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## CANADIAN GEOSPATIAL DATA INFRASTRUCTURE INFORMATION PRODUCT 39e

# **User's Guide on the Classification of Geospatial Information Policy Instruments**

GeoConnections  
Hickling Arthurs Low Corporation

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# 1. Preamble

*This guide is one in a series of Operational Policy documents being developed by GeoConnections. This guide is intended to assist [Canadian Geospatial Data Infrastructure \(CGDI\)](#) stakeholders that work with geospatial data and produce and/or use policy instruments that impact activities related to geospatial data. The [classification](#) framework described in this document is to be used in conjunction with a proper cataloguing system that will allow the inventorying and searching of policy instruments.*

This guide describes a geospatial [policy](#) classification framework that was developed to facilitate the organization and retrieval of relevant policies. The objective of the classification framework is to give managers of geospatial data the ability to rapidly identify the relevant policies for management and dissemination of their data in order to increase compliance with those policies. The framework was developed using a ‘request oriented classification’ approach (i.e., a classification in which the anticipated request from users influences how documents are classified). In using the framework, policy classifiers ask themselves, “Under which descriptors should this entity be found?” and consider “all the possible queries and decide for which ones the entity at hand is relevant” (Soergel, 1985) (Wikipedia, 2013).

*The GeoConnections program is a national initiative led by Natural Resources Canada. GeoConnections supports the integration and use of the **Canadian Geospatial Data Infrastructure (CGDI)**.*

*The **CGDI** is an on-line resource that improves the sharing, access and use of Canadian geospatial information – information tied to geographic locations in Canada. It helps decision makers from all levels of government, the private sector, non-government organizations and academia make better decisions on social, economic and environmental priorities.*

This guide will be of interest to CGDI stakeholders that are considering the development of a spatial data infrastructure and want to identify and classify applicable policy instruments, or that want to contribute to the maintenance of an existing policy inventory system. It will be of particular interest to anyone seeking a better understanding of the types of policy instruments that are relevant to the use of geospatial information within the Government of Canada.

## 2. Classification Framework Scope

Policies considered in scope in the classification framework described herein include all policy instruments that are related to the management and dissemination of geospatial data. Although the relevance is not so clear cut in the area of information technology, for the purpose of this classification framework, it is anticipated that only information technology policies directly related to the development and operation of geospatial applications, services, and databases will be included. More generic policies (e.g., for the use of email or departmental electronic networks) that are not directly related to development or operation of geospatial applications should not be included.

### 3. Policy Metadata Definition

While the focus of this guide is on classification of policy instruments, the cataloguing of such instruments requires additional attributes that are not classification-based. The attributes identified in Table 1 were used in the cataloguing of policy instruments from the Earth Sciences Sector of Natural Resources Canada (NRCan) as part of a prototyping exercise to test the classification framework. They are deemed to be a minimal set of attributes that should be part of any policy cataloguing system. All of the attributes are taken from the Dublin Core Metadata Element Set with the exception of “status”, “location” and “reference implementation”.

**Table 1: Minimal Set of Attributes for Any Policy Cataloguing System**

Attribute	Definition	Classification-based (Y or N)
Title	A name given to the policy (only one)	N
Type	The nature or genre of the policy (only one)	Y
Creator	An entity primarily responsible for making the policy (only one)	Y
Status	The current approval level of the policy	Y
Subject	The topic of the policy (one or more)	Y
Domain	The scientific, technology or business domain to which the policy is specifically addressed	Y
Description	An account of the policy, which may include but is not limited to: an abstract, a table of contents, a graphical representation, or a free-text account of the policy	N
Relation	A related policy	N
Location	URL pointing to a web page where the policy is either described in more detail or can be accessed	N
Reference Implementation	URL pointing to a web page or document describing a reference implementation of the policy	N

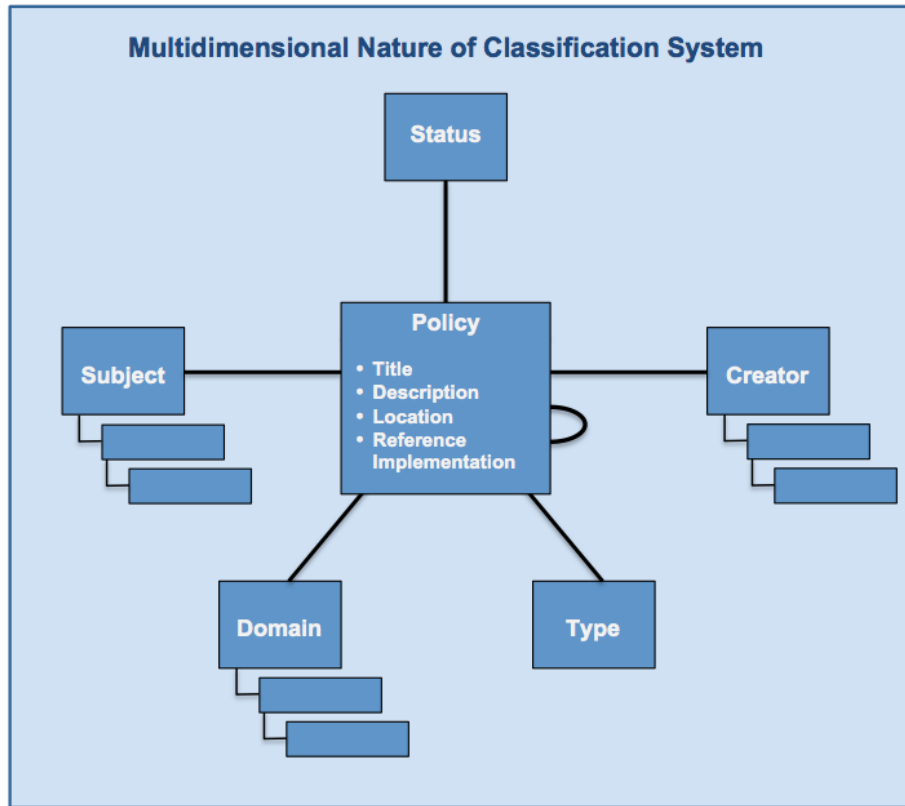
#### 3.1 Multidimensional Nature of Classification Framework

The classification framework uses multiple dimensions or facets. As such, any cataloguing system using this type of classification could be used by search systems to allow refinement of searches using any of the classification-based attributes. It could also be used by On Line Analytical Processing (OLAP) systems, if the objective is to conduct analysis on the content of the cataloguing system as opposed to searching for specific records.

As shown in Figure 1, each policy in the cataloguing system possesses unique attributes and links to multiple dimensions or facets. Each dimension or facet is represented as a taxonomy

which can include only one level or be broken down in a multi-level hierarchy. The diagram shows that Subject, Domain and Creator are currently multi-level hierarchies. Additionally, the diagram shows that policies can be related to each other, enabling navigation and exploration from policy to policy.

**Figure 1: Multidimensional Nature of Classification Framework**



### 3.2 Multilingual Nature of Cataloguing System

The policy cataloguing system must be able to support data management and access in multiple languages. This means that for every policy in the cataloguing system, attributes that are not classification-based could potentially have multiple values, one for each language supported. This includes all attributes presented in the Policy box of Figure 1.

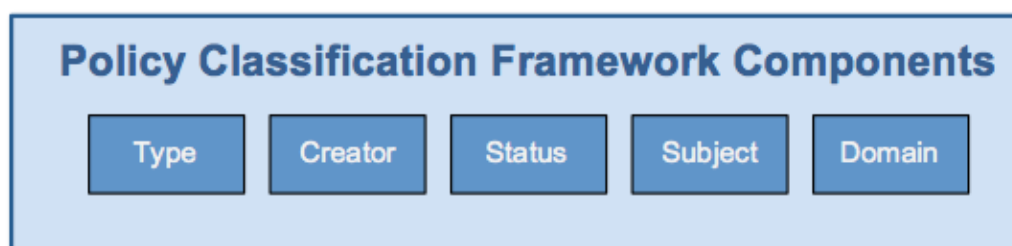
With respect to the dimensions, each term in a dimension should have a corresponding term in any language that must be supported by the cataloguing system. The management of corresponding terms should be the responsibility of the cataloguing system administrator and independent from the management of catalogue entries.

The implementation of multilingual functionality can take many forms and it is not the intent of this guide to prescribe any particular method.

## 4. Cataloguing and Indexing New Policy Instruments

This section defines the classification framework and describes best practices in how to create new records in a cataloguing system of policy instruments. The approach is system-independent and may need to be tailored to suit the strengths and weaknesses of a given technology used to implement a cataloguing system. The components of the classification framework are illustrated in Figure 2. Examples of the classification of actual policy instruments, done as part of the prototyping exercise with the Earth Sciences Sector of NRCan are presented at Appendix 3.

Figure 2: Components of the Geospatial Policy Classification Framework



### 4.1 Type

For the purposes of this guide, types are based on the policy instruments structure of the Treasury Board of Canada Secretariat (TBS), extended to better categorize tools. Table 2 presents the allowable values and one or more definitions for each term, along with the source for the definition.

Table 2: Types of Policy Instrument

Instrument Type	Definition
Law	A law made by the Parliament of Canada.
Policy	A formal direction that imposes specific responsibilities on departments. Policies explain <i>what</i> deputy heads and their officials are expected to achieve. (TBS) A high-level statement that sets out the overall objectives and philosophy of the organization, with respect to some aspects of IM & IT, and that is designed to influence community behaviour and achieve specific outcomes. (NRCan)
Directive	A formal instruction that obliges departments to take (or avoid) specific action. Directives explain <i>how</i> deputy heads' and their officials must meet the policy objective. (TBS) An authoritative statement issued by a high-level body or official that specifically encourages or bans a particular activity within the IM & IT domain. (NRCan)



Instrument Type	Definition
Standard	<p>A set of operational or technical measures, procedures or practices for government-wide use. Standards provide more detailed information on <i>how</i> managers and functional specialists are expected to conduct certain aspects of their duties. (TBS)</p> <p>A specification for hardware, software, or data that is either widely used and accepted (de facto) or is sanctioned by a standards organization (de jure).</p> <p>An accepted or approved example or technique against which other things are judged or measured, or which sets out a set of criteria that prescribes how something should be done (e.g., configuration standard). (NRCan)</p>
Guideline	A written statement or outline that guides how an individual user may use some aspect of IM [information management] or IT [information technology] and/or satisfy the provisions of a policy, directive, standard, etc. (NRCan)
Best practice	A method or technique that has consistently shown results superior to those achieved with other means, and that is used as a benchmark. (BusinessDictionary.com)
Instruction and Procedure	A fixed, step-by-step sequence of activities or course of action (with definite start and end points) that must be followed in the same order to correctly perform a task. (BusinessDictionary.com)
Template	A document or file having a pre-set format, used as a starting point for a particular application so that the format does not have to be recreated each time it is used. (The American Heritage® Dictionary of the English Language)
Checklist	A comprehensive list of important or relevant actions or steps to be taken in a specific order. (BusinessDictionary.com)
Backgrounder	An official briefing or handout giving background information

While policies are normally of one type, there may be cases where a policy instrument could be of multiple types (e.g., a policy instrument may be both a standard and a best practice).

## 4.2 Creator

Each policy instrument is the responsibility of one and only one creator. In the classification system developed for NRCan, the following classes were identified for creator:

- Government
  - Government of Canada
    - Natural Resources Canada
      - Geographical Names Board of Canada (GNBC)
      - Earth Sciences Sector
        - Mapping Information Branch
          - GeoConnections
    - Treasury Board of Canada Secretariat
  - Ground Segment Coordination Body
  - Consultative Committee for Space Data Systems
  - Federal Geographic Data Committee

- International Association
  - Commission for the Management and Application of Geoscience Information
  - Consortium of Universities for the Advancement of Hydrologic Science, Inc.
- Standardization Organization
  - Industrial Standardization Organization
    - Object Management Group (OMG)
    - Open Geospatial Consortium (OGC)
    - World Wide Web Consortium (W3C)
    - Internet Engineering Task Force (IETF)
  - International Standardization Organization
    - International Organization for Standardization
      - ISO/TC 211
      - ISO/TC 204
    - International Electrotechnical Commission
    - ISO/IEC Joint Technical Committee 1
      - Sub committee 24
      - Sub committee 32
    - North Atlantic Treaty Organization – Military Agency for Standardization (NATO-MAS)
      - Digital Geographic Information Working Group (DGIWG)
    - International Hydrographic Organization (IHO)
  - National Standardization Organization
    - Standards Council of Canada
      - Canadian General Standards Board Committee on Geomatics
      - Canadian Standards Association

#### Suggested Creator Classification Guidelines

- *Canadian federal laws should always be assigned to the Government of Canada.*
- *For organizations broken down to a lower level, only the relevant lower level organizations should be included (i.e., those that would be responsible for a relatively high number of policies). If the policy is the responsibility of an organization that has lower level organizations in the taxonomy above, but the appropriate lower level organization is not included in the taxonomy, then simply assign the organizational level of the taxonomy just above this organization. For example, if a policy is the responsibility of the Canada Center for Remote Sensing, since it is not included under the Earth Sciences Sector, this policy would be assigned to the Earth Sciences Sector.*
- *Always try to identify the creator at the lowest level of the taxonomy.*

As shown in the taxonomy above, there are three classes of creator at the first level: Government, International Association, and Standardization Organization. It is recommended that these classes remain stable. However, classes at the second level and below could change over time, depending on the frequency of usage. Some classes could be removed and some added.

### 4.3 Status

Status is used for information purposes only and serves to identify whether the policy is approved or in draft mode. There are three possible values for status:

- Approved
- Final draft
- Draft

## 4.4 Subject

Subject is the most extensive taxonomy in the policy classification framework. It is the key taxonomy that defines what a policy is really about and that will facilitate searching. As such, it is possible to assign one or more subjects to a policy. At the highest level the subject taxonomy is made up of the following five classes:

1. **Standardization / Policy Development Infrastructure:** Policies in this category set the framework for defining standards or policies.
2. **Legal Aspects:** Policies that serve to protect the rights of Canadian citizens, organizations and public institutions, with respect to information.
3. **Content:** Policies in this category generally define the meaning, structure and/or encoding of geospatial data and/or metadata.
4. **Information Management Lifecycle:** Policies that address the various activities or processes carried out to manage geospatial data throughout its life cycle, from acquisition to disposition.
5. **Information Technology:** Policies in this category address information technology use to support information management processes.

The following list presents the subjects that fall under each of the five classes and their respective definitions.

### 1. Standardization / Policy Development Infrastructure

- No lower level subjects

### 2. Legal aspects

- *Access to Information and Privacy* – Right to access information in federal government records and right for citizens to access personal information held by the government and protection of that information against unauthorized use and disclosure (TBS, 2009).
- *Accessibility* – Making web content more usable to users in general, including making it accessible to a wider range of people with disabilities, including blindness and low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities, photosensitivity and combinations of these (W3C, 2008).
- *Official languages* – Related to the implementation of the Official Languages Act.
- *Rights and Licensing* – Legal rights to data or data products and granting of permission to use the data or data products.
- *Security* – Assurance that information, assets and services are protected against compromise (TBS, 2012)

### 3. Content

- *Coverage, imagery and gridded data* – Data that can be represented as imagery or coverage data.
- *Data encoding* – Encoding rules for use in the interchange of geospatial data.
- *Data model* – Structure of data and/or list of valid values for a set of data, including feature classification.
- *Data quality* – Anything that describes quality or defines procedures to determine and / or evaluate quality of geospatial data or data sets.
- *Data registration* – Methods and procedures to allocate a unique identifier to a feature within a local or global system.
- *Metadata* – Data that describes geospatial information and services (ISO, 2009).
- *Observations and measurements* – Data about scientific observations and/or measurements.
- *Schema crosswalk* – Mapping of data structure and/or actual data values between two schemas or data models.
- *Spatial reference system* – Coordinate-based local, regional or global system used to locate geospatial entities (Wikipedia, 2013).

### 4. Information Management Lifecycle

- *Data acquisition and maintenance* – Activities that pertain to the procurement, collection or entry of data, and/or to data updating.
- *Data production* – Activities related to the production of value-added data or data sets from one or more sets of source data.
- *Data dissemination* – Activities related to the dissemination of collected data and/or data products.
- *Data use* – Activities related to the use of geospatial data.
- *Data archiving and disposition* – Activities related to the management of the retention of geospatial data, including when they need to be archived and when they need to be disposed of.
- *Data governance* – Planning, supervision and control over data management and use (DAMA, 2009).
- *Geographical Naming* – Activities that guide and specify rules regarding the naming of geographic features.

#### Suggested Subject Classification Guidelines

- *Policies that apply to many processes in the information management life cycle should be classified under “Information Management Life Cycle”. If there are strong components addressing one or a few of the sub-topics, they should also be classified with these sub-topics.*
- *Some policies may be applicable to both processes (life cycle) and content. In that case they should be classified with the relevant sub-topic from each category.*
- *For policies about information technology, if they are also specific to a given process in the life cycle, they should be classified using the life cycle sub-topic. If it is generally applicable to multiple processes, they should only be tagged with the relevant information technology topic or sub-topic.*

- *Volunteered geographic information* – The widespread engagement of large numbers of private citizens, often with little in the way of formal qualifications, in the creation of geographic information (Goodchild M. , 2008).

## 5. Information Technology

- *Services* – Service interfaces used for geospatial information
- *User interface* – The system by which people (users) interact with a machine (Wikipedia, 2013).

## 4.5 Domain

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Domain is used to identify whether a policy is applicable to one or more specific domains. If the policy is generic, there is no need to classify it with a domain. The initial list of domains was extracted from the Government of Canada Core Subject Thesaurus (Government of Canada, 2009) and consists of the following values:

- Earth Sciences
  - Geochemistry
  - Geodesy
  - Geography
  - Geology
  - Geophysics
  - Hydrology
  - Meteorology
  - Oceanography

## 4.6 Extending the Classification Framework

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The classification framework was designed to be extended both globally and locally. Global changes should be reflected in future versions of this document following approval through a formal governance process. Anyone using the classification framework for their own policy cataloguing / inventory system can also extend each of the classification dimensions to suit their requirements. While the five dimensions (type, creator, status, subject, and domain) are not expected to be changed, the values under each dimension can be extended to meet the specific requirements of an organization. In particular, the values for creator and domain should be reviewed before implementing a local inventory and extended as required.

## 5. Use Scenarios

The following sections outline two typical scenarios where the use of the geospatial policy instrument classification framework would be beneficial.

### 5.1 Developing an Inventory of Geospatial Policies

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John was recently appointed to the position of Manager of Geospatial Data Operations for the Ministry of Land Resources. Following a review of the objectives and activities of his new organization, John realized that major improvements were required in the management and publishing of geospatial data, in order to support new initiatives undertaken by the Ministry that required collaboration and information sharing with other government organizations. With limited staff and growing budgetary pressures, John wanted to optimize the services that his team could deliver through streamlined processes and standards-based services.

John assigned one of his analysts, Lea, to gather information on documented organizational practices and policies related to the management and dissemination of geospatial data. As there was no central repository where this information could be found, Lea developed a simple data inventory system where she could record relevant policies, practices and standards that were currently used in the organization. Lea interviewed key team members responsible for management and dissemination of geospatial data to get their input. As the team was spread across multiple locations, Lea also developed and distributed a survey to reach as many people as possible. She then collected all the information and recorded it in her data inventory system. To organize the information and make it more easily accessible, Lea classified each record, using the framework in the *User's Guide on the Classification of Geospatial Information Policy Instruments*. She then presented it to key team members to validate and confirm the classification she used for each record.

Lea provided access to the inventory to John who consulted it to search for specific practices and policies related to dissemination using terms from the classification scheme to filter his search. The search results provided a quick snapshot that allowed him to better assess the current state of practice in his organization and identify gaps where processes and policies required refinement in order to support the Ministry's new data sharing initiatives. The inventory system also put his organization in a very good position to share best practices with partners.

## 5.2 Using the Inventory of Geospatial Policies to Share Best Practices

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In his quest to implement services to share infrastructure data with his partners on a new regional infrastructure management initiative, John wanted to understand what other organizations of similar size were doing. He was interested in the policies and standards they were using and in best practices they had adopted.

He first searched the web using his favourite search engine. The web certainly provides an invaluable source of information on how to resolve a specific problem or how to address a particular activity. From YouTube videos to blogs to commercial sites trying to sell their wares and government sites that provide high-level directives, everybody has something to contribute. However, John was quickly overwhelmed with the variety of information provided and underwhelmed with the quality of the results for what he was seeking.

He then contacted a former colleague of his, Denise, who advised him that she was a member of a community of practice for geospatial data practitioners. This community had implemented a tool to allow its members to identify standards and external policies they were using in addition to recording their own local policies and best practices, with access links to allow other members to consult them. As custodian of the inventory tool, Denise was proud of the progress they had made in getting members to contribute content to the inventory. But more importantly, she felt that members were getting strong value from using the inventory as they were reporting that they were now able to find relevant policies, standards and best practices used by their colleagues, and adapt these to their own organization as opposed to developing them from scratch, saving substantial effort.

John joined the community and was able to search through the community's inventory, using a standard classification scheme to facilitate his search. He learned what standards community members were already using to share infrastructure data and what policies they had instituted or used to ensure interoperability and maintainability of their data, two topics that were of particular interest to him. John also decided to contribute the details of his organization's use of policies and standards and their own local best practices, so that others could also benefit from this knowledge.

In a follow-up discussion, John and Denise agreed that the collaborative nature of the community's inventory was helping forge new relationships within the community and was truly facilitating the implementation of regional and national initiatives.

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## Appendix 2: Glossary

Acronym	Term	Definition
CGDI	Canadian Geospatial Data Infrastructure	An on-line resource that improves the sharing, access and use of Canadian geospatial information – information tied to geographic locations in Canada.
	Classification	A systematic arrangement in groups or categories according to established criteria (Merriam-Webster).
DAMA	The Data Management Association International	A not-for-profit, vendor-independent, global association of technical and business professionals dedicated to advancing the concepts and practices of information and data management (DAMA International, 2012).
ISO	International Organization for Standardization	The world’s largest developer of voluntary International Standards, which was founded in 1947, and since then has published more than 19,500 International Standards covering almost all aspects of technology and business (ISO, 2013).
ISO/TC 211	International Organization for Standardization Technical Committee 211	The ISO technical committee responsible for standardization in the field of digital geographic information, the work of which aims to establish a structured set of standards for information concerning objects or phenomena that are directly or indirectly associated with a location relative to the Earth (ISO, 2013).
ISO/TC	Technical Committee of the International Standards Organization	Groups of experts from all over the world that are part of larger groups formed to develop ISO standards (ISO, 2013).
NRCan	Natural Resources Canada	The Government of Canada Department that develops policies and programs that enhance the contribution of the natural resources sector to the economy and improve the quality of life for all Canadians (NRCan, 2011).
	Policies	In the context of this guide, “policies” include standards, policies, directives, procedures, standards, best practices and other tools that can assist data managers.
TBS	Treasury Board of Canada Secretariat	As the administrative arm of the Treasury Board of the Government of Canada, the Secretariat has a dual mandate: to support the Treasury Board as a committee of ministers and to fulfill the statutory responsibilities of a central government agency (Treasury Board of Canada Secretariat, 2006).

## Appendix 3: Examples

This Appendix presents four examples of policy instruments and their classification, as catalogued during the prototyping exercise for the classification framework with the NRCan Earth Sciences Sector. Where terms are indented, it represents the path of a term in the hierarchy. For example in the first case, the creator is Treasury Board Secretariat and it is presented along with its broader expressions of the hierarchy.

<b>Title</b>	Standard on Geospatial Data
<b>Type</b>	Standard
<b>Creator</b>	Government Government of Canada Treasury Board Secretariat
<b>Status</b>	Approved
<b>Subject</b>	Content Metadata Content Data model Information Management Lifecycle
<b>Domain</b>	
<b>Description</b>	The objective of this standard is to support stewardship and interoperability of information by ensuring that departments access, use and share geospatial data efficiently and effectively to support program and service delivery.
<b>Location</b>	<a href="http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=16553&amp;section=text">http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=16553&amp;section=text</a>

<b>Title</b>	Information Management and Information Technology Policies, Directives, Standards, Guidelines and Procedures Framework
<b>Type</b>	Policy
<b>Creator</b>	Government Government of Canada Natural Resources Canada Earth Sciences Sector
<b>Status</b>	Approved
<b>Subject</b>	Standardization/Policy Development Infrastructure Information Technology Information Management Lifecycle

<b>Domain</b>	
<b>Description</b>	This document outlines the framework within which Natural Resources Canada (NRCan) supports the development, approval and implementation of department-wide information management and information technology (IM & IT) policies, directives, standards, guidelines and procedures.
<b>Location</b>	

<b>Title</b>	North American Profile of ISO 19115:2003 — Geographic information — Metadata (NAP — Metadata), CAN/CGSB-171.100-2009 (en)
<b>Type</b>	Standard Best practice
<b>Creator</b>	Standardization Organization National Standardization Organization Canadian General Standards Board Committee on Geomatics
<b>Status</b>	Approved
<b>Subject</b>	Content Metadata
<b>Domain</b>	
<b>Description</b>	Provides a mechanism for organizations producing geographic information to describe datasets in detail. The Profile helps users to better understand geographic metadata, the assumptions and limitations of geographic information, and facilitates the search for proper information to fit users' needs.
<b>Location</b>	<a href="http://www.fgdc.gov/standards/projects/incits-11-standards-projects/NAP-Metadata">http://www.fgdc.gov/standards/projects/incits-11-standards-projects/NAP-Metadata</a>

<b>Title</b>	NRCAN Collections Management Approach
<b>Type</b>	Procedure Best practice
<b>Creator</b>	Government Government of Canada Natural Resources Canada Earth Sciences Sector
<b>Status</b>	Approved
<b>Subject</b>	Information Management Lifecycle
<b>Domain</b>	Earth Sciences Geology

<b>Description</b>	This Management Approach and its principles are based on an analysis of NRCan multi-disciplinary collections and their diverse needs and uses through extensive consultations with Departmental practitioners and managers, as well as a synthesis of best practices across the Department and gleaned from other key organizations, especially some of the country's internationally recognized museums.
<b>Location</b>	