online Presence)**

**Informational:**
Putting up a static website for the organisation which provides government information for public use. This website keeps information about all the rules, regulations, procedures, etc. Some statutory downloadable forms are there in the web site  *(For BMC - [http://bmc.gov.in](http://bmc.gov.in))*

**Interacting:**
Developed two way communications through e-mail id for all officers. Phone numbers provide for all officers, Feed Back Forms given in the web site. *(For BMC - [http://bmc.gov.in](http://bmc.gov.in))*

**Dynamic:**
Developed online grievance monitoring system along with front office management system for creating a new generation citizen relationship management and creates a platform for efficient Government. *(For BMC - [http://bmc.gov.in](http://bmc.gov.in))*
Model - (e-Governance Development)

Core Module

Counter
- Entry of LBR Form
- Entry of Certificate Request Form
- Search for Birth/Death Registration
- Search for fees to be paid
- Printing of Birth/Death Certificates
- Generation of daily registration report
- Generation of daily fees received
- Generation of monthly reports
- Generation of various statistical reports

City Health Officer
- Search for Birth/Death Registration
- Search for fees to be paid
- Verify Birth/Death Certificates

Enquiry
- Rules for applying Birth / Death Registration
- Rules for applying Birth / Death Certificate
- Search for Birth/Death Registration
- Search for fees to be paid
**Power Module**
- Administrator (from department side)
  - Entry / Edit Hospital List
  - Entry / Edit Nursing Home List
  - Entry / Edit Fees to be paid
  - Entry / Edit Users
  - Entry / Edit Roles

**Administrator (from developer side)**
- Development of New Modules
- Edit of Modules etc.

**Citizen Module**

**Hospital / Nursing home / CSC Centres**
- Submit LBR Form online
- Edit LBR form online
- Generation of daily/monthly/yearly reports
- Various Queries

**Online Apply / Payment**
- Submit LBR Form online
- Search for Birth/Death Registration
- Search for fees to be paid
- Verify Birth/Death Certificates
Table 6.4: Product Backlog (Kalyan Mandap Reservation)

<table>
<thead>
<tr>
<th>Backlog item</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allow to make a reservation</td>
<td>5</td>
</tr>
<tr>
<td>Cancel a reservation.</td>
<td>5</td>
</tr>
<tr>
<td>Change the dates of a reservation.</td>
<td>3</td>
</tr>
<tr>
<td>Revenue-Per-Kalyan Mandap Reports</td>
<td>4</td>
</tr>
<tr>
<td>Improve exception handling</td>
<td>3</td>
</tr>
<tr>
<td>...</td>
<td>20</td>
</tr>
<tr>
<td>...</td>
<td>40</td>
</tr>
</tbody>
</table>

G2G Integration using Web Services

URL - http://as.ori.nic.in/ulbwebservice/bmcbirth.asmx

Web Service Components

reghomebirth(ByVal dob As String, ByVal sex As String, ByVal childname As String, ByVal fname As String, ByVal mname As String, ByVal address As String, ByVal birthplace As String, ByVal birthorder As Integer, ByVal informants As String, ByVal infaddress As String, ByVal tvname As String, ByVal distname As Integer, ByVal sname As Integer, ByVal religion As Integer, ByVal fliteracy As Integer, ByVal mliteracy As Integer, ByVal focc As Integer, ByVal mocc As Integer, ByVal mage As Integer, ByVal ageatbirth As Integer, ByVal noofchild As Integer, ByVal attention As Integer, ByVal mdelivery As Integer, ByVal birthwt As Integer, ByVal durofpregn As Integer, ByVal townvil As String, ByVal documents As String, ByVal ch As String, ByVal chdt As String, ByVal chpl As String, ByVal vleid As String, ByVal vlename As String, ByVal vleip As String) As String

-- Returns Application No. If No Error else Returns “INVALID”
dist(ByVal scode As String) As DataSet
This will return a dataset which contains
  dcode :: District Code
  dist :: Name of the District

state() As DataSet
This will return a dataset which contains
  scode :: State Code
  state :: State Name

religion() As DataSet
This will return a dataset which contains
  rcode :: Religion Code
  religion :: Name of the Religion

qualification() As DataSet
This will return a dataset which contains
  qcode :: Qualification Code
  qual :: Qualification

occupation() As DataSet
This will return a dataset which contains
  ocode :: Occupation Code
  occupation :: Occupation

attention() As DataSet
This will return a dataset which contains
  acode :: Attention Code
  attention :: Attention
Delivery() As DataSet
This will return a dataset which contains
   mdelivery :: Attention Code
   mdel :: Attention

hospital() As DataSet
This will return a dataset which contains
   mtext :: Hospital Name

nursing() As DataSet
This will return a dataset which contains
   ntext :: Nursing Home Name

hnbrstatus(ByVal rno As String)
** rno :: Registration No.

-- This will return a dataset of registration details

rnosearch(ByVal dob As String, ByVal infname As String, ByVal inf As String) As DataSet
** dob :: Date of Birth of the child.
** infname :: Name of the informants(Hospital/Nursing Home).
** inf :: For Nursing home (N)/ Hospital (M) / Home (H)

Returns Dataset containing all details of the birth along with the Status.

reqhnbcert(ByVal rno As String, ByVal childname As String, ByVal apnm As String, ByVal aprel As String, ByVal apadr As String, ByVal pur As String, ByVal documents As String, ByVal ch As String, ByVal chdt As String, ByVal chpl As
String, ByVal vleid As String, ByVal vlename As String, ByVal vleip As String) As String--Returns “BCRR” for Birth Certificate Request Registered else “BCAI” for Birth Certificate Already Issued and “IRN” for Incorrect Regn Number -

- reqaddlbcert(ByVal rno As String, ByVal apnm As String, ByVal aprel As String, ByVal apadr As String, ByVal pur As String, ByVal ch As String, ByVal chdt As String, ByVal chpl As String, ByVal vleid As String, ByVal vlename As String, ByVal vleip As String) As String--Returns “FBCNI” for First Birth Certificate Not Issued else “ABCRR” for Additional Birth Certificate Request Registered and “IRN” for Incorrect Registration Number

Public Function fbcertfees(ByVal rno As String) As String
  ** RegNo :: Registration No
  Returns
  “IRN” for Incorrect Registration Number
  “FBCAI” for First Birth Certificate Already Issued,
  Amount to be Paid for Birth Certificate Request Registered

bregnfees(ByVal dob As String) As String
  ** dob :: Date of Birth
  -- Returns Amount to be paid if success else return “INVALID” --

6.3 Conclusion
This chapter presented above discussed in detail the new SDLC Model developed by us specially for e-Governance applications. Also a case study has been taken which is the first e-Governance project developed & implemented using this new SDLC Model.