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Quality Assurance Framework

For eGovernance Applications

Government of India

Department of Information Technology

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Executive Summary

In recent years, governments across the world have been investing considerable resources in applying ICT tools to transform the way in which public services to citizens and enterprises are delivered. This wave has been popularly known as eGovernance.

While transformational in nature, eGovernance projects tend to be complex and costly. Variations in capacity and knowledge within government make these projects highly risky and prone to poor implementation outcomes. Poorly implemented or failed eGovernance initiatives subsequently make it more difficult in future to justify financing for such systems and hamper stakeholder 'buy-in'.

These errors, vulnerabilities and risk therefore need to be managed over the project lifecycle within acceptable parameters. This can be done by putting into place quality assurance mechanisms at relevant stages of a typical eGovernance project lifecycle.

Moreover, the Government of India has initiated implementation of the National eGovernance Plan (NeGP) where all eGovernance projects in the country are expected to comply with values and objectives defined in its vision[1]. To translate these values into operational terms, there is a need of a methodology to ensure that eGovernance systems adequately reflect user-centric quality characteristics.

This document outlines a standardised Quality Assurance Framework (QAF) for use by senior administrators, project management personnel, external consultants and vendors involved in eGovernance implementation. The QAF should be read with the Conformity Assessment Requirement (CARE) document and the User Satisfaction document. All three documents together constitute the complete QAF.

The QAF is not meant to be prescriptive – instead, it indicates the general operational principles and technical aspects that a quality assurance exercise should incorporate when customised to the requirements of a specific eGovernance project. The QAF is linked to the project lifecycle and integrates quality assurance requirements for all the necessary phases that a project goes through.

The three principal objectives of the QAF are:

- Ensuring system **requirements** in terms of product processes & services are defined (Definition).
- Ensuring the system **conforms** to requirements (Verification)
- Ensuring **user satisfaction** with the system, once it goes 'live', (Validation)

[1] The vision of the National EGovernance Plan has been defined as: "Make all Government services accessible to the common man in his locality, through common service delivery outlets and ensure efficiency, transparency & reliability of such services at affordable costs to realize the basic needs of the common man."

The three objectives of quality assurance in an eGovernance project lifecycle can be achieved through the identification and application of **Quality Gates (QG)** at various phases of the project.

Each QG consists of a set of quality baselines relevant to that project phase and is aligned with relevant IS/ ISO standards. QGs can be further divided into two categories: essential and desirable with each project mandatorily required to clear the essential QG regardless of scope or duration.

The essential QGs relate to four key areas:

- Quality Processes in the Organisation (Gate 1)
- Software Quality (Gate 2)
- Information Security (Gate 3)
- IT Service Quality (Gate 4)

Desirable QGs relate to such aspects as project documentation, use of recognised standards and architectures, risk management, business continuity planning etc. Desirable QGs can be incorporated into project planning based on complexity, risk and resource availability.

The purpose of the e-governance Quality Assurance Framework is to provide assurance that work products (solutions) and Processes comply with predefined provisions and plans. As a result of successful implementation of this Framework the following will be the expected outputs

i) A strategy for conducting quality assurance is developed (through RFP);
ii) Evidence of quality assurance is produced and maintained;
iii) Problems and/or non-conformance with requirements are identified and recorded;
iv) Adherence of products, processes and activities to the applicable standards, procedures and Requirements are verified and
v) User satisfaction is measured.

These are achieved by performing the following activities:

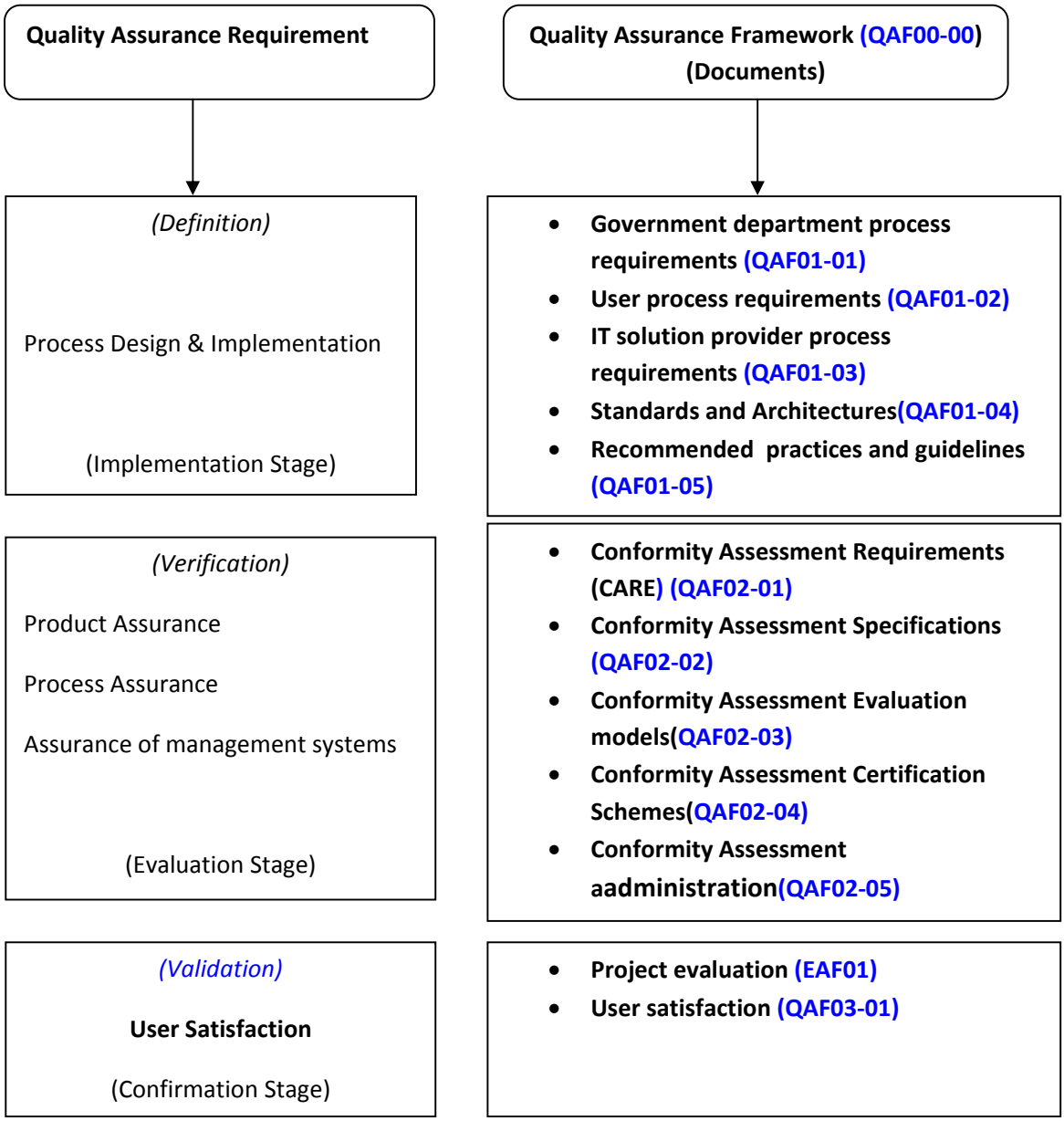
i) Process Design & Implementation (Processes for government,project,vendor & user)
ii) Product Assurance (Software Application, Hardware & networking components), Process Assurance (Risk management, Asset management, Disaster Recovery …) and Assurance of management systems (ISMS, ITSM, QMS….) and
iii) Measurement of user satisfaction

This document is structured in the following manner. The User Guide following this section maps this document, the QAF Concept Document (QAF00-00), to the subsequent documents that provide details on various components and aspects of the framework. Chapter 1 provides the rationale for establishing quality assurance framework in eGovernance. Chapter 2 outlines a typical eGovernance architecture and project lifecycle and links it to quality assurance framework. Finally, chapter 3 outlines a methodology to apply the QAF to a live project.

Structure & User Guide for Navigation

0.0 Structure & Scope

The Quality assurance framework (QAF) for e-governance is designed to address the requirements of quality assurance namely Definitions, verification & Validation. It is modular in nature to facilitate easy navigation & readability to the user. The structure for Navigation is as follows:



Navigation Guide for User

The Quality Assurance Framework (QAF) consists of a number of components which are covered in different volumes of related documents. The map above provides a guide to the reader to the contents of all the documents related to the QAF.

This QAF Concept Document (QAF00-00) outlines the QAF, its rationale, approach and its relevance to the project lifecycle and consequently on a typical architecture of an eGovernance system. It also outlines the primary components of quality assurance in eGovernance projects: process requirements from relevant stakeholder agencies, conformity assessment and user satisfaction.

0.1 Target Audience:

The complete set of documents should ideally be read together. The QAF is targeted at policy makers, administrators, implementing agencies, project managers, private sector contractors and consultants. However, in view of constraints of time initially the reader can focus on certain volumes first as follows:

Policy Makers and administrators should read the Concept Document (QAF00-00) and the CARE Document (QAF0201) for a conceptual view of the framework as well as to know which phases of a project should have the appropriate quality assurance mechanisms in place. These two documents are also appropriate for the general reader who wishes to be familiar with the broad framework without wishing to go into technical details of every component.

Project Managers, contractors and consultants should read the CARE Document in detail and then focus on project process document (QAF0101-01) depending on the stage of project implementation.

The QAF will help in developing and maintaining sound relationship between private and public partners in case of Public-Private-Partnerships (PPP). It is also expected to facilitate greater clarity and granularity in RFP and contract conditions as QAF provisions are based on internationally recognised standards. Project team leaders and board members can use its provisions to generate confidence in project implementation.

0.2 Purpose of Quality Assurance Framework Documents

0.2.1 Govt. organisation – Process Requirements (QAF0101)

Govt. organization should be responsible for acquisition of IT solution integrated with administrative and Governance processes. The acquired IT solution should deliver services to citizens, businesses or other users. To achieve this Govt. organization should provide resources and infrastructure necessary to support projects. This requires enabling processes such as project management, infrastructure management, HR management & Quality management to ensure the fulfillment of Govt. organizations Vision, Mission and objectives.

The Govt. organizations perform the following processes to achieve the above objectives.

- Govt. organization Environment Management Process
- Investment Management Process
- Information Security Management Processes
- Resource Management Process

- Quality Management Process
- Content Management Process
- Workflow Management Process (e-Manual)
- eService Execution Process
- eService Standard identification Process (SLA)

QAF 0101 defines the purpose, activities and expected outcome from these processes. The target audiences of this document are Sr. administrators responsible for policy making & reviewing the implementation of e-governance project.

This document is supported by two documents, Project Process Requirements (QAF 0101-01) & Legal requirements (QAF 0101-02).

0.2.1.1 Project Process Requirements (QAF 0101-01)

To implement eGovernance Govt. organization need to establish a Unit for management of Project (Generally known as Project Management Unit). PMU is responsible to execute Project Processes to establish and evolve project plans, to assess actual achievement and progress against the plans. To identify, control and mitigate risks and to control execution of the project. It consists of the following processes:

- Project Planning Process
- Project Assessment Process
- Project Control Process
- Decision-making Process
- Risk Management Process
- Configuration Management Process
- Information Management Process.

Target readers for this document are the project managers.

0.2.1.2 Legal requirements (QAF 0101-02)

QAF0101-02 summarize various legislations applicable, primarily the IT Act 2000 (Amendment 2008) and the other acts for delivery of the Govt. Services through Websites like consumer protective out, disability act, right to information act etc. The target audience is project manager and concerned responsible from the concerned ministry. This document provides a commentary on: Governance and IT Act 2000 (and Amendment 2008)

- eGovernance and Legal Recognition of Electronic Records
- eGovernance and Legal Recognition of Digital Signatures
- eGovernance and use of Electronic Records and Digital Signatures in Government and its Agencies
- eGovernance and Retention of Electronic Records
- eGovernance & Electronic Gazette
- eGovernance & Limited eGovernance Rights

- eGovernance & Dynamic eGovernance Law

Interpretation of applicable acts while delivering Services by Website/media.

- Indian Evidence Act 1872
- Right to Information Act 2005
- Prevention of Insults to National Honour Act, 1971 and subsequent Amendments in the year 2003 & 2005
- State Emblem of India (Prohibition of Improper Use) Act, 2005 34
- Raj Bhasha Act
- Copyright Act,1957
- Trade Mark Act 1999
- Consumer Protection Act,1986
- Persons with Disabilities (Equal Opportunities, Protection of Rights)
- Framing of Terms of Service Agreement
- Framing of Privacy policy

Target readers for this document are the project managers.

0.2.2 User Process Requirements (QAF0102)

The purpose of this document is to address users' related processes. This document provides recommendations to users to safeguard their interest with respect to security and privacy of personal information.

Target readers for this document are mainly users, & it is also useful for programme managers & project managers of the e-governance projects.

0.2.3 IT Solution Provider Process Requirement (QAF0103)

This document highlights the processes which the implementing agency should follow. The implementing agency may be a consortium of different expert groups like application developers, Internet service providers (ISPs), Data centres Service Providers, Computer & networking components vendors, TPA's (for SDC and SWAN) etc…The processes & practices to be followed by all these are covered in this document.

Target readers for this document are the RFP Writers, Conformity assessment bodies & the solution providers/vendors

0.2.4 Standards & Architectures (QAF0104)

This document presents standards, processes, methods and products of state of the art IT development for eGovernance applications in concise form. The reader will get a view about the notified standard in terms of its purpose & objective (list only).Target reader of this document are RFP team members (writers) , consultants, and conformity assessment bodies.

The purpose of this document is to promote the notified standards & recommended practices to enhance interoperability, Security ,reduction of cost & risks.

Target readers for this document are the RFP Writers, Conformity assessment bodies & the solution providers/vendors.

0.2.5 Guidelines & Recommended Practices (QAF0105)

A set of recommended practices are being developed to make the system efficient & effective. This facilitates the Project Manager to estimate the requirements, extent of efforts required, knowledge areas required and the various process steps. These are prescriptive in nature & provide necessary information to understand the issues involved & possible ways to address those issues. At present following guidelines are provided.

1. State Data Centre(QAF 0105-01)
2. State Wide Area Network (QAF 0105-02)
3. Risk Management (QAF 0105-03)
4. Business Continuity Management (QAF 0105-04)
5. Disaster Recovery (QAF 0105-05)
6. Request For Proposal & Service Levels Agreements (QAF 0105-06)
7. Acquisition & Outsourcing (QAF 0105-07)

Target readers for these Guidelines & Recommended Practices are the solution providers /vendors

0.2.6 Conformity Assessment Requirements (CARE) (QAF0201)

The purpose of defining Conformity Assessment Requirements (CARE) is to encourage the employment of quality practices in e-Governance solutions beginning with the development of specifications right up to their deployment. It provides an indicator of the degree of compliance of the solution to the requirements as defined in the Request for Proposal (RFP)/contract documents by means of an objective evaluation of the solution. It recommends process for selecting quality gates and evaluating the solution for these quality gates.

The quality gates shall be selected based on risk analysis considering criticality, cost and schedule implication.

Target readers for these Conformity Assessment Requirements are the RFP Writers & the solution providers/vendors

0.2.7 Conformity Assessment Specification (QAF0202)

This document elaborates the CARE document In terms of introduction, purpose, objectives, scope, target audience, technical description & process, specification & specific requirements, applicable standards, minimum documents required & assurance mechanism. The specific details are targeted for those readers who are responsible for implementing quality practices on any component of e-gov architecture.

Target readers for this Conformity Assessment Specification are the technical experts, Evaluators (CAB) & the solution providers/vendors.

0.2.8 Conformity Assessment Evaluation models (QAF0203):

Quality evaluation model are prepared for those components where quality of the subject area needs to evaluated, standard exists but no formal certification scheme in place.

Evaluations are carried out on both the process & product artifacts. At present following models along with process & product artifacts compliance checklist is provided.

Models:

Software Product evaluation model (QAF0203-01)

Website Quality evaluation model (QAF0203-02)

Processes Artifacts - Compliance checklist

- Technical Standards and Architectures (QAF0203-03)
- Government Process Re -engineering (QAF0203-04)
- Acquisition and outsourcing(QAF0203-05)
- Documentation(QAF0203-06)
- Risk Management(QAF0203-07)
- Asset Management(QAF0203-08)
- Business Continuity Planning(QAF0203-09)
- Disaster Recovery Management(QAF0203-10)
- Request for proposal and Service Level Agreement(QAF0203-11)
- Digital Preservation & Information Archiving(QAF0203-12)

Product Artifacts -Compliance checklist

- Software Requirement Specification (QAF0203-13)

- Software Architecture Document (QAF0203-14)
- Software Design Document (QAF0203-15)
- User Manual (QAF0203-16)

Target readers for these models are the technical experts, Evaluators (CAB) & the solution providers/vendors.

0.2.9 Certification Schemes QAF0204)

Certification Schemes are designed are designed around those subject area & standards where normative document on "requirements" exist & certification schemes are in operation by various accredited certification bodies traceable to international accreditation forum. At present following certification schemes are in operation.

1. Information Security Management system(QAF 0204-01)
2. Information Technology Service Management (QAF 0204-02)
3. Software Product Evaluation & Certification (QAF 0204-03)
4. Quality Management System in Service organisation(QAF 0204-04)
5. Website Certification Scheme (QAF 0204-05)
6. Smart Card certification Scheme (QAF 0204-06)

Target readers for these certification schemes are the certification bodies(CAB) & the solution providers/vendors.

0.2.10 Conformity Assessment - Administration (QAF0205)

To maintain a sound eco system between the solution providers & the government organization a degree of confidence is essential .Conformity assessment concept is built around "Confidence". In e-governance a large no. of conformity assessment bodies will be playing their role as inspection bodies, auditing bodies, test laboratories, reviewers & certification bodies. This document highlights about the administration of conformity assessment of e-governance programme.

Target readers for this document-administration are the Conformity Assessment Bodies (CAB)

0.2.11 User Satisfaction (QAF0301):

For validating the design, implementation & service delivery of e-governance system, it is required to get a feedback from users about their perception after consuming the government services rather than

government point of view how the services were delivered. User Satisfaction measurement model perceives four categories of users

i) Policy Makers ,administrators & funding agencies

ii) Co administrators

iii) Citizens & Businesses

iv) Employees

Target readers for this document are the Policy makers & administrators.

0.2.12: Project evaluation (EAF01)

Purpose: To create a rational framework for assessing e-Governance projects on various dimensions. So that there is evidence of appraisal being done before the sanction / grounding of a project or during the period of its execution, as to whether the project is proceeding on the right lines to achieve its original objectives. The purpose of Assessment Framework (EAF) is:

To provide guidelines for shaping future e-governance projects
To provide material for e-governance training programs
To enhance the trust and confidence of stakeholders by enabling creation of a Knowledge base of all e-Governance projects rated as per a trusted framework.

Target Audience for this documents are senior administrator of implementing organization and the funding agencies.

Chapter 1

1.0 Introduction to QAF

1.1 Context

With increasing globalization and integration of India's economy with the world, the need for efficiency and transparency in government services have changed radically. Citizen services today are expected to be quick, accessible and transparent in delivery. Information and Communication Technology (ICT) is now used as a tool by governments across the world to transform the way public services are delivered to citizens and businesses. The wave of ICT application to government service delivery is popularly termed as eGovernance.

While transformational in nature, eGovernance implementation is a complex and challenging reform process because of the diversity of personnel and agencies involved in government. Complexity of government ICT systems is often high, requiring seamless data flows and high degree of interoperability. Capacity and knowledge gaps within government mean that eGovernance projects tend to have poorly documented functional requirements, inadequately tested applications and loosely defined project management mechanisms.

Poor implementation of eGovernance projects in turn leads to public services that are prone to frequent disruptions and delays. A larger consequence of the failure of eGovernance projects is a build-up of resistance towards future projects, particularly if these involve investment of taxpayer money.

Against this backdrop, the Government of India has initiated massive investment of public resources towards the federal National eGovernance Plan (NEGP), first defined in the Tenth Five Year Plan. In addition, several states are independently implementing eGovernance projects customized to their local requirements and are acquiring high-end ICT systems to achieve these objectives. eGovernance projects in India are expected to comply with the values outlined in the NEGP mission statement which aims to deliver public services to the citizen in his or her locality and ensure that such services are efficient, transparent and reliable.

With such a magnitude of risk, public resources and stakeholder expectations involved, it becomes essential to achieve a high level of quality at all stages of the eGovernance project lifecycle. The Quality Assurance Framework (QAF) provides a formal methodology for administrators, project managers and consultants to set, monitor and achieve quality benchmarks throughout the project lifecycle. It also provides managers with an operational mechanism to ensure that eGovernance projects are oriented towards the values defined in the NEGP mission statement. The framework applies to management, organisational and technical aspects and focuses on three key principles:

- Correct processes of specifying requirements for the ICT system
- Conformance of the proposed ICT system to requirements
- Satisfaction of users availing the ICT enabled services

The QAF provides guidelines and good practices to achieve high quality eGovernance services and thereby achieve the vision of the NEGP. The QAF also provides a baseline for quality evaluation of eGovernance solutions and systems.

1.2 Rationale for Quality Assurance in eGovernance

Ensuring that eGovernance projects meet the principles outlined above requires that quality standards be defined and consistently met at all stages of a typical project lifecycle. This would also facilitate compliance to the objectives and values defined in the NEGP mission statement which will be the blueprint in India for future eGovernance investments by government. There are other fundamental reasons for quality assurance in eGovernance systems:

- eGovernance solutions require substantial budgets and taxpayers are entitled to the most efficient and value-for-money application of these budgets
- eGovernance requires procurement of complex ICT systems and a well defined quality assurance framework ensures that both the purchasing agency and bidders know what quality milestones are expected to be met and provides a mechanism to measure compliance with these milestones
- Variations in capacity and internal turnover of key personnel in public administrations makes project implementation a challenge and it is essential that project stakeholders are aware of key project processes, their roles, activities and expected outcomes
- Poorly implemented or even failed projects that are suspended midway make it harder to justify financing of such projects in future
- In cases where eGovernance projects are financially supported by international donor agencies, there is an explicit requirement for an impact assessment mechanism that can monitor quality of implementation and form the basis for negotiations for continuation of such funding.

Moreover, ICT Systems are prone to crashes and security violations due to errors and vulnerabilities. These errors and vulnerabilities can be because of rapidly changing technology, human error, poor requirement specification, poor development processes or as a result of underestimating threats. In addition, system modifications, new flaws, and new attacks are frequently introduced contributing to increase in vulnerabilities, failures and security violations throughout the system life cycle. It is also known that if data volumes are not addressed properly and architectures are not balanced, system performance and user performance can severely deteriorate over time.

These errors, vulnerabilities and risk therefore need to be managed over the project lifecycle within acceptable parameters. These are managed by technology, organizational policies and processes. The task of establishing acceptable quality assurance based on risk leads to achieving reasonable confidence that the eGovernance system performs the way as intended or claimed. This translates into stakeholder confidence in the system which arises from the knowledge that best practices and processes were followed while designing and implementing the solutions and services.

Chapter 2

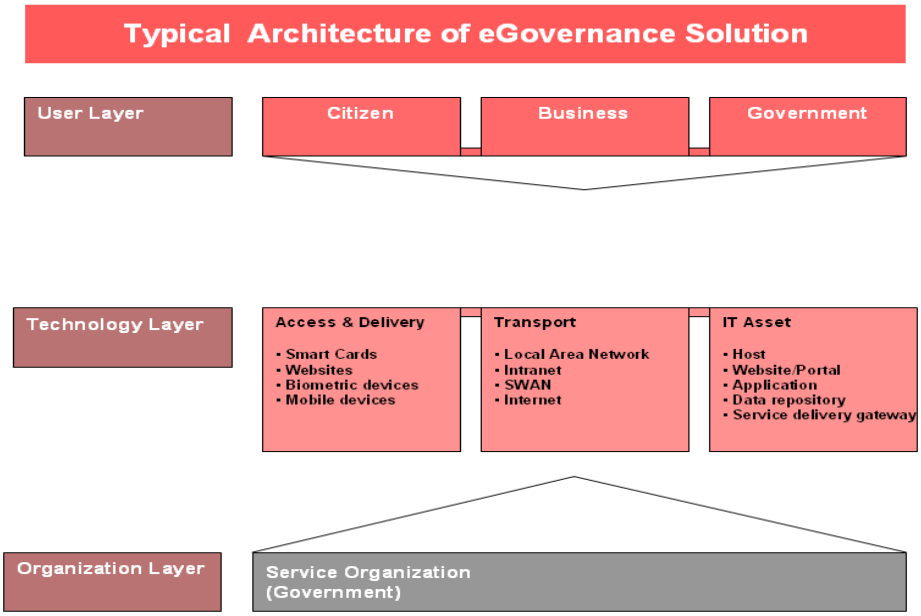
2.0 E-Governance Architecture and Quality Aspects

This chapter outlines the typical architecture of an eGovernance system and explains the stages where quality assurance comes into play in the design and development of such a system. Mapping the architecture of an eGovernance solution is the first step towards planning quality assurance mechanisms for each component in the architecture.

2.1 E-Governance Architecture

The basic architecture of eGovernance can be represented in a three layer structure (see Figure 1 below). The user layer is the layer where users interact with the system for access to government services through multiple channels. The technology layer is the layer that carries the user's service request through to the government agency responsible for the service. This layer in turn consists of an Access and Delivery Layer (such as a public internet terminal for citizens), a Transport Layer (which is the network) and the IT Asset Layer (which comprises the gamut of infrastructure assets such as data centres, routers, hubs, switches and disaster recovery facilities). The final layer is the Organisation Layer which receives the service request through the ICT system, logs the details of the request and then uses the ICT system to deliver the service to the user. The QAF envisages to get end-to-end assurance, ensure quality of each layer.

FIGURE 1: TYPICAL ARCHITECTURE OF EGOVERNANCE SOLUTION



2.1.1 User Layer

User layer defines the user categories seeking government services through a variety of access channels such as a public internet kiosk (e.g. Common Service Centre {CSC}), desktops, laptops and handheld devices. The users may be citizens/ businesses/ other government departments interacting with the government departments through the Service Access Layer by submitting requests for various services provided by the government. Users want the effective and efficient delivery of services in a secure manner. The factors determining successful access and delivery are customer satisfaction and fulfilment of User related SLAs.

2.1.2 Technology Layer

The Technology Layer consists of the three sub layers (i) Access and Delivery, ii) Transport and (iii) IT Assets.

2.1.2.1Access and Delivery Sub-Layer

Each access mechanism has its quality assurance programme. Some of the Common access mechanisms are as follows:

1. Smart card
2. Biometric system
3. Mobile devices & others
4. Websites

Services through websites can be classified as follows:

a) Information

At the information stage, information is displayed but there is no possibility for the user to interact with the system or with the staff who maintain the service. The communication flow is one way only (System to User).The user needs basic information on statistics, rules and procedures so that by using this information, s/he can proceed further.

Examples of information services are portals that provide contact information on disaster relief infrastructure at the time of emergencies, relief camp locations, hospitals etc.

b) Interaction

The next stage allows the user to interact with the system. The communication flow is two –way (system to user to system to user). Though the interactions are relatively simple, they help the user to save time and avoid travel to the service delivery point. After obtaining the basic information from the system, the user can opt for further help with selected queries from system generated menus. Typical examples are

customised queries based on parameters defined by the user or the input of information into the system through online forms.

Examples of such services are online train reservation enquiries, tax information etc.

c) Transaction

Transactional services are more complex and enable the user to complete entire tasks electronically at any time of the day. Transactional services encompass the information and interaction phases. In this phase, the system should offer options for online payment and grievance tracking and resolution while ensuring stringent information security standards are met.

A typical example of a transaction service is when a citizen uses a government portal to look up essential drug supply points at a time of epidemic, submit specific indents and pays online for the supply of these indents.

Security will be a paramount concern at this layer requiring appropriate identification, authentication and authorization through log-ins/ passwords, digital tokens, smart cards, biometrics, digital signatures and Public Key Infrastructure (PKI). In addition, where users depend on public internet kiosks for access, the ability of kiosk operators to comply with Service Level Agreements (SLAs) will also affect the achievement of user satisfaction.

The Access and Delivery Layer depends on the technology which enables the government to provide the services. The technology layer is made of the applicable communication and protocol, process, data and metadata, security and localization standards. The use of open standards ensures risk reduction, cost effectiveness, interoperability, availability, security and usability.

2.1.2.2 Transport Sub layer

This layer specifies how the user requests are communicated to the government & the response of the government back to the user. The key issues will be availability, performance, security and related SLAs of the communication channel (intranet, extranet, State wide Area Network (SWAN) & Internet).

2.1.2.3 IT Asset Sub Layer

The IT Asset Sub Layer specifies the IT infrastructure that includes the various IT components such as routers, switches, firewalls, load balancers, gateways, servers (web, application, data etc.), and storage devices. The most critical component of this layer is the software application & data repository. This calls for adherence to software quality attributes - Functionality, Performance, Usability, Security, Interface, Interoperability, etc - for both front office as well as back office applications. This layer needs to be well protected from security vulnerabilities.

2.1.3 Organization Layer

The Organization (Government) Layer defines the back-end systems, i.e., the government organization that is providing the services. To deliver services the government uses a regulatory framework which consists of acts, rules, procedures, policies, decisions and processes of government administration. For the eGovernance system to be sustainable and technically efficient, it is necessary to first conduct

business process improvements in government agencies and align ICT systems to the reengineered business processes. In doing so, it would also be necessary to take account of legal and regulatory amendments that would need to be made to authorise the changes in the existing government processes.

2.2 E-Governance Project Lifecycle and Quality Assurance

Figure 1 outlined a typical architecture of an eGovernance system. However, this architecture must be designed, the necessary service providers procured and the appropriate software, hardware and network infrastructure developed and deployed. This is commonly done through a project approach to implementation.

For the three architecture layers to function successfully in coordination with each other, quality assurance is required at all stages of the project lifecycle, like design phase, procurement phase, development, implementation, and post-implementation phases.

The overall objectives of the quality assurance exercise in any eGovernance project lifecycle are:

- To ensure that correct processes have been followed while specifying the functional and technical requirements of the proposed system
- To ensure that the system conforms to the requirements
- To ensure that user satisfaction with the system, once it goes 'live', is monitored and corrective actions taken in case of adverse feedback

Figure 2 below shows a typical project lifecycle for implementation of an eGovernance system and the stages where quality assurance is required. The project lifecycle is shown in two key phases – the design phase (before procurement) and the implementation phase (after procurement).

FIGURE 2: PROJECT LIFECYCLE AND QUALITY ASSURANCE

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The design phase starts from the beginning of the project till the point where procurement of the implementation agency (or as is the practice today, a System Integrator) is completed. This phase originates with a Demand Analysis for electronic services conducted by the concerned government agency. If the analysis reveals significant demand for such services from stakeholders, an As-Is assessment is conducted where the government agency in the Organisation Layer (see Figure 1 above) studies its internal business processes and identifies areas of performance improvement. This forms the basis of the Functional Requirement Specifications, a document that defines in detail what the proposed system is expected to do for the organisation. Once functional requirements have been defined, the procurement cycle is initiated with development of the Request for Proposal and other documents needed for a competitive tendering process. The concerned agency can either manage the procurement in-house or as is more common today, engage the services of a consulting firm.

At this stage, quality can be assured by defining the process models for acquiring ICT systems and integrating them with existing administrative procedures. A model for quality for the entire project

should be agreed upon by the relevant project stakeholders by benchmarking with best practices in project management, change management and technical processes.

Once the procurement is completed, the selected agency will develop a detailed project implementation plan,. The project plan is especially important to schedule the acquisition, commissioning, installation and acceptance of ICT infrastructure assets made up of components of hardware, software and network assets. An important complement to the project implementation plan would be a Change Management Plan which would identify the relevant stakeholder groups, the key messages to be conveyed at various stages of the project and a training needs assessment and delivery plan. The implementing agency will also develop the Software Requirement Specification (SRS) document, in consultation with the purchasing government agency. Both application functionalities and the accompanying ICT infrastructure can be tested in phases, either by modules or by locations or both, depending on the requirements of the system and the purchasing government agency who will own the system.

At this stage, quality can be assured by identifying essential and desirable Quality Gates (QG) to ensure that the system conforms to the requirements of the stakeholders and to form the grounds for an objective evaluation that will promote stakeholder confidence in the eGovernance system.

Once the agency has signed off on its operational acceptance of all system components, the eGovernance system is ready to "go-live". Once this happens there should be mechanisms to continuously monitor system performance and evaluate user feedback to address areas for troubleshooting or further improvement.

At this stage, quality can be assured by developing a model for classifying categories of eGovernance users, defining "user satisfaction" metrics for each category and methods of measurement.

2.3 Quality Gates

The three objectives of quality assurance in an eGovernance project lifecycle can be met through the identification and application of Quality Gates (QG) at various phases of the project.

Each QG consists of a set of quality benchmarks relevant to that project phase. QGs can be further divided into two categories: essential and desirable with each project being required to clear the essential QG regardless of scope or duration.

The essential QGs relate to four key areas:

- Quality Processes in the Organization (QG 1)
- Software Quality (QG 2)
- Information Security (QG 3)
- IT Service Quality (QG 4)

In Figure 2, for instance, the project should clear Gate 1 in the design phase by ensuring that citizen charter & service specifications including service levels are defined .These are based on vision, mission & the quality policy of the organisation. Based on these enterprise architectures are frozen by doing Government Process Reengineering. System requirements are specified & basic quality management system is in place & activity of acquisition & outsourcing of IT starts (procurement) through RFP process. Once procurement is completed, Gates 2, 3 and 4 come into play at the relevant stages of the project. These four essential QGs ensure that the entire project lifecycle meet a critical minimum standard and technical accuracy.

In addition, depending on risk level (High, Medium or Low), availability of time, budgets and project resources, there should be an effort to achieve certain desirable QGs. Desirable QGs relates to the following areas:

- Government Process Re –engineering (QG 5)
- Technical Standards and Architectures (QG 6)
- Acquisition and outsourcing (QG 7)
- Request for proposal and Service Level Agreement (QG 8)
- Documentation (QG 9)
- Risk Management (QG 10)
- Asset Management (QG 11)
- Business Continuity Planning (QG 12)
- Disaster Recovery Management (QG 13)
- Digital Preservation & Information Archiving (QG 14)

When a project phase or output clears a QG, it is often benchmarked to a internationally recognised quality certification. Various such certifications exist today. Figure 3 below provides indicative quality certification standards that could be used at various stages of the project.

FIGURE 3: QUALITY CERTIFICATIONS IN THE PROJECT LIFECYCLE

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Note : The arrow indicates the subject of certification.

Figure 3 suggests quality certifications that could be used for various project components to certify quality. These are:

IS 15700: Developed by the Department of Administrative Reforms and Public Grievances in collaboration with the Bureau of Indian Standards, it is a standard for quality in public service delivery by government organisation, also known as Sevottam

IS/ ISO 9126-2: Developed for assessing quality of Software Engineering, provides a set of metrics to evaluate quality of software

IS/ ISO 27001: Stands for a family of certifications Information Security techniques and management systems

IS/ ISO 20000: Measures quality of IT Service Management incorporates best practices defined in the Information Technology Infrastructure Library (ITIL) family of standards

Note: Conformity Assessment- Administration (QAF0205) highlights about the recognised conformity assessment bodies which includes certification bodies, inspection bodies, evaluation bodies, & test laboratories.

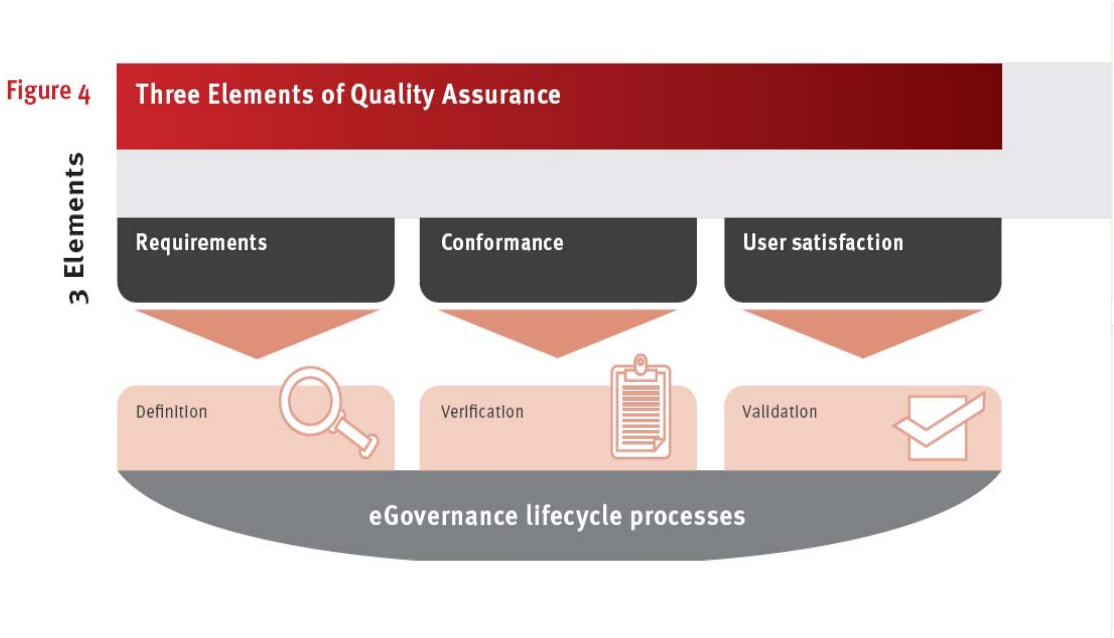
It is the responsibility of the of a particular organisation who owns the system to obtain the certificate.e.g. Information Security is the prime responsibility of the government department & they should demonstrate the compliance. If some controls are applicable to other related parties/organisation that should be demonstrated through contractual agreement. Statement of applicability (SOA) should bring out this clearly. Similarly certification for ISO 20000 is the responsibility of IT Service provide/ implementing agency. Application developer is responsible for demonstrating compliance of application quality with SRS which incorporates the quality characteristics given in the quality model ISO 9126-4. Certification or" letter of compliance" are the various ways to provide assurance of conformity. The Conformity assessment bodies shall be involved at different milestones of the project depending on the RFP requirements, CARE provides an exemplar template 3PAA (3rd Party Audit Agency) which is a commonly used term for Conformity Assessment bodies which is in nature of more technical as prescribed by ISO.

Chapter 3

3.0 Quality Assurance Framework

The Quality Assurance Framework (QAF) enhances the eGovernance framework conditions in India to support the National eGovernance Plan's vision of providing reliable, cost-effective and transparent citizen services by applying international good practices and guidelines.

FIGURE 4: THREE ELEMENTS OF QUALITY ASSURANCE



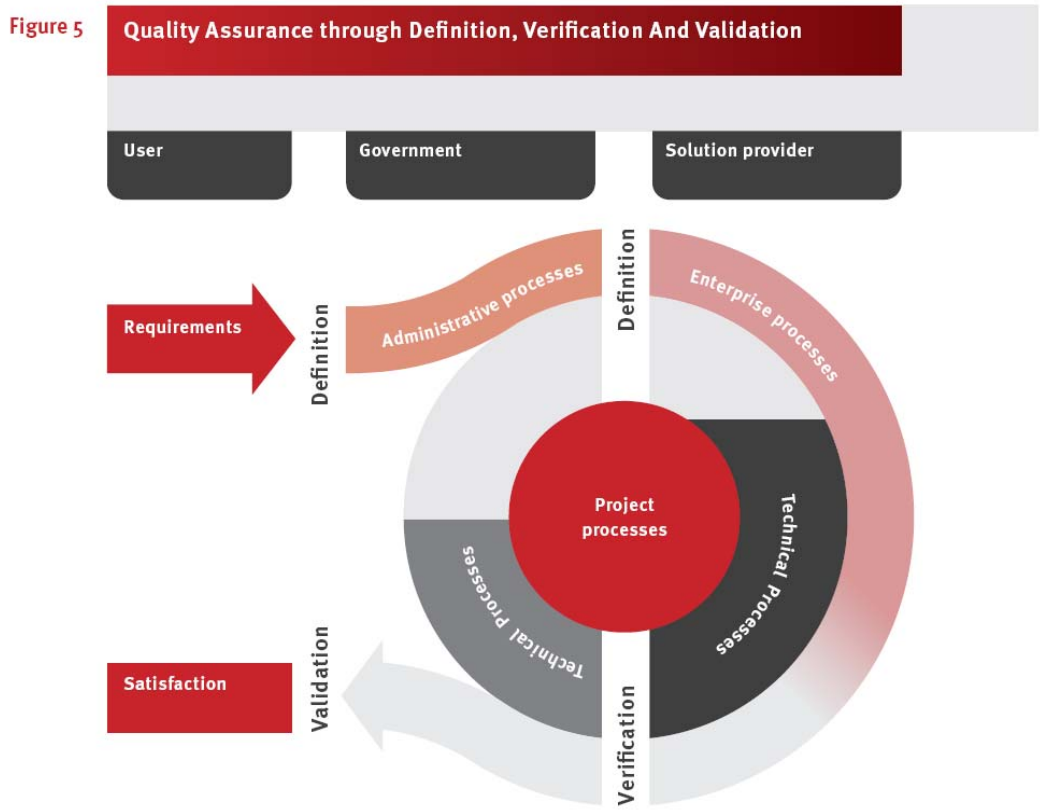
The QAF focuses on three elements of quality (see Figure 4 above):

- Requirements of Processes (For role based processes i.e. the government agencies, system integrators or solution providers and the users of the eGovernance solution) through its implementation.
- Conformance (i.e. verification that the ICT solution complies with requirements) through evaluation process.
- Satisfaction (i.e. validation from users that the system is responding completely and accurately to their requirements) through confirmation.

These three elements cover the interactions between the user, the government and the solution provider. Figure 5 below shows these linkages. Through role-based processes, the requirements of the users and government are documented and passed on to the solution provider who is selected through competitive procurement. Once the solution provider has started developing the system, it is the government who must verify that the system is being developed according to the requirements defined earlier. Once the system goes 'live', an assessment of the user experience across various user groups,

internal and external, is used to validate if the developed system has been able to meet the original requirements and ensure user satisfaction.

FIGURE 5: QUALITY ASSURANCE THROUGH DEFINITION, VERIFICATION AND VALIDATION



These three quality elements of definition, verification and validation can further be addressed by three stages of quality assurance in the project lifecycle: Implementation, Evaluation and Conformation as depicted in user guide.

3.1 Implementation Stage

The implementation approach refers to the identification and reengineering of processes in the government organisation, implementing an eGovernance project. In e-governance system life cycle all the three players (Govt, User & implementing agency) should execute a set of processes. The govt. organisation requires implementing these processes (QAF0101) in following groups:

1. *e-governance project enablement*
2. *Acquisition of IT system & outsourcing*
3. *e-governance project management*
4. *Technical processes*
5. *Supply of services to Citizen, businesses etc.*

The **implementing agency /IT solution provider (QAF01-03)** in a similar way shall also implement the following processes:

1. *Enterprises processes for project enablement*
2. *Acquisition*
3. *project management*
4. *Technical processes*
5. *Supply of IT services to government*

The objective of the implementation approach is to ensure that by implementing a defined processes the probability of success of achieving outputs gets enhanced.

Each process group consist of number of processes and each process may be invoked, as required, at any time throughout the life cycle and there is no definitive order in their use. Any process may be executed concurrently with any other life cycle process. Any process may apply at any level in the hierarchical representation of a systems structure. This continuous interaction between processes is represented by Figure 6 below.

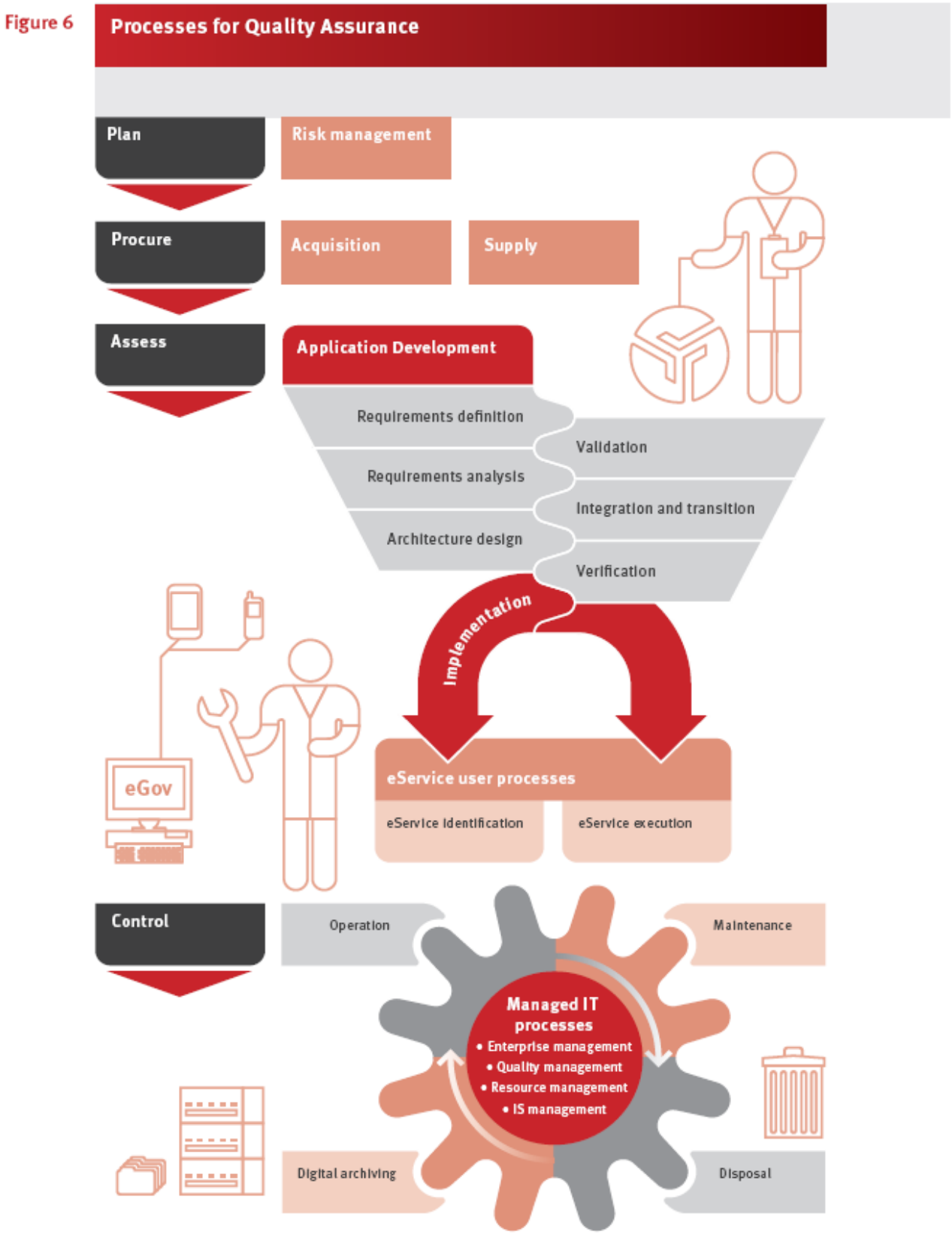


FIGURE 6: QUALITY GATES AT EVALUATION STAGE

3.2 Evaluation Stage

The evaluation approach identifies and applies Quality Gates to assess the quality of the eGovernance system at various stages of the lifecycle (QAF0201). The overall objective is to ensure that the eGovernance system responds completely and correctly to the requirement specifications. More importantly, Quality Gates can be used to assess whether (i) the requirements themselves were framed correctly, (ii) which areas need further action to drive the system towards complete conformity with requirements and (iii) which exogenous variables have or are likely to impact the system which cannot be accounted for while defining requirements.

Section 2.3 outlines essential and desirable Quality Gates. The essential QGs relate to quality organisational processes for project design and implementation, software quality, information security and IT service management.

Successful application of QG to each project ensures that quality benchmarks are defined and met consistently and the overall project outcome reflects a true transition from manual governance systems to a quality eGovernance system (see Figure 7 below).

Figure 7: Various User Groups of eGovernance Systems

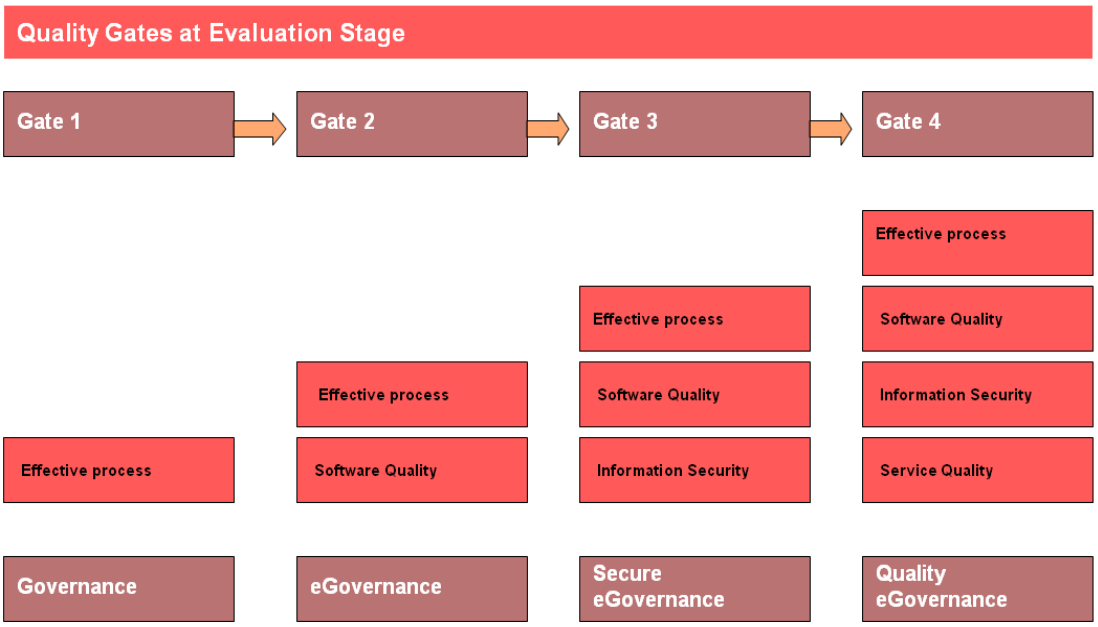


Figure 5 also shows the transition from 'governance' to a 'quality eGovernance' system. This transition is enabled by electronic services delivered on request from users that successively clear the four essential Quality Gates of effective processes, software quality, information security and quality of service.

3.3 Confirmation Stage

The first two stages ensure that the requirements from the eGovernance system are correctly documented and verify that the system conforms to these requirements. The true utility of the eGovernance system however lies in the value added to the users of this system.

The confirmation approach to quality assurance completes the chain by validating whether the eGovernance system that has been developed through the project lifecycle is responsive to user requirements and generates confidence that the services delivered would be reliable and quality-assured.

The confirmation approach (QAF0301) sets metrics for the measurement and monitoring of various segments of users and feedback. This is used to track if the system offers functionalities that are of value to the various users and isolate issues and areas for troubleshooting or further improvement.

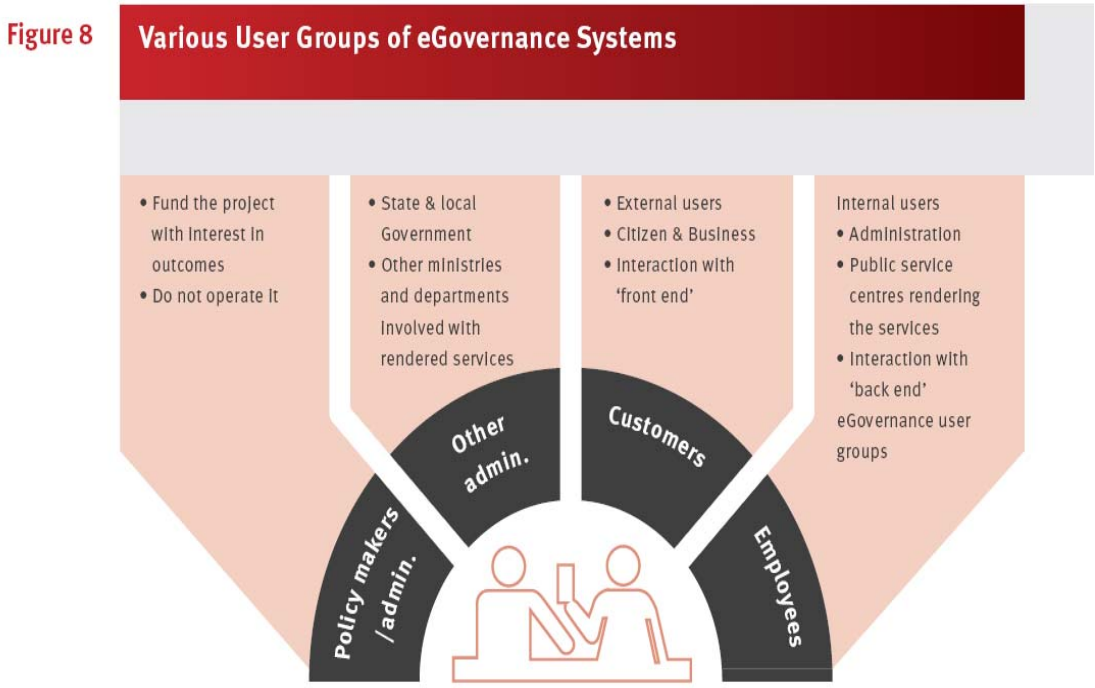
Figure 8 below illustrates the various categories of users who would be relevant for validating whether the eGovernance system is generating a user experience that is satisfactory for various groups. The first category of users is comprised of policy makers and administrators who form the project board and are the owners of the implementation process. Their satisfaction will relate to the extent that the eGovernance system meets the final outputs or outcomes that were conceived at inception, including the financial and economic returns to the financial investment in the project. In other words, the satisfaction of this group would depend on the final outcomes of the eGovernance project and not so much on the inputs and the processes that have gone into the production of such outcomes.

The second category of users relates to other administrators and agencies that form part of the value chain of the bouquet of services delivered through an eGovernance system. This could involve government agencies and personnel at state, provincial and local levels as well as other ministries and departments where cross-cutting services are being delivered. Satisfaction of this user category would focus mainly on variables related to data security, interoperability, data exchange and system performance.

The third category of users refers to government employees involved in the delivery of the eGovernance service(s). This would consist of relevant department personnel involved in the operations of the eGovernance system, either at the 'back-end' agency offices or at the 'front-end' staff of public access points such as Common Service Centres. From their perspective, user satisfaction would be determined by variables relating to system performance, user friendliness and impact on productivity and efficiency.

The final category of users would be the citizens and business at whom the eGovernance bouquet of services are targeted.

FIGURE 8: PRIORITISING USER FEEDBACK



FOUR KEY AREAS TO MONITOR WITH REGARD TO USER SATISFACTION OF THE USER CATEGORIES DEPICTED ABOVE ARE:

- *User expectations*: There are four key factors which affect user expectations that are important for an organisation to consider in relation to service quality: 'word of mouth' (promises), personal needs, past experience, and external communications by the service provider. A thorough understanding of the expectations that users bring to the service experience will provide vital information to plan for either managing expectations or targeting areas of improvement.

- *Perceptions of service experience*: It is important for the service provider to understand user perceptions of the service experience in order to identify potential areas of improvement. The issue could be either a difference in perception of a service experience or a bottleneck in actual service delivery. The organisation may choose to clarify points of contact by communicating with users or they may redesign their service delivery process to decrease the number of contacts required by the user in order to receive the service needed.

- *Level of importance*: The perceived importance of a service (or its elements) is an essential service variable on two levels: as an antecedent of satisfaction and for planning purposes. As an

antecedent of satisfaction, the user assigns a certain level of importance to the service experience. As an user experiences service delivery, his or her perceptions of the experience are filtered by the level of importance attached to that service. Frequency of use is also considered to be a factor that influences the level of importance.

- *Level of satisfaction*: User react to a combination of their expectations - the importance of the service to them and the actual service experience, resulting in an internalized response or perception. Monitoring satisfaction levels can help the project management to take corrective actions as required or improve on an existing system functionality based on additional feedback.

- *Priorities for improvement*: Information on how important the overall service and individual service items are to users promote well-informed planning decisions. Cross-analysis of satisfaction and importance variables will identify priorities for improvements and thus promote efficient allocation of resources. Figure 6 below provides indicative criteria to prioritise user feedback on quality perceptions and criticality.

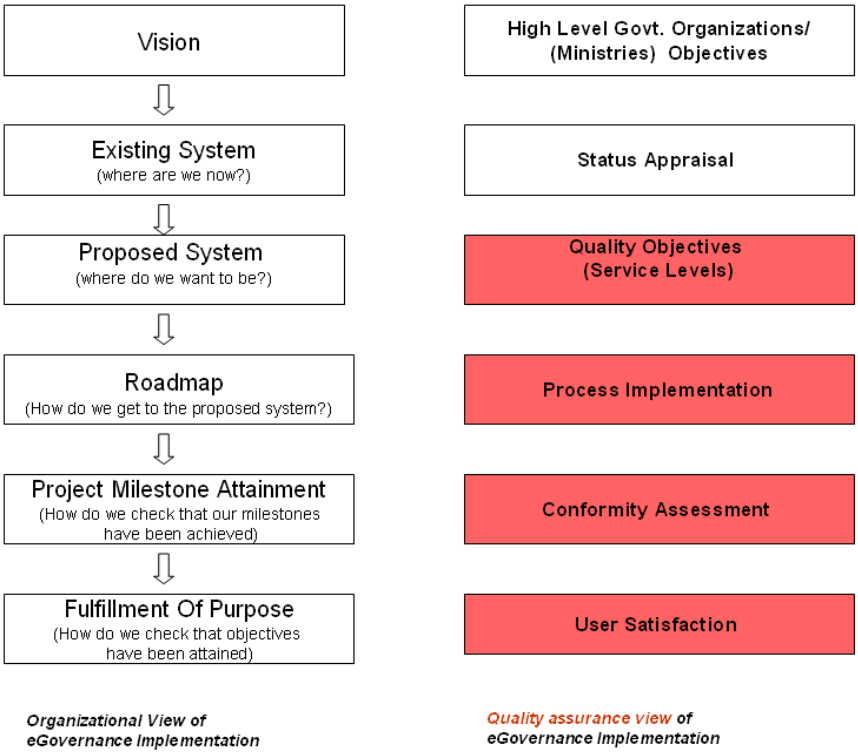
Figure 9 below provides an indicative approach to classifying and prioritising user feedback from various groups on eGovernance systems. Implicit in all quadrants is the obvious consideration of cost while deciding the sequence of responses addressing feedback. An important quadrant for policy makers and administrators is the one marked as "Review It". It checks against eGovernance solution providers in supplying more and more expensive systems which may enhance user experience but are not essential requirements for the services that are being delivered by the system. System integrators, solution providers and assorted vendors have an incentive to 'over specify' equipment specifications in large scale, complex eGovernance systems.

Figure 9 Prioritising User Feedback

Chapter 4

4.0 Applying QAF

The QAF can be used by policy-makers, administrators, project managers, external consultants and vendors engaged in the implementation of an eGovernance project. The QAF would assist these stakeholders to be acquainted with the quality assurance objectives of the project and which stages and components of the project they would be linked to. These stakeholders can then deploy suitable technical personnel to supervise respective parts of the project. The following process depicts the high level application of quality assurance framework.



The following set of activities will help the overall responsible person (e.g. Project Director) to prepare the plan for implementing QAF.

1. **Frame a Quality Policy** and / or mission statement drawing on the NeGP vision statement and specific project objectives. This exercise should be driven by members of the Project Steering Committee with the Project Director of the government agency taking ownership of

implementation. The Quality Policy should be framed in such a way as to encourage conversion of organization vision to measurable quality objectives as far as practicable. (Annexure -4)

2. **Identify the processes**, & its sequence needed for the project and their application throughout the organisation

3. **Ensure the availability of resources,** skilled & knowledgeable human resources & other financial resources.

4. **Implement the processes**, Project gets implemented as a set of these processes; determine criteria and methods needed to ensure that both the operations and controls of these processes are effective.

5. **Focus project processes** with special emphasis on life cycle stages like: concept (RFP Review), development (SRS, Architecture, Design & code Review), production (UAT & other CA activities), utilisation (SLAs), support & retirement.
   Note: Items in brackets are control checkpoints.

6. **Monitor, measure and analyse** these processes

7. **Evaluate the critical components** of the system for compliance with the Risk based selected CA specifications

8. **Plan and conduct** User Satisfaction Surveys and incorporate into project monitoring mechanisms

9. **Implement action** necessary to achieve planned results and continual improvements of these processes

Figure 10 below illustrates the application of the QAF for an eGovernance project.

Figure 10 **Steps for Initiating Quality Assurance through the Project Lifecycle**

1	**FRAME A QUALITY POLICY** drawing on the NeGP vision statement and specific project objectives. This exercise should be controlled by members of the Project Steering Committee with the Project Director of the government agency taking ownership of implementation. The Quality Policy should be framed in such a way as to encourage conversion of policy objectives to measurable indicators as far as possible
2	**DETERMINE THE PROCESSES** needed for the project and their application throughout the organization
3	**DETERMINE THE SEQUENCE** and interaction of these processes
4	**DETERMINE CRITERIA** and methods needed to ensure that both the operations and controls of these processes are effective
5	**MAKE AVAILABILE** skilled resources and information necessary to support the operation and monitoring of these processes
6	**MONITOR, MEASURE AND ANALYSE** these processes
7	**IMPLEMENT ACTION** necessary to achieve planned results and continual improvementsof these processes
8	**DEVELOP THE RFP** using standards, architectures and conformity assessment (CA) requirements
9	**EVALUATE THE CRITICAL COMPONENTS** of the system for compliance with the risk based selected CA specifications
10	**PLAN AND CONDUCT** User Satisfaction Surveys and incorporate into project monitoring mechanisms

In conclusion, this document outlines the Quality Assurance Framework, its approach, building blocks and components. The reader is advised to read the Conformity Assessment Requirement (CARE) document (QAF0201).The CARE document outlines how Quality Gates, with each gate as a set of quality standards, is applied (a) at various stages of the project (i.e. process requirements), (b) on various components of the solution architecture to measure compliance and (c) on the user communities who are the recipients of the eGovernance system.

Annexure -1

Linkages between QAF application activities & QAF documentation

1. Frame a Quality Policy and / or mission statement (QAF0101)
2. Identify the processes (QAF0101), (QAF 0101-01) (QAF 0101-02) ,(QAF0201) ,(QAF0301) ,(QAF0104) & (QAF0102)
3. Ensure the availability of resources(QAF0101)
4. Implement the processes(QAF0101), (QAF 0101-01) (QAF 0101-02) , (QAF0201),(QAF0104) & (QAF0105)
5. Focus project processes(QAF 0101-01), (QAF 0105-03)
6. Monitor, measure and analyse(QAF0101),
7. Evaluate the critical components(QAF0202) ,(QAF0201) (QAF0103) (QAF0204)
8. Plan and conduct User Satisfaction Surveys,(QAF0301)
9. Implement action necessary to achieve planned results(QAF0101),

Annexure – 2

Abbreviations

ISMS: Information Security Management System

ITSM: Information Technology Service Management

QMS: Quality Management System

QAF: Quality Assurance Framework

CARE: Conformity Assessment Requirements

EAF: E-Governance Assessment Frameworks

IFEG : Interoperability Framework for E-Governance Framework

PFC: Passport Facilitation Centres

Annexure – 3
Glossary

Quality

Degree to which a set of inherent characteristics fulfils requirements.

Customer satisfaction
Customer's perception of the degree to which the customer's requirements have been fulfilled

Capability
Ability of an organization, system or process to realize a product that will fulfill the requirements for that product

System
Set of interrelated or interacting elements

Management system
System to establish policy and objectives and to achieve those objectives

Quality management system
Management system to direct and control an organization with regard to quality.

Quality policy
Overall intentions and direction of an organization related to quality as formally expressed by top management.

Quality management
Coordinated activities to direct and control an organization with regard to quality

Quality assurance
Part of quality management focused on providing confidence that quality requirements will be fulfilled

Quality improvement
Part of quality management focused on increasing the ability to fulfill quality requirements.

Continual improvement
Recurring activity to increase the ability to fulfill requirements

Effectiveness
Extent to which planned activities are realized and planned results achieved

Efficiency
Relationship between the result achieved and the resources used.

Process
Set of interrelated or interacting activities which transforms inputs into outputs

Framework Conditions
Framework conditions – both statutory and market-related – in general play a very important role for innovations. It requires the economic viability, social acceptance, technical performance & statutory framework conditions to be met to the greatest extent possible.

Annexure -4

From Vision to Quality Policy & Service Specifications

(An exemplar methodology)

Step 1: Ministry/Department to define vision & mission.

Vision & Mission

A vision is an idealized state for the department. It is the big picture of what the leadership wants the department to look like in the future.

The department's Mission is the nuts and bolts of the vision. Mission is the who, what and why of the department's existence.

Vision is a symbol, and a cause to which we want to bond the stakeholders. The people work best, when they are working for a cause, than for a goal. Vision provides them that cause. The vision is a long-term statement and typically generic and grand.

The entire process starting from the Vision, down to the objectives is highly iterative. Vision and mission statement should be made first without being colored by constraints, capabilities and environment. This vision is non-negotiable and it drives the organization to find ways and means to achieve their vision, by overcoming constraints on capabilities and resources. Vision should be a stake in the group, a position, a dream which should be prudent, but should be non-negotiable barring few rare circumstances.

Step 2. Mission follows the Vision:

It is strongly recommend that mission should follow the vision. This is because the purpose of the organization could change to achieve their vision. Ministry/Department's mission is the nuts and bolts of the vision. Mission is the who, what and why of your department's existence. The vision represents the big picture and the mission represents the necessary work. Mission of the department is the purpose for which the department exists. It is in one way the road to achieve the vision.

Step 3. Objectives:

Objectives represent the developmental requirements to be achieved by the department in a particular sector by a selected set of policies and programmes over a specific period of time (short-medium-long).

Objectives could be of two types: (a) Outcome Objectives address ends to achieved, and (b) Process Objectives specify the means to achieve the objectives.

Objectives should be linked and derived from the Departmental Vision and Mission statements.

Step 4.Quality Policy and Objectives:

Having defined organization business objectives it is requires to defined the quality policy and quality objective. Quality policy gives the direction for framing quality objectives. And this should be align with organization vision, mission and objectives. The quality objective sport the organization business objective by quantifying the service parameters/service levels. And other process specification other which conformity can be checked .For making quality policy and quality objectives additionally take inspirations from National E-Governance Plan (NeGP) vision. Which is

"Make all Government services accessible to the common man in his locality, through common service delivery outlets and ensure efficiency, transparency & reliability of such services at affordable costs to realize the basic needs of the common man."

Example: The quality policy of Passport Seva Project could be "The Passport Seva Project will provide the passport related services to Indian citizen in a speedy, convenient & transparent manner. It will enable the citizen to enjoy the benefits of a technology led service oriented approach to passports while ensuring that the proper security, safety & safeguards are maintained."

Step 5 - Draw Quality objectives from the Quality policy:

To draw quality objectives prepare the existing & required system at a macro level.

Example: Existing & required systems at a Glance for Passport Seva Project.

S.No	Item of Passport issuance process	Existing system	Proposed system
1.	Time taken for tatkal passport	7 to 14 days	Same day
2.	Time taken for non-tatkal passport	30 to 45 days	3 days
3.	No. of passport outlets	52	92
4.	public dealing counters at passport outlets	345	1250
5.	Public dealing hours per working day	4	7
6.	Waiting period to submit passport application	2 to 3 hour in crowded conditions	45 minutes in decent & comfortable conditions
7.	Information for applicants	Unsatisfactory	Effective-call centre & internet.
8.	Grievance handling through phone, online & mail.	Unsatisfactory	Immediate

9.	Paperwork	80% manual involving paperwork	100% on computers
10.	Exchange of information with police	By Post – time consuming	Online
11.	Management Information System	Unsatisfactory	Wide range of information available to the management for effective control.

The Quality Objectives at a micro level can be defined in form of SLA.

For Example: The quality objectives of Passport Seva Project are

SLA 1

Description

Average Time Spent by citizen (Walk-In) at Passport Facilitation Centres (PFC) during Peak Hours (Wait Time + Service Time)

Metrics

Baseline	**Lower**	**Higher**	**Breach**
< 45 minutes	>= 45 minutes	< 30 minutes	> 60 minutes

SLA 2

Description

Average Time Spent by citizen (On Line) at PFC during Peak Hours (Wait Time + Service Time)

Metrics

Baseline	Lower	Higher	Breach
< 25 minutes	>= 25 minutes	< 18 minutes	> 35 minutes

SLA 3

Description

Average Time Spent by citizen (Walk-In) at PFC during Non Peak Hours (Wait Time + Service Time)

Metrics

Baseline	Lower	Higher	Breach
< 30 minutes	>= 30 minutes		> 45 minutes

SLA 4

Description

Average Turn around time of request – response cycle for document upload on Portal**.**

Metrics

Baseline	Lower	Higher	Breach
< 45 seconds	>= 45 seconds	< 30 seconds	> 60 seconds

SLA 5

Description

Availability of all services over Internet

Metrics

Baseline	Lower	Higher	Breach
>99.9%	<= 99.9%		< 99%

SLA 6

Description

Availability of Security Solution at DC and DRC

Metrics

Baseline	Lower	Higher	Breach
100%	<100%		<99.999%

Source is from RFD document from Govt. Dept. & Passport Seva Project (e-gov Vol: 4 issue: 12 release date: December 2008.)