An Overview of e-Government Metadata Standards and Initiatives based on Dublin Core

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Abstract: the broad definition of metadata is 'data about data' or 'data that describe data or information'. In more specific terms, 'metadata is data about other data or objects, used to describe digitized and non-digitized resources located in a distributed system in a network environment' (Haynes, D, p 8). In e-Government applications it may be used, amongst other for the discovery and retrieval of government information, as well as to assist in the management of government electronic resources. In other words, metadata is the key to interoperability.

This paper aims to highlight the use of metadata in e-Government projects with a review of the most widely metadata standard used in e-Government application (DC). Also, it will compare the work which has been carried out in the UK, Australia, New Zealand, Canada and Ireland with DC, as all these metadata projects are based on simple Dublin Core metadata. Finally, roadmap for metadata development will be proposed.

Keywords: metadata, Dublin Core, e-Government

1. Preface

In the summer of 2008 my mother-in-law came to visit us in the UK, we had asked her to come to stay with our children, as we were so busy in our studying and the schools were closed for the summer holiday. She planed to stay around five weeks, but during her stayed something unexpected happened to her health. Therefore, she decided to return to Saudi Arabia after the second week of her visit.

We thought of sending our children with her. Sarah had an independent passport and Nasser was listed on his mother's passport, which shows that this was an unusual situation for me.

At first, I searched all Saudi government agency websites looking for passport information, but unfortunately I found nothing useful. The next day I tried to call the General Department of Passport in Riyadh, but no one answered. Also, I tried to contact the Department of Passport at King Khalid International Airport in Riyadh and again no one answered. Using Google I searched for phone numbers for any Saudi border ports and I found ALBATHA border port, which is located between Saudi Arabia and the United Arab Emirates. At 10 a.m. I made the first call and had a short conversation with the central officer who told me at first it was okay for my son to travel using his mother's passport. However, before the end of the conversation he asked me to call him the next day to speak to the director of the port as he was not 100% certain. At the same time I was thinking that the Royal Embassy of Saudi Arabia in London may have the answer, so I phoned them and after a long time of transferring me from office to office, they answered my question. I was told that there was no clear rule for this situation and that no one could deny my son entry into the country.

Next day I phoned the ALBATHA Border port asking for the director and his answer was okay, but before the end of the call he asked me to call him 3 hours later as he was not 100% certain. After 3 hours I called him again and I was told that it is not allowed for non independent passport holders to enter the country without the main passport holder.

The purpose of this story is to attempt the reader's attention to one of the major barriers in e-Government applications, which is organizing and managing of government information since such these sites become the most communication channels for providing public information and services to citizens in the information society.

Organising and managing government information in a way which help citizens to find information without needing to know which government agency provide them is a fundamental in e-Government initiative.

Although this information is available somewhere on the internet, the questions that to be answered is that: How to make government information and services easy to find and use? I believe this story will clarify the issues and justify the objective of this study.

Reference this paper as:
Alasem, A. "An Overview of e-Government Metadata Standards and Initiatives based on Dublin Core." *Electronic Journal of e-Government* Volume 7 Issue 1 2009, pp. 1 - 10, available online at www.ejeg.com

2. Introduction

The rapid advances in the information communication technology (ICT) have an enormous impact on how people live and work, especially after the internet was introduced and became available for the public about twelve years ago. Since then the ***e*** letter, which means ' electronic' has become essential in many day to day activities to describe a work performed electronically. For example, e-mail, e-banking, e-learning, e-health, e-commerce and recently e-Government.

The concept of e-Government was first introduced in the late 1980s when a few European countries introduced what were known as 'Electronic Villages' to link remote villages with the central government. (Altai, A, 2006). However, "the term 'e-Government' was first introduced in 1993, by the US National Performance Review" (Silva, M, 2006), and around 2000, the term 'e-Government' was being used in many developed countries around the world. The United Nations defines e-Government as 'utilizing the Internet and the world-wide-web for delivering government information and services to citizens'. (UNPAN,2005).

e-Government is a recent innovation and a natural of the development of ICT, which has been used in many sectors, especially business known as e-business to improve the services provided to their customers, as well as to reach a broader range of population. For that reasons, business sector was first sector keen to invest in technology than public sectors. However, in the last few years the public sectors realized the importance of the technology and become eager to invest in technology, for instance, in the UK £675 million were made available for establishing e-Government initiative. (Office of the e-Enovy ,2003). As e-Government can play a significant role in increasing transparency, reducing administrative corruption, improving services delivery, improving civil performance, empowerment and improving government finances. (Bhatnagar, S, 2004). An example of the benefit of establishing e-Government can be seen clearly in the US the states government are saving up to 70% by moving services online, and the cost of vehicles registration in Alaska for example have dropped from $7.75 to only $ 0.91 by using online system. (Atallab, S, 2001). On the other hand, in Australia, 45% of people surveyed confirmed that they had saved money by using e-Government services. (AGIMO, 2003).

To date, many countries (182 of 192) have adopted their e-Government project while other in their process to get a benefit from the available technology, as well as to catch up with advanced countries in the field of information and communication technology (ICT) to improve the country's economy, as well as the lives of its citizens. (UNPAN,2008).

However, e-Government does not simply mean posting information on the internet. Therefore, the barriers of implementing e-Government including information architecture issues have been discussed by a number of studies in the last few years. From the point of IA Maurer (2004) points out that if the system is difficult to use, users will react to it in one of several ways, the first being that they won't use it at all, and the second, that they will carry out their task elsewhere. Thirdly, they will use it as little as possible. They will need more time and support to learn how to use it. Finally, they will continue to use the traditional methods. Consequently, many governments, particularly developed countries have become aware that information architecture is essential in terms of government resources and services discovering, accessing and managing on the World Wide Web, thus a number of international and national metadata standards have evolved for describing government information and services and to be used across the public information systems sectors in those countries to achieve the aim of establishing e-Government projects.

The study therefore aims to focus on the role of metadata in e-Government applications as an essential factor by reviewing those in English nationwide standards including the UK, Australia, New Zealand, Canada and Ireland to identify the processing used to developed a nationwide metadata, as well as recognize additional metadata elements introduced.

The paper is based on literature reviews of introducing and developing nationwide standards for metadata to be used when describing online government information and services.

3. Review of the literature

Many studies have been written over the last few years focusing on the importance of metadata in general in terms of information finding and managing. However, there have been relatively few studies on metadata in e-Government applications as a tool that can be used in order to improve multiple functions, i.e. make government information easy to find and manage, as well as interoperability. Several of those studies discussed metadata as a principles of Information Architecture. The term, which is used to describe the

structure of a system, i.e. the way information is grouped, the navigation methods and terminology used within the system. (Barker, I, 2005). In addition, several projects have been published that can be characterized as the best practices authored by a group of consulting firms, government bodies and organizations.

Tambouris, E. *et al* (2007) in their comprehensive study, describe the scope of metadata in government digital collections as a fundamental in building government digital collection. Also they discussed in brief the used of Dublin Core metadata standard in e-Government projects. They concluded their study by developing a metadata for IST eGOV project. Quam (2004) asserted the importance of metadata and controlled vocabularies in government portals website as the main function of portals is to give access to a wide range of government information and services through one access point. She believed the problem is that most government websites developers do not properly credit the importance of metadata. Morville and Rosenfeld (2006) point out that the problem with companies in information architecture is that most companies do not have lawyers on their staff. They bring lawyers in when the situation becomes particularly messy, complex, or important. The same happens and will continue to happen with information architects.

On the other hand, numerous of the depth studies that focusing on the use of metadata in e-Government applications, as well as processes of implementing nationwide standards are written within specific nationwide metadata standard in several countries. Cumming (2001) in his study outlined the processes of developing the UK e-Government metadata standard (eGMS), with more details on the new elements: Audience, Disposal, Preservation and Location. Andersen (1999) summarized the development of Denmark national metadata standard possesses. Barham (2002) argued the key issues of implementing New Zealand Government Locator Service (NZGLS), as well as processes used to create and manage NZGLS.

On the other hand, there are several projects on nationwide metadata standards which can be seen as comprehensive best practices studies. For example, Rand (2005) report on Designing a National Standard for Discovery Metadata to improve access to digital information in the Dutch government. The report examined and evaluated a range of national and international metadata standards in order to develop the Netherlands nationwide metadata standard. European Committee for Standardization CEN (2003) in their guidance on the use of metadata in e-Government document addressed the importance of metadata in e-Government project with emphasis on the use of DC. Also, provide a methodology to assist in determining an appropriate e-Government metadata elements set.

4. The importance of metadata in e-Government

In an electronic collection, searching for and retrieving resources can be difficult, especially in e-Government. Carter and Belanger (2004) identify three characters of e-Government which make e-Government different compared to other applications, such as e-commerce: access, structure and accountability. In the area of access the e-commerce the system is designed for a particular group of users or at least expected users, however, in e-Government public agencies are responsible for providing access to information and services for everyone living within a country, all of whom will have varying levels of IT skills including individuals with lower incomes and disabilities. This is essential to make e-Government services and information accessible and easy to find, that is why, organizing of e-Government electronic collections on the internet in a way which help users to search and locate government information without needing details of government structure, or to find government services without knowing which agency delivers them is a fundamental in e-Government.

Metadata, which is defined as ‘Data about data’ or ‘information about information’ is a valuable tool in e-Government applications to make seamless flow of information and services across government and support citizens finding government information and services more easily.

The term of metadata is a recent term, although many of the concepts and techniques of metadata creation, management and use were first employed by librarians to describe a library’s resources, such as title, author, publisher, etc. (Haynes, D, 2004). Currently, with the expansion of the use of the Internet in many essential day-to-day activities, metadata has become a part of many of these online activities, such as e-businesses, e-learning and recently e-Government.

The benefits of using metadata in e-Government domain can be seen in several aspects. In the terms of government information and services discovery “metadata can facilitate the discovery of e-Government resources, by identifying resources, bringing similar resources together, distinguishing similar resources, and

giving location information". (Tambouris, E. *et al,* 2007). Which enable users to search and locate electronic and non-electronic government information without needing details of government structure.

Also, metadata is a tool for the management of information resources, whether they are electronic and available on the Internet or in physical format; metadata enables the management of the lifecycle wherein the resources are created, modified and used. Furthermore, metadata helps to determine the authenticity of data and, lastly, metadata is the key to interoperability. (Haynes, D, 2004).

5. Dublin Core

The Dublin Core Metadata Initiative (DCMI) is the outcome of a joint workshop held in Dublin, USA, by the Online Computer Library Center (OCLC) and the National Center of Supercomputing Application (NCSA) in 1995.

DC is one of the most widely-used metadata standards recognized by the International Organization for Standardization (ISO 15836: 2003). It is a simple and flexible metadata standard which can be used in almost all domains of networked electronic resources. "The applications of DC elements have been designed to cover not only the type of resources in traditional repositories of information, but also on the web. Each element is repeatable and can also have sub-types and sub-object relationships." (Nair. S & Jeevan. V, 2004, p 4). Simple DC metadata proposes a set of 15 elements, as shown in the table below.

Table 1: Simple DC metadata elements

Element	Definition
Title	The name given to the resource.
Subject	The topic of the content of the resource.
Description	An account of the content of the resource.
Type	The nature or genre of the content of the resource.
Source	A reference to a resource from which the present resource is derived.
Relation	A reference to a related resource.
Coverage	The extent or scope of the content of the resource.
Creator	An entity primarily responsible for making the content of the resource.
Publisher	The entity responsible for making the resource available.
Contributor	An entity responsible for making contributions to the content of the resource.
Rights	Information about rights held in and over the resource.
Data	Data associated with an event in the cycle of the resource.
Format	The physical or digital manifestation of the resource.
Identifier	An unambiguous reference to the resource within a given context.
Language	Language(s) of the intellectual content of the resource.

6. UK e-Government Metadata Standard (eGMS)

The UK e-Government Metadata Standard Framework (eGMF) was published in May 2001, as a result of several months of consultation and planning which began in 1999. 'Modernizing Government White Papers', was a long-term project for modernizing public services lad by the Ministry of the Cabinet (Cumming, M, 2001). eGMF aimed to determine the government's policies for establishing and implementing a common metadata standard across the public sector, and which would be used across all information systems. Metadata in the view of the British government is "a summary of the form and content of a resource" (Office of the e-Envoy, 2001). It is used to support a number of functions, such as resource discovery, administration, preservation, e-commerce and content ratings (Powell, A, 2000).

The first e-Government Metadata Standard (eGMS) was developed in 2001. It was based on simple Dublin Core and had additional six elements to cover description and management for e-Government purposes. The six elements are: disposal; preservation; audience; location for the purpose of record management and archiving requirements and; accessibility and status for the purpose of resource discovery. (Coles, C, 2003).

By 2003, further work had been done and the e-Government Metadata Standard (eGMS) version 2.0 was published, containing four additional record management elements: addressee; digital signature; mandate;

and aggregation. Since the publication of eGMS version 2.0 the only changes have been in refining the elements and the encoding scheme for the elements.

Table 2: Additional UK eGMS Metadata Element Set (eGMS) version 3.1 (2006).

Element	Definition
Accessibility	Indicates the resource's availability and usability to specific groups.
Addressee	The person (or persons) to whom the resource is addressed.
Aggregation	The level or position in a hierarchy of the resource.
Audience	The category of user for whom the resource is intended.
Digital signature	To be decided.
Disposal	The retention and disposal instructions for the resource.
Location	The physical location of the resource.
Mandate	Legislative or other mandate under which the resource was produced.
Preservation	Information to support the long-term preservation of the resource.
Status	The position or state of the resource.

7. Australian Government Locator Services (AGLS).

The development of the Australian Government Locator Service (AGLS) metadata standard began in December 1997, with the AGLS version 1.0 metadata standard being published in 1998. Metadata in the view of the Australian government is "structured information that is created specifically to describe another resource". (AGIMO, 2004). It was designed to improve the usability, accessibility and interoperability of government information and services through the provision of standardized web-based resource description (Wilson, A, 2002).

The AGLS metadata standard is based on simple Dublin Core and has four additional elements designed for the Australian context, which are function and availability for the purpose of government information and service findability, and audience and mandate for records management.

Table 3: Additional AGLS Metadata Element Set . version 2.0(2006)

Element	Definition
Availability	How the resource can be obtained, or contact information for obtaining. the resource
Function	The business function of the organization to which the resource relates.
Audience	A target audience of the resource.
Mandate	A specific warrant which requires the resource to be created or provided.

8. New Zealand Government Locator Services (NZGLS).

The NZGLS metadata standard was recommended in 1998 by the NZ Discovery Level Metadata Standard Working Group (NZMSWG), which was established to suggest a common policy, standard and rules to be used across government agencies to improve the discovery of New Zealand government information and services. As a result of 15 months of consultation and usability testing, the NZMSWG recommended that the Australian Government Locator Service (AGLS) be used in the NZ e-Government initiative with some changes, such as element obligation, refinement and encoding schemes (Booth, K, 2002). Like the AGLS, the NZGLS has four additional elements: function, availability, audience and mandate. The NZGLS was issued in 2001. and by May 2002, NZ agencies were require to create a core set of metadata describing their information and services. (Booth, K, 2002).

Table 4: Additional NZGLS Metadata Element Set . version 2.1(2004)

Element	Definition
Function	The business function of the organization to which the resource relates
Availability	How the resource can be obtained or contact information for obtaining. the resource
Audience	A class of entity for whom the resource is intended or is useful.
Mandate	A specific warrant which requires the resource to be created or provided.

9. Ireland Government Metadata Standard (IGMS)

The Irish Public Service Metadata Standard (IPSMS) was developed in 1999, as a result of a recommendation submitted by the Web Publication Group (WPG). The group recommended using simple DC with two additional elements: service descriptor and life event descriptor (WPG, 1999). A metadata working group (MWG) was set up to decide which metadata that would suit the e- government of Ireland, and in 2002, the Metadata Working Group agreed the proposed metadata standard. It is based on simple DC, without the addition of new elements.

10. Canadian Metadata Standard

The Government of Canada Metadata Framework established a strategy for the development of metadata within federal departments or agencies. The Government On-line Metadata Working Group was established to adopt a common metadata standard to be used on the federal web. The group agreed on Common Look and Feel Metadata Standard (CLF), which is based on simple DC with two additional elements: audience for record management purposes, and keyword for resource discovery. This appeared in 2002. (GOMWG, 2005).

Table 5: Additional CLF Canadian Metadata Standard elements.

Element	Definition
Audience	A class of entity for whom the resource is intended or is useful.
Keywords	Additional words or phrases to serve as access points for search engines.

11. e-Government Metadata Development

In e-Government applications, Dublin Core international standard has been used by many governments, such as those of the UK, Australia, Ireland and Canada, as the basis for their own standard. Others, such as those of New Zealand and the Netherlands, are based on national standards.

In this section, a proposal for an e-Government metadata development roadmap is presented. This roadmap is drawn from a review of published literature relating to e-Government metadata development, and evaluations published by several countries, as well as the metadata development roadmap suggested by the MMI-DC Workshop of the European Committee for Standardization.

11.1 Phase I: Establishing a Metadata Working Group.

In this step, a group of experts are involved in identifying and describing the metadata that will be used across government agencies. The MWG should be designed so that public and private sector organizations can work together to support and develop standard metadata in accordance with the country's e-Government policies. Making government information and services more accessible is the initial task of the group. This first requires a decision as to what kind of national metadata standard will be used throughout the government, as metadata can support a number of functions. The group can also address the major issues that may be raised during the process of metadata development by reviewing and evaluating existing international and national metadata standards.

The outcome of this step will be an overall standard metadata process plan. An example of a metadata working group can be found in the New Zealand project, where the Metadata Working Group had members from 32 agencies, comprising librarians, IT specialists, DC experts and managers of government agencies. (Booth, K, 2002).

11.2 Phase II: Identifying the Requirements of Providers of Government Resources, Users' Needs & Government Resources to be described by Metadata.

In this step further studies should be carried out to identify the requirements and the concerns of providers and producers of government resources. As government agencies deal with different subject areas and have different policies and procedures, it can therefore be identified from these what metadata elements can meet their needs, within the context of a country's policies, laws and regulations as a whole. On the other hand, the skills and knowledge of the use and management of government resources of government providers should be taken into consideration. For example, handling government information and delivering electronic services in a professional way should be addressed in this step, as metadata creators and managers are crucial to metadata implementation in each organization. This can be done through several methods; for

example, by engaging all government resources via an online working group, regular meetings, interviews etc.

Metadata users (citizens, residents, businesses etc.) are very important in the process of developing metadata, as satisfying users' needs is the most important aim of the use of metadata. Users of government resources come with various skills and backgrounds, therefore, considering how users search for information, as well as what is the most sought-after information can assist in both determining the resources to be described and the metadata elements for discovery. There are several ways to obtain information about users, for example, user surveys, focus groups, analysis of feedback. It can also be very useful to use several indicators, such as official statistics on existing government programmes and projects, and Internet users, to identify users' skills in ICT.

To conclude this step, the MWG identified the government resources to be described by metadata according to the requirements of both government resource providers and users. In the e-Government domain, resources can be more general, and this depends on the government policies. For example, the Commonwealth Implementation Manual: AGLS Metadata provides a list of resources for which AGLS metadata should be created, such as government website home pages, government publications, government offline resources, government regulations and procedures, pages providing online government services etc.

A list of the needs of government resource providers and users, as well as the government resources that will be described by metadata, is the outcome of this step.

11.3 Phase III: Studying existing government websites.

In this step, MWG will study and evaluate existing local government websites to find out if any metadata schemes are used by government websites. If so, are any encoding schemes and controlled vocabulary used with them? In this step the group can identify the major problems with existing government websites according to the information gathered in the previous step. The output from this will be a first draft of a metadata framework. This will include the key policy decision on the national metadata standard that reflects the metadata from the perspective of government resource providers and users.

11.4 Phase IV: Determine appropriate metadata elements.

The MWG in this step has all the relevant information required to create and develop national e-Government metadata; therefore, the group has to decide on the exact elements which should be included in the application profile. There are three options for doing this: Firstly, endorsement of an existing national metadata standard, such as Dublin Core which is used by many governments as a basis for their own national standard. An international standard can be adopted as it is, without any refinement, or additional elements and qualifiers may be added to meet requirements. The second option is to select an appropriate national e-Government metadata standard to use with amendments. The final option is to define new elements. The knowledge and experience of the group concerning the different international and national metadata standards obtained in the first phase will help them to make the right decision. Finally, it is important to clarify that creating or developing metadata is an ongoing process.

12. Conclusion

Although the history of e-Government is relatively brief, there has been great activity in the issues related to e-Government information architecture, such as metadata creation, controlled vocabularies and content management.

Metadata is a tool that can be used amongst others to make content findable and manageable and there are many metadata schemas that have been developed for specific needs by various bodies. In the e-Government domain Dublin Core metadata standard is the most widely-used, and those countries mentioned above are not the only ones to have adopted Dublin Core the in creating their metadata standards; according to a survey carried out by DCMES in 2005, there are more, including France, Finland, Denmark, and the Netherlands. On the other hand, the survey shows that most of the countries that have not adopted Dublin Core are in the process of establishing ISO 15836:2003 as their country's national standard (DC, 2005). It can be speculated that Dublin Core will be more widely implemented in e-Government applications in the future, as a result of the great support it has received from many national and international institutions.

However, this is a part and not the end of the story in order to improve government information and services discovery. Encoding schemes should be developed and used (thought not all) of the metadata elements, for instance, a controlled vocabulary to be used with subject element to help citizens to access government electronic resources more easily. Finally, although it is in an early stage a common regional metadata standard projects for e-Government has been developed in some regions, such as European Metadata Standard for e-Government.

Table 6: Summery of UK, NZ and AU Metadata

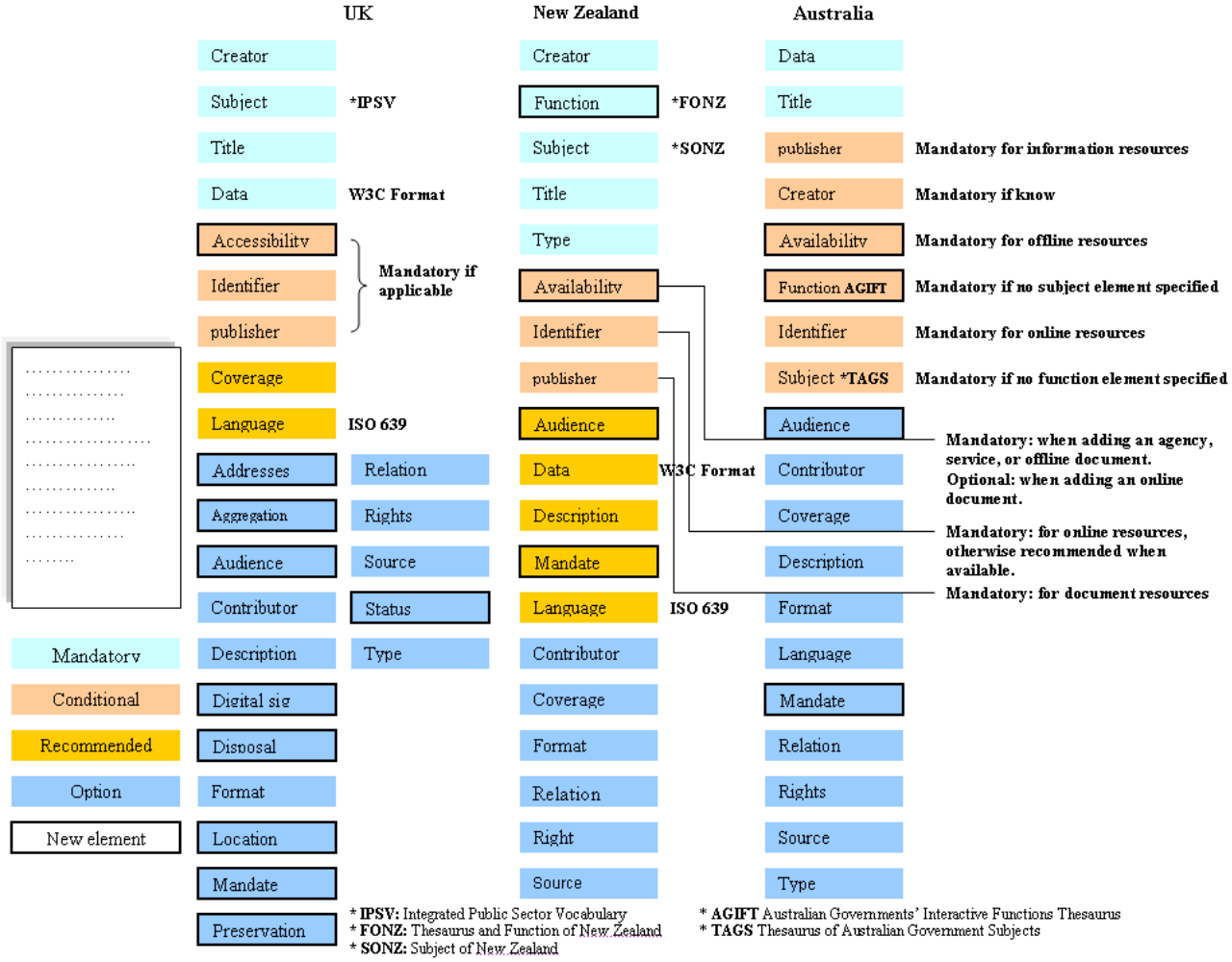
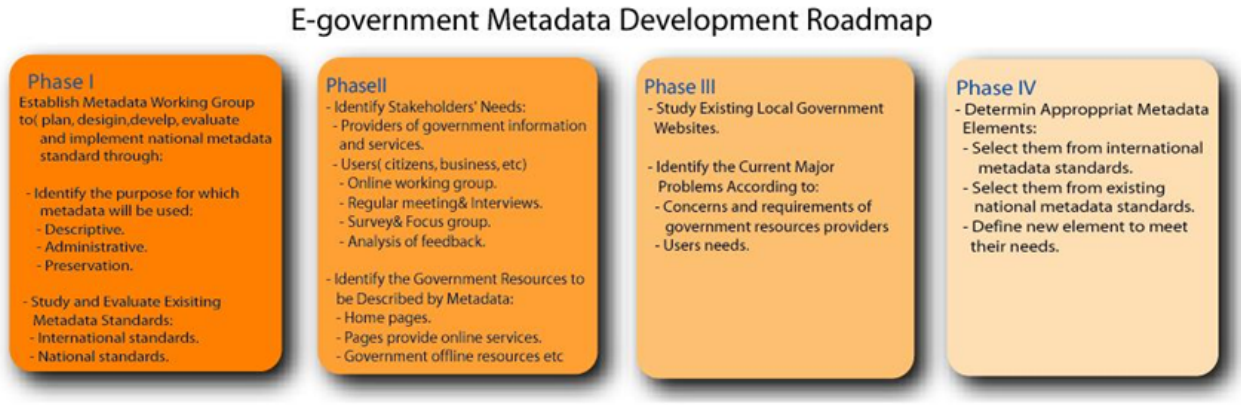


Table 7: Summery of CN, and IR

Table 8: e-Government Metadata Development Roadmap



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