

Chapter 1. Introduction

1.1 Introduction

Developments in Information Communication Technology (ICT) have revolutionized entire niche of human life. Like any other domain it has made remarkable impact on governance also. ICT has not only supplied the infrastructure for soliciting public input into planning decisions, but has opened new channels of communication between citizens, designers, advocacy groups, and decision makers.

e-Governance is the process of using information technology for automating both the internal operations of the government and its external interactions with citizens and other businesses.

It is the application of electronic means in (a) the interaction between government and citizens, and government and businesses, as well as (b) in internal government operations to simplify and improve democratic, government and business aspects of governance [1]

Variety of e-governance initiatives have been undertaken to improve the efficiency and effectiveness of internal government operations, communications with citizens and transactions with individuals and organizations [2].

As e-governance applications are increasing, management and retrieval of information in such systems are becoming more complicated. Metadata can be used to tackle such situations. Here the organizing skills and theory used in libraries can be applied. Metadata is structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource. Metadata is often called data about data or information about information [3].

There are number of institutions and government departments developing e-governance tools, catering to the varied information or service needs of different categories of users. Several such tools represent the same concept in different terminologies or format, resulting in incompatibility and very limited exchange of information among such initiatives. This hinders access to information required by the government, business, NGOs and general public.

This research work concentrates on identification of metadata elements for e-governance in Indian context and suggests an interoperable e-Governance metadata framework model using semantic web concepts and technology.

1.2 Problem

The most important anticipated benefits of e-governance include improved efficiency, convenience, and better accessibility of public services.

E-governance initiatives all over the world are mostly ambitious and costly e-government programmes. The required domain analysis is usually conducted on a local and ad-hoc basis, due to lack of commonly accepted standards for the overall e-governance system.

Many developments initiated by various government agencies are seemingly done in isolation. Different development platforms are used and the applications under different platforms are seldom interoperable, with the result that, it is difficult to integrate them even though they have similar features and functionalities [4].

A major problem of the current e-governance initiatives in India is non compliance of interoperability. Due to this, communication between the stakeholders in governance is difficult.

1.3 Need for the Study

1.3.1 Global Scenario

An increasing number of governments are currently launching or maintaining metadata initiatives. These initiatives aim amongst others to define appropriate metadata standards for describing governmental resources.

Different countries are adopting e-governance practices since several years. Number of European Union member states have done considerable work towards establishing national standards on the use of metadata for describing governmental resources. These include UK [5], Ireland [6], Iceland, Finland and Denmark [7].

A number of countries outside the European Union have also established metadata application profiles for governmental resources. Some of these countries include USA [8], Canada [9], Australia [10], New Zealand [11] etc.

Examples of such e-governance standards are:

- E-GMS (E-Government Metadata Standard): United Kingdom
- AGLS (Australian Government Locator Service) Metadata Set:
Australia
- NZGLS (New Zealand Government Locator Service): New Zealand
- GILS (Government Information Locator Service): United States

1.3.2 Indian Scenario

The National e-Governance plan of Government of India has entrusted NIC with the task of providing network back-bone and e-Governance support to Central Government, State Governments, Union Territory Administrations, Districts and other Government bodies. It offers a wide range of ICT services including nationwide communication network for decentralized planning, improvement in government services and wider transparency of national and local Governments. NIC assists in implementing Information Technology

projects, in close collaboration with central and state governments, in the areas of (a) Centrally sponsored schemes and central sector schemes, (b) State sector and State sponsored projects, and (c) District administration sponsored projects. NIC has been entrusted with the major task of formulation of standards as a part of National e-Governance Plan (NeGP) in association with other stakeholders.

Following five areas have been identified under the National e-Governance Plan (NeGP) as the key priority areas:

1. Quality and Documentation
2. Localisation and Language Technology Standards
3. Meta Data and Data Standards for Application Domains
4. Network and Information Security
5. Technical Standards and E-Governance Architecture

Working groups are being set up for each of the above areas. The Terms of Reference of the Working Group is as follows [12]:

- Advise on development of required White Papers for discussion in the Working Group to evolve standards
- Evolve Standards
- Manage interaction with similar initiatives and standards bodies elsewhere in the world
- Nominate members on various international standards committees and continuously strive towards key roles for India in such international forums
- Define the scope of any deliverables, expected milestones, and the process for the group participants to approve the release of these deliverables (including publishing intermediate results)
- Determine any dependencies of other entities on the deliverables of this group
- Define the expected level of involvement by the members of the Team (e.g., to track developments, write and edit technical reports etc).

- Must also include an estimate of the expected time commitment from participants
- Requirements that a quorum of group participants supports any formal decision of the group
- Change control of the draft standard document and version management
- Create a supporting framework for implementation and testing
- Setting timeline for the release of initial set of standards to the apex body of standards of DIT.

1.3.3 Need for this Study

Earlier most governance activities were done manually. But, due to advances in information technology, government departments in India are going for e-governance either through NIC or individually. These initiatives are undertaken considering the local requirements. Due to this compartmentalization, it has become impossible to communicate between these systems. These initiatives in turn produce huge quantum of data, much of them are common in nature but stored in different formats. However, these information units and resources are highly useful and need to be managed for effective functioning of the government. Hence there is a need to describe the information object and services to make them findable and manageable by computers. Metadata can be used to classify and categorize Govt. information and services. But such a metadata element set need to be developed for Indian context.

This also calls for a common framework which enables the interoperability of the system, which are currently 'islands' by themselves.

1.4 Literature Review

In order to understand the current state of the interoperability issues in e-governance, metadata standards and further the status of e-governance interoperability in India and semantic interoperability in e-governance, extensive literature survey was conducted using major bibliographic and full-

text electronic journals databases. Apart from this major websites in the fields were also searched for getting latest information on the relevant areas of research. Major databases used for the literature survey include LISA, LISTA, EBSCO Business Source Elite, Emerald, IEEE/IEE Electronic Library, ACM Digital Library, Science Direct, Google Scholar etc.

1.4.1 Information Resources used for Literature Review

- *Library and Information Science Abstract (LISA)*

LISA is an abstracting and indexing journal with international coverage of library and information science resources from over 20 languages, covering more than 440 periodicals [13].

- *Library, Information Science & Technology Abstracts (LISTA)*

LISTA [14] is a bibliographic database published by EBSCO Publishing Group,[15] and it provides bibliographic information on major areas of library science including that of librarianship, classification, cataloging, bibliometrics, online information retrieval, information management etc. This database indexes nearly 600 periodicals and books, research reports, proceedings etc.

- *EBSCO Business Source Elite*

EBSCO Business Source Elite [16] is a full text database of EBSCO Publishing Group,[15] covering journals in the areas like economics, Management, Business etc including coverage on librarianship, e-governance, etc.

- *Emerald Group Journals*

Emerald Group Publishing Limited has number of journals [17] in the library and information science, including that of Electronic Resources Review, Aslib Proceedings, Online Information Review etc.

- *IEEE/IET Electronic Library (IEL)*

IEL is a full-text package of resources including journals, conference proceedings, standards etc published by the IEEE and the Institution of Engineering and Technology (IET) [18].

- *ACM Digital Library*

ACM Digital Library is a database containing every article published by the ACM along with bibliographic records from many publishers in computing. The ACM Digital Library is published by the Association for Computing Machinery (ACM)[19]. ACM Digital Library contains several resources pertaining to Library science especially digital libraries.

- *Science Direct*

ScienceDirect [20] is a full-text scientific database of peer reviewed journals and books. ScienceDirect is a part of Elsevier [21] one of the leading publisher.

Apart from the above databases listed above individual website, journals, books, and other resources were also reviewed for the present work.

1.4.2 Review of the Literature Related to the Present Work

In order to facilitate the accessibility of e-Governance systems, many countries, mainly developed countries have realized the importance of the information architecture for easy discovery, accessibility and management of government resources and services on the World Wide Web. Describing government services and government information require common set of policies, standards, rules and procedures which are used across the government set up [22].

Backus (2001) [1] presents a general e-governance model and several case studies and discussed the technology aspects of e-Governance. He also conducted a SWOT analysis on e-governance in developing countries.

Wilson, A and Aagaard, P (2003) [7] surveyed implementations of Dublin Core in government.

Identification of various e-Governance metadata standards is undertaken by reviewing various literatures. Different studies and surveys conducted by

Booth, K (2002) [22], Mahajan, M (2005) [23], Alasem, A. (2009) [24] etc. illustrate various e-Governance metadata initiatives in various parts of the world.

Alasem A, (2009) [24] provided an overview of e-Government Metadata Standards and initiatives based on Dublin Core. He illustrated different national and international metadata standards like Australian Government Locator Service (AGLS) [25], e-Government Metadata Standard (E-GMS) [5], New Zealand Government Locator Service (NZGLS) [11], Irish Public Service Metadata Element Set [6] etc. are evolved to describe government information and services. So that they can be used across the public information systems and sectors in those countries.

Based on the literature reviews, four major e-Governance Metadata Standards [5], [6], [11], [25] candidate standards are identified for this study.

Nagarajan, et al (2006) put forwarded handling message level heterogeneities between interoperating services, based on predefined mapping and extensible elements of existing web services standards and tools, using WSDL-S and Axis 2 [26].

In a work jointly funded by Microsoft Corporation, Government of Macao SAR, and UNU-IIST Centre for Electronic Governance, Sanchez. et al, (2008) illustrated the need for the semantic interoperability in electronic government and they put forward a Semantic Interoperability Middleware (SIM) [27]. This does not assure any technical architecture like service oriented architecture, web service or any other communication middleware. This allows the use of SIM in the environment where exchange of information is not supported by Web service or SOA.

Lallana, (2008), [28] reviews a comparative analysis of eight existing Government Interoperability Frameworks (GIF) and serves as a useful resource for those involved in the development or revision of Government Interoperability Frameworks (GIF). This provides general overview of the e-

governance interoperability at various levels and initiatives taken in countries including that of Australia, Brazil, Denmark, Malaysia, New Zealand, UK etc.

Charalabidis, and Askounis (2008) illustrates the 'interoperability registry' which is devoted to the formal description, composition and publishing of government services, both traditional and e-governance services in an integrated scheme for Greek government [29]

Saekpw, A and Boonmee, C (2009) considers the adoption of Interoperability Practical Implementation Support (IPIS) tool in Thailand [30].

Bountouri, Lina., et al., (2009) explores the documentation needs for public sector information and focuses on metadata interoperability issues and highlights two methodologies to obtain interoperability through development of application profile, and semantic integration by creation of an ontology.[31]

Ojo, A., et al, (2009) develops a pair of reference model to guide the development of semantic interoperability considering the policy, governance, organizational and technological dimensions [32].

Ojo, A., et al., (2010) discusses the issues associated with the semantics in connection with the emerging Governance 2.0 networks. For guiding governments and their agencies, it tries to evolve an architectural framework in developing semantic interoperability capabilities [33].

Above studies are mainly concentrated on the interoperability in e-government especially in the context of various e-government interoperability framework (e-GIF) in specific countries. However, in Indian context literature on interoperability in e-governance was found very scarce.

1.5 Scope of the Work

In any e-Governance initiative, the primary focus is on communication; communication between government departments, communication within a department and communication between the government and the citizens, businesses etc. The multitude of applications that exist in the e-Governance space, supporting this communication, need to exchange data necessary for delivering services to citizens, businesses and other government departments.

Communication calls for a commonly understood set of vocabularies having the same semantic content among all these users. Therefore, it is critical that data standardization and standardization of information elements and resources be performed in e-Governance programs. The standardization will also help in reducing redundancy, enhancing clarity and will facilitate reusing data elements across all departments.

In this study, different source of e-governance information, target and format of information, information service in e-governance framework is identified. Metadata that best describe and enables to classify documents, relationship across documents and information for inferring is proposed. A model metadata framework is suggested for semantic interoperability among e-governance applications. The current study considered only English resources and local language resources are not considered in the scope of this study.

1.5.1 What is Metadata?

The most common definition of the term metadata is 'structured data about data', information that describes other information. The World Wide Web Consortium has defined metadata as machine understandable information for the Web [7]. For example, if a Web page has an author, a title, a date of creation and a unique Internet address, these elements constitute metadata about the page. Metadata is an Internet-age term for information that librarians traditionally have put into catalogs and it commonly refers to descriptive information about Web resources [7].

A metadata record is a label, like the label we might find on an everyday product in a supermarket. The label describes the product, and quite often contains information that is useful both to consumers and to the electronic systems that control the store. The label contains data that a person can understand, such as a list of ingredients, and data a machine can read, like a barcode.

Metadata labels are attached to documents and other information assets with similar aims in mind. By storing information such as authors name, version number, subject, we can help people to find information more easily, and allow computers to process it more effectively.

1.5.2 Why Metadata?

Metadata provides useful to tabs on pieces of data and hence achieves an organization of the data. It is also useful for resource discovery which is most important in the parlance of e-governance data and services. In general metadata provides:

- Description about information assets or services
- Makes the content findable and manageable by computers
- Information processing becomes easier for the computer systems

1.5.3 Role of Metadata in e-Governance

The role of metadata can be envisaged as the following:

- Metadata standard can be used to classify and categorize government information and services
- Allows identification of services and information intelligently
- Inter-departmental information exchange becomes easier
- Increases the visibility and accessibility of government services over the Internet
- Modernising government calls for better use of official information, joined-up systems and policies, and services designed around the needs of citizens

- Metadata makes it easier to manage or find information, be it in the form of web pages, electronic documents, paper files, databases, any- thing
- For metadata to be effective it needs to be structured and consistent across organisations [7]

1.6 Importance of Interoperability in e-Governance

Interoperability means the ability of information and communication technology (ICT) systems, as well as, of the business processes they support in order to exchange data and enable the sharing of information and knowledge [34].

The Central and State governments in India are spending crores of rupees every year on e-governance with the objective of ensuring efficiency, transparency and better citizen-friendly interface [35].

But if e-governance were to be truly effective, then individual application program of one department should be able to ‘talk to’ another application program installed in another department. Interoperability of e-governance projects is thus of vital importance if the citizens are to feel the benefit of Information Technology in day-to-day life.

1.7 Objectives

Main objectives of the present work are:

- To identify different sources of e-governance information, target and format of information, information need and information services in e-governance framework.
- To find out how metadata can be used to classify and categorise government information and services, thereby increase the visibility and accessibility of government services over the Internet.
- To study the possibility of interoperability of the e-governance applications using Semantic Web Technology.

In short, this is an effort to develop a semantically interoperable e-governance metadata framework for easy retrieval of e-government information.

1.8 Hypotheses

This study is based on the following hypotheses:

- An unique set of metadata elements can be identified which will be useful for e-governance in India.
- Interoperability among e-governance applications can be achieved by Semantic Web Technology.

1.9 Methodology

Some major e-governance standards are studied and evaluated to present the idea about the basic elements, metadata descriptors, and vocabulary control and metadata management mechanism for development of metadata standard.

Basic metadata element set are identified which are in conformity with the world standard for e-governance metadata, as well as various application profiles suitable for the needs of domain under consideration.

Each government sector has its own vocabulary regarding its function and subject area. Therefore, controlled vocabulary lists are identified dealing with the services and also with the subject terminology.

To start web-based services, the domain specific service description is represented in the form of XML. Its presentation on the web browser is taken care by XSLT.

Standardisation of the data, which are to be input in the respective metadata fields is also studied and presented.

1.10 Conclusion

Governments throughout the world recognise that the volume of information produced by government and its agents is growing at an ever-increasing rate, and bringing order to the mass of information produced is essential to ensure its continued availability, use and value [6]. Isolated e-governance initiatives have created chaotic situations resulting in non-compatibility. Hence it is suggested to have an e-governance metadata framework to describe the information and service artifacts of the government. In order to correlate these systems a semantic web based model is suggested for this study, as an interoperability mechanism.

1.11 References

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