METADATA USAGE REPORT

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For
The E-learning Sub-group, GOL Metadata Working Group
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SUMMARY OF THE REPORT

BACKGROUND AND OBJECTIVE

In the Fall of 2001, as part of the Government of Canada's Government On-Line Metadata Working Group (GOL MWG), informal discussions took place between the Department of National Defence (DND), Industry Canada (IC), the Department of Canadian Heritage (PCH) and the Treasury Board Secretariat (TBS) on the need for a common approach to e-learning metadata across the Government of Canada. Based on the results of these informal meetings, the GOL MWG established the E-learning Sub-group to study e-learning metadata and provide advice on future directions.

The purpose of this document is to provide the E-Learning Sub-group with a detailed assessment of the qualities, distinguishing features and implementation issues of the key e-learning metadata standards and application profiles. This assessment also includes a high-level analysis of where these standards and application profiles are commonly in use, for example, within other governmental, national and international environments. This document contains recommendations specific to the Government of Canada.

For more information on the Government On-Line Metadata Working Group, its E-Learning Sub-group, and their activities, please consult the following URLs:

Background on the GOLMWG - http://publiservice.cio-dpi.gc.ca/im-gi/mwg-gtm/intro_e.asp
Background on the E-Learning Sub-group - http://publiservice.cio-dpi.gc.ca/im-gi/mwg-gtm/ems-sml/intro_e.asp

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Summary and Recommendations

This report is a scan of e-Learning metadata standards and related activities. The report covers the following areas of research:

A high-level analysis of e-Learning metadata "standards"

The report includes a discussion of the two major metadata standards being used in the e-Learning realm and selected application profiles: the Dublin Core (DC) and IEEE Learning Object Metadata (LOM) standards. Both of these standards form the basis for a range of application profiles. The application profiles are derived from the standards, and provide variations by defining additional elements or selecting and defining a specific sub-set of elements.

Although Dublin Core has not specifically been developed for e-Learning content, it is used in a wide range of education contexts for resource discovery and it has sometimes been augmented with education specific elements. Where and how DC has been modified to increase its relevance for learning content provides a useful perspective for GOL e-Learning metadata implementation.

IEEE LOM is a much more complex standard that has been developed specifically for describing learning objects and capturing pedagogical considerations. It has been developed in alignment with the IMS Global Learning Consortium's Learning Resource Metadata Specification (commonly refer to simply as IMS specification). Because this is a complex standard, application profiles, such as Canada's CanCore, have been developed to facilitate its implementation. CanCore's core element set is a subset of IMS, which greatly simplifies its implementation and in doing so encourages broader compliance with the LOM/IMS standard.

This study looks at the advantages and disadvantages of the two major standards and at the contexts in which their respective application profiles are being developed and successfully adopted for tagging learning content. For each of the standards, a detailed case study is provided.

Implementation issues and considerations

The selection of an e-Learning metadata standard for the Government of Canada (GOC) should be based on a careful analysis of implementation costs and benefits. The overall cost of designating metadata tags for learning content must be weighed against the end-value. With this in mind, it is essential to determine the context in which GOC learning content is to be used. Essentially metadata is used for resource discovery and/or for learning object management and exchange.

The Dublin Core standard is an effective standard for resource discovery. Many of the education contexts in which it is used involve the need for resource discovery by a broad audience of education professionals. DC implementation is

often streamlined by virtue of its "ease of use". Where DC is being used, content developers and providers are frequently also the content "metadata taggers". (This is the case, for example, with GEM, a major U.S. Department of Education content gateway which is based on Dublin Core and which is based on content provided by hundreds of independent content contributors.)   A number of DC application profiles and implementation examples have been supplemented at the local level by the addition of education specific elements. Although DC does not describe learning objects from a technical and pedagogical perspective, its application in an educational context has been enhanced somewhat by the recommendations for additional elements put forward by the DC Education Group. These recommendations as well as the advantages and disadvantages of DC for describing learning content are discussed in this report.

The IEEE LOM standard (and its twin, the IMS specification) is a more complete standard for handling learning objects. The CanCore subset and recommendations for best practices offer a practical formula for LOM/IMS implementation. Because CanCore has been widely adopted by Canadian organizations, CanCore has also paved the way for the practical exchange of learning objects among Canadian universities, colleges and other agencies dealing with the development of learning content. While less complex than the full IEEE LOM standard, the CanCore application profile includes general descriptive elements for resource discovery as well as selected elements related to basic technical implementation, education application, rights management, relationship to other learning content, and classification based on a specific taxonomy. IEEE LOM is a more robust standard than Dublin Core, but its suitability for use in a particular context depends very much on the anticipated use that will be made of a given learning object repository. In general, IEEE LOM and its variations (SCORM/CanCore) are most appropriate as a standard where learning content is designed for use in a formal training program (vs. incidental content that may or may not be used specifically for learning). Although there are few examples that identify specific costs for LOM implementation, the scope and complexity of LOM indicate that its implementation is certain to be expensive (in comparison to DC). The additional costs of implementing LOM (or CanCore) must be weighed against the degree to which additional elements related to object sharing, technical implementation and pedagogical information would be used. The IEEE LOM, its related application profiles, and a case example are discussed in this report.

Standards usage

Activity related to the implementation of e-Learning standards is extensive. There are national guidelines, collaborative groups, implementation projects, research agencies, learning object repositories and education gateways. All of these have an impact on the development and continuous evolution of e-Learning standards. Although it has not been possible in the time frame available for developing this report to investigate all areas of standard usage and related implementation issues, the report does provide a sampling of usage data.

Agencies that are using a specific standard are identified as part of the discussion of each standard. In addition, short summaries have been developed for selected projects to give a closer look at the mix of activity and types of agencies active in the area of e-Learning standards. The data provided with respect to usage is international in scope. Canadian implementation examples are mostly related to CanCore, which accounts for much of the Canadian activity in the area of learning standards. The usage information provided in the report includes links for further research and contact information where this was available.

Conclusions and recommendations

1. We recommend the use of IEEE LOM/IMS V1.2.1 following the CanCore application profile for describing learning objects. Most specifications and application profiles are aligning themselves with IEEE LOM: IMS, SCORM, CanCore, ARIADNE, so choosing IEEE LOM will allow the GOC metatagged learning content to be compatible with all of them. The advantage of CanCore is their useful and helpful guidelines and documentation as well as their applicability to Canadian resources.

2. Once a metadata standard is selected, it will be necessary to establish a common practice with respect to which fields should be filled at a minimum. The GOL Metadata Working Group, E-learning Sub-group, will need to determine which elements should be mandatory for GOC learning objects. Designating an e-Learning metadata element as <u>mandatory</u> should be based on the likelihood of that element serving a practical purpose for learning content exchange among GOC agencies. Individual departments can provide more comprehensive metadata tagging based on departmental needs and agreements with external agencies with which they are most likely to be exchanging content. A reasonable starting point for selecting GOC common elements would be either the SCORM mandatory set or the CanCore element set.

3. Dublin Core can, and likely will, still be used to describe objects (assets) such as images, video, and audio as well as content primarily intended for resource discovery by the general public. Because GOL guidelines related to the use of Dublin Core (TBITS 39.1) do not preclude the use of DC elements beyond the five mandatory elements, departments may choose to adopt the DCEducation elements for some kinds of learning content. This should not be a problem since Dublin Core is an appropriate standard in any context where resource discovery is the primary goal.

4. Clear guidelines for GOC e-Learning metadata implementation should be developed. These guidelines should be aligned with Canadian and international best practices. To ensure quality and consistency it may be necessary to centralize some aspects of e-Learning metadata implementation.

5. Be aware that not all search engines will be able to use the metadata element set that you choose. None of the public search engines search metadata content, although some use metadata information for relevance ranking.

Government of Canada departmental search engines are being configured to search Dublin Core metadata fields. The GOL Metadata Working Group, E-learning Sub-group, should determine what tool(s) will be put in place for locating learning objects. Metadata elements should be transparent to those searching for content.

6. The GOL Metadata Working Group, E-learning Sub-group, should specify which vocabularies should be used with specific e-Learning elements. CanCore specifies that, "elements that are subject to the vocabulary datatype should reference publicly sourced and maintained vocabularies." Although the issue of mapping between different vocabularies is best addressed at an international level, the E-learning Sub-group should track developments in this area and adopt policies in conformance with work in this area as it goes forward. CEN-ISSS (Information Society Standardization System) is a central resource for taxonomy and thesauruses development and for linguistic interoperability.

7. The GOL Metadata Working Group, E-learning Sub-group, should create a mapping from IEEE LOM (IMS) to DC to be able to transform metadata, as needed.

8. GOL Metadata Working Group, E-learning Sub-group, should create a mapping from DC to IEEE LOM (IMS) to be able to transform metadata, as needed.

9. The GOL Metadata Working Group, E-learning Sub-group, should follow the work done by the *CETIS Metadata Special Interest Group* and request to be on the CETIS Metadata listserv. The GOL Metadata Working Group, E-learning Sub-group, should also follow case study research currently being done by CETIS Metadata SIG Coordinating Partner Phil Barker. [1]

10. The GOL Metadata Working Group, E-learning Sub-group, should continue to monitor metadata activities, especially work being done by IMS, SCORM and CanCore.

Final thoughts

The following passage is from a presentation given by Stephen Downes.[2] It captures a number of points that should be considered with respect to vocabulary and other aspects of metadata implementation.

Language (and therefore metadata) has three dimensions (Charles Morris)
- Syntax – sentence structure and grammar
- Semantics – reference and representation

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[1] CETIS: http://www.cetis.ac.uk/
CETIS Metadata SIG: http://cetis-metadata.lboro.ac.uk/index.htm
Phil Barker: ICBL, Dept of Computing and Electrical Engineering Heriot-Watt University phone: 0131 451 3278 email: philb@icbl.hw.ac.uk
[2] Stephen Downes, NRC presentation "One Standard for all", Jan 2003

▪ Pragmatics – context of use

We can conclude this:
We say different things about an object depending on our different
relations (e.g., Contexts of use) of an object

And thus:
The more we restrict what we can say about an object, the more
the meanings of the terms we do use will vary according to context.

The lesson is this:
▪ If we attempt to restrict the vocabulary used to describe learning objects, then because of pragmatics we are almost guaranteeing that the words in our vocabulary will lose their fixed meaning.
▪ This will make it impossible for machines – as well as humans – to understand what is being said.
▪ Objects are best described using multiple vocabularies.
▪ There is no way to determine which vocabulary will be relevant to either an author or a user of a given objects.
▪ Trying to stipulate a canonical vocabulary a priori needlessly reduces the effectiveness of a system of communication.