Project for the Strengthening of Spatial Data Infrastructures in Members States and Territories of the Association of Caribbean States

Geographic Information Metadata

Capacity building programme under the frame of the XVI Informatics Convention and IX Geomatics Congress - La Havana, Cuba

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Catalina Tapia
Pablo Morales

14 Marzo 2016

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Monday 14, March 2016

Time	Topic
9:00 - 9:30	Opening remarks
9:30 - 9:45	Diagnostic evaluation
9:45 - 10:00	Concepts, Utility and Importance in the context of the Spatial Data Infrastructure (SDI)
10:00 -10:15	Coffee break
10:15 - 11:00	General structure of geographic metadata Metadata standards: FGDC, Dublin Core and ISO Standard ISO 19115 and profiles
11:00 -12:00	Other metadata standards: 19115-2, 19119, 19139 and 19115-1 Technological alternatives to develop Metadata Cases in the world and the Latin American Metadata Profile - LAMP
12:00 - 13:00	Study Case: Developing a product of geographic information and metadata using free software
13:00 - 14:00	Lunch
14:00 - 15:00	Practical recommendations to develop metadata Study Case: Developing a product of geographic information and metadata using free software
15:00 - 15:15	Coffee Break
15:15 - 16:00	Study Case: Developing a product of geographic information and metadata using free software

Diagnostic evaluation

1. Do you know what metadata is?

2. Do you know what a geographic metadata is?

3. Are you familiar with some metadata catalog?

4. Is there such a catalog in your country?

5. Have you ever used a metadata catalog?

6. What information can be found in a metadata record?

7. Does your country or any public organization institution apply metadata standards for GI?

8. Is there a software tool to build metadata in your country or institution?

9. Does the institutions that produce geographic information in your country, develop metadata?

10. How important is metadata for you?

11. Could you mention us some examples of the benefit of using metadata for geographic information?

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Metadata:
Concepts, Utility and Importance in the context of the Spatial Data Infrastructure (SDI)

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Concepts, Utility and Importance in the context of the Spatial Data Infrastructure (SDI)

Imagine you are alone in the Atacama Desert, Chile
You are very hungry and thirsty ....

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Genius gives you the option to open only one of these 6 cans….

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beans?

TUNA?

Without a label ....

How do you know which open?.....

Dog food?

Oil for cars?

Water?

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Concepts, Utility and Importance in the context of the Spatial Data Infrastructure (SDI)

Metadata are useful because they allow us to make a good decision

Metadata is "Information about a resource" (ISO TC 211)

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Metadata are useful because they allow us to know the characteristics of the resource

The purpose of metadata is to describe resources

Resource

Metadata

Ingredients

Address

Phone

Web page

Product name

Manufacturer's Name

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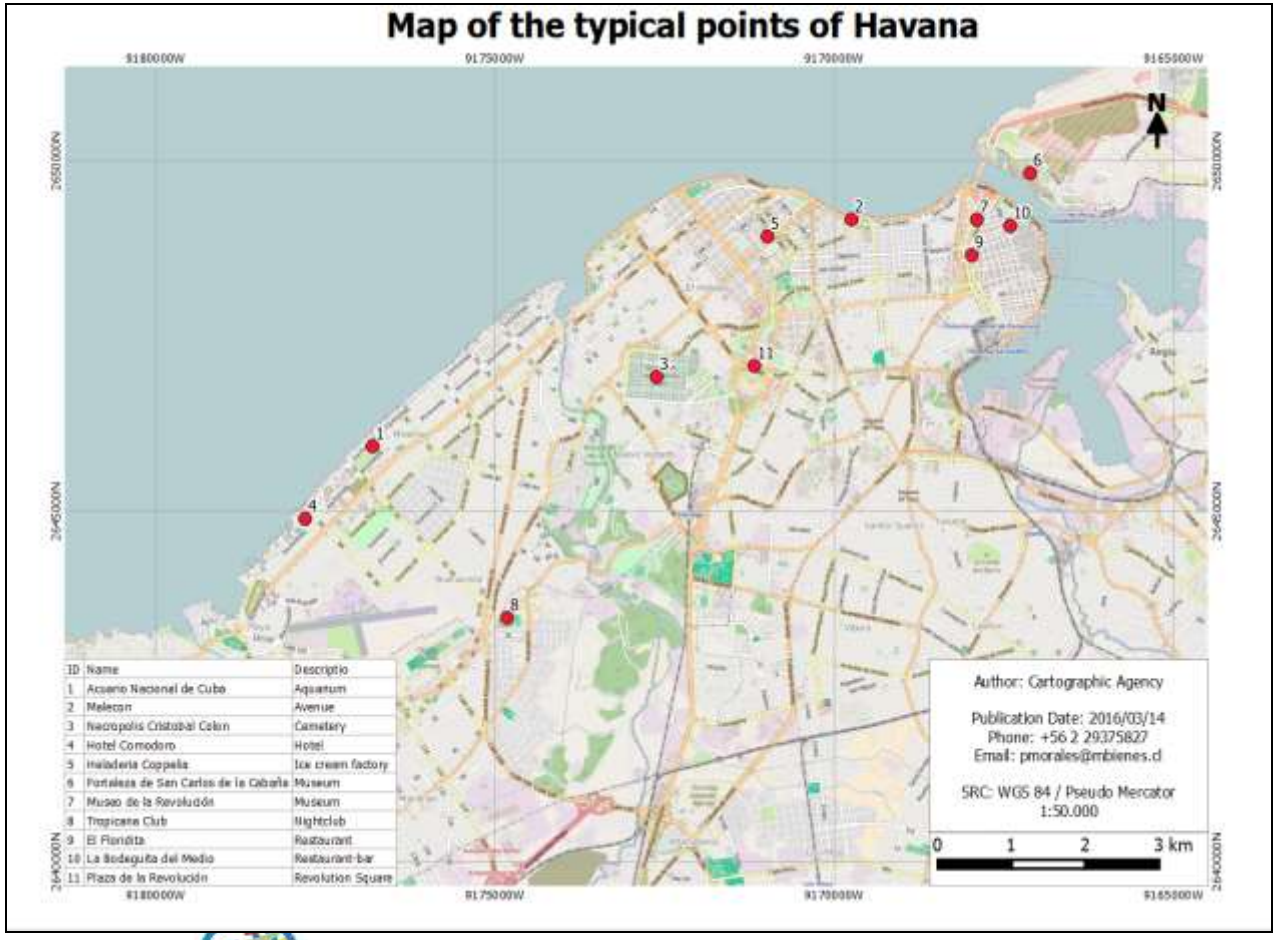
Resource



Metadata

Title: Map of Typical points of Havana

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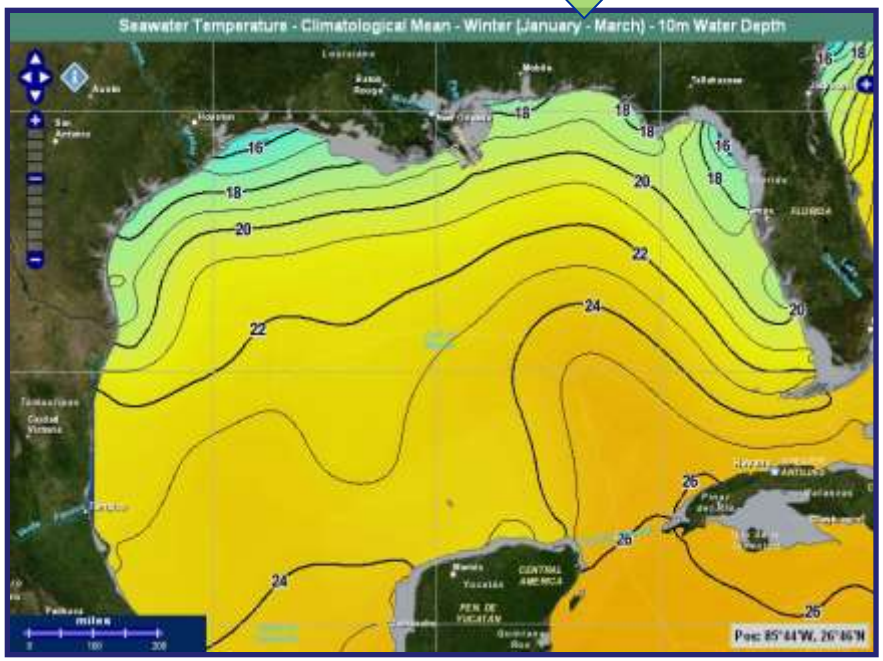
This is the metadata for this.

World Ocean Atlas 0.25 degree grid temperature climatologies for the Gulf of Mexico

Identification Information
Content Information
Distribution Information
Metadata Maintenance Information

```
Metadata:
  File identifier:
      373df2e0-92dd-11e1-b0c4-0800200c9a66
  Language:
      eng; USA
  Character set:
    Character set code:
      utf8
  Hierarchy level:
    Scope code:
      dataset
  Metadata author:
    Responsible party:
      Organisation name:
          NOAA/NESDIS/NODC/NCDDC-National Coastal Data Development Center
      Contact info:
        Contact:
          Phone:
            Telephone:
              Voice:
                  866-732-2382
              Facsimile:
                  228-688-2968
```

a small part of



NOAA

Metadata record

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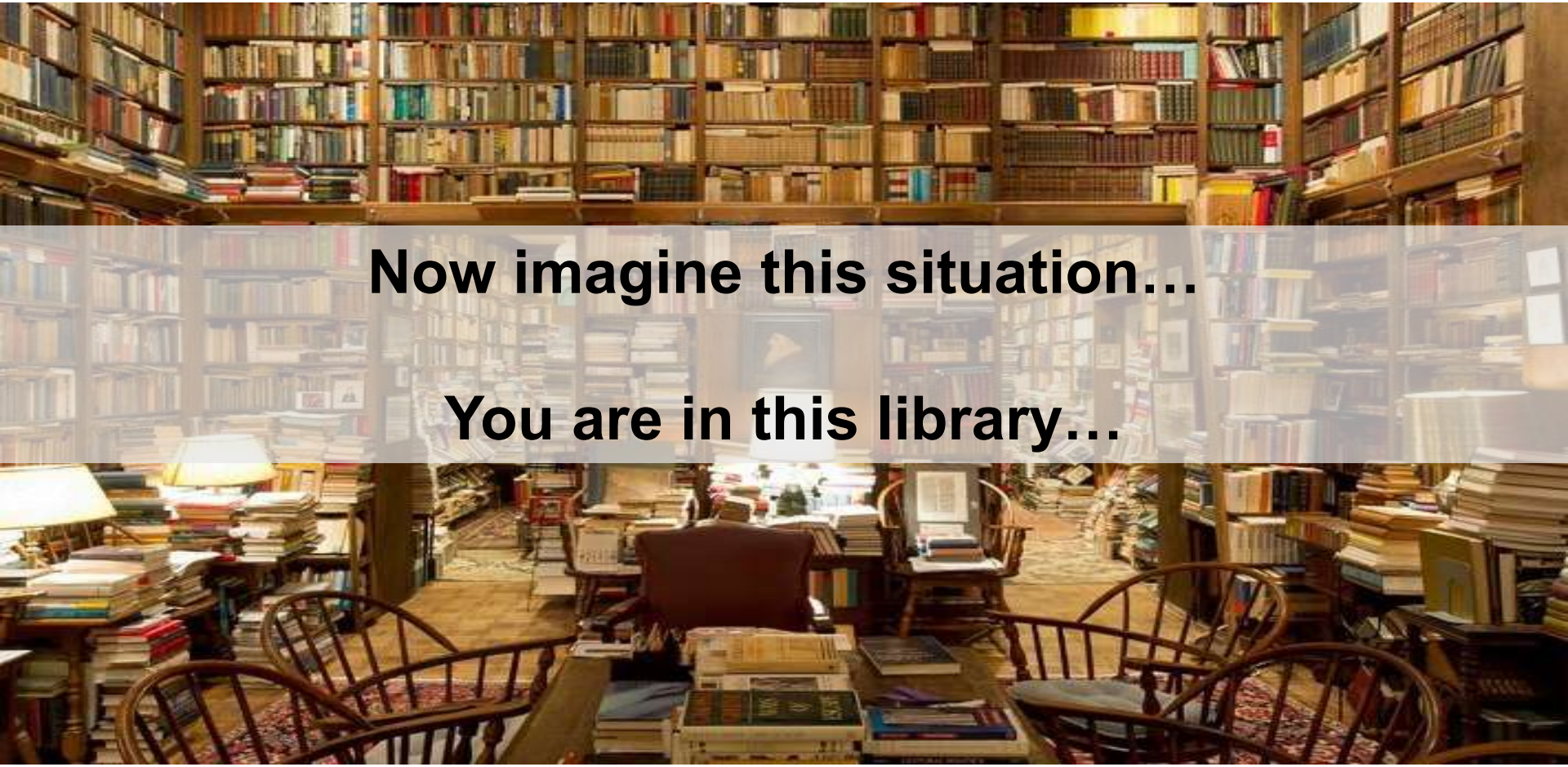

Now imagine this situation…

You are in this library…

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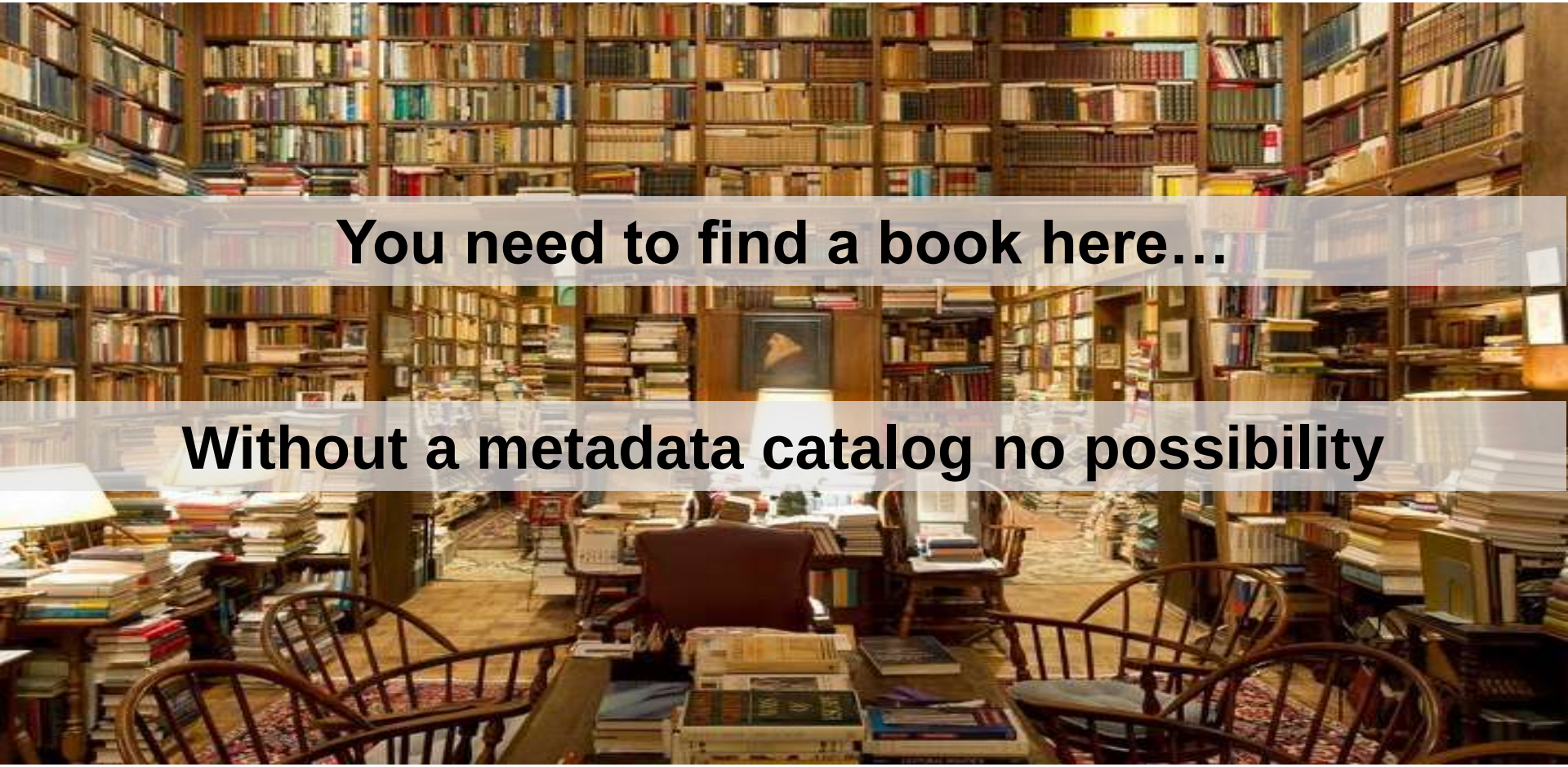

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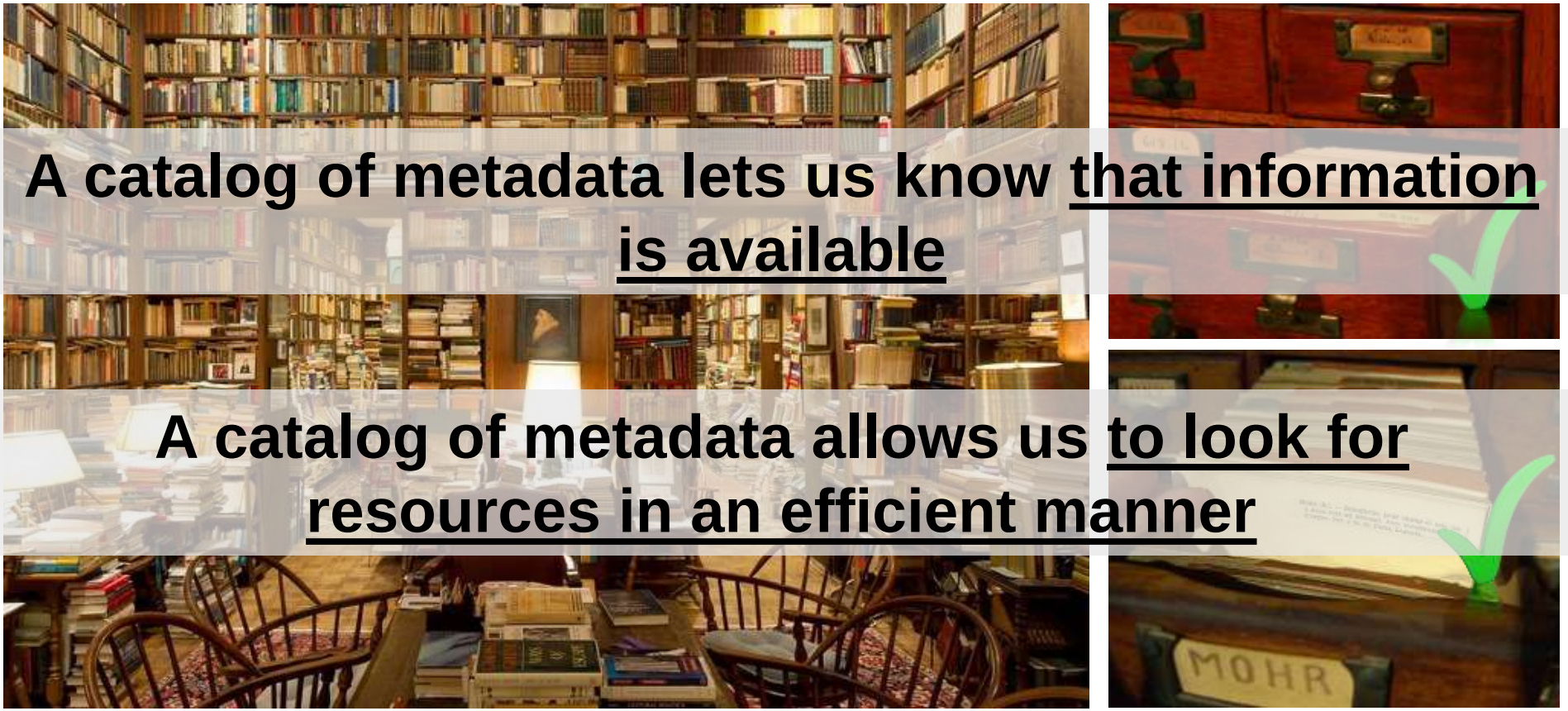

A catalog of metadata lets us know <u>that information is available</u>

A catalog of metadata allows us <u>to look for resources in an efficient manner</u>

Library Card Catalogs

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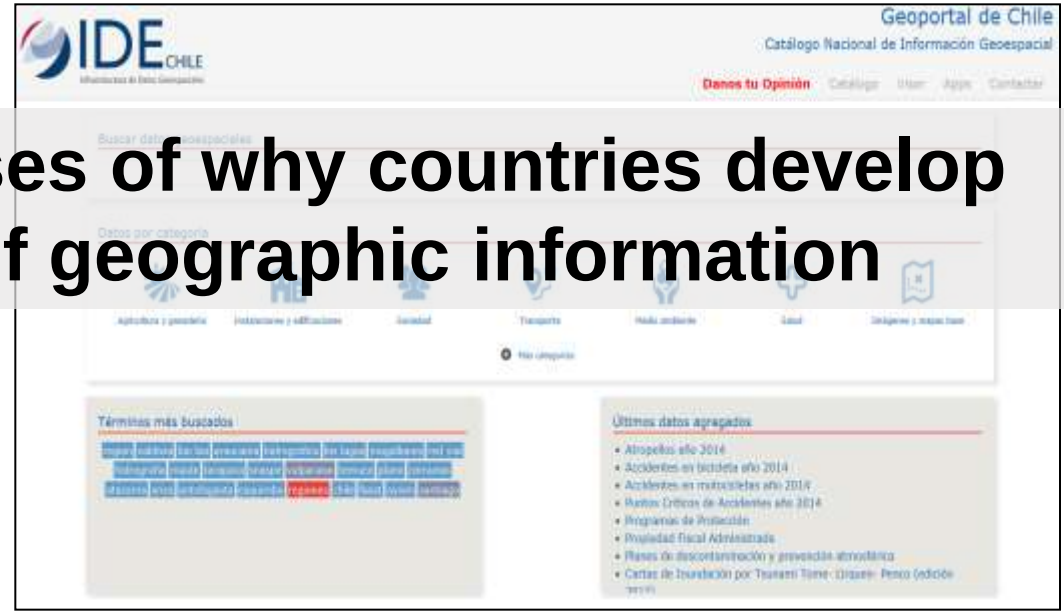
This is one of the causes of why countries develop national catalogs of geographic information



http://www.geoportal.cl/geoportal/catalog/main/home.page

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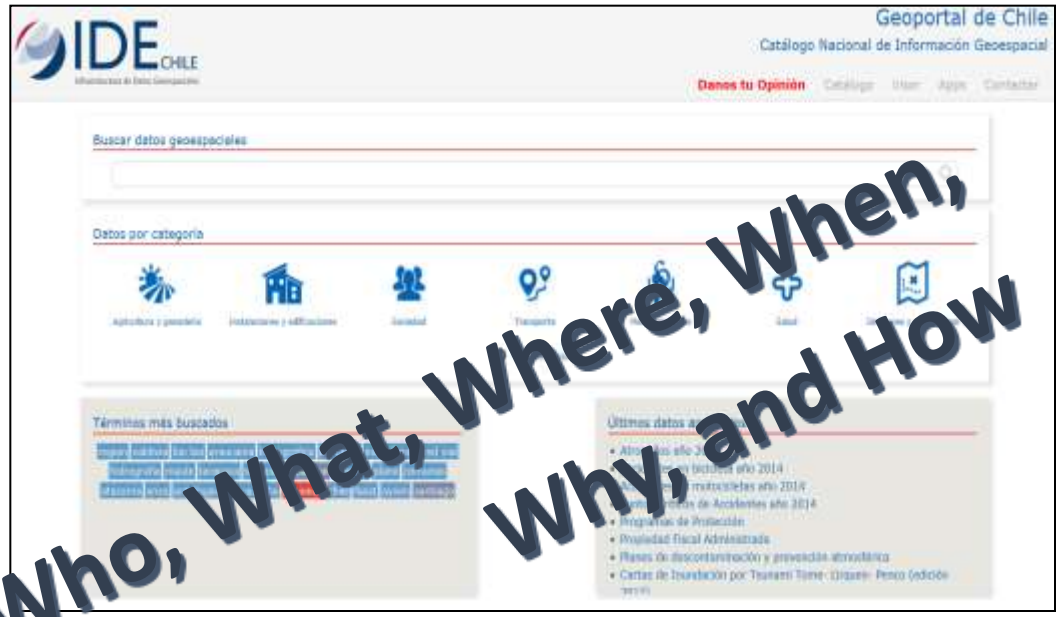
Concepts, Utility and Importance in the context of the Spatial Data Infrastructure (SDI)

Metadata catalog for Geographic Information

Functions…

- Discovery (Search)
- Access (Download)
- Documentation
- Metadata management



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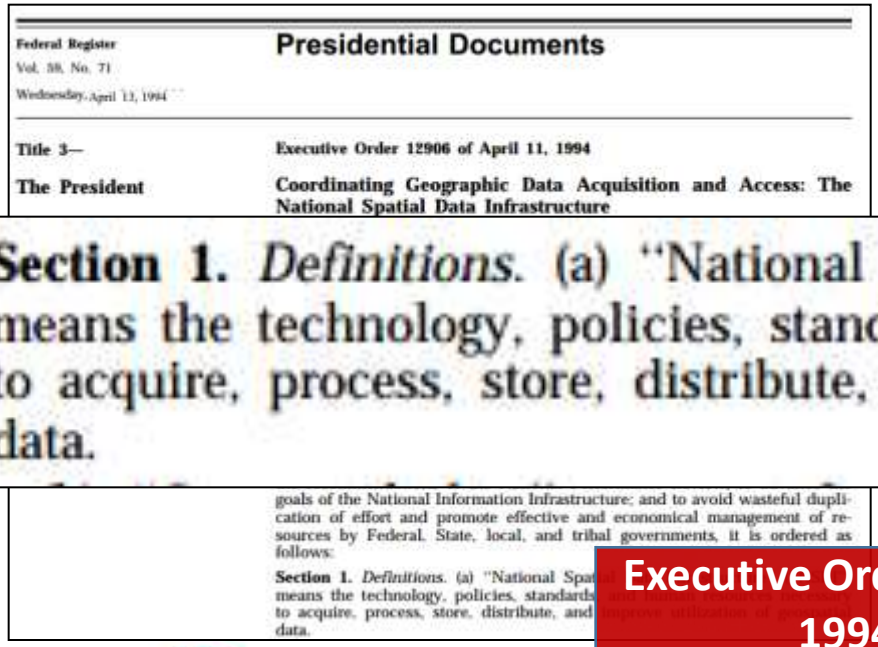
Concepts, Utility and Importance in the context of the Spatial Data Infrastructure (SDI)

A **Metadata catalog** for Geographic Information is a basic technological component of Spatial Data Infrastructures (SDI).

An SDI according to one of its first and most classic definition is::



Federal Register
Vol. 59, No. 71
Wednesday, April 13, 1994

Presidential Documents

Title 3—
The President

Executive Order 12906 of April 11, 1994

Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure

Section 1. *Definitions.* (a) "National Spatial Data Infrastructure" ("NSDI") means the technology, policies, standards, and human resources necessary to acquire, process, store, distribute, and improve utilization of geospatial data.

goals of the National Information Infrastructure; and to avoid wasteful duplication of effort and promote effective and economical management of resources by Federal, State, local, and tribal governments, it is ordered as follows:

Section 1. *Definitions.* (a) "National Spat
means the technology, policies, standards
to acquire, process, store, distribute, and
data.

Executive Order 12906 1994

Link: *http://www.archives.gov/federal-register/executive-orders/pdf/12906.pdf*

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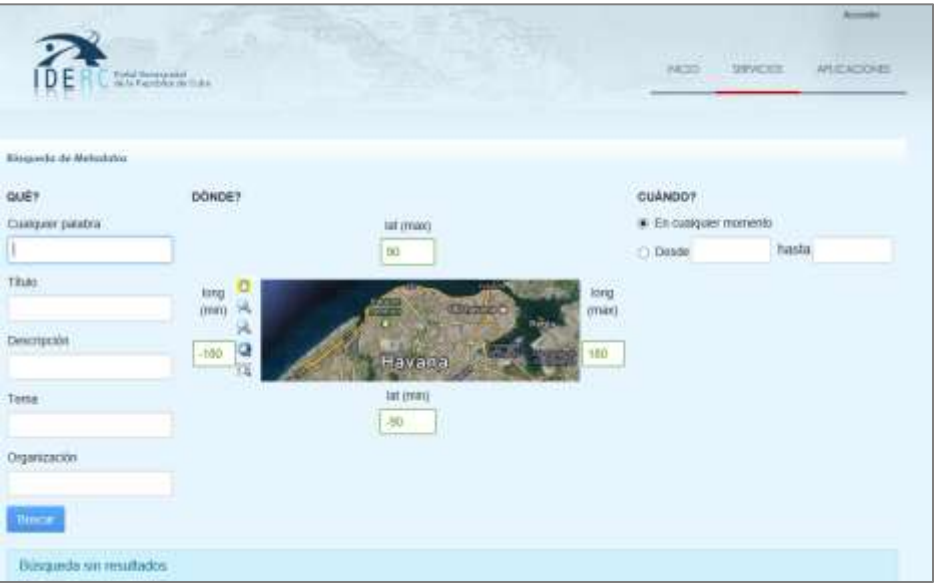
Concepts, Utility and Importance in the context of the Spatial Data Infrastructure (SDI)

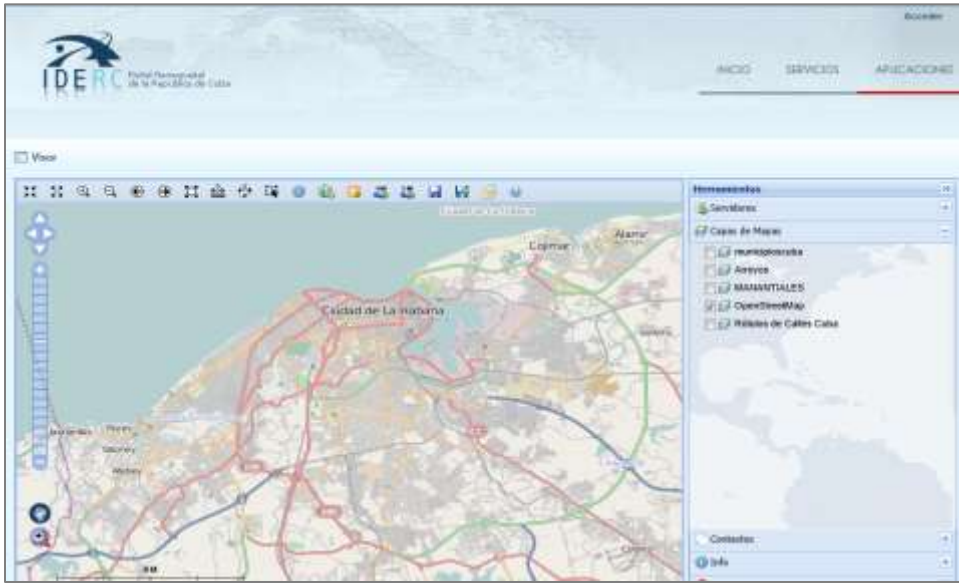
The basic technological components of an SDI

Metadata catalog for Geographic Information



http://www.iderc.cu/web/iderc/catalogo-de-metadatos/

Web map viewer



http://www.iderc.cu/web/iderc/visor

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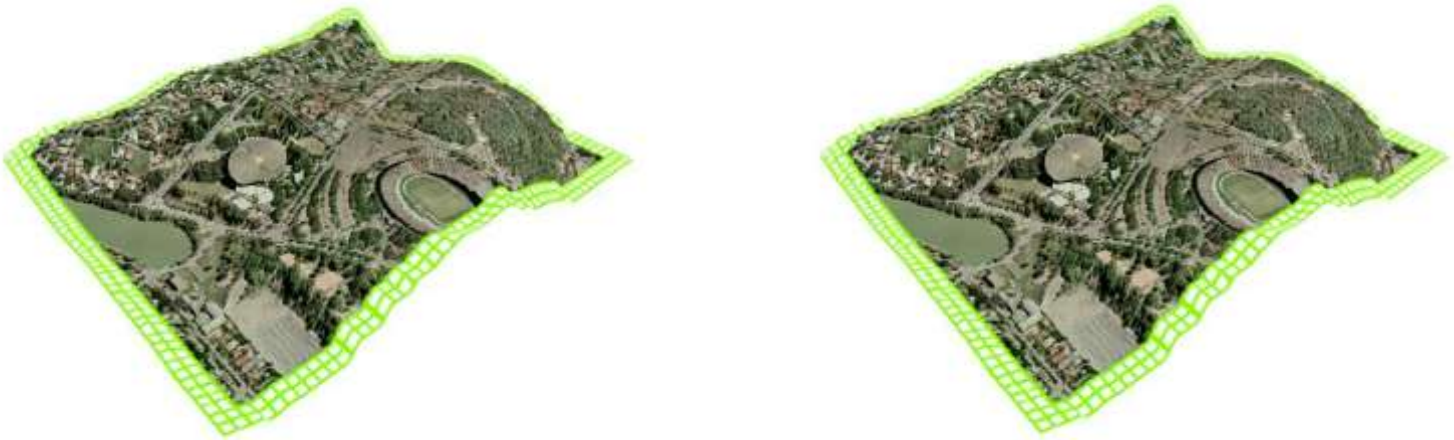
Importance in the context of the Spatial Data Infrastructure (SDI)

It is estimated that between 70 and 80% of the expenditure of any GIS project is due to the purchase of data and maintenance of your information.[1].

In a scenario without SDI, the data are bought by different agencies "n" times (on occasion by the same agency)



Duplication of information and spending

1- "Curso de Doctorado Infraestructuras de Datos Espaciales ..." 2011. 4 Mar. 2016 <http://redgeomatica.rediris.es/CURSO_IDE_2004-05/documentos/1.Conceptos_IDE/Lecture_1.2.ppt>

Metadata perspectives

Why it's more important now?

- **Expansion in the use of Geographic Information**
  - Proliferation of data
  - Non-geographers using geospatial data
  - The producer is not the user

- **Geospatial data is imperfect**
  - A model, a "point of view"
  - Assumptions, limitations, approximations, simplifications

- **Expensive**
  - Reuse
  - Data management

David Danko

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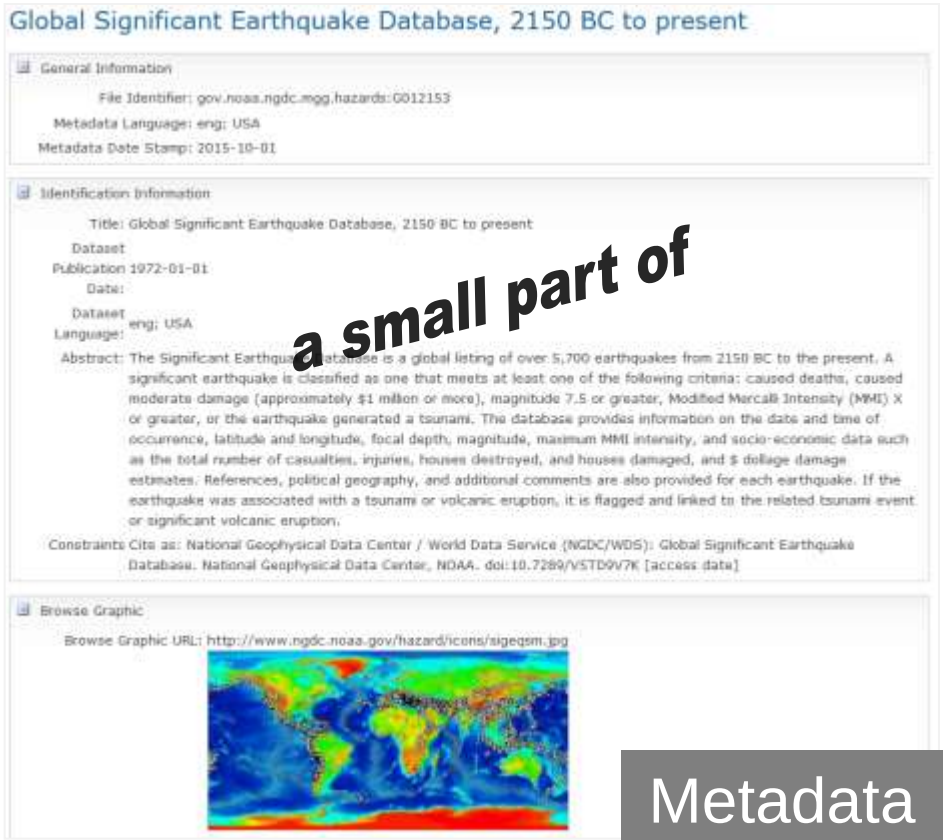
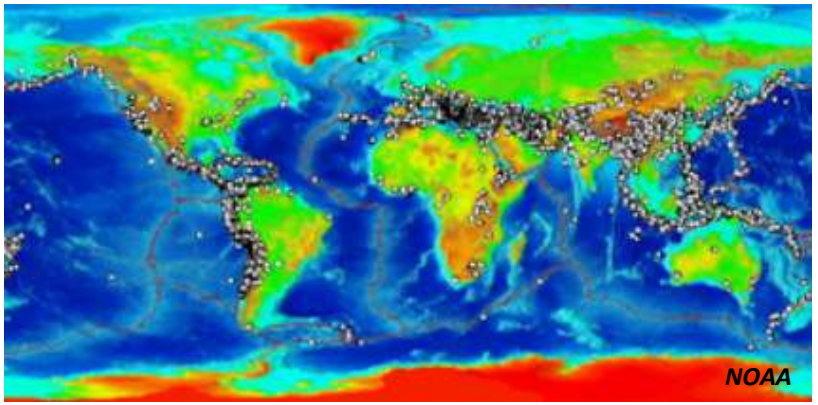
General structure of geographic metadata
Metadata standards: FGDC, Dublin Core and ISO
Standard ISO 19115 and profiles

General structure of geographic metadata

<u>This</u> is the metadata for <u>this</u>.





Metadata record

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General structure of geographic metadata

- ✓ General Information
- ✓ Identification Information
- ✓ Browse Graphic

NGDC/WDS Global Historical Tsunami Database, 2100 BC to present

General Information

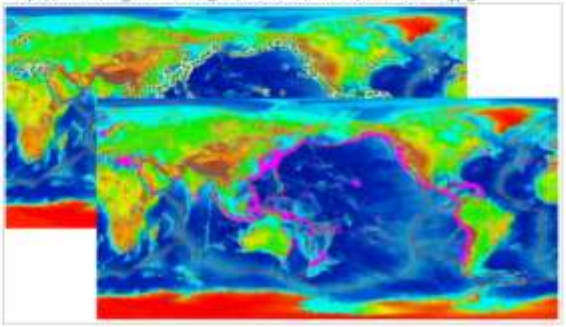
File Identifier: gov.noaa.ngdc.mgg.hazards:G02151
Metadata Language: eng; USA
Metadata Date Stamp: 2015-10-01

Identification Information

Title: NGDC/WDS Global Historical Tsunami Database, 2100 BC to present
Dataset Publication Date: 1974-01-01
Dataset Language: eng; USA
Abstract: The Global Historical Tsunami Database provides information on over 2,400 tsunamis from 2100 BC to the present in the the Atlantic, Indian, and Pacific Oceans; and the Mediterranean and Caribbean Seas. The database includes two related files. The first file includes information on the tsunami source such as the date, time, and location of the source event; cause and validity of the source, tsunami magnitude and intensity; maximum water height; the total number of fatalities, injuries, houses destroyed, and houses damaged; and total damage estimate (in U.S. dollars). The second related file contains information on the runups (the locations where tsunami waves were observed by eyewitnesses, reconnaissance surveys, tide gauges, and deep-ocean sensors) such as name, location, arrival time, maximum water height and inundation distance, and socio-economic data (deaths, injuries, damage) for the specific runup location.
Constraints Cite as: National Geophysical Data Center / World Data Service (NGDC/WDS): Global Historical Tsunami Database. National Geophysical Data Center, NOAA. doi:10.7289/V5PN93H7 [access date]

Browse Graphic

Browse Graphic URL: http://www.ngdc.noaa.gov/hazard/icons/tsunamis.jpg



Browse Graphic Caption: Maps showing tsunami events and tsunami runups and locations.
Browse Graphic Type: jpg

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General structure of geographic metadata

- ✓ Data Theme
- ✓ Spatial Domain
- ✓ Data Quality Information
- ✓ Contact Information

Data Theme

Theme Topics: Oceans and Estuaries, Geological and Geophysical

Spatial Domain

West Bounding Longitude: -180
South Bounding Latitude: -63
East Bounding Longitude: 180
North Bounding Latitude: 71

Beginning Date: -2000-00-00

Data Quality Information

Scope (quality information applies to): repository

Contact Information

Organization: DOC/NOAA/NESDIS/NCEI > National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce
Address: 325 Broadway, Mail Code E/GC4
City: Boulder
State: CO
Postal Code: 80305-3328
Country: USA
Email: Paula.Dunbar@noaa.gov
Telephone: (303) 497-6084
Fax: (303) 497-6513

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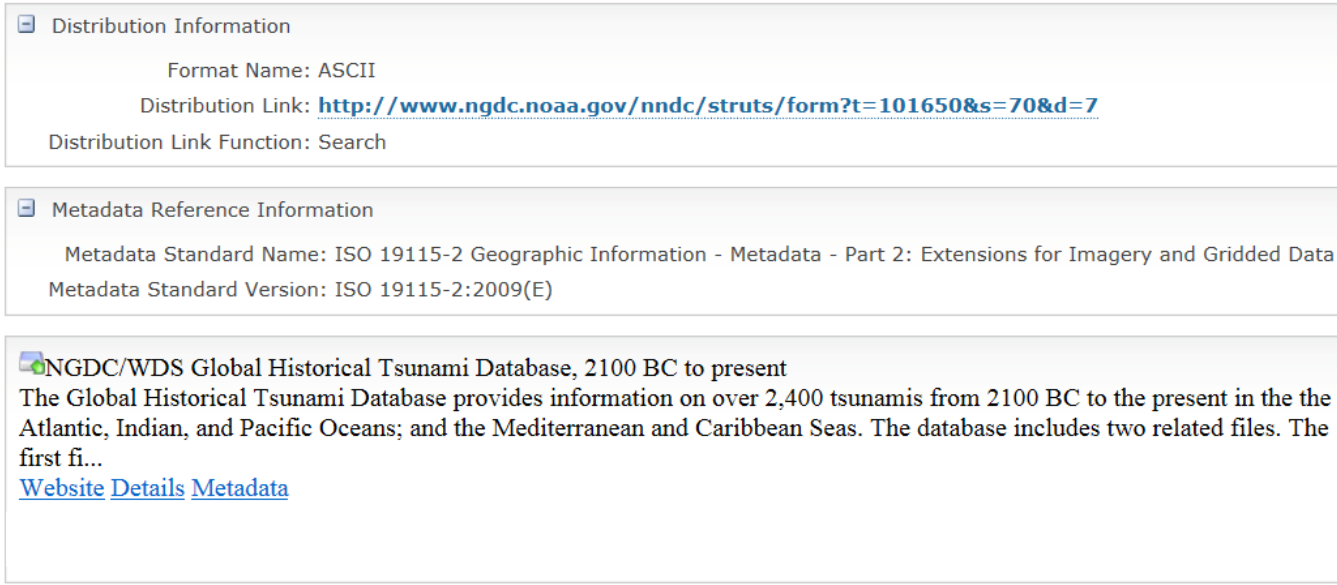
General structure of geographic metadata

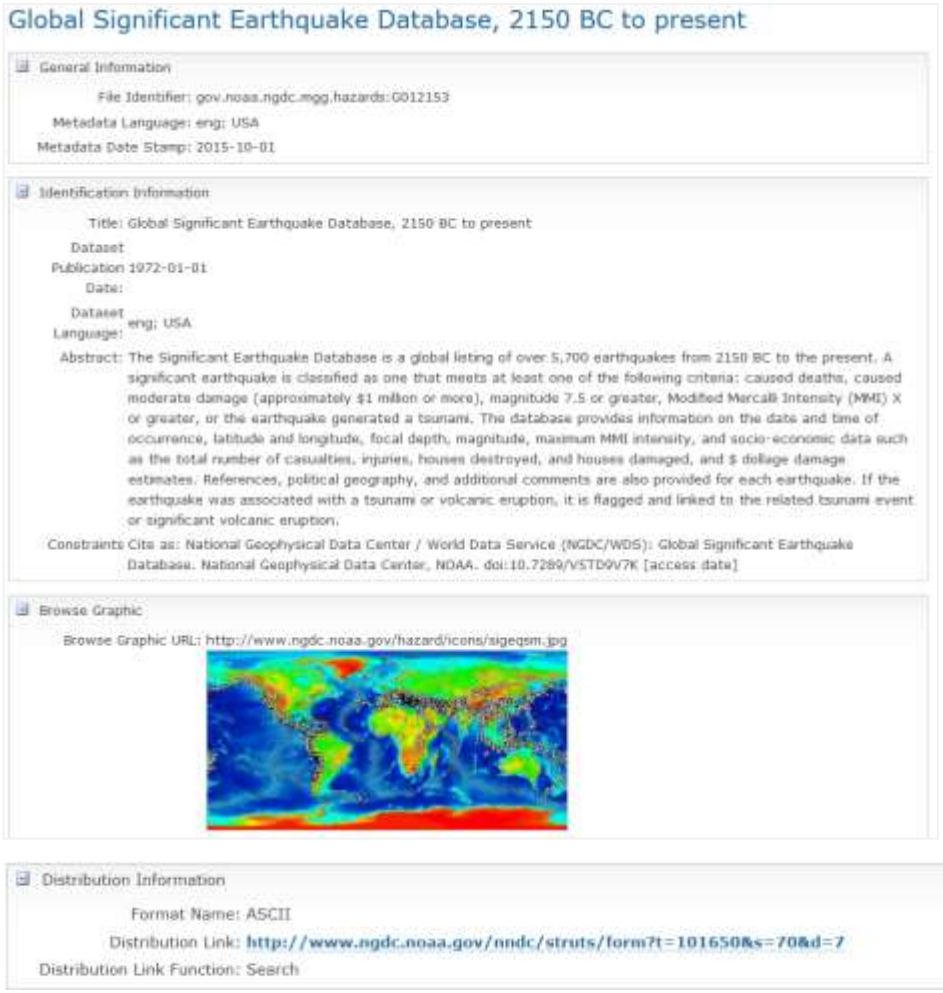
- ✓ Distribution Information
- ✓ Metadata Reference Information



General structure of geographic metadata

Metadata applications that enables users to:

1. Locate
   - Find
   - Discover
2. Evaluate
   - Restrictions
   - Quality
   - Reputation
3. Extract
   - Order
   - Download
4. Employ
   - Apply
   - Use



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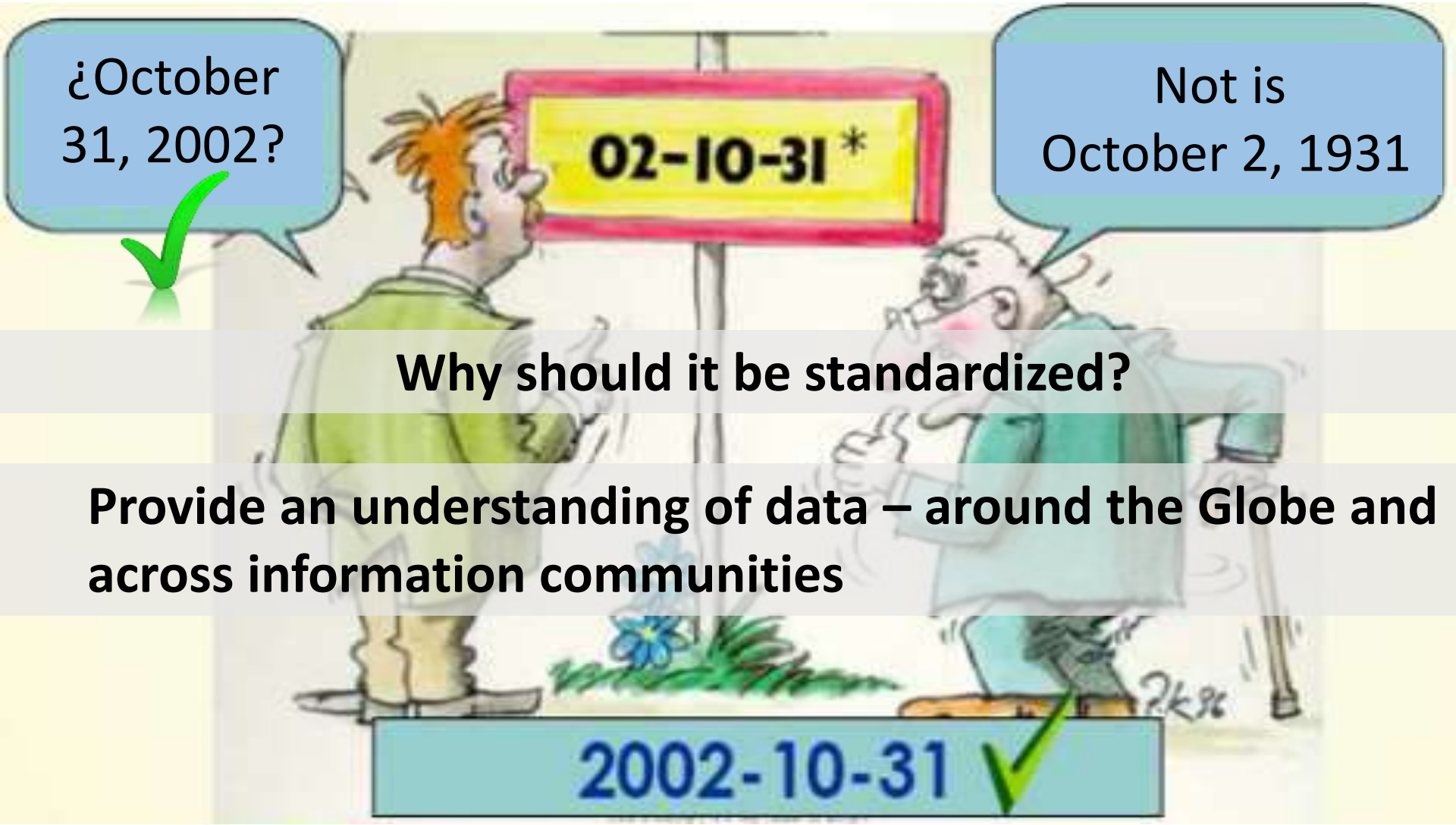
Metadata standards: Dublin Core, FGDC and ISO



Why should it be standardized?

Provide an understanding of data – around the Globe and across information communities

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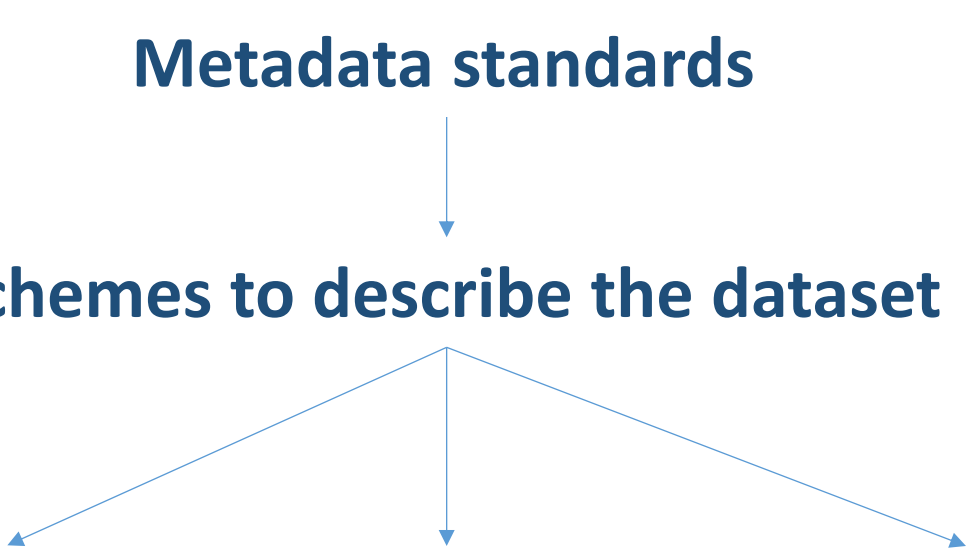
Metadata standards: Dublin Core, FGDC and ISO



The Dublin Core is used to describe a wide range of resources

US national standard for geographic information metadata

International standard for geographic information metadata

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Metadata standard: Dublin Core

✓**Dublin Core Metadata Element Set is a vocabulary of fifteen** properties for use in resource description

✓ *The Dublin Core is used to describe a wide range of resources*

✓ *The name "Dublin " is due to its origin at a 1995 invitational workshop in Dublin, Ohio; "Core" because its elements are broad and generic usable for describing a wide range of resources*

http://dublincore.org/

Metadata standard: Dublin Core

The Dublin Core contains 15 Simple Metadata Elements:

1. **Title**
2. **Creator**
3. **Subject**
4. **Description**
5. **Publisher**
6. **Contributors**
7. **Date**
8. **Type**
9. **Format**
10. **Identifier**
11. **Source**
12. **Language**
13. **Relation**
14. **Coverage**
15. **Rights**

http://dublincore.org/documents/dces/

Metadata standard: Dublin Core

1. **Title:** A name given to the resource.
2. **Creator:** An entity primarily responsible for making the resource.
3. **Subject:** The topic of the resource. (Typically, the subject will be represented using keywords, key phrases, or classification codes. Recommended best practice is to use a controlled vocabulary).
4. **Description:** An account of the resource.
5. **Publisher**: An entity responsible for making the resource available.
6. **Contributor**: An entity responsible for making contributions to the resource.
7. **Date:** A point or period of time associated with an event in the lifecycle of the resource.

http://dublincore.org/documents/dces/

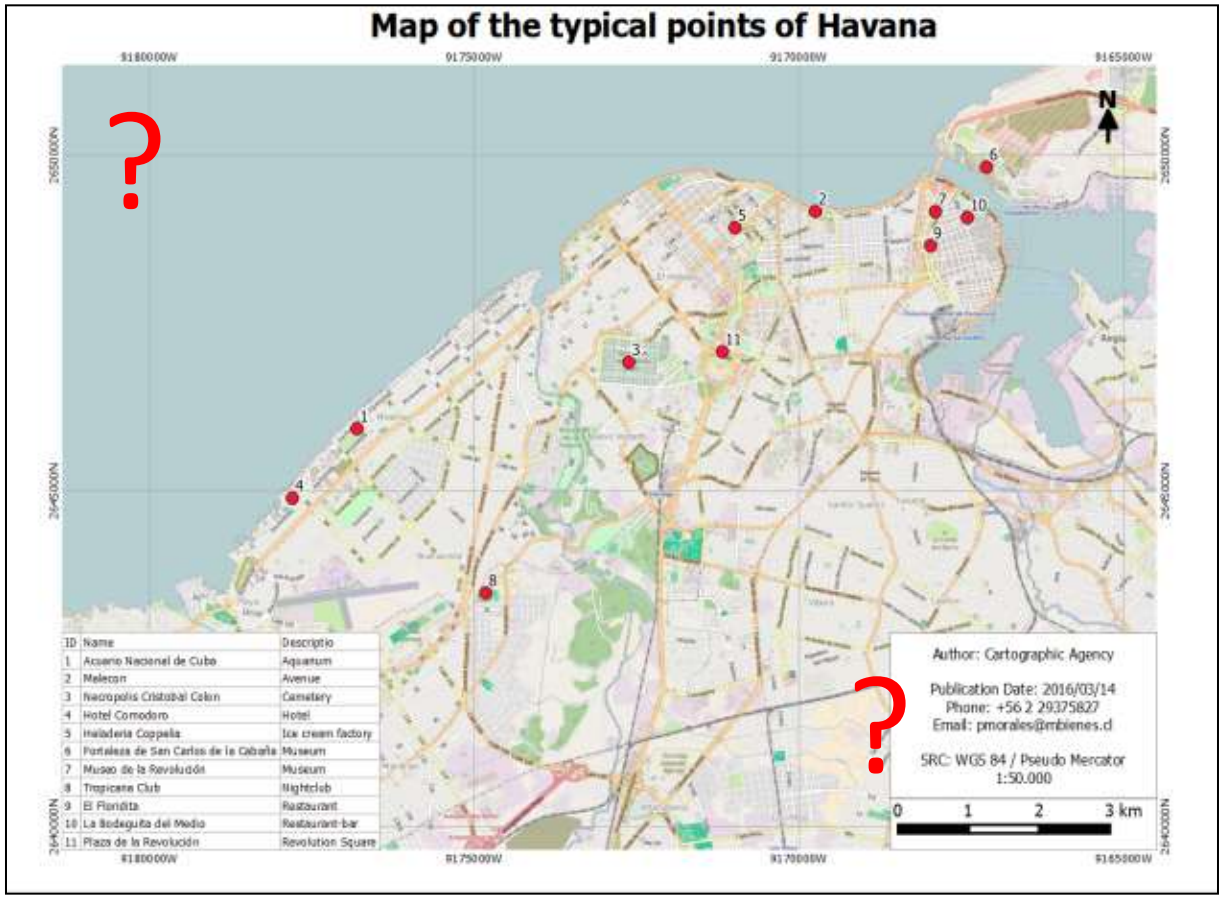
Metadata standard: Dublin Core

8. **Type:** The nature of the resource.
9. **Format :** The file format, physical medium, or dimensions of the resource
10. **Identifier:** An unambiguous reference to the resource within a given context.
11. **Source:** A related resource from which the described resource is derived.
12. **Language:** A language of the resource.
13. **Relation:** A related resource
14. **Coverage:** The spatial or temporal topic of the resource, the spatial applicability of the resource, or the jurisdiction under which the resource is relevant.
15. **Rights:** Information about rights held in and over the resource.

http://dublincore.org/documents/dces/

Metadata standard: Dublin Core

1. **Title:** Map of Typical points of Havana
2. **Creator:** Cartographic Agency
3. **Subject:** Culture, travel
4. **Description:** Map of Typical points of Havana, contains the location of museums, Revolution Square, restaurants, bars, etc.
5. **Publisher:** Cartographic Agency
6. **Contributors :** Pablo Morales
7. **Date:** 2016-03-14
8. **Type:** Image
9. **Format:** gif
10. **Identifier :** “Map01”
11. **Source:** "Image from page 54 of the 2016 edition of Caribbean Atlas "
12. **Language: “**en”
13. **Relation:** Developed for training Metadata
14. **Coverage:** Havana, Cuba
15. **Rights:** *Creative Commons* - CC BY



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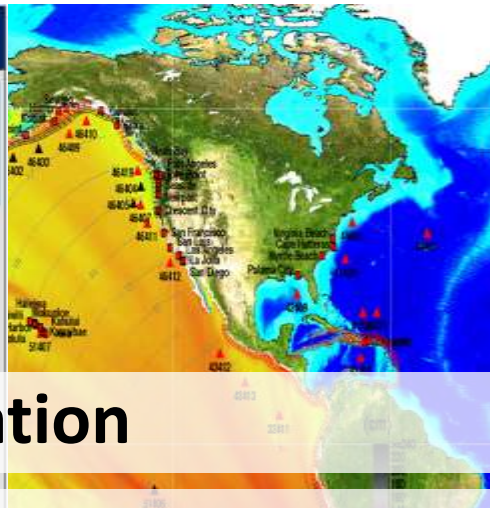
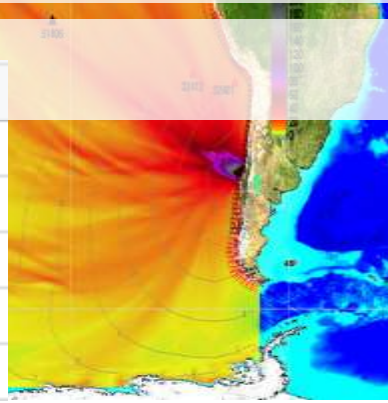


This is a special type of information

It's geographic information

Postal Code

	id	nombre	Address	City	State	Country
2	1	Aurelio	Calle del Universo, 3, Valladolid	Valladolid	Castilla y León	Spain
3	2	Diego	Calle de la Constelación, 1, Valladolid	Valladolid	Castilla y León	Spain
4	3	Iker	Calle de la Nebulosa, 7, Valladolid	Valladolid	Castilla y León	Spain
5						



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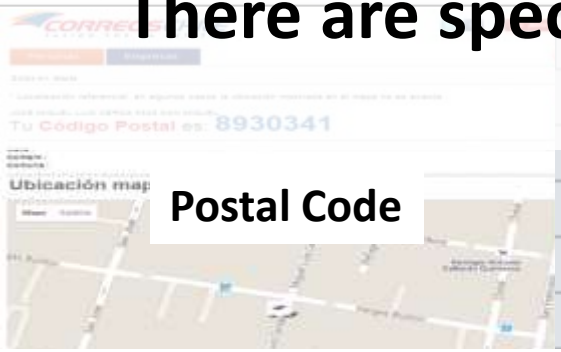
Geographic Information

Information concerning phenomena implicitly or explicitly associated with a location relative to the Earth (ISO TC 211)

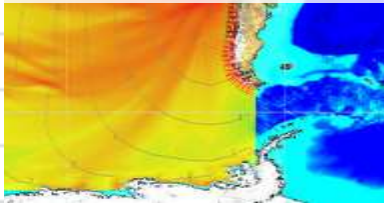
It is estimated that 80% of all information used by governments have attributes or characteristics related to location (Rajabifard, 2000)

There are specific standards for developing geographic information metadata …



Postal Code

2	1 Aurelio	Calle del Universo, 3, Valladolid	Valladolid	Castilla y León	Spain
3	2 Diego	Calle de la Constelación, 1, Valladolid	Valladolid	Castilla y León	Spain
4	3 Iker	Calle de la Nebulosa, 7, Valladolid	Valladolid	Castilla y León	Spain
5					



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Metadata standard: FGDC

Formal name: Content Standard for Digital Geospatial Metadata (CSDGM)

Developed by "Federal Geographic Data Committee" (FGDC)

CSDGM Geospatial Metadata Standards (1998):
http://www.fgdc.gov/metadata/geospatial-metadata-standards#csdgm

CSDGM Workbook:
https://www.fgdc.gov/metadata/documents/workbook_0501_bmk.pdf

Metadata standard: FGDC

- The standard is designed to describe all possible geospatial data.
- 334 different metadata elements, 75 pages.
- Do not let the length dismay you; the standard is meant to be a reference, not recreational reading.
- Its use allows to evaluate, obtain and use effectively geographic information.
- The standard is organized into 7 main sections and three support sections.
- Distinguish between mandatory, optional and conditional elements.


FGDC-STD-001-1998

Content Standard for Digital Geospatial Metadata

Metadata Ad Hoc Working Group
Federal Geographic Data Committee

Federal Geographic Data Committee
Department of Agriculture • Department of Commerce • Department of Defense • Department of Energy
Department of Housing and Urban Development • Department of the Interior • Department of State
Department of Transportation • Environmental Protection Agency
Federal Emergency Management Agency • Library of Congress
National Aeronautics and Space Administration • National Archives and Records Administration
Tennessee Valley Authority

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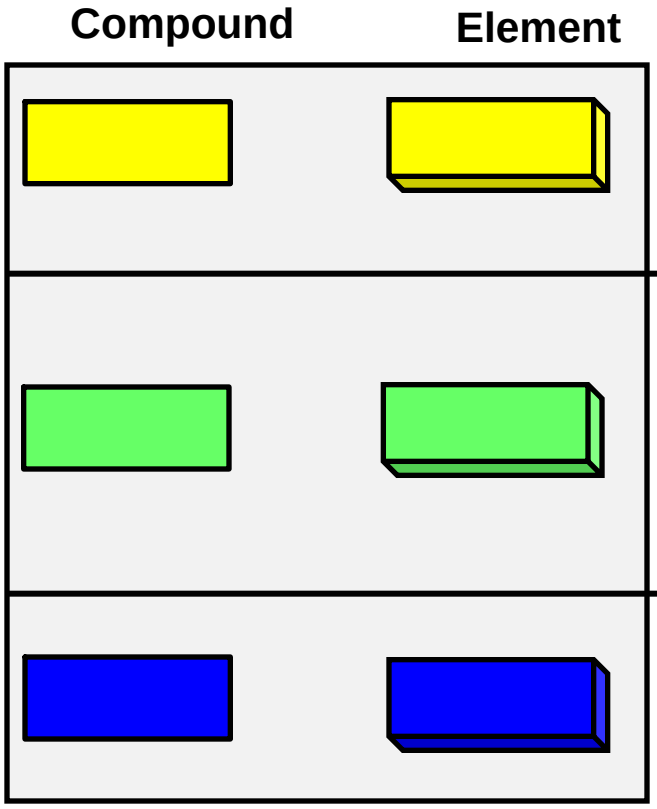
Using the Graphical Representation

What's Mandatory? What's Not?



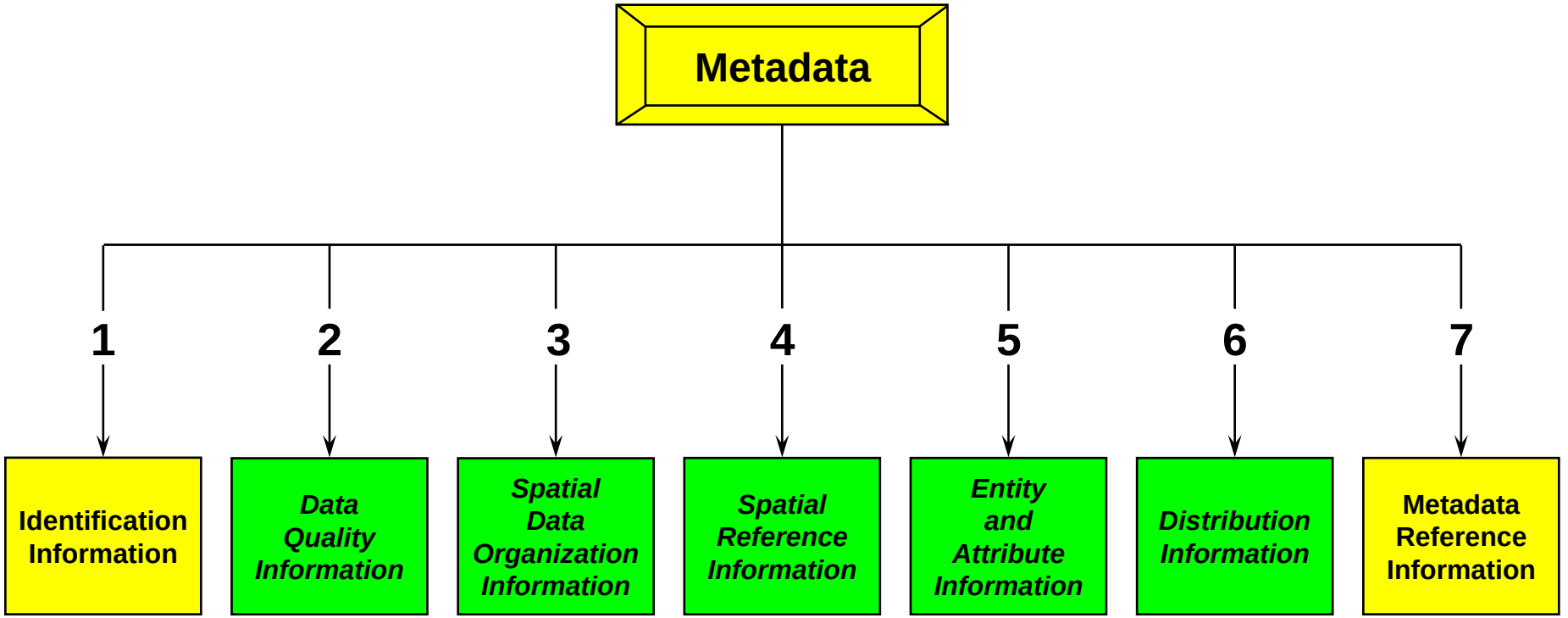
Mandatory - *must be provided*.

Mandatory if Applicable - <u>must</u> *be provided if the data set exhibits the defined characteristic*.

Example: If a map with coordinates, should indicate the coordinates.

Optional - *provided at the discretion of the data set producer*.

Metadata standard: FGDC



Legend

Mandatory	*Mandatory If Applicable*

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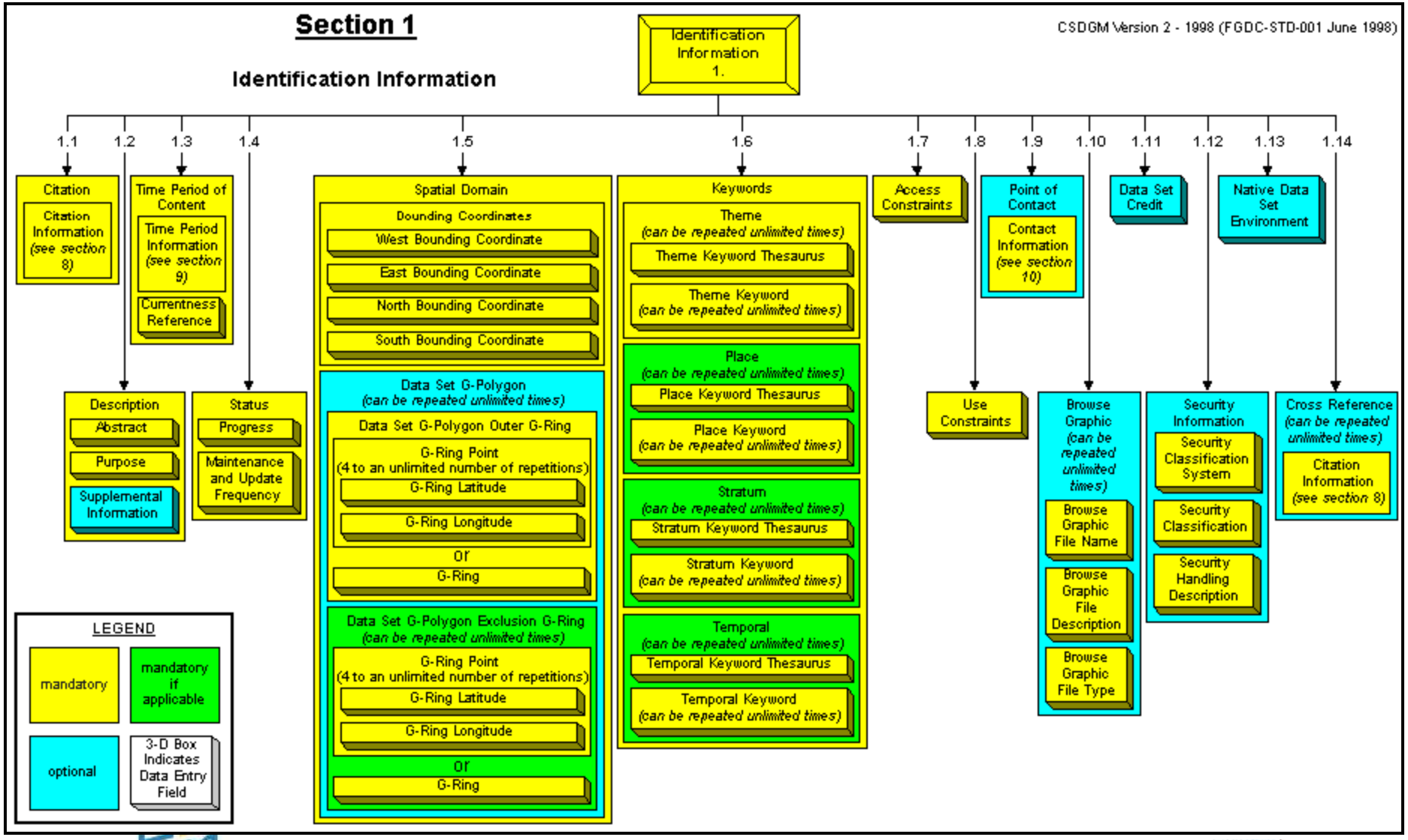
Metadata standard: FGDC



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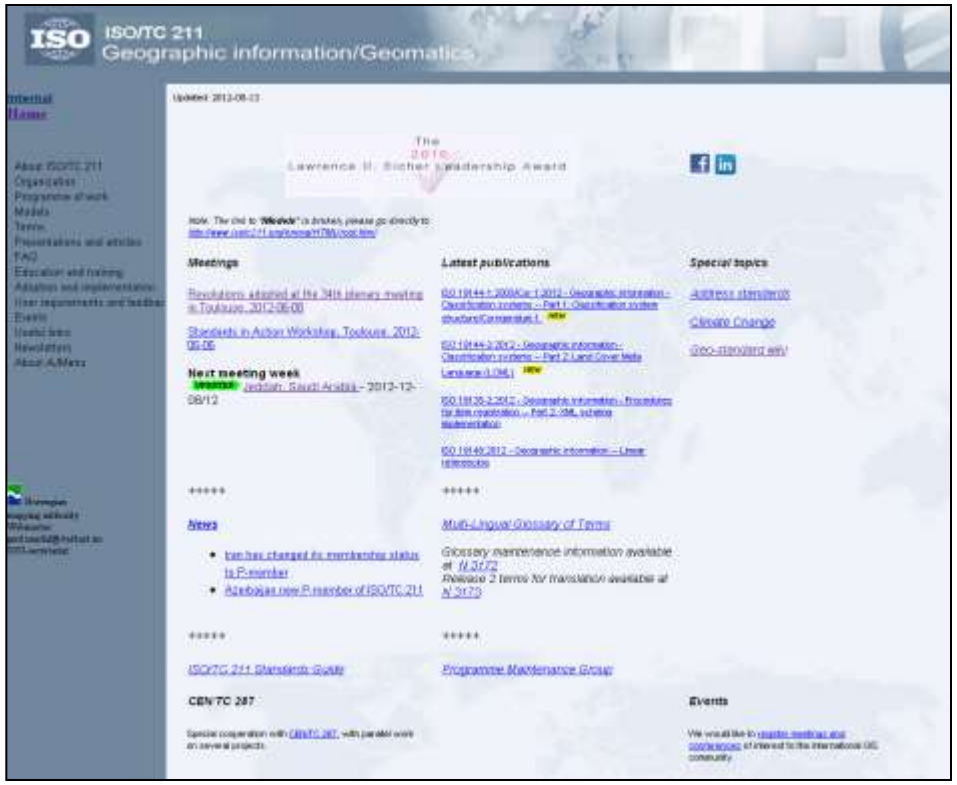
Metadata standard: FGDC

FGDC: Federal agencies are encouraged to transition to ISO metadata as their agencies are able to do so…

https://www.fgdc.gov/metadata/geospatial-metadata-standards

Metadata standard: ISO TC 211



http://www.isotc211.org/

International Organization for Standardization

ISO/TC 211

International Standards
Digital Geographic Information
Approximately 58 standards

19115
19139
19115-1
19115-2
19119

19104
19131
19157
19128

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ISO 19115:2003 Geographic information -- Metadata

ANZLIC

FGDC

CEN/TC287

Other

ISO
TC 211
19115

Metadata standard
ISO 19115

2003

Metadata
Technical Corrigendum

2006

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ISO 19115:2003 Geographic information -- Metadata

- ✓Standard that facilitates the search, selection and reuse of data.
- ✓It is a complex standard
- ✓It includes a total of 409 elements
- ✓It has minimal required set of metadata (Core)
- ✓It has mandatory, optional and conditional elements

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ISO 19115:2003 Geographic information -- Metadata

Metadata package data dictionaries

Name / Role name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
MD_Identification	Ident	basic information required to uniquely identify a resource or resources	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Metadata) <<Abstract>>	Lines 24-35.1
citation	idCitation	citation data for the resource(s)	M	1	Class	CI_Citation (B.3.2) <<DataType>>
abstract	idAbs	brief narrative summary of the content of the resource(s)	M	1	CharacterString	Free text
purpose	idPurp	summary of the intentions with which the resource(s) was developed	O	1	CharacterString	Free text
credit	idCredit	recognition of those who contributed to the resource(s)	O	N	CharacterString	Free text
status	idStatus	status of the resource(s)	O	N	Class	MD_ProgressCode <<CodeList>> (B.5.23)
pointOfContact	idPoC	identification of, and means of communication with, person(s) and organization(s) associated with the resource(s)	O	N	Class	CI_ResponsibleParty (B.3.2) <<DataType>>

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ISO 19115:2003 Geographic information -- Metadata

B.5.23 MD_ProgressCode <<CodeList>>

	Name	Domain code	Definition
1.	MD_ProgressCode	ProgCd	status of the dataset or progress of a review
2.	completed	001	production of the data has been completed
3.	historicalArchive	002	data has been stored in an offline storage facility
4.	obsolete	003	data is no longer relevant
5.	onGoing	004	data is continually being updated
6.	planned	005	fixed date has been established upon or by which the data will be created or updated
7.	required	006	data needs to be generated or updated
8.	underDevelopment	007	data is currently in the process of being created

Dataset title (M) (MD_Metadata > MD_DataIdentification.citation > CI_Citation.title)	**Spatial representation type** (O) (MD_Metadata > MD_DataIdentification.spatialRepresentationType)
Dataset reference date (M) (MD_Metadata > MD_DataIdentification.citation > CI_Citation.date)	**Reference system** (O) (MD_Metadata > MD_ReferenceSystem)
Dataset responsible party (O) (MD_Metadata > MD_DataIdentification.pointOfContact > CI_ResponsibleParty)	**Lineage** (O) (MD_Metadata > DQ_DataQuality.lineage > LI_Lineage)
Geographic location of the dataset (by four coordinates or by geographic identifier) (C) (MD_Metadata > MD_DataIdentification.extent > EX_Extent > EX_GeographicExtent > EX_GeographicBoundingBox or EX_GeographicDescription)	**On-line resource** (O) (MD_Metadata > MD_Distribution > MD_DigitalTransferOption.onLine > CI_OnlineResource)
Dataset language (M) (MD_Metadata > MD_DataIdentification.language)	**Metadata file identifier** (O) (MD_Metadata.fileIdentifier)
Dataset character set (C) (MD_Metadata > MD_DataIdentification.characterSet)	**Metadata standard name** (O) (MD_Metadata.metadataStandardName)
Dataset topic category (M) (MD_Metadata > MD_DataIdentification.topicCategory)	**Metadata standard version** (O) (MD_Metadata.metadataStandardVersion)
Spatial resolution of the dataset (O) (MD_Metadata > MD_DataIdentification.spatialResolution > MD_Resolution.equivalentScale or MD_Resolution.distance)	**Metadata language** (C) (MD_Metadata.language)
Abstract describing the dataset (M) (MD_Metadata > MD_DataIdentification.abstract)	**Metadata character set** (C) (MD_Metadata.characterSet)
Distribution format (O) (MD_Metadata > MD_Distribution > MD_Format.name and MD_Format.version)	**Metadata point of contact** (M) (MD_Metadata.contact > CI_ResponsibleParty)
Additional extent information for the dataset (vertical and temporal) (O) (MD_Metadata > MD_DataIdentification.extent > EX_Extent > EX_TemporalExtent or EX_VerticalExtent)	**Metadata date stamp** (M) (MD_Metadata.dateStamp)

7 (Mandatory)
4 (Conditional)
11 (Optional)

Core

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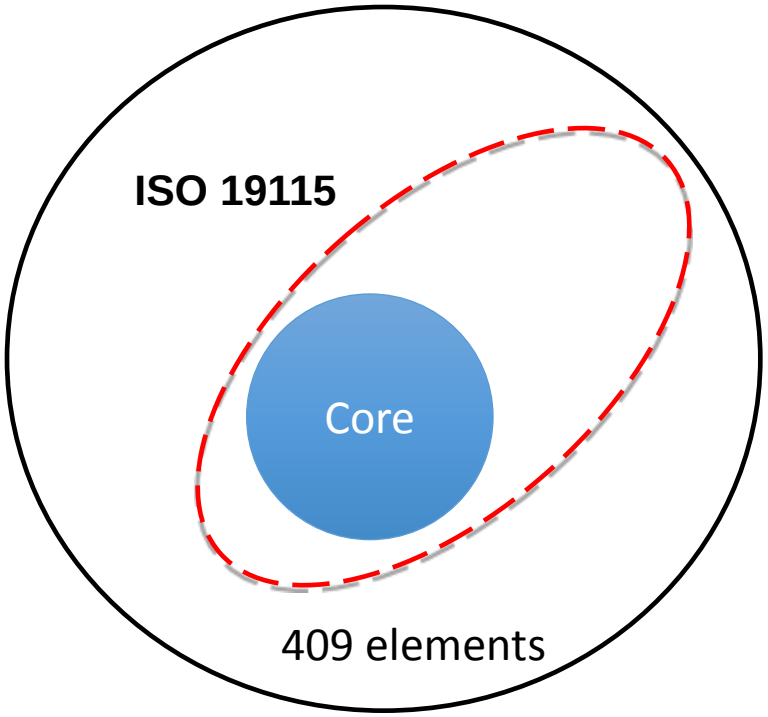
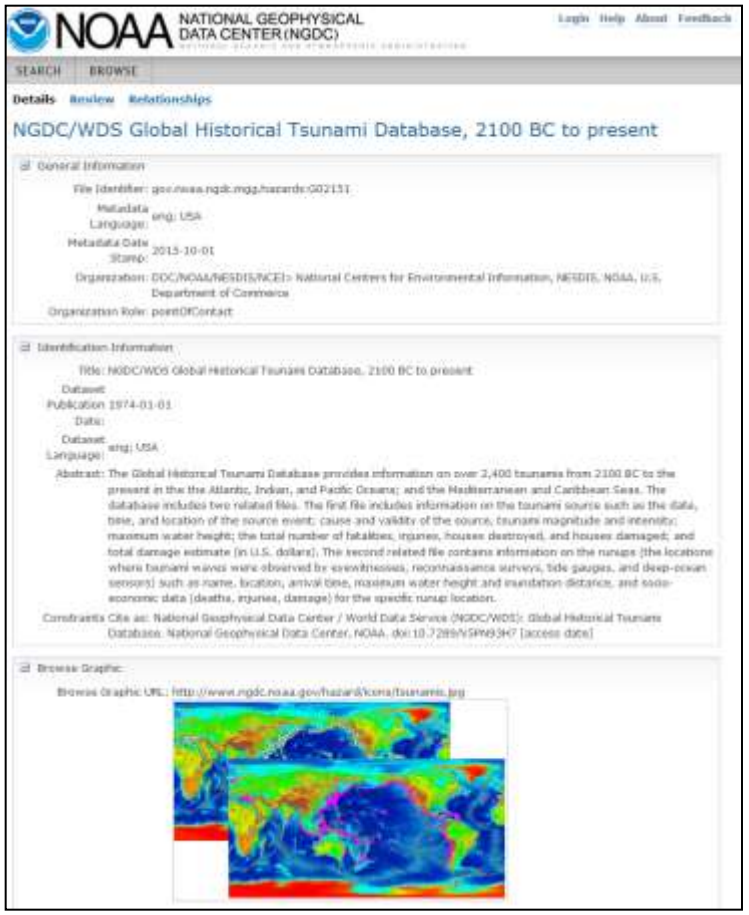
Standard ISO 19115 and profiles

Profiles (19106 - ISO)

Profiles : Set of one or more standards , that are necessary for accomplishing a particular function.





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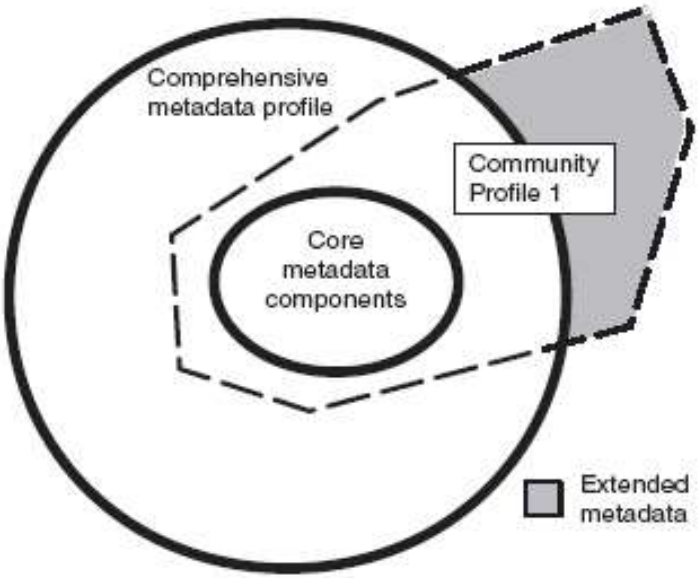
Standard ISO 19115 and profiles

North American Profile (NAP) of ISO 19115

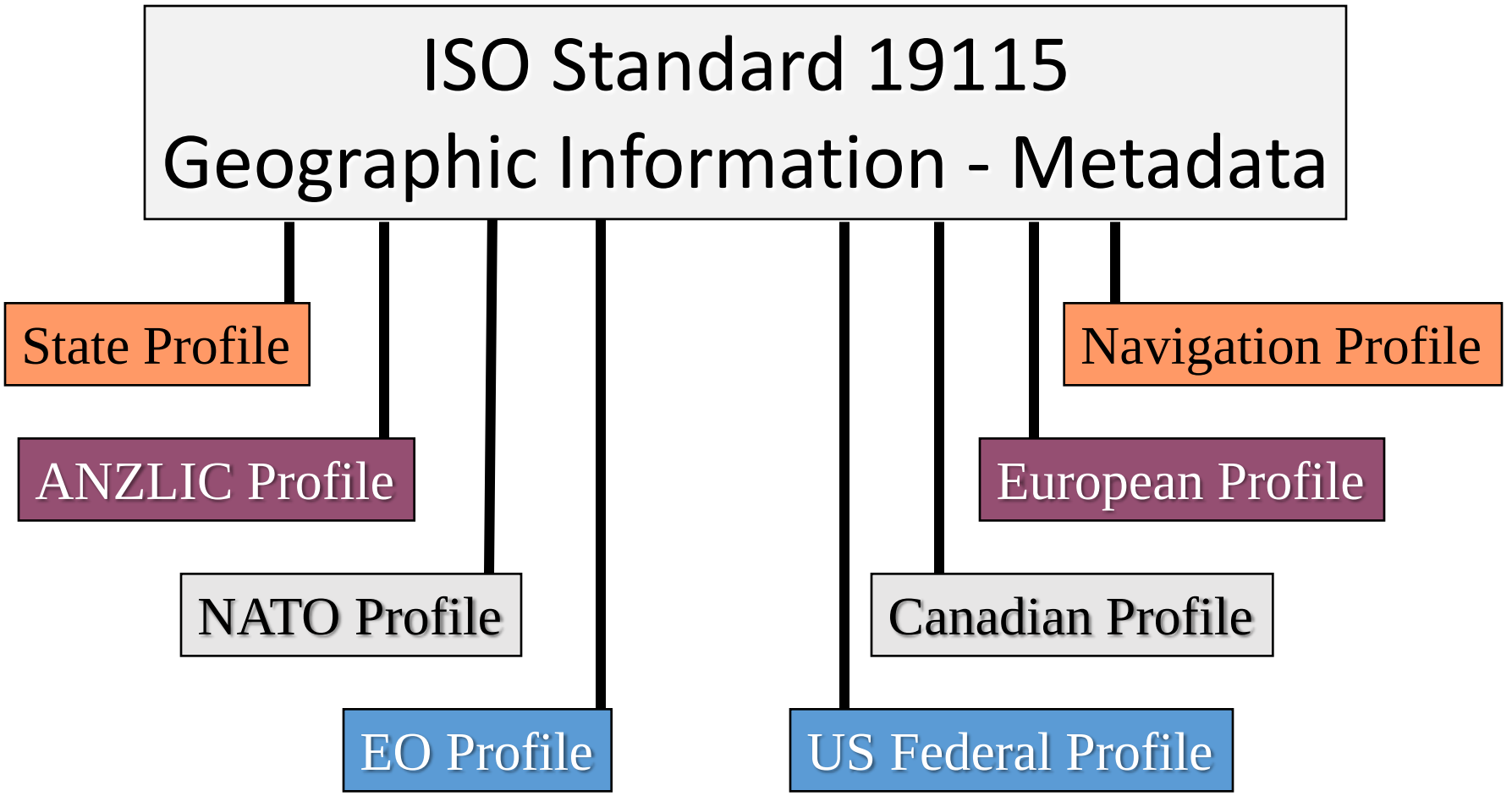
Latin America Metadata Profile (LAMP)

Chilean Metadata Profile



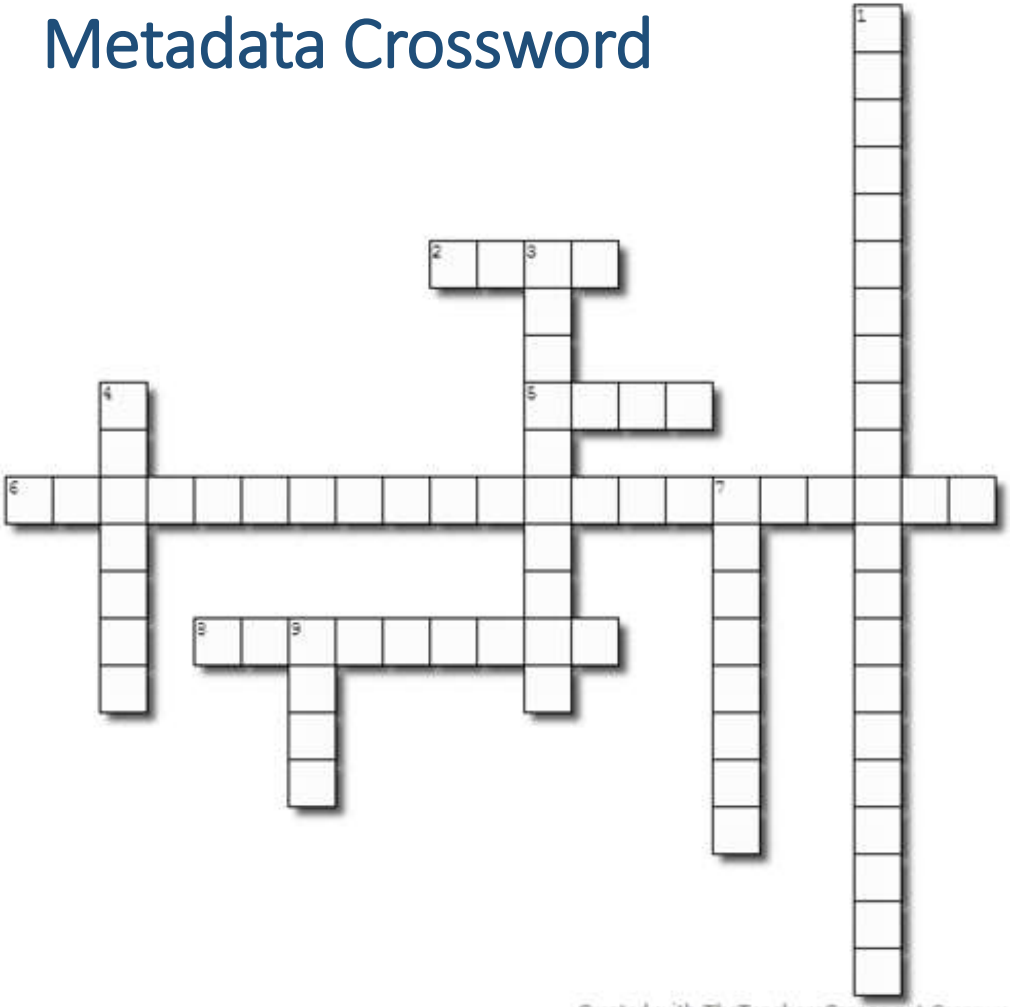
ISO 19115

Regional, national, & organizational profiles



Profiles Enable Interoperability Between Communities

Metadata Crossword



Mandatory | Profile | GeographicInformation | NSDI | Metadata | FGDC

ConstraintInformation | DublinCore | LAMP

Horizontal:

2. Federal Geographic Data Committee.

5. Latin America Metadata Profile.

6. Information concerning phenomena implicitly or explicitly associated with a location relative to the Earth.

8. Must be provided.

Vertical:

1.Restrictions on access and use of a resource or metadata.

3. The name “Dublin “is due to its origin at a 1995 invitational workshop in Dublin, Ohio; “Core” because its elements are broad and generic usable for describing a wide range of resources, is used to describe a wide range of resources.

4. Set of one or more standards, that are necessary for accomplishing a particular function.

7. Information about a resource.

9. Means the technology, policies, standards, and human resources necessary to acquire, process, store, distribute, and improve utilization of geospatial data.

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