

# Chapter 7. Conclusion

## 7.1 Introduction

Metadata being core in information retrieval it has got its own importance in exchanging information between varied e-Governance information systems. In order to reap the benefit of the information technology, governments are adopting e-governance mechanisms. Recent years have witnessed the growth of e-governance and its applications in various parts of the country. Such services varying from delivery of common services to provision of unique identification number to the citizens. Such e-governance initiatives produce huge quantum of information, that are useful for the government process in various ways. Unfortunately, due to this non-interoperation these systems are isolated, and either man or machine is not in a position to infer the information or to make use of it for various activities in a seamless way.

The present work is an attempt to derive an interoperable metadata model, in the context of India. So that, e-governance information can be described, in such a way that, it can be useful for the machines/computers and intelligent agents to infer or interpret the data using semantic web concepts.

In this work, a model metadata element set called Indian e-Governance Metadata Set (I-GMS) is being derived based on the study of globally accepted standards and also considering the needs of Indian context.

Attempts are made in this work to represent this metadata contents in a universally accepted and semantic web based model for the purpose of interoperability. It also suggests different ways to achieve semantic interoperability in various contexts.

## 7.2 Findings and Conclusions

### 7.2.1. e-Governance Initiatives by State and Central Governments

e-Governance in India is becoming an urgent need. Central and state governments across the country have been giving adequate importance for modernizing their functions through e- governance.

This study reveals that different state governments have taken appropriate actions to incorporate the e-governance as one of their priority areas. Information Technology policies form basis for implementation of the programmes of governments. A close analysis of Information Technology policies of different state governments shows that state governments are committed to offer e-Governance and provide citizen centric services using Information Technology. Such recommendations in the Information Technology Policies of different states are summarized below.

#### ***7.2.1.1 Initiative in Fund Mobilization***

Many state governments have earmarked specific fund allocation for e-Governance. Government of Assam, Gujarath, Punjab and Rajasthan earmarked specific percentage of their fund for their e-governance initiatives. Government of Assam [1] as per its IT policy, proposed to earmark special budget allocation of at least 5% of plan fund of the government departments every year to complete their computerization programmes, and implementation of various components and strategies outlined in its IT Policy. Similarly, 3% of the total plan outlay is earmarked for IT sector in Bihar [2]. Government of Gujarath [3] also directed all departments for earmarking up to 3% of their plan outlay for implementation of e-Governance initiatives.

Government of Punjab [4] also proposed to utilize 5% of the state budget for induction of Information Technology. The Government of Rajasthan [5] also proposed to earmark up to 3% of their plan outlay for implementation of e-

Governance initiatives. IT Policy of the Government of Rajasthan also proposes to increase the budgetary outlay for IT expenditure on a year-to-year basis and separate budget head has been earmarked for adopting Information Technology in the state.

In contrast to above states, Government of Uttar Pradesh [6] and Haryana [7] propose to generate fund from other sources. IT Policy of the Government of Haryana has proposed to generate fund for e-Governance with contributions from profit making state PSUs, co-operative institutions and other public sector organizations. Similarly the Government of Uttar Pradesh proposes to generate IT pool fund for electronic governance from sources like profit making state PSUs, co-operative institutions and other public sector organizations etc.

The Government of Goa [8] formed a 'Task Force for Good Governance' and entrusted them to ensure the flow of sufficient funds for e-Governance activities.

#### ***7.2.1.2 Initiatives in Establishing Institutional Mechanisms***

Several governments including that of Delhi, Goa, Haryana, Manipur, Punjab, Sikkim, Tamil Nadu, Karnataka, and Himachal Pradesh have provisions for institutional mechanism to implement and monitor the e-governance in their state/region. Government of NCT of Delhi [9] has proposed to form a high level committee under the chairmanship of the Chief Minister and formation of different core groups in various key areas including that of e-Governance. Similarly, IT Policy of the Government of Goa [8] proposed to establish a task force for Good Governance under the chairmanship of the minister to lay down the policy framework for achieving the objectives of good governance, including e-Governance.

The Government of Haryana [7] proposed to have IT cell in each departments to be headed by Chief Information Technology Officer (CITO) who shall co-ordinate and supervise implementation of e-Governance. A State Level

Steering Committee called IT PRISM headed by the Chief Secretary oversees computerisation and application of IT in public domain in the state. The Government of Manipur [10] is setting up Core Groups in each of the key areas of the IT Policy including e-Governance.

In order to monitor the implementation of IT activities including e-Governance in Punjab [4] the 'IT Vision Group' and a Departmental Committee on IT and Empowered Committee on Computerization (ECC) are formed by the government.

The IT policy of the Government of Sikkim [11] has proposed to establish an e-Governance Steering Committee headed by the Chief Secretary to direct and monitor e-governance initiatives under National e-Governance Plan (NeGP). Similarly, Tamil Nadu e-Governance Agency (TNeGA) in Tamil Nadu [12], Centre for e-Governance in Karnataka [13] and Society for IT and E-Governance in Himachal Pradesh [14].

### ***7.2.1.3 Initiatives in Enhancing Capabilities of the Workforce***

Some of the governments have prioritized to provide manpower development and enhancement of existing workforce so as to facilitate e-Governance.

In order to speed up the implementation of e-governance, the Government of Gujarath [3] has proposed to offer IT training for all government employees. It is mandating that all Class I, II and III employees shall be required to pass 'CCC' and 'CCC+' level certification respectively in order to avail their future promotions. Similarly, provisions are made to modify recruitment rules so that computer skills are made compulsory for all future direct recruitments to Class I to III cadres in the State Government.

In Haryana [7] senior and middle level functionaries in the departments shall be trained in relevant IT applications and management techniques, apart from achieving minimum defined proficiency level. As per the IT policy of the government of Bihar [2], Haryana [7] and Manipur [10], governments

implement IT literacy plan to achieve 100% IT literacy in the government. Uttar Pradesh Government [6] also envisages to make all its employees IT literate in a time bound manner.

The Government of Jharkhand [15] also has proposed to provide training for all government employees in use of Information Technology. In order to facilitate such training, special training institutes are also proposed. West Bengal [16] Government is initiating different activities to increase the IT literacy level of the citizens and also that of the government employees. Himachal Pradesh [14] has made knowledge of computer compulsory for the category of steno-typists, passing of the test in computer proficiency of a specified level is made mandatory, and provision of appropriate training for the existing staff is also made.

#### ***7.2.1.4 Legal and Policy Level Initiatives***

Central and several state governments have taken initiatives in formulating related policies like IT Security Policy, Audit Policy, ITES Policy etc to enable IT based applications including online transactions. Similarly, State governments are amending appropriate rules and acts for facilitation of IT application including e-Governance. In order to provide legal backing for the e-governance and electronic transactions the Information Technology policy of Government of Andhra Pradesh [17] proposed to examine all the state level legislations and statutes, so as to ensure necessary harmonization and to provide a transparent, simple and enforceable set of laws, to facilitate e-business and other IT-enabled activities.

Assam [1] is in the process of formulating IT Security Policy as per ISO 17799 security standard and prevalent cyber laws of India. The Government of NCT of Delhi [9] has also come up with an IT Security and Audit Policy.

### ***7.2.1.5 Initiatives in Establishing e-Governance Implementation Agencies***

Different states have arranged e-governance implementation agencies. Assam Electronics Development Corporation Ltd. (AMTRON) has been nominated as implementation agency for programmes under National e-Governance Plan (NeGP) in Assam [1]. In Bihar [2] departments in the state nominate a nodal officer responsible for implementation of e-Governance initiatives.

### ***7.2.1.6 Initiatives on Data, Metadata and Interoperability***

Issues regarding the management of data and metadata, similarly, standardization efforts –which is core to this study- are being discussed in the IT policies of the state's like Assam, Haryana, Kerala etc.

IT policy of the Government of Assam [1] highlights that metadata will be collected and reviewed at all the three critical stages such as data preparation, data modeling, and deployment, so as to classify as Transactional Data, Purchased Data and Collected Data for data mining process within the government. This also propose to build a robust Information System (IS) based on Meta Data and Digital content.

In order to provide interoperability of the systems and services the IT policy of the government of Bihar, proposed to formulate standards, templates and data formats in consultation with IT, academic and domain experts [1]. The IT policy of Haryana, propose to establish information databanks for all government departments as a mandatory requirement. It also proposed standardization of the data to the feasible extent so as to facilitate the interoperability of the systems.

The IT Policy of the Government of Kerala [18] throws light on the need for interoperability among different application. According to this policy a data inventory is to be setup for sharing of data between Government agencies and to avoid duplication of work. Data standards including data structures would

be adopted / created to ensure interoperability. Creation of standardized spatial data set will be a priority area [18].

The Government of Punjab has proposed to create authenticated databases on citizen databases, business databases, property databases and all government services are proposed to be provided on-line on the basis of these databases [4]. In Uttar Pradesh [6] Technical Committee of the Department of I.T. and Electronics is entrusted to ensure interoperability of the Systems, portability and integration of resources created in Uttar Pradesh, procurement of hardware, software and networking equipments etc. This committee will lay down standards and specifications for the above items.

In Meghalaya [19] IT Policy envisions to establishment of integrated e-Governance system and facilitation of data interchange between departments by establishing data centers and data hubs.

Above discussion reveals that, though state governments have taken appropriate measures for strengthening e-Governance, emphasis on interoperability at semantic level has not been adequately addressed by different state governments in India.

### 7.2.2 Metadata in e-Governance

Making government information more accessible to the citizen is considered as an important characteristics of making government more transparent to its citizens, and one of the widely accepted benefits of metadata is the potential to improve accessibility [20].

Present study reveals that metadata is being identified as one of the important components of semantic interoperability and which is being seriously taken by various countries for organizing and retrieving e-governance information.

This study reveals that many countries have considered metadata as a vital tool for information management in e-governance. Countries like Australia,

Ireland, United Kingdom, New Zealand etc have developed e-governance metadata standards to manage the government information.

### 7.2.3 Metadata Standardization Efforts in India

India has initiated the metadata standardization. Considering the immediate need for data and metadata standards for generic elements like name, address etc which are common across e-Governance applications, competent authority set up by the Government of India has come up with a 'Metadata and Data Standards for Person Identification and Land Region Codification' [21] for exchange of data between e-Governance applications. Standardization of generic data elements and their formats to describe a person's identification and land codification was done through this standard.

Based on this study, it is identified that 'Metadata and Data Standard for Person Identification and Land Codification' [21] issued by the Department of Information Technology under the National e-Governance Plan of the Government of India is the only prominent initiative in the country to address the metadata standardization, in a practical sense. This initiative is positive move towards data standardization. It addresses the data standardization of the generic elements like name and address only.

### 7.2.4 Model for Indian e-Governance Metadata Set

As part of the current work a detailed study of various metadata standards used in Australia, United Kingdom, New Zealand and Ireland are undertaken to identify the common features, element specific features etc. Such metadata standards include Australian Government Locator Service (AGLS) [22], e-Government Metadata Standard (E-GMS) [23], New Zealand Government Locator Service (NZGLS) [24], Irish Public Service Metadata Element Set [25].

Several countries have gone a long way in developing and implementing Standards Metadata Element Set. But India does not have such a

comprehensive metadata element set. Hence, an attempt is made in this work to derive a model interoperable metadata element set suitable for India.

Based on the detailed comparative study of various e-Governance metadata standards a model e-governance metadata element set called Indian e-Governance Metadata Set (I-GMS) is proposed with 18 elements having 4 Mandatory, 3 fields with mandatory based on type of resources and 11 optional fields. Fields such as Creator, Date, Title, and Subject are identified as mandatory and fields such as Availability, Identifier and Publisher are mandatory based on type of resources. Elements such as Audience, Contributor, Coverage, Description, Format, Language, Mandate, Relation, Rights, Source, and Type are considered as optional elements.

Such a model Indian e-Governance Metadata Set (I-GMS) framework forms base for implementing semantic interoperability across e-Governance in Indian context.

### 7.2.5 Interoperability Frameworks

Many countries like New Zealand, UK, Australia, Greece, Belgium, Ireland, Denmark, France etc have come up with e-government interoperability frameworks (e-GIF). Such interoperability framework include e-Governance Interoperability Framework of UK (United Kingdom) [26] having e-Government Metadata Standard (E-GMS) and an Integrated Public Sector Vocabulary having a structured thesaurus of administrative activities at different levels. In France, 'Le Cadre Commun d'Interoperabilite' (CCI) published by the French ADAE [27] containing recommendations for strengthening public electronic systems coherence and multi agency electronic service delivery. Denmark has also come up with the Danish Interoperability Framework (DIF) as a guideline to public agencies while developing IT plans projects etc. Through InfostructureBase website [28] Denmark has set up a repository of XML schemas called OIOXML. This facilitates joint use of XML in Danish public sector.

Similarly within European Commission the DG Enterprise and Industry manages the ISABC Programme. IDABC published the European Interoperability Framework (IDABC EIF) [29], which provides a common framework for interoperability issues.

As discussed above and in previous chapters, it is understood that many country's metadata standards are part of such e-Government Interoperability Frameworks. However, current study reveals that India is only in the process of developing a technical standard for interoperability framework and yet to finalize an exhaustive e-Government Interoperability Framework, incorporating the policy, technical and other requirements for the Interoperability.

The proposed metadata element set model can be adopted by the Government of India with appropriate modification, if required, as a standard metadata element set for describing e-Governance information in the country.

Current study shows that many countries have common schema libraries, standards repositories, data model description, interface descriptions, e-governance information objects, service descriptions etc. However, India is lacking such repositories and these needs to be derived. Such tools shall be developed in a domain specific context for interoperation in the concerned department or domain under consideration. This is not in the scope of the current study.

### 7.2.6 Semantic Interoperability

Most of the e-Governance data are generally available in the relational databases. The ability of Semantic Web technologies to access and process these relational data along with other data from Web sites, XML documents, and other systems increases the amount of useful data available.

This study has analyzed the data representation mechanisms suggested/used in major e-governance initiatives for the purpose of interoperability at data level.

Data representation mechanisms of countries like UK, New Zealand, Ireland and Australia have been considered as candidates for exploring the availability of the commonly adopted data representation mechanism.

With reference to the above study it is inferred that XML is being used as a commonly accepted representation medium for encoding the metadata elements. Seakow and Boonmee [30] confirms that main thrust nowadays is to adopt open and international standards for all government systems and to adopt XML and XSL as the core standards for data integration and data representation. Accordingly, current study propose to represent the I-GMS metadata in XML format, for interoperation and data exchange between different e-government resources/services.

Due to the advantage of XML, which provides capturing of the context along with data, it makes suitable for integration of the data generated at various locations like state, district, panchayath etc. Similarly, it would be easy to export/import data to and from database management systems, as XML tags represents 'fields', subfields etc.

Studies show that data represented using XML can be used for interoperation using XSLT for data transformation, which provide semantic level interoperability of e-Governance. Interoperability between different services can be achieved by developing service level authority list.

As discussed in the second chapter, some of the state governments are in the process of establishing state level data centre to aggregate the data in a central location. Such aggregation shall require a well understood domain specific XML schema for aggregation and further exchange of information. Such a micro level schema needs to be developed in each sectors of the government, for proper interoperation so that data centres can host the homogenous data.

## 7.3 Limitations

Current study is a step towards exploring the possibility of deriving the interoperable metadata element set which can be used in Indian context. However, several issues like local language issues in interoperation are not addressed in this work. A real interoperation happens when exhaustive description of e-Governance information, services, etc are well defined in various contexts.

This work has concentrated on the semantic level interoperability in e-governance. However, technical, organizational and other interoperability issues are to be addressed separately and which is not in the scope of this study.

The current study is not specific to any particular department or domain. It is considered as applicable in governance information in general. However, such metadata model can be applied in different domains based on the requirements.

Current study is restricted in the context of India considering the local requirements of the country.

## 7.4 Scope for Further Work

The present study has concentrated only on the semantic level interoperability. However, for a complete interoperation it requires technical and organizational level interoperations. Such issues can be taken up separately in the Indian context.

Present work has considered only the semantic interoperability in English language. However, countries like India having varying local languages; such local language level interoperability can be studied further.

As mentioned elsewhere, domain specific common schema libraries, standards repositories, data model description, interface descriptions, e-governance information objects, service descriptions, domain ontology etc can be derived considering the local requirements and in the national level interoperability perspective.

## 7.5 Conclusion

Adequate infrastructure in terms of people, technology and knowledge needs to be kept in place to develop, apply and sustain the e-government interoperability mechanisms. Though the e-governance frameworks are set in place, the success of the same will largely depend on the acceptance of the same for practical implementation by the people i.e. government officials. This calls for an environment where every stakeholder in the government comes forward to adopt the standard. Similarly, it may also require the governments to frame appropriate rules and regulations to mandate the use of interoperability standards.

Provision of an 'Indian Interoperability Clearing House' for facilitating the interoperable tools and contents in different domains will be helpful for streamlining the interoperable data in a coordinated manner. Such clearing house shall be facilitated with adequate library and information management professionals, so that the rich knowledge and ability of the librarians in managing information can be utilized effectively in managing e-governance information also.

## 7.6 References

1. Directorate of Printing and Stationary. (2009), "Information Technology Policy of Assam." *The Assam Gazette* 233 (2009), <http://assamgovt.nic.in/pdf/IT-Policy09.pdf> (accessed August 4, 2009).
2. Government of Bihar. (2008), "Information Technology Policy." [http://gov.bih.nic.in/Documents/Draft\\_IT\\_Policy\\_2008.pdf](http://gov.bih.nic.in/Documents/Draft_IT_Policy_2008.pdf) (accessed December 1, 2009).

3. Government of Gujarat. (2006), "IT Policy 2006-2011" [http://dst.gujarat.gov.in/pdf/it\\_policy\\_2006-2011.pdf](http://dst.gujarat.gov.in/pdf/it_policy_2006-2011.pdf) (accessed December 1, 2009).
4. Government of Punjab. (2001), "Punjab Information Technology (IT) Policy 2001". <http://punjabgovt.nic.in/WHATSNEW/itpicy2001.pdf> (accessed December 15, 2009)
5. Government of Rajasthan. (2007), IT and ITES Policy 2007. [http://www.rajasthan.gov.in/rajgovresources/actnpolicies/it\\_policy.pdf](http://www.rajasthan.gov.in/rajgovresources/actnpolicies/it_policy.pdf) (accessed December 21, 2009).
6. Government of Uttar Pradesh. (2004), "UP Information Technology Policy-2004". [http://infotech.up.nic.in/IT\\_Policy/I.T.Policy.pdf](http://infotech.up.nic.in/IT_Policy/I.T.Policy.pdf) (accessed December 11, 2009)
7. Government of Haryana. "Information Technology Policy". <http://haryana.gov.in/government%20Policies/it%20policy.asp> (accessed December 1, 2009)
8. Government of Goa. (2005), "IT Policy 2005." <http://www.goagovt.nic.in/documents/itpolicy-go-2005>. (accessed December 1, 2009).
9. Government of NCT of Delhi, "IT Policy" <http://delhigovt.nic.in/icetpolicy.pdf> (accessed October 7, 2009).
10. Government of Manipur. (2003), "Information Technology Policy of Manipur". [http://manipur.nic.in/DST/ITPolicy\\_Manipur2003.pdf](http://manipur.nic.in/DST/ITPolicy_Manipur2003.pdf) (accessed December 1, 2009)
11. Government of Sikkim. (2006), "Information Technology Policy for the State of Sikkim, *Sikkim Government Gazette*, 207, (2006) [www.sikkim.gov.in/asp/misc/itpolicy.pdf](http://www.sikkim.gov.in/asp/misc/itpolicy.pdf) (accessed December 1, 2009)
12. Government of Tamil Nadu.(2009), "Information Technology Department, Policy Note 2009-10". <http://www.tn.gov.in>

- /policynotes/pdf/information\_technology.pdf (accessed December 11, 2009)
13. [198] Department of Information Technology, Government of Karnataka. "The Millennium IT Policy". <http://www.bangaloreitbt.in/worddocument/ITpolicy.pdf> (accessed May 21, 2010).
  14. Department of Information Technology, Government of Himachal Pradesh. (2009), "IT Policy", <http://himachalnit.gov.in/page/IT-Policy.aspx> (accessed December 21, 2009).
  15. Information Technology Department, Jharkhand. "IT Policy". [http://www.nisg.org/knowledgecenter\\_docs/B16010001.pdf?PHPSESSID=4ef7a49f6121f2aed005d13186e78f29](http://www.nisg.org/knowledgecenter_docs/B16010001.pdf?PHPSESSID=4ef7a49f6121f2aed005d13186e78f29) (accessed December 1, 2009)
  16. Government of West Bengal. (2003), "West Bengal IT Policy 2003". <http://westbengal.gov.in/BanglarMukh/Download?AlfrescoPath=WebContent/Departments/Information%20Technology/Other%20Documents&FileName=Chap-itpolicy.pdf> (accessed December 11, 2009)
  17. Government of Andhra Pradesh. (2000), "AP FIRST: Information Technology Policy-2000". <http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN002946.pdf> (accessed November 30, 2009).
  18. Government of Kerala. (2007), "Information Technology Policy: Towards an Inclusive Knowledge Society." [www.technopark.org/downloads/ITPolicy-2007.pdf](http://www.technopark.org/downloads/ITPolicy-2007.pdf) (accessed November 30, 2009)
  19. Department of Information Technology, Government of Meghalaya.(2004) "Information Technology Policy-2004". [http://ditmeghalaya.gov.in/policy/IT%20Policy\\_2004.pdf](http://ditmeghalaya.gov.in/policy/IT%20Policy_2004.pdf) (accessed December 21, 2009).
  20. Rothenberg, Jeff *et al.*, (2005), *Designing a National Standard for Discovery Metadata: Improving Access to Digital Information in the Dutch Government*. Pittsburgh: RAND Corporation, 2005. [http://www.rand.org/pubs/technical\\_reports/2005/RAND\\_TR185.pdf](http://www.rand.org/pubs/technical_reports/2005/RAND_TR185.pdf) (accessed February 23, 2010).

21. Department of Information Technology. (2009), "Metadata and Data Standards for Person Identification and Land Region Codification, Version 1.0". [http://www.stqc.nic.in/writereaddata%5CmainlinkFile%5CMDDS\\_Standard\\_\\_1.0\\_\(DT\\_21\\_DEC\\_09\).doc](http://www.stqc.nic.in/writereaddata%5CmainlinkFile%5CMDDS_Standard__1.0_(DT_21_DEC_09).doc) (accessed December 26, 2009).
22. National Archives of Australia. (2002), "AGLS Metadata Element Set: Part-1 Element Description" [http://www.naa.gov.au/images/agls\\_reference\\_description\\_v1-3\\_tcm2-880.pdf](http://www.naa.gov.au/images/agls_reference_description_v1-3_tcm2-880.pdf) (accessed November 10, 2009).
23. Cabinet Office. (2006), "e-Government Metadata Standard, Version 3.1" <http://www.cabinetoffice.gov.uk/media/260000/docicon.gif> (accessed June 10, 2010).
24. State Services Commission. "NZGLS Metadata Element Set Version 2.1". <http://www.e.govt.nz/standards/nzgl/standard/element-set-21/> (accessed June 21, 2010).
25. Government of Ireland.(2002). "Irish Public Service Metadata Standard: User Guide". <http://www.gov.ie/webstandards/metastandards/index.html> (accessed November 10, 2009).
26. Cabinet Office. (2005), "e-Government Interoperability Framework", Version 6.1". [http://www.cabinetoffice.gov.uk/media/253452/eGIF%20v6\\_1\(1\).pdf](http://www.cabinetoffice.gov.uk/media/253452/eGIF%20v6_1(1).pdf) (accessed June 24, 2010).
27. Agence pour le Developpement de l'Administration Electronique. (2010), <http://www.adae.gouv.fr>, (accessed March 11, 2010).
28. Gøtze, John (2003) "The Danish Infostructurebase". <http://gotze.eu/2003/03/08/the-danish-infostructurebase/> (accessed May 18, 2009).
29. European Commission (2004), European Interoperability Framework for pan-European e-Government Services, Version 1.0, Brussels, 2004.

30. Saekow, A., and C Boonmee., "Towards a Practical Approach for Electronic Government Interoperability Framework (e-GIF)". In the Proceedings of the 42<sup>nd</sup> Hawaii International Conference and System, Hawaii, January 5-8, 2009:1-9.