

Celebrating 10 Years of Government of Canada Metadata Standards

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Abstract

As the Dublin Core Metadata Initiative celebrates its 15th anniversary, the Government of Canada (GC) celebrates its 10th year of making information easier to find. The Government of Canada officially adopted the Dublin Core as its core metadata standard for Web resource discovery in 2001. Soon the Government of Canada started to develop domain-specific metadata beyond Web and resource discovery to meet wider information needs. Supported by standards and other policy instruments, rapid metadata developments were made in the areas of records management, Web content management, e-learning, executive correspondence and geospatial data. The Government of Canada actively participated in the DC-Government Working Group, and organized its own event, the Canadian Metadata Forum in 2003 and 2005. More recently, the Government of Canada has adopted an enterprise information architecture (EIA) approach to metadata, within a larger information management strategy. The Government of Canada now has plans underway to develop other metadata domains, registries and repositories, its own namespace facility, and a vast awareness campaign to brand metadata as the “DNA of Government”.

Keywords: Government of Canada; metadata; strategic direction; standard; application profile

1. Introduction

While 2010 marks 15 years of Dublin Core, the Government of Canada marks 10 years of metadata standards. Like Dublin Core, the Government of Canada’s use of metadata has evolved significantly over that time. Early work focused on Web resource discovery to support Internet service to Canadians. Finding effective and efficient ways of delivering information and services has always posed a challenge for the Government of Canada which serves a diverse population of approximately 34 million people spread over almost 10 million square kilometers. The Government of Canada itself comprises over 120 departments, agencies and Crown corporations that deliver more than 1,600 programs and services. Metadata standards based on Dublin Core were developed to improve navigation, searching, information sharing and interoperability across government Web sites.

Over the years, the Government of Canada has gradually extended its use of Dublin Core metadata and other metadata standards across domains with the expansion of electronic systems and services. This has led to an understanding of the key role metadata plays in supporting information management throughout the government. This paper provides an overview of developments in metadata within the Government of Canada from the adoption of the Dublin Core in 2001 to metadata as the “DNA of government” within an enterprise information architecture framework.

2. Developing Metadata Standards

2.1. Early Work

Work on metadata for Web resource discovery started in 1995. At that time, governments were increasingly recognizing the value of metadata to improve access to government information on the Internet, to help users gain access to information resources which were not available on-line and to support the management of growing collections of electronic information. Within the Government of Canada, the interdepartmental GILS Subgroup assessed the Government Information Locator Service (GILS)¹ and proposed it as the standard for common content and structure for the description of government information resources (Brodie unpublished). The group also suggested revisions to the GILS Application Profile, produced the Canadian GILS Guidelines and ran a GILS pilot project.

In 2000, the Government of Canada published Common Look and Feel (CLF) standards and guidelines for the Internet. This was part of a major Government On-Line (GOL) initiative to give Canadians seamless access to government services. The goal of Common Look and Feel was to “ensure that all Canadians, regardless of ability, geographic location or demographic category, are given equal access to information on Government of Canada Web sites” (TBS 2004c). Metadata requirements were included to facilitate information retrieval and site navigation. Five metatags were made mandatory for all Government of Canada Web pages: Title, Originator, Language of Resource, Date and Controlled Subject. No external element set was specified to define these metatags. At the time that the Common Look and Feel standards were developed, the Government of Canada had not yet committed to the use of the Dublin Core.

2.2. Adopting Dublin Core in the Government of Canada

To support the implementation of the metadata requirements in the Common Look and Feel standards, the Government On-Line Metadata Working Group was set up to provide guidance on the use of the mandatory metatags. This group turned to Dublin Core as the most appropriate element set for Web resource discovery metadata on Government of Canada Web pages.

Stemming from this decision, the Government On-Line Metadata Working Group developed two metadata-related standards in 2001. These became mandatory policy instruments within the Government of Canada, known as Treasury Board Information and Technology Standards (TBITS). The first of these standards, the *TBITS 39: Treasury Board Information Management Standard, Part 1: Government On-Line Metadata Standard*, specified that Dublin Core be adopted as the “core metadata standard for resource discovery” (TBS 2001a). This standard mandated that the five mandatory Common Look and Feel metatags were to be implemented using the Dublin Core elements Title, Creator, Language, Date and Subject. The use of other Dublin Core elements was optional. The standard also specified the types of Web pages that must carry metadata, largely inspired by the Australian Government Locator Service (AGLS). Software and system requirements to support the use of metadata were also indicated in the standard. The second of these standards, the *TBITS 39: Treasury Board Information Management Standard, Part 2: Controlled Vocabulary Standard* adopted the principle of controlled vocabularies to support metadata and set out requirements for choosing value domains for the Subject element (TBS 2001b). Specifically, the use of the Government of Canada Core Subject Thesaurus was encouraged as the default scheme. With the implementation of these two standards, the use of Dublin Core was firmly established within the Government of Canada.

The place of Dublin Core was further reinforced in the *Government of Canada Metadata Framework* (TBS 2003). The Framework showed the relationship between the Dublin Core as adopted by the Government of Canada and other extensions for specific subject domains or

¹ The Government Information Locator Service (GILS) is a metadata element set, developed in the United States, based on the ISO 23950 *Information and documentation -- Information retrieval (Z39.50) -- Application service definition and protocol specification* standard.

purposes (figure 1). The five mandated Common Look and Feel metatags, implemented in Dublin Core, were seen as a core set of metadata that would be common to metadata element sets across different domains. The *Dublin Core Metadata Element Set* also played a central role in this framework, providing a base set of elements that these domain-specific element sets could extend with domain-specific elements as required.

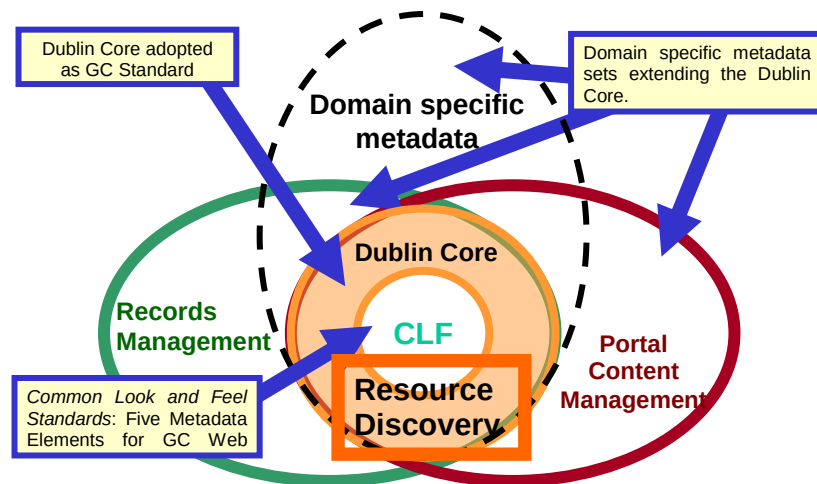


FIG 1. Government of Canada Metadata Framework

3. Tools to Support the Use of Dublin Core for Web Resource Discovery

To assist Government of Canada departments in understanding and meeting their obligations to use metadata to describe their Web information resources, a number of tools have been created over the past ten years. These guidelines, schemes, and application profiles have helped to ensure a consistent approach to describing information resources. This, in turn, supports the ultimate goal of making information resources easier to access, retrieve, use and share.

3.1. Guidelines

In 2002 a first version of the *Government of Canada Metadata Implementation Guidelines for Web Resource Discovery* was published through a cooperative effort within the Government On-Line Metadata Working Group. This document was designed to assist departments in understanding and meeting their obligations to produce descriptions of their Web-based information under the Government of Canada Common Look and Feel standards and the Treasury Board Information Management Standards. These guidelines set out recommended practices for the implementation of the Dublin Core metadata properties within the Government of Canada. Practical guidance on the usage of the properties as well as recommendations for the choice of vocabulary and syntax encoding schemes are provided. The *Government of Canada Metadata Implementation Guidelines for Web Resource Discovery* has become an essential resource for metadata practitioners and developers in supporting Web resource discovery.

Since its introduction, four more editions of the *Government of Canada Metadata Implementation Guidelines for Web Resource Discovery* have been produced, with a sixth edition currently under development. The sixth edition will incorporate current developments within the Government of Canada metadata standards (see below) as well as referring to the *Dublin Core Abstract Model* and changes to the */terms/* namespace.

3.2. Government of Canada Encoding Schemes

In addition to the implementation guidance, the Government of Canada has developed several vocabulary encoding schemes to provide consistent value sets for some of the Dublin Core elements.

- The *gc.audience* vocabulary encoding scheme provides a list of terms to be used to populate the *Audience* property. These terms are meant to describe a wide variety of audiences targeted by a significant number of Government of Canada Web sites, programs and services.
- The *gc.format* vocabulary encoding scheme provides a list of terms to be used to populate the *Format* property. The terms, derived from the IANA MIME Media Type list, include the formats found on Government of Canada Web sites.
- The *gc.type* vocabulary encoding scheme provides a list of terms to be used to populate the *Type* property. Its main function is to standardize the external form and meaning of index terms, thus ensuring that a particular resource type will always be represented in the same way in the index.
- The *Government of Canada Core Subject Thesaurus* (LAC 2009) provides a high-level list of terms to be used to populate the *Subject* property. It is a bilingual English and French thesaurus consisting of terminology which is intended to cover all the subject areas represented in the Government of Canada.

These schemes and certain other vocabulary encoding schemes used by Government of Canada departments and agencies are registered in the Government of Canada Controlled Vocabulary Registry (LAC 2008).

The Government of Canada also makes use of existing syntax encoding schemes where appropriate. For example, the *Standard on Metadata* (TBS 2010) requires the use of World Wide Web Consortium Date and Time Formats (W3CDTF) syntax encoding scheme to populate all Date properties, including Issued and Modified for Web resource discovery metadata and Web Content Management Metadata.

3.3. Application Profiles

In 2006, the Government of Canada published its *Dublin Core Application Profile (DCAP) for Web Resource Discovery in the Government of Canada* (TBS 2006) to document how to use DC terms to describe Web resources. It identifies and describes the attributes of the Dublin Core properties that the Government of Canada has adopted to aid discovery of its Web resources. The profile also identifies recommended registered vocabulary and syntax encoding schemes when populating the properties.

The *Dublin Core Application Profile (DCAP) for Web Resource Discovery in the Government of Canada* was intended to be used as a foundation for many metadata applications beyond Web resources in order to encourage standardization and interoperability. Recently, the DCAP was revised to align with changes to the *Dublin Core Abstract Model*.

To support the use of Dublin Core application profiles in different domains, the Government of Canada developed guidance which was featured in the 2005 Canadian Metadata Forum and a subsequent article in *The Serials Librarian*. (Devey and Côté 2006)

3.4. Training and Conferences

To support the implementation of metadata for Web resource discovery, the Government of Canada took further steps to train those who would be involved in creating and maintaining metadata within government departments and agencies, as well as to support the broader Canadian community. It developed a metadata training package which consisted of three components: a trainers' manual, a presentation that instructors could use during their training sessions and a participant's workbook.

The Government of Canada also organized the Canadian Metadata Forum in 2003 and 2005 to link the broader Canadian metadata community.

4. Defining Metadata in Other Domains

As other metadata domains were developed, the *Government of Canada Metadata Framework* evolved. Mixing and matching properties from different standards was not always possible due to incompatible abstract models. As a result, the framework was revised slightly to allow for metadata standards other than the Dublin Core that could be used in conjunction with, or be mapped to, core elements from the Dublin Core. A combination of Dublin Core properties, Government of Canada extensions and other metadata standards that conform to this revised framework have been used in the development of metadata standards and guidance for e-learning, records management, Web content management systems and geospatial data.

4.1. E-learning Metadata: Dublin Core, IEEE LOM, CanCore and SCORM

The Government of Canada e-learning community approached the GC metadata experts in early 2001 to start working on a common e-learning metadata standard. Finding that the IEEE 1484.12.1-2002 *Standard for Learning Object Metadata* (LOM) was the only viable and complete standard for the domain, the Government of Canada turned to the CanCore to meet Government of Canada needs. The CanCore guideline, developed by Athabasca University, provides guidance on the interpretation and application of the IEEE LOM (CanCore Learning Resource Metadata Initiative 2006).

The initial intent was to develop an e-learning metadata application profile that combined properties from both the Dublin Core and IEEE LOM. As their information models differ greatly, metadata experts soon encountered problems. By looking at use case scenarios, two separate application profiles were developed, one for the Dublin Core and one for the IEEE LOM.

Web-based Information Resources and Web-based Learning Content

An application profile was developed to support the use of the Dublin Core to describe Web-based e-learning resources within the Government of Canada. The *Guidelines for Government of Canada Education (GCED) Metadata Application Profile* (TBS 2004d) allows organizations to identify and further describe the e-learning resources in a way that highlights their potential for re-use in a learning context.

Managed Learning Environment (MLE)

In other cases, a more sophisticated description may be required to document information about the Web based e-learning products and to provide the basis for learners to conduct searches on available learning content. This may require use of the Government of Canada profile of the IEEE LOM, called the *Government of Canada Apprentissage / Training (GCAT) Metadata Application Profile* (TBS 2004e). GCAT provides the minimum set of elements to be used in a Managed Learning Environment (MLE) when Government of Canada organizations need to track a learner's progress through a course for regulatory, financial or diagnostic reasons.

Some organizations make use of the Shareable Content Object Reference Model (SCORM) which, in turn, makes use of the IEEE LOM within Learning Management Systems.²

4.2. Records Management Metadata

Early work on records management metadata started in the 1990's to support the development of a shared solution for records, documents and information management in the Government of Canada, known as the Records, Document, and Information Management System (RDIMS). The

² For further information on SCORM, refer to information found on the Advanced Distributed Learning (ADL) Initiative Web site at <http://www.adlnet.gov/Technologies/scorm/default.aspx>.

IM Forum's *Record Keeping Metadata Requirements for the Government of Canada* (2001) defined a list of elements to be used by federal organizations to describe the identity, authenticity, content, context, structure and management requirements of records created in the context of a business activity. It took a modular approach, defined a set of minimum metadata requirements, and mapped the record keeping elements to the Dublin Core Metadata Element Set version 1.1.

This work was followed in 2006 by the *Government of Canada Records Management Metadata Standard* (LAC 2006c) and the *Government of Canada Records Management Application Profile* (LAC 2006b). These documents define a recommended records management metadata element set and describe how it is to be implemented within the Government of Canada. The *Government of Canada Records Management Metadata Standard* identifies the metadata elements that should be captured in records management systems used by federal government institutions to ensure the authenticity, reliability, integrity and usability of records. The element set incorporates seven of the Dublin Core elements for description purposes, thus ensuring semantic interoperability with the Government of Canada Web resource discovery metadata. The *Government of Canada Records Management Application Profile* defines the business rules delineating the use of records management metadata elements. These documents are being updated to support the new recordkeeping requirements of the *Standard on Metadata*. This guidance is expected to be published by March 2011.

4.3. Web Content Management System Metadata

Early in 2003, the Government of Canada acquired licenses for the implementation of a Web content management system (WCMS). Metadata specialists involved with the implementation of WCMS systems recognized the need for a common approach to the implementation of metadata. As a result, the *Government of Canada Web Content Management System Metadata Element Set (WCMS-MES)* (TBS unpublished C) and the *Government of Canada (GC) Web Content Management System Metadata Application Profile (WCMS-MAP)* (TBS unpublished B) were drafted. They define the information model and rules required to support business and technical processes for authoring, managing and publishing Web content in Government of Canada Web management solutions, as well as implementation specifications and usage guidelines. The new *Standard on Metadata*, issued in July 2010, contains metadata requirements for Web content management systems. Guidance relating to this standard is expected to be published by March 2011.

4.4. Executive Correspondence Metadata

The *Government of Canada Executive Correspondence Metadata Application Profile (GC ECMAP)* (LAC 2006a) identified thirty-four standard metadata elements, a logic model, and an analysis of when elements are used in the workflow of executive correspondence. The GC ECMAP is fully aligned to the *Government of Canada Records Management Metadata Standard (GC RMMS)* and the *Government of Canada Records Management Application Profile (GC RMAP)*.

4.5. Geospatial Metadata

In some domains, the use of Dublin Core has been found to be insufficient for particular business needs. This is true of the geospatial community within the Government of Canada. The Government of Canada has led the development of the Canadian Geospatial Data Infrastructure (CGDI) in partnership with other levels of government as well as academic and business groups. One of the pillars of this work has been to standardize the way information is stored, accessed, and presented online to facilitate use of geospatial databases across the country. A number of international standards have been adopted, including ISO 19115 *Geographic information -- Metadata* a metadata standard for describing digital geographic data. To support this work within the Government of Canada, the *Standard on Geospatial Data* (TBS 2009b) was developed. It

requires that departments describe digital geospatial data using the mandatory elements from ISO 19115.

While the Government of Canada has not used Dublin Core to describe digital geospatial data, the standard can be mapped to the six core Dublin Core properties Title, Creator, Language, Issued, Modified, and Subject. This allows maps available on the Web to be described using the Dublin Core, where applicable. In this way, the general needs of people accessing geospatial information on the Web can be satisfied, while not sacrificing the needs of the geospatial community to be able to fully describe digital geographic information.

5. Metadata Strategy

In 2003, early work on a Government of Canada information management strategy revealed a need for a metadata strategic direction. The first Metadata Strategy was developed in 2004, focusing on metadata for interoperability, information sharing and collaboration. In 2006, information management was recognized as an internal program that supports external government programs and service delivery. Business architecture principles were applied to information management. Metadata was acknowledged as a cornerstone for the strategy and branded in the *Metadata Management and Services Transformation Strategy* as the “DNA of Government” (TBS unpublished A). The *Metadata Management and Services Transformation Strategy* demonstrated the value of metadata in a broader context than Web resource discovery.

6. Current Work

Although much has been accomplished over the past decade, considerable work still needs to be done to develop and implement comprehensive metadata guidance, within the context of an enterprise information architecture approach, to support Government of Canada departments in delivering their programs and services efficiently and effectively.

6.1. Enterprise Information Architecture

Today, as the Government of Canada fully embraces enterprise information architecture (EIA), metadata is more than ever considered a major building block. Following ISO/IEC 42010 *Systems and software engineering -- Recommended practice for architectural description of software-intensive systems*, metadata is formalized as viewpoints and views. A viewpoint is simply a set of instructions. For example, the Government of Canada is currently developing a viewpoint for constructing metadata application profiles based on guidance and best practices developed over the past 10 years. A view is a product developed following the instructions outlined in a viewpoint. For example, the *Dublin Core Application Profile (DCAP) for Web Resource Discovery in the Government of Canada* is a view. The architecture rigor put around metadata supports “the consistent capture, description, retrieval, use, re-use, and maintenance of information resources, regardless of systems in which they exist, and across departments, and the ability of programs and services to share information efficiently and effectively between systems and across departments.” (TBS 2010) By adopting this enterprise information architecture approach, this fundamental role of metadata will become even more recognized and leveraged to support Government of Canada programs and services.

6.2. Standard on Metadata

In 2009, the Government of Canada undertook a major revision to the existing Web resource discovery metadata standards to reflect changes in the DCMI's *Dublin Core Abstract Model* (2007) as well as administrative changes in the Government of Canada. However, it soon became apparent that a new standard was required to reflect the use of metadata across multiple domains within the Government of Canada. A new Treasury Board *Standard on Metadata*, issued in July 2010, broadens the scope of the metadata beyond Web resource discovery to also include requirements for Web content management systems metadata and recordkeeping metadata. In

future years, it is anticipated that further domains will be added to the *Standard on Metadata* based on the Government of Canada Metadata Strategic Direction.

Within the *Standard on Metadata*, the requirements for Web resource discovery metadata are designed to support navigation, searching, information sharing, and interoperability. Specifically, the standard requires that, at a minimum, six “core” Dublin Core properties be used to describe Web pages: Title, Creator, Language, Issued, Modified and Subject. Additional Dublin Core properties are optional. Certain value domains are required for some of these properties. This preserves the requirements of the earlier Treasury Board Information Management Standards, the Government On-Line Metadata Standard (TBITS 39.1) and the Controlled Vocabulary Standard (TBITS 39.2).

The WCMS requirements within the *Standard on Metadata* include the mandatory six “core” Dublin Core properties and the recommended use of additional WCMS properties defined in the Government of Canada Web Content Management System Metadata Element Set (WCMS-MES).

The *Standard on Metadata* also contains new requirements for recordkeeping metadata. To support these recordkeeping requirements, the standard adopts the metadata model outlined in ISO 23081 Information and documentation – Records management processes – Metadata for records – Part 1: Principles; and ISO 23081 Information and documentation – Records management processes – Metadata for records – Part 2: Conceptual and implementation issues. It specifies the minimal elements to be used, both from the ISO standard and a recordkeeping metadata element set that will build on the Government of Canada Records Management Metadata Standard (GC RMMS).

The *Standard on Metadata* also requires Government of Canada departments to store and document their metadata in a registry. Guidance based on ISO 11179 Information technology -- Metadata registries (MDR) -- Part 3: Registry metamodel and basic attributes will be issued to assist departments in creating a federation of metadata registries.

6.3. Metadata Strategic Direction

The Government of Canada is building upon the existing Metadata Framework to develop a Metadata Strategic Direction that will map out priorities for metadata work over the next five years. The *Government of Canada Metadata Strategic Direction* will feature six themes: metadata governance, people and capacity, enterprise information architecture, tools, value of metadata, and vision for the future. This work will take a wide look at metadata across domains, including the use of metadata to support data stewardship. As well, it will address the infrastructure needed to support the development and maintenance of metadata across the Government of Canada, including how to sell the need for metadata, the role of metadata registries and repositories, and priorities for the development of standards and guidance. The *Government of Canada Metadata Strategic Direction*, along with the *Standard on Metadata*, will form a strong foundation for an expanded and sustained use of metadata within the Government of Canada.

7. Future Work

The priorities for the current year are the development of the *Government of Canada Metadata Strategic Direction* and the publication of guidance to support the *Standard on Metadata*. As mentioned previously, the *Government of Canada Metadata Strategic Direction* will map out the priorities for metadata development over the next five years. The guidance for the *Standard on Metadata* will include updated application profiles and implementation guidelines for Web resource discovery metadata and Web Content Management System metadata, as well as the development of a recordkeeping metadata element set, application profile and supporting implementation documentation.

The *Government of Canada Metadata Strategic Direction* will play a key role in determining the future developments in metadata within the Government of Canada. Preliminary work has

prepared the way for developments across a number of domains. The structure of the *Standard on Metadata* allows for future additions of domain-specific metadata requirements. As presented before, the Government of Canada has developed metadata application profiles for e-learning and executive correspondence. These application profiles now need to be updated. In addition, early work on the *Government of Canada Metadata Strategic Direction* recommends including the following domains: audiovisual, e-libraries and repositories, Web 2.0 and social media, Web 3.0 and beyond, metadata for structured and semi-structured information resources, and open data.

The *Government of Canada Metadata Strategic Direction*, coupled with the requirements of the *Standard on Metadata*, will set the course for the development of infrastructure to support the maintenance and stewardship of metadata within the Government of Canada. This includes the development of metadata registries and repositories, including a model for a Government of Canada metadata registry. This will leverage work already done within the Government of Canada, as well as other registries such as the DCMI metadata registry. The *Government of Canada Metadata Strategic Direction* is also expected to recommend the establishment of Government of Canada namespace conventions to support the definition and use of local elements. These measures will allow the Government of Canada to fully exploit the benefits of standardized metadata.

8. Conclusion

It has been an exciting decade of Dublin Core metadata developments – and beyond – in the Government of Canada. A number of critical factors have contributed to the success of these efforts. First, there has been significant support for the development of metadata within the Government of Canada, due to recognition of the importance of metadata for managing information resources as strategic assets to facilitate decision-making, accountability, and the efficient delivery of Government programs and services. While initially focused on supporting Web resource discovery, this has been extended to other domains. A second critical factor is the evolution of Dublin Core and other metadata standards (e-learning and geospatial for example). These standards have provided a solid base for the development of Government of Canada standards and guidance. Third is the high degree of collaboration across Government of Canada departments and agencies which has allowed the development of several iterations of metadata frameworks, standards, strategies, local element sets, application profiles and guidance. The volume and quality of work produced would have been impossible without the dedication and practical experience of metadata experts in many organizations and domains. As well, cross-fertilization with other governments within Canada and abroad has enriched the Government of Canada's approach. In the Government of Canada, metadata increasingly gets the recognition it deserves and plays a central role in information management and enterprise information architecture. Much work lies ahead, and the Government of Canada metadata community is ready to take on the challenge.

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