CHAPTER 1
INTRODUCTION

1.1 Background

E-Governance is the application of Information and Communication Technology (ICT) that uses cloud computing technology or the Internet or the WWW to provide government information and services to its citizens. At this point, E-Governance particularly uses the software as a service (SaaS) model, to enhance the access and delivery of government information and services to all of its citizens, businesses, government agencies and other agencies at all levels of government (Varma 2010). Figure 1.1 shows some application services of Indian E-Governance services to citizens. The software as a service is a type of web application that can be accessed over the internet or cloud with specific URLs.

![Figure 1.1 E-Governance Application Suites (NIC 2013)](image)

The ability to access the information is a key feature of citizenship and participation in society. Most of the Indian government departments have individual websites that offer information and services directly to citizens, including information for
research, government forms and services, public policy information, employment and business opportunities, voting information, tax filing, license registration or renewal, payment of fines, and submission of comments to government officials (Chander & Kush 2011).

According to Mukherjee & Sahoo (2010); many individuals believe increased access to government information online will help them become more active participants in the democratic process.

However, in order to reach the government information and services to all citizens, it must be fully accessible to all citizens, including people with disabilities (Sharma et al. 2008). To provide better accessibility of Indian E-Governance websites the Department of Information Technology, Government of India had developed a set guideline in 2009. These Guidelines are based on International Standards including ISO 23026, W3C’s Web Content Accessibility Guidelines and Disability Act of India as well as Information Technology Act of India (NIC 2009).

Further, the longstanding experience of the employers in design, development and management of government websites as well as their knowledge of the ground realities and challenges faced by the Government Departments in developing and managing their websites have helped significantly in drafting these Guidelines. The requirement of the guidelines is that all Indian E-Governance websites should provide their information and services in a fully accessible manner (NIC 2009).

The failure to achieve acceptable levels of accessibility for E-Governance services threatens not only the E-Governance initiatives, but also the relationship between the government and citizens in general (Mukherjee & Sahoo 2010).

Accessibility and usability are the most important factors when determining the success of an E-Governance project and this should be reflected to the user via the E-Governance websites (Huang 2010). Thus, any E-Governance project should pay sufficient attention in its strategy for designing accessible websites, as it is the main cornerstone for the E-Governance project’s success.
The objects of the website are considered as one of the most important aspects of accessibility, because it is the medium for interaction and communication between the system and the users (Jeng 2005; Bertot et al. 2008). Good accessibility of any system should be the main goal of website designers, and the website must be satisfactory for those users with disabilities (Wu et al. 2009). So, without having good accessibility in E-Governance websites, E-Governance will continue to find problems when interacting with users.

1.2 The Problem Statement

The recent government acts like the existence of internationally accepted web content accessibility guidelines and Indian government website development guidelines are developed for the production of web contents and must be accessible to all the citizens including people with multiple disabilities. However, there are still many E-Governance websites which remain inaccessible for people with multiple disabilities (Sharma et al. 2008; Chakravarthula 2011; AlFawwaz 2011).

Hence, the main research problem to be addressed is - How to improve and maintain a consistently high level of accessibility throughout the E-Governance websites and more successful E-Governance project development in India? From this the following sub-problems follow:

- Are the nationally and internationally accepted accessibility guidelines being implemented?
- Are the available guidelines sufficient to achieve consistent high accessibility?
- Are the available Accessibility checking tools support and maintain constant accessibility?
- Are the internal or external factors of E-Governance agency affecting the accessibility?
- Are the users participation needed to develop an accessible website?
- Is any new development model needed to develop accessible E-Governance websites?
Are the available metrics enough to rank and measure the accessibility level?

1.3 Research Motivations

The main factors that led to my choice of topic are:

(1) Its social relevance,

(2) Its scientific challenge,

(3) Its usefulness.

First, the developing countries have become more interested in E-Governance and pointed out that 35% of E-Governance projects in developing countries are classified as being total failures, 50% partial failures and just 15% successful (UNPAN 2014). Unfortunately, most of these governments have faced some challenges in making their websites Accessible. Although accessibility is becoming one of the main reasons affecting users dealing with E-Governance, as well as affecting the success or failure of E-Governance project development (Huang 2010). In addition, there does not appear to be much focus in studies, nor many studies that concentrate on E-Governance accessibility, so far in developing countries, particularly in India, which leaves a significant gap in the available literature that need to be filled.

Second, the Indian E-Governance websites are subject to a lack of consistency in relation to standards and features, as well as an absence of different features that improves interaction with the user, most likely due to a lack of consideration for the people’s expectations and needs (Jaeger 2006). Although there is already software (e.g., screen reader, screen magnifier, voice recognizer) designed specifically for blind, low vision and mobility impairments. But for mobility impairment the voice recognizer or eye tracking applications are well working in standalone systems but not in web based applications.

Moreover, most frequently visited websites currently offer no accessibility options for the disabled users. Now-a-days the people without disabilities are also lacking when they interact with thin client devices (Manhas 2014). This investigation will help to
identify some main points that could help in improving the accessibility of E-Governance websites in India for future websites.

Finally, one of the problems E-Governance websites face is not understanding or ignoring the end user’s needs, which will negatively affect the accessibility of websites. These issues are more significant in developing countries such as India. If the E-Governance websites are more accessible to disabled and non-disabled people, then the interaction between the government and their citizens will improve (AlFawwaz 2011). This improvement will help the growth of the country and their people in socially and economically. Providing equal access to disabled people is a key feature of citizenship and participation in society (Mohammad et al. 2009).

1.4 Research Aim and Objectives

The aim of this research was to improve and maintain a high level of accessibility of E-Governance websites and more successful E-Governance project development in India, by conducting comprehensive, user-centered accessibility testing of Indian E-Governance websites. Findings and conclusions from this research have the potential to offer meaningful information that can be applied to improve the accessibility of e-government websites. The conclusions of this research include an analysis of testing issues, proposed a novel metric for assessment of accessibility of Indian websites, and reinforcement of the conceptual model. The findings from this research were intended to be practical and useable in the design of websites and on those websites that have already been implemented.

The aim was achieved by performing the following objectives:

- Evaluating the current status of the existing E-Governance websites in India by automatic evaluation tools;
- Investigating the level of accessibility of the existing E-Governance websites in India from the manager’s and content developer's perspective;
- Evaluating the status of accessibility of the existing E-Governance websites in India from the end-users perspective;
Proposing a model of the E-Governance website accessibility in order to provide a guide on how to achieve an accessible E-Governance websites in India;

Proposing a new metric for measuring accessibility assistance needed for a website.

1.5 Significance of the Research

The accessibility of E-Governance websites is an issue that must be addressed to avoid excluding a large number of citizens from the benefits of E-Governance, as inaccessible E-Governance websites deny people with disabilities, the chance to equally use the information and services on the websites (Jaeger 2006). In India, there has been a very poor record of conducting the accessibility of E-Governance websites at the national and state levels (Sloan 2014). The accessibility of specific types of local E-Governance websites, such as websites of public libraries and government Universities has also needed to be examined.

Further, this research has value to the 70 million Indians with disabilities (India 2012), as it may help to facilitate increases the accessibility of E-Governance information and services. People with multiple disabilities, including visual impairments, mobility impairments, cognitive impairments, and learning disabilities, can encounter serious accessibility problems with E-Governance websites.

According to Bailey (2007); providing equal access to electronic information and services has become an important new area of concern for social justice. Accessibility allows individuals with disabilities to have use of information and services that is equal or equivalent to those used and enjoyed by everyone else (Zeng 2004). Given the growing importance of information technology in the organization and retrieval of information, this research is a particular concern for individuals with disabilities.

Testing the accessibility of E-Governance websites, by measuring WCAG with the Indian government guidelines represents a way in which to ensure as many people as possible are able to use E-Governance websites (Marincu 2006). If the goal of the government is to expand the number of people using E-Governance and the amount of
information and services available on the websites, then accessibility testing could done by how to continually improve websites for users.

Testing and ranking the accessibility E-Governance websites, if performed in a comprehensive manner, could be significant in the development of E-Governance for persons with disabilities to participate in and communicate with the government (Marincu 2006). This type of testing and ranking can also help the Advisory and the executive commities to understand whether the goals of accessible E-Governance, feasible and most effective E-Governance are currently established.

1.6 Research Approach

In order to address the research problems stated in section 1.2, five research approaches have been created. The research approaches are as follows:

- **Evaluate the current accessibility status by automatic tool:** It is mandatory to analyze the Indian E-Governance websites by automatic tools, in-order to identify what features are missing for the disabled people access, is the available guidelines are implemented properly and is the tool is addressing all problems needed by disabled or any up gradation are needed to check the accessibility (Carmen Marincu 2006).

- **Evaluate the current accessibility status by managers and experts:** In-order to develop best accessible website it is must to understand the requirements from E-Governance website managers and content developers (AlFawwaz 2011). This will help to maintain consistent accessible E-Governance websites, for this a set five scales Likert questionnaires was developed and given to them for identifying the requirements.

- **Evaluate the current accessibility status by the end-user:** For the growth of any country and the E-Governance development it is very important to participate in the citizens. By that way conducting research by end-user perspective is very helpful for developing accessible websites (AlFawwaz 2011; Freire 2012). To understand user feedback about our Indian E-Governance websites the study was conducted in two stages, the first one is pre test and the second one is post test. The pretest
includes the general information about them and about some of the websites. Post test includes five types of five scales Likert questions, the users are requested to use particular websites and then respond to the questionnaire.

- **Develop AESD (Accessible E-Governance Site development) model:** this thesis is presenting a model which supports to develop and maintain accessible websites. The model was developed based on the findings of the tool study, managers, expert study and end-user study. Its aim is to allow the quick identification, diagnosis and correction of pages with accessibility barriers and maintain constant accessible websites.

- **Develop AAEM (Accessibility Assistance Evaluation Metric) Metric:** A new metric is proposed in this thesis, in-order to measure the accessibility level of websites and ranking based on the score.

**1.7 Structure of the thesis**

The research presents a detailed examination of the subject background, research methodology, data analysis, findings, novel model, metric and discussion of the development of accessible E-Governance websites to knowledge and practice. The work presented in this thesis aims at improving accessibility of Indian E-Governance websites. The flow of the research is illustrated in Figure 1.2. The next sections summarize the content of each chapter:

- **Chapter One: Introduction**

  Chapter one describes the overview of the research with a clear statement of: the research background, problem statement, aim, objectives, research approach, significance and definition of key terms. Finally, the structure of the thesis and summary is provided.

- **Chapter Two: Relating Disabilities and Website Accessibility**

  Chapter two describes about multiple disabilities, how the disabilities affecting them when interacting with websites and the importance of better
accessible websites. The chapter also describes the features that cause accessibility problems for people with disabilities and the need for accessible website design.

- **Chapter Three: Literature Review**

  Chapter three reviews the literature about website accessibility guidelines, accessibility evaluation methods, tools and metrics used to measure the accessibility level, people’s needs of E-Governance, challenges of E-Governance development, accessibility of the E-Governance website, E-Governance development in India, about MMPs, the accessibility level of E-Governance websites in India.

- **Chapter Four: Research Methodology**

  Chapter four describes the research methodology used in the research work. The chapter also provides an overview of the methodology, data collection methods, the choice of participants and data analysis approaches.

- **Chapter Five: E-Governance website accessibility evaluation from Automatic tool’s perspective**

  Chapter five presents the evaluation of the accessibility status of the existing E-Governance websites in India from automatic evaluation tool’s perspective. The chapter describes data collection method, problems identified by the analysis, the results and discussion are presented and conclusions drawn.

- **Chapter Six: E-Governance website accessibility evaluation by manager’s and content developer’s perspective**

  Chapter six describes the level of accessibility of the existing E-Governance websites in India from the management and content developer’s point of view. Data were collected by a set of questionnaires, the results are presented, discussed and a general conclusion is drawn presenting the facts about management and content developer’s views on the current level of accessibility of the E-Governance websites in India.
Chapter Seven: E-Governance website accessibility evaluation by end-user’s perspective

Chapter seven presents the evaluation of the accessibility status of the existing E-Governance websites in India from the end-user’s perspective, drawing on data collected through a specially designed questionnaire, methodology used during this part of study is given; the results and discussion are presented and conclusions drawn.

Chapter Eight: The Proposed AESD Model

Chapter eight presents the proposed AESD (Accessible E-Governance Site Development) model to improve E-Governance website’s accessibility in India. An explanation will present the method adopted for creating the model.

Chapter Nine: The Proposed AAEM Metric

Chapter nine presents the proposed AAEM (Accessibility Assistance Evaluation Metric) metric to measure the assistance needed for the E-Governance website to disabled. An explanation will present the method adopted for creating the metric.

Chapter Ten: Conclusion and Future work

Chapter ten presents the conclusion of this research and recommendations for future work.

1.8 Definitions of key terms

This section defines the key terms that are used throughout the thesis.

- **Disability:** disability may be generally defined as a condition which may restrict a person's mental, sensory, or mobility functions to undertake or perform a task in the same way as a person who does not have a disability.
- **End user:** End user is the person who actually uses a particular product.
- **E-Governance**: It is the application of information and communication technology (ICT) for delivering government services, exchange of information communication transactions, integration of various stand-alone systems and services between government-to-customer (G2C), government-to-business (G2B), government-to-government (G2G) as well as back office processes and interactions within the entire government framework in the form of two-way-communication.

- **E-Government**: It is the transformation of internal and external public sector relationships, through Information and Communications Technology (ICT) in order to optimize government service delivery and citizen participation in the form of one-way communication.

- **WWW**: WWW refers to the World Wide Web. The World Wide Web consists of all the public websites connected to the Internet worldwide, including the client devices (such as computers and cell phones) that access web content. The WWW is just one of many applications of the Internet and computer networks.

- **Internet**: Internet is a global computer network providing a variety of information and communication facilities, consisting of interconnected networks using standardized communication protocols.

- **Web Service**: Web Service is a method of communication between two electronic devices over a network. It is a software function provided at a network address over the web with the service always on as in the concept of utility computing.

- **Web Accessibility**: Web Accessibility means that people with disabilities can use the web. More specifically, Web accessibility means that people with disabilities can perceive, understand, navigate, and interact with the web, and that they can contribute to the web. Web accessibility also benefits others, including older people with changing abilities due to aging.

- **Website**: Website also written as site is a set of related web pages typically served from a single web domain. A website is hosted on at least one web server, accessible via a network such as the Internet or a private local area network through an Internet address known as a Uniform resource locator. All publicly accessible websites collectively constitute the World Wide Web.
1.9 Summary

This chapter initially presented the background details of this research and explains the research problem. Then this chapter discovered the aim of this research, objectives and...
research approaches to solve the research problems. Also, this chapter highlighted the motivation and significance of this research and the way it is adding to knowledge.

The significance section presented that how much this research is useful in India for accessible E-Governance website development for better delivery of government services directly to the citizens without any barriers including people with disabilities. Finally, this chapter presented definition of key terms that involved in the research work.

The following chapters describe the literature, analysis and practical implementation of the steps detailed in the thesis. Next chapter describes about multiple disabilities, how the disabilities affecting the people when interacting with websites and the importance of better accessible websites. The chapter also describes the features that cause accessibility problems for people with disabilities and the need for accessible website design.