Chapter V
Parameters for Evaluation of e-Governance Web Portals

5.1 Introduction:
Parametric evaluation is a technique that assesses the performances based upon certain statistical analysis. As discussed in chapter 3 and 4 the e-Governance web portals G2C, G2B or G2E have been designed, developed and implemented by keeping citizen as central focal point. There are various aspects and functions which are taken into consideration while designing these e-Governance web portals. From the literature survey, NeGP guidelines, respondents’ opinions, interactions with the experts and through the study of the existing e-Governance web portals from the State of Maharashtra and some from India, we have extracted 125 parameters, which are supposed to be the major content of any e-Governance web portal. For evaluation purpose we have grouped these 125 sub parameters in 10 major parameters according to their functionality and characteristic. These 10 major parameters are i. Basic Static Information, ii. Functional Content, iii. Design, iv. Citizen Relationship Management, v. Quality of Services, vi. Security Measures, vii. Web Development Tools, viii. e-Readiness, ix. Governance Support System and x. Economic and Social Aspects. This chapter discusses about all these major and sub parameters in the subsequent sections.

5.2 Basic Static Information:
The information and data which is static in nature and does not need any periodic updation are grouped under this major parameter. Following 18 sub parameters are itemized under this group.

5.2.1 National Emblem: As per NeGP guidelines, it has been made mandatory by Government of India to put National Emblem on right or left top corner of home page. The Image quality, color, size, etc. are left with the designer; but keeping the utmost important of the Emblem.

5.2.2 Ownership and Lineage Information: Information of the name of the Department/Section/Division in readable and eye catching typography is to be showcased.
5.2.3 Name of State: This is in conjunction with ownership and lineage information, the name of the state must be displayed on home page of the web portal.

5.2.4 Domain Name: All e-Governance web portals are supposed to register domain form government agency and expected to have .gov.in extension. NIC is responsible for providing these domains for government departments in India; state or central.

5.2.5 Departments and Sections: Listing and Information of Various Departments and Sections on the respective e-Governance Web Portals.

5.2.6 Acts and Rules: The information in read only format of all the acts and rules concern with the department and all the sections should be made available for the stakeholders like citizens, business and government employee.

5.2.7 Link with National Portal: Government of India has launched www.india.gov.in as a national portal which is also used as web directory for Government of India. All the e-Governance web portals are supposed to be hyperlinked with national portal.

5.2.8 Copyright, Terms & Conditions and Privacy Policy: Information about terms and conditions for the use of respective website, copyright conditions and privacy policy framed with inclusion of legal aspects.

5.2.9 Profile: History, milestones, achievements and other information related to subsistence of the department is to be put on this hyperlink.

5.2.10 Mission Vision Statement: Every organization, department has mission vision statement. Decorative and attractive lines of mission and vision could improve the facial value of the web portal.

5.2.11 Organization Structure: Organizational structure with hierarchy, designation and names are necessary element of any e-Governance web portal.

5.2.12 News and Press Release: Displaying news, press releases on the web portal for the stakeholders and also for broadcasting purpose are common feature of websites.

5.2.13 Contact Us Information: Department and section wise office landline numbers, email ids, and other contact information like FAX; social media is one of the mandatory requirements of the web portals.

5.2.14 FAQs: To avoid the hurdles and repeated queries of users of the web portals, FAQs are very helpful. Properly designed and answered FAQs minimize the work load of officers and enquiry counters. By having these FAQ's, site visitors will be able to find the
answer to their questions and office will have fewer emails. It saves them time; citizens can get an immediate answer to their questions without having email to office. They can check out a scheme/service FAQ and see that it does do what they want, it does solve their problem.

5.2.15 Online Support and Help Manuals: Text based chat and online support along with read only help manuals has become an integral part of any web design system.

5.2.16 Non Commercialization Instructions: e-Governance web portals are strictly operated and used for the purpose of Governance, so the non commercialization statement is necessary on the portals.

5.2.17 Relevant Images: An image is worth for thousand words. Images related to the concern department, achievements, or other snaps to be showcased can be put on home page.

5.2.18 Site Map: Web designers put site map to have bird eye view of the entire website. This helps users to quickly locate any links which they find difficult to trace.

5.3 Functional Content:

In view of the respondents opinion and the study of various e-Governance web portals, it is found that the Functional Parameter is the most important and crucial parameter of the evaluation pattern. The information and data which is dynamic in nature and needs periodic and consistent updation are grouped under this major parameter. Following 18 sub parameters are itemized under this group.

5.3.1 Schemes: Link and sub links mentioning about all the schemes of the concerned department/ministry on home page in lucrative manner. This is one of the most crucial and important aspect of any e-Governance web portal.

5.3.2 Services: Various services provided by the department/section shall be mentioned at eye catching place on home page. Facility of Online Applications with Regional Language Support for these services is also expected.

5.3.3 Downloads: Citizens and other stakeholders shall be able to download the requisite forms, GRs, Notification or other information with open source read only formats.

5.3.4 Application Forms: Online application form for schemes and services and other transnational activities should be made available by the e-Governance web portals.
5.5.5 Circular/ Notifications, Events and Announcement: Information regarding circulars, notifications and announcements to citizens, business organizations and employees must be displayed in proper format like, readable, date and time, subject line, etc.

5.5.6 Discussion Forums and Chat Rooms: With the swift growth in the ICT each web portal must provide online discussion forum and chat rooms for the end users. Forum is designed to build online communities of people with similar interests. A chat is a real time online conversation between many computer users. e-Governance web portals should provide chat rooms and discussion forum facility to citizens.

5.5.7 Feedback Monitoring System: Almost all the e-Governance web portal has feedback system. What is required is a feedback monitoring expert system which will enable tracking and actions taken of feedbacks, complaints. Feedback is the essence of two-way communication.

5.5.8 Tenders: Every Government Department has its own purchase policy and procedures. All of these require e-Tendering system complete in all respect; right from announcement, call of tenders to final payments.

5.5.9 Recruitments: Facilities like advertisement for the recruitment, online application, online examination and results declaration must be made available on the portal.

5.5.10 Content Contribution, Modernization and Approval Policy (CMAP): NeGP has clearly given the guidelines about the quality and approval policy for upload of content on e-Governance web portals. Departments can design their own policy using the framework.

5.5.11 Date and Time of Last Update, Content Upload, Content Removal: Hourly, Daily and monthly based timely update and removal of information on portal is the key of liveliness of e-Governance.

5.5.12 Content Management System: There is a multi fold increases in the efficiency of the work force if the integral Content Management System (CMS) is made available for the government employees.

5.5.13 Content Accuracy and Review Policy (CARP): Similar to CMAP NeGP has given guidelines for Content Accuracy and Review Policy; as per the hierarchy of the department.
5.5.14 Intelligent Content Search: With increase in the functionality and number of users the data on the web portals increases steeply. Citizens and other users must have intelligent information search facility for the portal as well as other related links.

5.5.15 Linking with Search Engine: Facility to search content with the help of existing open search engine like Google, Sify, Yahoo etc.

5.5.16 Logs Maintenance and Monitoring: Log of every user of the web portals must be maintained and monitored. This will help for security and deciding the responsibilities within and outside organizations.

5.5.17 Desk and Work Management System: As per the organizational structure of the section, desk and work management system is an essential part of the web portal.

5.5.18 Office Management System: For overall administration, control, management and execution; integral office management system is a vital module of the systems. This also includes the document management system. Document management focuses on the storage and organization of documents to support active work in progress, including content creation and sharing within an organization. When organizations do not have any kind of formal document management system in place, content is often created and saved in an unmanaged and decentralized way on scattered file shares and individual hard disk drives. This makes it hard for employees to find, share, and collaborate effectively on content. This also makes it difficult for departments to use the valuable business information and data in the content.

5.4 Design:

Web design encompasses many different skills and disciplines in the production and maintenance of websites. Different areas of web design include web graphic design; interface design; authoring, including standardized code and proprietary software; user experience design; and search engine optimization. The major parameter is technical aspect of the web portals. Following 9 are the sub parameters.

5.4.1 Domain Name: Simple, easy to remember and related to the name of the department with .gov.in domain is desirable URL for the domain name.

5.4.2 Visual Identity: The overall look, attractiveness and framework of home page give a first sight impact; hence should be tackled artistically with proper visual effects.
5.4.3 Page Layout: The layout of the web portal is expected to be user friendly and independent of the operating environment and hardware used. The very first step in designing a Web site is to define it. And to properly define a site there are three questions that must be answered. What is the purpose of the site? Who will be visiting the site?, How will the site serve the client? The answers to these questions will guide you as you construct the site.

5.4.5 Navigation: Hyperlinks for movement across the web pages and with easy to use for a common man. Unbroken pages are also one of the peculiar characteristic of this functionality. Forward and back links from current page must be done properly.

5.4.5 Simplicity: Overall layout and look of the web pages especially home page must appear to be simple to use and understand to a lay man stakeholder.

5.4.6 Use of Highlighter Tools: Use of colors, marquee, designer tools etc to highlight the current and important content of the department is important. Use of these highlighter tools helps citizens to quickly locate the information intended.

5.4.7 Graphics, Button and Icon Quality: The graphics, buttons, drop down menus, task and menu bars, icon and image quality should be of high standard and compatible with all the internet browsers.

5.4.8 Typography (Fonts): The font used both English and regional language should be appropriate and should be made available with free download facility.

5.4.9 Audio, Video and Animation: With the availability of high speed internet connectivity across the state, the web users expects use of audio, video and animation tools to be incorporated in the web portals in the form of tutorials or other concern documentaries.

5.5 Citizen Relationship Management:

Citizen Relationship Management (CzRM) is a growing effort at all levels of government to respond quickly, succinctly and accurately to citizen requests or inquiries for answers to questions and general information about policies, practices, and procedures. This term takes CzRM as its abbreviation, and is a deliberate play on the more common expansion of that abbreviation, customer relationship management. Ultimately, the goal of both is to foster closer, more effective and efficient working relationships, to better anticipate and
meet customer/citizen needs and to develop a more detailed working understanding of what citizens want, expect, and need from those who serve them. Government organizations at all levels are looking for technology that can help their employees more fully engage with their constituents. Meeting citizen needs even exceeding their expectations in a cost-effective manner is something e-Governance web portals are suppose to do.

5.5.1 CzRM Policy: Each government department is supposed to maintain relationship with the citizen similar to a business organization is doing through CRM. The concept CzRM is extracted, designed, mined and suggested out of our research work.

5.5.2 User Registration and Password Policy: As it is expected that the e-Governance web portals are dynamic the user registration facility and password policy taking into consideration all the security aspects must be implemented in the system.

5.5.3 Reduced Number of Trips: In an ideal situation citizens owing for the work to be done by the concerned government department should get benefits of the system by doing entire work from home, if not, at least number of trips should be reduced if compared with the manual system.

5.5.4 Last Login Details: For security reasons and for the personal records the web system should provide last login details to each legal user.

5.5.5 User Friendliness: The e-Governance web portals are supposed to be user friendly; as the complex, bulky, over written, incomplete systems leads to confusion and lack of interest of the users. Content is the most critical factor convincing users to stick around website. Delivering content that is fresh, easy to read and interactive, is the stepping stone to making website more user-friendly

5.5.6 Workflow and Dataflow: Every citizen should be able to locate the exact link, page, department, officer, and work. Also the hierarchy of the work and flow must be displayed and maintained in the system.

5.5.7 Alert (SMS, Email, Phone etc) Management System: Full hand shake communication with the citizens with the help of SMS, Email, Alerts, and Citizen Care Call Centers are the need of the time and a crucial aspect of the Citizen Relationship Management Policy.
5.5.8 Regional Language Support: The framework of the e-Governance web portals must be designed to support multilingual use. In a country like India, Regional Language Support is important; as Marathi language in Maharashtra.

5.5.9 Response Time: Technically, web response time on internet and mobile is as important as the response time by the system to the citizens for his/her application. Both time are crucial and should be incorporated by the system.

5.5.10 Citizen Charter: The Government of India has passed a bill of RTI and Citizen Charter which gives the details about the time required to complete a particular task in a Government Department along with the requisite fees. These all features should be displayed on web portal.

5.5.11 Public Awareness: In Maharashtra almost all the Departments, Ministries have their individual and dedicated web portal. But awareness is negligible in rural and semi-urban areas. Public awareness should be increased with the help of other media like newspaper and TV.

5.5.12 e-Governance Model Used: As discussed in chapter 2; from the known e-Governance three, four or five stage models suitable model can be chosen for design of the system; depending upon the requirement and analysis of the domain.

5.5.13 Reduced Cost to Citizens: The e-Governance portal should reduce the cost to citizen to perform a task if compared with the manual systems.

5.5.14 Time and Process Log: Availability of the information like time log and process log for each citizen; to know the exact status of time and the process for which the citizen has logged in the system.

5.5.15 Domain Specific Citizen Database: With the help of modern data warehousing and data mining techniques the citizen, services, schemes and other domain specific database must be designed and implemented for the system.

5.6 Quality of Services:

Delivering QoS on the Internet is a critical and significant challenge because of its dynamic and unpredictable nature. Applications with very different characteristics and requirements compete for scarce network resources. Changes in traffic patterns, denial-of-service attacks and the effects of infrastructure failures, low performance of Web...
protocols, and security issues over the web, create a need for Internet QoS standards. Often, unresolved QoS issues cause critical transactional applications to suffer from unacceptable levels of performance degradation.

5.6.1 Quality Policy Framework: Every organization; government or other do have their quality policy framework in their offices. Similar needs to be set up specifically for e-Governance modules and deliverance of services to citizens.

5.6.2 Business Process Reengineering: While designing and implementing the e-Governance system it is required to adopt a well proved system of software development which is used broadly while designing large scale IT projects. Business Process Reengineering (BPR) is basically rethinking and radically redesigning an organization's existing resources. BPR, however, is more than just process improvising; it is an approach for redesigning the way work is done to better support the organization's mission and reduce costs. Reengineering starts with a high-level assessment of the organization's mission, strategic goals, and customer needs. As a structured ordering of work steps across time and place, a business process can be decomposed into specific activities, measured, modeled, and improved. Re-engineering identifies, analyzes, and re-designs an department’s core governance processes with the aim of achieving dramatic improvements in critical performance measures, such as cost, quality, service, and speed.

5.6.3 Use of Open Source Software: Use of open source software helps for making projects platform independent and widens the compatibility which in turn helps the client side programming.

5.6.4 Information Security: Top to bottom and horizontal to vertical security aspects of information available for all the stakeholders has to be incorporated as an information security policy.

5.6.5 Service Quality Log Book: Log of each process, citizens’ requests and the way these are executed needs to be recorded for Quality Services and future enhancements.

5.6.6 Performance Index: Using the network protocols and various logs the performances of each section, employee, PC, workgroup should be recorded online. A proper system need to be designed.
5.6.7 Web Traffic Analysis: Web Traffic Analysis is to find the answers for: How many visitors are coming to website? How those visitors are getting there? How they are behaving while they are there? To provide the quality services especially for the web portals which has high traffic needs a web traffic analysis. For example for online admission system in Maharashtra June to August is peak time and requires high network bandwidth and ports.

5.6.8 Site On Time: The web services provided by web servers, database servers should be available 24X7. As online services provided by service providers claims 99.99% on time. This also includes the page load time. The speed of website is very relevant to site ranking within Google as well as other search engines. The standing theory on the increased load time of your site is that faster load times create happier internet users. This means that the faster the site loads the higher the site will rank which turns into an increased revenue stream and cost efficiency of your site.

5.6.9 Unbroken Links: Smooth navigation across the pages without any broken links is the minimum requirement of any web portal. This is the basic requirement of the quality of Services as far as web portals are concerned. Broken links are confusing and unprofessional. They bring negative impression and lower the credibility of content. It is necessary to make sure and test every link, button and page before launching site. Also it is advisory to monitor links regularly and make sure that they are working properly and leading to the correct pages.

5.6.10 Web Review: A review site is a website on which reviews can be posted about people, businesses, products, or services. These sites may use Web 2.0 techniques to gather reviews from site users or may employ professional writers to author reviews on the topic of concern for the site.

5.6.11 Periodical Enhancement: The periodically review enhancement requests helps in considering new functionality for inclusion in future releases. If they are planned then they will be moved to one of the release forums.

5.6.12 Web Audit: The main objective of web audit is to identify and improve website pages to generate qualified visitors, leads and customers. You should do a website audit once a year or more depending upon the requirements.
5.7 Security Measures:

Widespread Internet Access is making it possible for government to move information and services online, providing substantial savings in cost, time, and labour. By letting Citizen interact with the Government from their own computer rather than in person, e-Governance enhances quality of services and accessibility. However, economy and convenience must be traded off against security. Online systems are becoming vulnerable to hackers, and the Government has an obligation to prevent the unauthorized disclosure of personal information as well as prevent forgery and alternation of official documents. The task of developing the Information Security Standards and guidelines for e-Governance in India has been given to STQC. To provide trusted services, e-Governance needs to focus on efficiency, competence, litheness and transparency. From the attributes it becomes evident that the value of information held and processed by the e-Governance service needs to be protected at all levels (i.e. Application, Infrastructure, and Operation & Management). Information security is intended to preserve the information assets and is determined in terms of privacy, integrity and accessibility. To safeguard the “value” of information, effective security measures need to be implemented amicably. These security measures provide layers of protection to the application, IT infrastructure, Control and Management in an e-Governance Computing environment. Security of any information system is an amalgamated output of Application Security, and secure Operation and Management. In today’s time, a new layered approach called ‘Defense in depth’ has lately become popular, which stresses upon the enforcement of safety at all levels. Following are the sub parameters of this important parameter

5.7.1 Design of Security Policy: To design security policies it is important to research security requirements. It must be known what documents to protect and what code of execution to be controlled. It should be known how sensitive the data is and what the level of risk posed by users is. Depending on the security need and size of organization Security policies must be planned.

5.7.2 Adoption of Web Security Policy: Once the security policies are designed it should be adopted and implemented for the three tier architecture, client server model for the entire network and organization.
5.7.3 Validations, Authorization and Authentication: Validation of the users means to check if the citizen meets the expected security specifications. Authorization is specifying the access right to resources concerning the information security. Authentication is an act to check and confirmation of truth of a single data or entity.

5.7.4 Use of CAPTCHA: CAPTCHA is an acronym from Carnegie Mellon University. It stands for ‘Completely Automated Public Turing Test to tell Computers and Humans are Apart’. The CAPTCHA test is designed to disable hackers and spammers from filling auto filling forms at the webpage.

5.7.5 Backup Policy and Data Corruption Measures: Backup policy helps manage users' expectations and provides specific guidance on the "who, what, when, and how" of the data backup and restore process. It helps clarify the policies, procedures, and responsibilities. It helps the user to know where backups are located, who can access backups and how they can be contacted, how often data should be backed up what kind of backups are performed and what hardware and software are recommended for performing backups. Data corruption refers to errors in computer data that occur during writing, reading, storage, transmission, or processing, which introduce unintended changes to the original data. In general, when data corruption occurs, a file containing that data will produce unexpected results when accessed by the system or the related application; results could range from a minor loss of data to a system crash.

5.7.6 Data Encryption: In cryptography, encryption is the process of encoding messages or information in such a way that only authorized parties can read it. In an encryption scheme, the message or information, referred to as plaintext, is encrypted using an encryption algorithm, turning it into an unreadable cipher text. This is usually done with the use of an encryption key, which specifies how the message is to be encoded. Any adversary that can see the cipher text should not be able to determine anything about the original message. An authorized party, however, is able to decode the cipher text using a decryption algorithm that usually requires a secret decryption key that adversaries do not have access to. For technical reasons, an encryption scheme usually needs a key-generation algorithm to randomly produce keys.

5.7.7 Password Policies: A password policy is a set of rules designed to enhance computer security by encouraging users to employ strong passwords and use
them properly. A password policy is often part of an organization's official regulations and may be taught as part of security awareness training. The password policy may either be advisory or mandated by technical means. Some governments have national authentication frameworks that define requirements for user authentication to government services, including requirements for passwords.

5.7.8 Hardware/Software Crash Measures: A system crash occurs when a computer or a program such as a software application or an operating system stops functioning properly. If the program is a critical part of the operating system kernel, the entire computer may crash, often resulting in a fatal system error. Hardware crash refers when particular device for example CPU get failed and did not start. e-Governance system should have measures for avoidance.

5.7.9 Hacking Proof: High traffic web portals are vulnerable to hacking because they usually of the nature of open to all and non specific stakeholders. They also suffer more if their lack of expertise slows repairs and their ability to get back to work. Departments can lose significant online traffic and confidential data.

5.7.10 Use of Strong and Secure Network Protocols: A secure Web application relies upon a secure network infrastructure. The network infrastructure consists of routers, firewalls, and switches. The role of the secure network is not only to protect itself from TCP/IP-based attacks, but also to implement countermeasures such as secure administrative interfaces and strong passwords. The secure network is also responsible for ensuring the integrity of the traffic that it is forwarding. If you know at the network layer about ports, protocols, or communication that may be harmful, counter those potential threats at that layer.

5.7.11 Digital Signature: e-Governance web portals should provide facility of Digital Signature. A digital signature is a mathematical scheme for demonstrating the authenticity of a digital message or document. A valid digital signature gives a recipient reason to believe that the message was created by a known sender, such that the sender cannot deny having sent the message authentication and non-repudiation and that the message was not altered in transit integrity. Digital signatures are commonly used for software distribution, financial transactions, and in other cases where it is important to detect forgery or tampering.
5.7.12 e-SAFE (e-Governance Security Assessment Framework): National Information Security Assurance Framework for eGovernance has identified the need to develop various standards and guidelines to ensure information security in various e-Governance information systems. This document will provide guidelines for categorizing the information systems used for e-Governance to enable selection of appropriate levels of security measures. The guidelines will give an idea about the types of information and information systems to be included in each category. This guideline is one of the documents identified in the e-Governance Security Assurance Framework.

5.7.13 RAS/VPN: RAS is usually used for accessing services through a modem link. VPN is a link between two nodes carried by virtual circuit or the public network ‘the Internet’. VPN is very secure if its setup is right. The VPN can be compared to a local area connection spread over a large distance. A RAS is a truly local area connection between two connections. A VPN is a dedicated service while RAS is not. For Government organization; network must be implemented with RAS/VPN techniques.

5.8 Web Development Tools:
Web development is a broader term used for almost any activity involved in building a website. This can include web design, e-commerce and business development, web content development, client-side and server-side scripting, and even web server configuration. The web development certificate concerns itself with the non-design part of a website that the end-user or client sees, and uses client-side technologies like markup languages such as HTML, CSS, and client-side scripting languages like JavaScript. Web development tools give you the ability to create and maintain resources for Web applications in Web projects, which typically contain Server Pages, Hyper Text pages or images, and any associated metadata. Web Projects are always imbedded in Enterprise Application projects, since the Web development tools wizards that let you create a Web project or import a WAR file require that an Enterprise Application project be specified. When you complete tasks with the wizards, they will update the application.xml deployment descriptor of the specified Enterprise Application project so that your Web project is defined as a module element.
5.8.1 Programming Language Paradigm: A programming paradigm is an approach to programming a computer based on a mathematical theory or a coherent set of principles. Each paradigm supports a set of concepts that makes it the best for a certain kind of problem. Selection of paradigm helps to select the particular programming language depending upon the e-Governance application.

5.8.2 Open Source: Many people prefer open source software because they have more control over that kind of software. They can examine the code to make sure it's not doing anything they don't want it to do, and they can change parts of it they don't like. Users who aren’t programmers also benefit from open source software, because they can use this software for any purpose they wish—not merely the way someone else thinks they should.

5.8.3 File Formats: File format is the layout of a file in terms of how the data within the file is organized. A program that uses the data in a file must be able to recognize and possibly access data within the file. A particular file format is often indicated as part of a file's name by a file name extension (suffix). Conventionally, the extension is separated by a period from the name and contains three or four letters that identify the format.

5.8.4 Open Source Development Environment: Open source software promotes software reliability and quality by supporting independent peer review and rapid evolution of source code. A proprietary solution cannot compare to that of open source. Use of open source development environment makes clients i.e. citizens more comfortable.

5.8.5 Font and Display Standards: To make internet a better place, for both developers and visitors, it is important that both browsers and Web developers follow the display standards. Using Web standards will ensure that all browsers will display your Web site properly, without time-consuming rewrites. Web pages that conform to the standard are easier for search engines to access and index, easier to convert to other formats, and easier to access with program code.

5.8.6 Web Content Accessibility Guidelines (WCAG): Web Content Accessibility Guidelines covers a wide range of recommendations for making Web content more accessible. These guidelines will make Web content more usable to users in general. WCAG 2.0 success criteria are written as testable statements that are not technology-specific. Guidance about satisfying the success criteria in specific technologies, as well as
general information about interpreting the success criteria, is provided in separate
documents by W3C. All e-Governance web portals in India have adopted WCAG 2.0
guidelines for their web portal design and developments.
5.8.7 SMS and Email Gateway: email gateways offering free anti-spam, anti-virus
protection and Data Loss Prevention to secure all existing email servers, such as
Microsoft Exchange, Lotus Domino, Postfix, Exim, Qmail and more. An SMS gateway
allows a computer to send or receive SMS transmissions to or from a telecommunications
network. Most messages are eventually routed into the mobile phone networks. Many
SMS gateways support media conversion from email and other formats.
5.8.8 Hosting: Web hosting is a process of providing storage space and access for
websites. The web-hosting or server is much like the space that you rent out to have your
business in. It's merely the space itself. It does not include furnishings like shelves for
your products, just as the web-hosting account doesn't include a site for you to sell your
products.
5.8.9 Search Engine Optimization: Search engine is a program that searches for and
identifies items in a database that correspond to keywords or characters specified by the
user, used especially for finding particular sites on the World Wide Web. Search engine
optimization is the process of maximizing the number of visitors to a particular website
by ensuring that the site appears high on the list of results returned by a search engine.
5.8.10 Payment Gateway: A payment gateway is a service that sends credit card
transactions to the credit card payment networks for processing. When you accept credit
cards through a website checkout, it will submit your transaction to your selected
payment gateway for routing to the credit card payment networks. A payment gateway is
a server that is dedicated to linking websites and banks so that online credit card
transactions can be completed in real-time.
5.8.11 Data Mining: Data mining is the practice of examining large pre-existing
databases in order to generate new information. Data mining is the practice of
automatically searching large stores of data to discover patterns and trends that go
beyond simple analysis. Data mining uses sophisticated mathematical algorithms to
segment the data and evaluate the probability of future events. Data mining is also known
as Knowledge Discovery in Data.
5.8.12 Data Warehouse: Data warehouse is a large store of data accumulated from a wide range of sources within a company and used to guide management decisions. A data warehouse is a subject-oriented, integrated, time-variant and non-volatile collection of data in support of management's decision making process.

5.8.13 Character Encoding Standard: Text in a computer or on the Web is composed of characters. Characters represent letters of the alphabet, punctuation, or other symbols. Unicode is a universal character set, i.e. a standard that defines, in one place, all the characters needed for writing the majority of living languages in use on computers. As long as client and server agree on the encoding, they can use any encoding that can be converted to Unicode.

5.8.14 Online Analytical Processing: OLTP is characterized by a large number of short on-line transactions like insert, update, delete etc. The main emphasis for OLTP systems is put on very fast query processing, maintaining data integrity in multi-access environments.

5.8.15 Online Transaction Processing: OLAP is characterized by relatively low volume of transactions. Queries are often very complex and involve aggregations.

5.9 Infrastructure (e-Readiness):

e-Readiness is the ability to use ICT to develop one's economy and to foster one's welfare. There are several benchmarking indices at the macro level, also called global, universal, etc. e.g., those calculated by the UNPAN, World Bank, Economist Intelligence Unit etc. Because what appear on the macro level can hide wide heterogeneity among organizations, local areas, individuals, in digital access, a micro level more detailed benchmarking is suggested to compute sub-measures for networking, applications, web-accessibility and readiness (NAWAR). e-Readiness indices at the macro level are constructed primarily for ranking countries, facilitating comparisons between countries and over time. They can also be used to track the global digital divide, i.e. the gap between countries that have access to ICT and those that do not (mainly because of differences in income, education, etc.). NAWAR is constructed primarily to measure how ICT is actually put to work for development. For example, NAWAR is concerned with the gap between humans with respect to natural / assistive access to ICT in e-business
environments, i.e., whether organizations have assistive systems (e.g. Braille keyboards and printers, one-handed keyboards, annotated websites for screen reading software, etc.) and whether organizational cultures adopt green computing. More importantly, because NAWAR is concerned with how ICT is actually put to work for development, attention is given to change in the level of activity, i.e. the move from e-readiness to impact in e-business environments.

5.9.1 Web Portal Management Team: Web Portal Management Team is an organization's structure of staff and the technical systems, policies and procedures to maintain and manage a website. Website management team applies to both Internet and Intranet sites. With the proper infrastructure for e-Governance; each department must have web portal management team.

5.9.2 Availability of Software Resources: Characteristic of a resource that is committable, operable, or usable demand upon to perform its designated or required function. It is the aggregate of the resource's accessibility, reliability, maintainability, serviceability, and sociability. Availability of Software Resources for all the stakeholders is a must.

5.9.3 Network Connectivity Wired, Wireless, and Mobile: While e-Governance is often thought of as Internet Based Governance many technologies can be used in this context. This includes Telephone, Fax, PDA, SMS, MMS, wireless networks and services, Bluetooth, CCTV, Tracking Systems, RFID, Biometry, Smart Cards, TV, Radio, email, m-Governance, and GIS, GPS applications.

5.9.4 Natural Disaster Recovery Policy: Natural Disaster recovery is the process, policies and procedures that are related to preparing for recovery or continuation of technology infrastructure which are vital to an organization after a natural or human-induced disaster. Disaster recovery focuses on the IT or technology systems that support business functions, as opposed to business continuity, which involves planning to keep all aspects of a business functioning in the midst of disruptive events.

5.9.5 KIOSKS: Information display kiosks are useful in public places like municipal offices, educational institutions, visitor information booths, libraries, galleries, conferences, shopping malls, airports, in short any location where simple, easy access to information is desirable. Kiosks are normally set up with touch screens or pointing devices such as trackballs, to allow people to select and view information that is
attractively displayed and up to date. There are many ways to create kiosks, from expensive solutions based on proprietary software to HTML-based open-source solutions. Browser-based technologies are particularly attractive because they are inherently multimedia, offering text, graphics, sound and streaming media, and the content is highly portable. It is expected that each e-Governance web portal should design and provide KIOSKS to the citizens.

5.9.6 Cyber Café: Through Maharashtra State Wide Area Network (MSWAN) Government has set up facilitating centers to citizens. These include privately operated cyber cafes also. These cafés are available in urban, semi urban and rural areas and provide e-Governance service facilitation centre at a very nominal rates at the doorstep of the citizens.

5.9.7 Infrastructure available for Citizens / Call Centers: Call centre has proved to be an important medium to serve the citizens in various ways. Through an integrated call centre a person can get all information about the departments through the medium of single phone call. Call centers provide fast, efficient and relatively cheaper solutions to departments in managing their day-to-day activities. In this connection, there appears to be a reasonable prospect of implementing business-type call centers as an e-Governance tool in delivering better services including the dissemination of important information to citizens and other stakeholders.

5.10 Governance Support System:

GSS is an intelligent software that supports governing bodies with government level information and thus enhance governing capacities and facilitates decentralized need based planning, budgeting and development.

5.10.1 Decision Support System: DSS is a computer-based information system that supports organizational decision-making activities. DSSs serve the management, operations, and planning levels of an organization, usually mid and higher management and help to make decisions, which may be rapidly changing and not easily specified in advance. The e-Governance portals should have a provision for DSS.

5.10.2 Executive Support System: ESS is a reporting tool that allows you to turn your organization's data into useful summarized reports. These reports are generally used by
executive level managers for quick access to reports coming from all company levels and
departments such as billing, cost accounting, staffing, scheduling, and more.

5.10.3 Executive Information System: EIS is a type of management information system
that facilitates and supports senior executive information and decision-making needs. It
provides easy access to internal and external information relevant to organizational goals.
EIS offers strong reporting and drill-down capabilities.

5.10.4 Top Down-Bottom Up: Top-down approaches emphasize planning and a complete
understanding of the system. Top-down approaches are implemented by attaching the
stubs in place of the module. This, however, delays testing of the ultimate functional
units of a system until significant design is complete. Bottom-up emphasizes coding and
early testing, which can begin as soon as the first module has been specified. This
approach, however, runs the risk that modules may be coded without having a clear idea
of how they link to other parts of the system, and that such linking may not be as easy as
first thought. Re-usability of code is one of the main benefits of the bottom-up approach.

5.10.5 Information Hierarchy: People naturally categories to make information more
manageable. Use a hierarchy to help people choose where to direct their attention - and
how deep they want to go. An effective information hierarchy helps people know where
to find things, and also what kinds of things there are to find.

5.10.6 Reporting Tools: Reporting software is used to generate human-readable reports
from various data sources. This helps both; citizens and employees; e-Governance
through portals.

5.10.7 Automated Tools: There are certain tools which requires on daily basis for regular
operators and government employees and have many core transactions associated with it.
Such tools need to be designed carefully and implemented with capacity building.

5.10.8 Analytical Tools: For middle and higher level government officer’s analytical
tools are major operators for decision making. Graphical, tabular, annual, monthly, region
wise, scheme wise, service wise, group wise, cluster wise tools are some of the example
of the analytical tools.

5.10.9 Expert System: An expert system is a computer system that emulates the decision-
making ability of a human expert. Expert systems are designed to solve complex
problems by reasoning about knowledge, represented primarily as if–then rules rather than through conventional procedural code.

5.10.10 Meta Data and Data Dictionary: A metadata (also called the data dictionary) is the data about the data. It is the self describing nature of the database that provides program-data independence. It is also called as the System Catalog. Data dictionary is used to actually control the database operation, data integrity and accuracy. Metadata is used by developers to develop the programs, queries, controls and procedures to manage and manipulate the data. As e-Governance systems have huge, sensitive and secured data the availability of Meta data and data dictionary are highly desirable.

5.10.11 Process Intelligence: process intelligence systems combine operational data with analytical tools to present complex and competitive information to planners and decision makers. The objective is to improve the timeliness and quality of inputs to the decision process. Process Intelligence is used to understand the capabilities available in the Government Organizations; the state of the art, trends, and future directions in the governance, the technologies, and the regulatory environment; and the actions of competitors and the implications of these actions. The emergence of the data warehouse as a repository, advances in data cleansing, increased capabilities of hardware and software, and the emergence of the web architecture all combine to create a richer process intelligence environment than was available previously.

5.10.12 Process Flexibility: Process must be able to deal with uncertainty, exceptional situations, and environmental changes. Needed citizen agility is often hindered by the lacking flexibility of existing process. Once a process is implemented, its logic cannot be adapted or refined anymore, and no flexibility is provided to users. This often leads to rigid behavior or gaps between real world processes and implemented ones.

5.11 Economic and Social Aspects:

Governments are confronted with a new reality and changed imperatives as a result of the diffusion of ICT throughout the world and within their nations. This demands a fundamental change in the way the State acts internally and interacts with its citizenry, particularly in its function of promoting good governance as a condition for sustainable social and economical development. The advent of the information society is creating
unprecedented conditions for exercising this function. Through ICT and e-Governance applications, communication between administrations, citizens and businesses can be enhanced to improve governance and public sector management, access economic and social opportunities and bridge the digital divide within a society and between countries.

5.11.1 Public Private Partnership (PPP): is a government service or private business venture which is funded and operated through a partnership of government and one or more private sector companies.

5.11.2 e-Governance Project Life Cycle (e-PLC): Every Government Department / Organization should design their own project life cycle. For long term planning and to achieve mission, vision, goals and objectives properly framed e-PLC in collaboration with SDLC are necessary.

5.11.3 IT ACT: An Act to provide legal recognition for the transactions carried by means of electronic data interchange and other means of electronic communication, commonly referred to as ‘e-Functions’, which involve the use of alternatives to paper based methods of communication and storage of information, to facilitate electronic filings of documents with the Government agencies.

5.11.4 Legal Aspects: The Department of Information Technology, Government of India and IT Act 2000 has been tasked with evolving/laying down Standards and Legal Policy Guidelines in its role as facilitator and catalyst. Owing to the complexities involved in evolution/development and adoption of the overall framework standards and to ensure sharing of information and seamless inter-operability of data and e-Governance applications under NeGP, an Apex body is constituted with a mandate to approve, notify and enforce the Standards/Guidelines formulated by different Working Groups.

5.11.5 Digital Divide: Digital divide is an economic inequality between groups, broadly construed, in terms of access to, use of, or knowledge of ICT. The digital divide refers to the difference between people who have easy access to the Internet and those who do not. There are many issues that contribute to the digital exclusion of vulnerable groups culminating in the underutilization of e-Governance services by those who need them most. Among the important issues of digital exclusion are infrastructure and access. Gaps in citizens’ access to and use of ICTs and e-Governance services often consist of
connectivity hurdles, such as the lack of affordable access to PCs, Internet devices, modems, telephone lines, and Internet connections.

5.11.6 Geographical Divide: The continental /geographical divide is defined as an imaginary or physical boundary that separates how the waters are drained into the ocean, seas, or bays. On one side of the boundary, water flows into a specific body of water or waters, and on the other side of the boundary, the water flows into a different set of bodies of water.

5.11.7 Educational Divide: Educational divide that already exists, especially for higher education. Certain societal groups or communities may be excluded from current educational provision for a variety of reasons. Within higher education some or all of the following may be barriers to particular groups and communities engaging with available provision. India with a large population and low literacy rate, education divide matters a lot.

5.11.8 Social Divide: The social divide is the gap between the information rich and information poor within a society like people with different levels of income, racial/ethnic groups, family situations, age groups, disabilities, etc.

5.12 Matrix Formulation:
For evaluation of these portals data analysis is done by formulation of the matrices for each major parameter. For example for Functional content parameter there are 18 sub parameter and 80 selected web portals under G2C category. A matrix of 18 by 80 is formulated. Each element of the matrix can have one value out of 1, 0.5 or 0. As explained in chapter 6 in detail. 1 score indicate the particular service/facility/link is available on the web portal and working with fullest facility; 0 indicated facility does not exist and 0.5 score is for partial provisions. Likewise the data analysis is done for all the 10 major parameters. The same is repeated for other two categories viz. G2B and G2E.

For Functional Content sub-parameter the matrix is look like as shown in following table:
Table 5.1: Evaluation Matrix

<table>
<thead>
<tr>
<th>Portal No</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>S6</th>
<th>S7</th>
<th>S8</th>
<th>Total Score</th>
<th>Total Weighted Score</th>
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<tr>
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<td>1</td>
<td>1</td>
<td>1</td>
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<td>1</td>
<td>1</td>
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<td>90.6</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>10.5</td>
<td>73.2</td>
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<tr>
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<td>1</td>
<td>0</td>
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<td>62.7</td>
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<td>..</td>
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<td>1</td>
<td>1</td>
<td>0.5</td>
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<tr>
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<td>1</td>
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<td>0.5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>13.5</td>
<td>94.1</td>
</tr>
</tbody>
</table>

On the basis of matrix element score for Functional Content parameter for each portal is evaluated as:

\[
\text{Total Score (Functional Content)} = T_1^2 = \sum_{i=1}^{n} a_{1n}
\]

where \( T_i^2 \) = score of first web portal for second parameter i.e. total score of Maharashtra Government web Portal (www.maharashtra.gov.in) for Functional Content parameter. Similarly, \( T_{671}^2 \) = score of 71st web portal for sixth parameter i.e. total score of MHADA web Portal (www.mhada.maharashtra.gov.in) for Security Measure parameter.

Along with the parametric score weighted score is also calculated on the basis of weights allotted by the respondents for the particular parameter. Lastly the final score for each web portal is calculated as:

\[
\text{Final Score } W_i = \sum_{i=1}^{10} T_{ii}
\]

where \( W_i = \text{Final score of } i^{th} \text{ web portal.} \)