Interoperability & Metadata

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Interoperability

"the ability of two or more systems or components to exchange information and to use the information that has been exchanged (1)"

- **Be able to:**
  - find what you need;
  - access it;
  - understand and employ it;
  - have goods and services responsive to the needs of consumers (2)

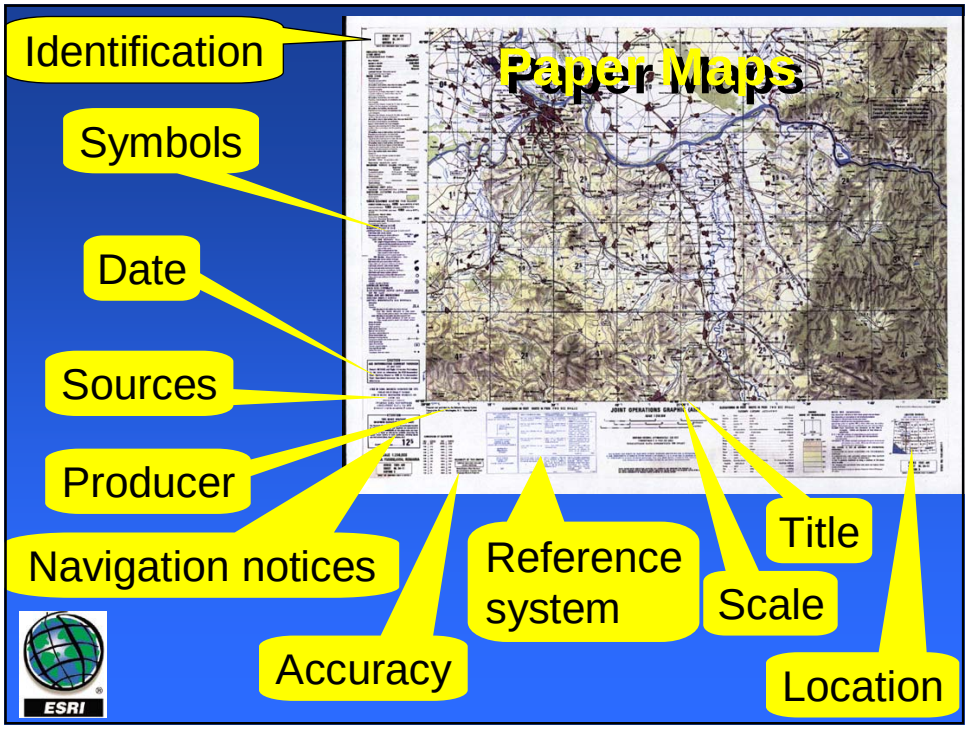
(1) IEEE
(2) ISO TC211

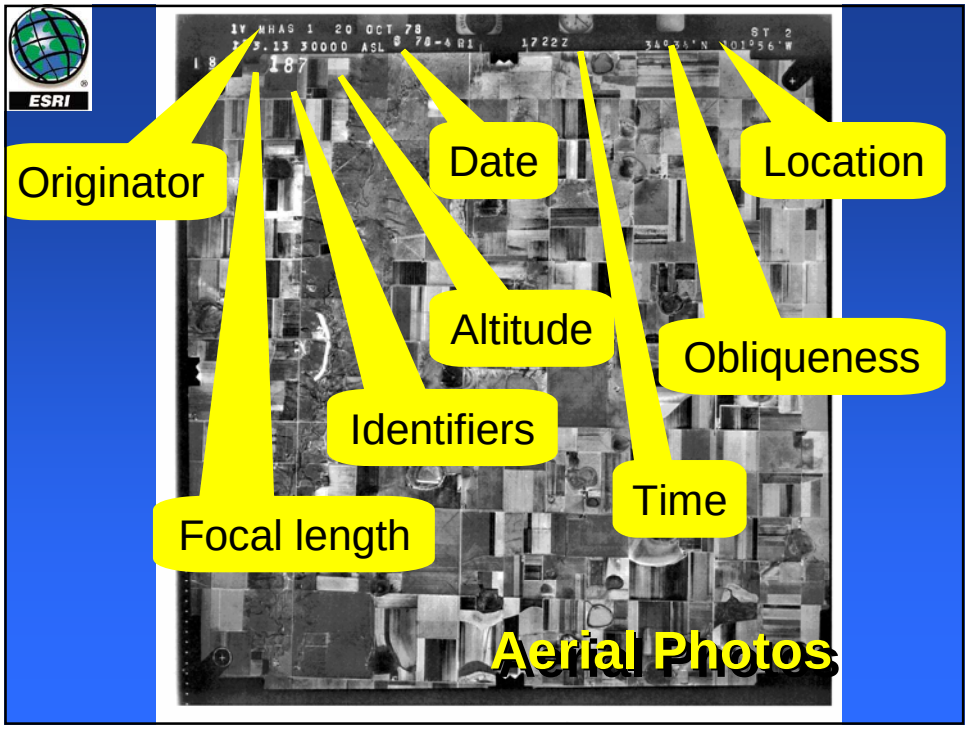
Interoperability Enablers

- Infrastructure
  - Compatible Technology
- Authorization
- Copyright
- Business Agreements
  - MOUs
- Business Model
  - Pricing/commerce
- **Standards**
- Security
  - Privacy
- Information Assurance
  - Certification
  - Quality
- **Metadata**

Metadata

- **Data about Data**
- **Documentation that describes information (data) so it can be understood**
- **Insures we find and use the right data for the right purpose**
  - **That it is used correctly**


Paper Maps
Identification
Symbols
Date
Sources
Producer
Navigation notices
Accuracy
Reference system
Scale
Title
Location
ESRI


Aerial Photos
Originator
Date
Location
Altitude
Obliqueness
Identifiers
Time
Focal length
ESRI

Metadata Environments

Application

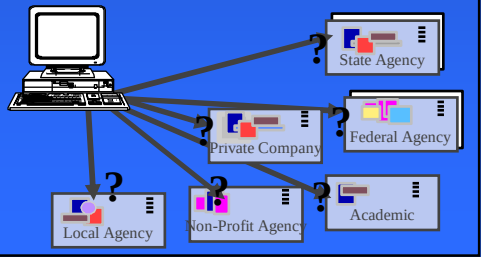
Environment

	Catalog	Processing Support	Historical Record	Understand Data
Locate	X		X	X
Evaluate	X		X	X
Extract	X	X		
Employ		X		X

Catalog Environment

Locate Evaluate Extract

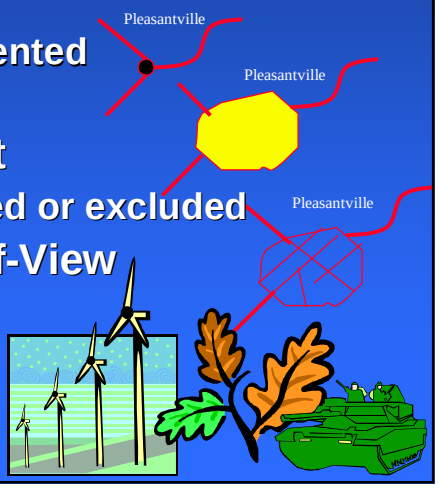
- Product Catalog
  - Printed
  - On-line
- Portals
- Clearinghouse
  - Searching
  - Browsing
- Data Warehouse
  - Management



User Environment

Locate Evaluate Employ

- Understand the Model
  - How features are represented
  - Connectivity
- Understand the Content
  - Why features are included or excluded
- Understand the Point-of-View
  - Business/Commercial
  - Environmental/Scientific
  - Military/Defense/Intel



Processing Environment

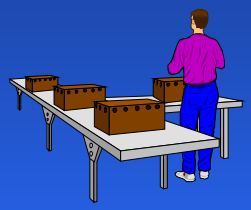
Extract Employ

- Support user Decisions
  - Identify multiple datasets within an application
  - Know the good and bad areas
  - Merging data (which is the better data?)
    - Currentness
    - Quality
- Support Computer Processing
  - Application software functions
  - Capabilities, access
  - Guide software through the data

Historical records

Locate Evaluate

- Production Management
  - Planning - setting priorities
  - Coordinating production
  - Storage/Archival
- Legal Records
  - Proper use
  - Document assumptions



Metadata perspectives

- Why is metadata 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
  - Geospatial data is expensive
    - Reuse
    - Data management
- Why should it be standardized?
  - Provide an understanding of data – around the Globe and across information communities

ISO 19115:2003

INTERNATIONAL STANDARD

ISO 19115

First edition
2003-05-01

Geographic information — Metadata

Information géographique — Métadonnées

Reference number
ISO 19115:2003(E)

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ISO 19115:2003

Scope

- ...the schema required for **describing** geographic information and services.
- ...information about the identification, the extent, the quality, the spatial and temporal schema, spatial reference, and distribution of **digital** geographic data.
- ...applicable to the cataloguing of datasets, clearinghouse activities, and the full description of datasets for a wide range of geographic applications.
- …applicable to geographic datasets, dataset series, and individual geographic features and attributes
- ...may be used for other forms of geographic data such as map, charts, textual documents

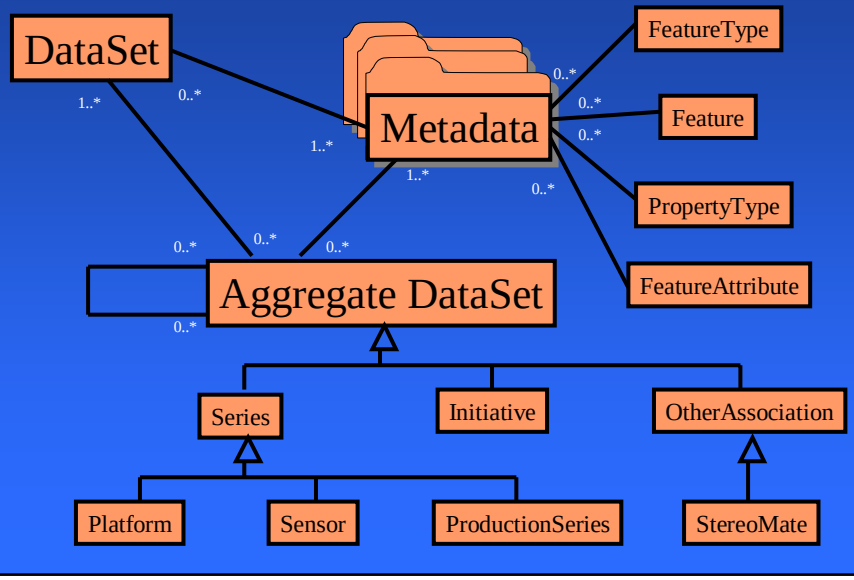
19115:2003 Geographic Information – Metadata

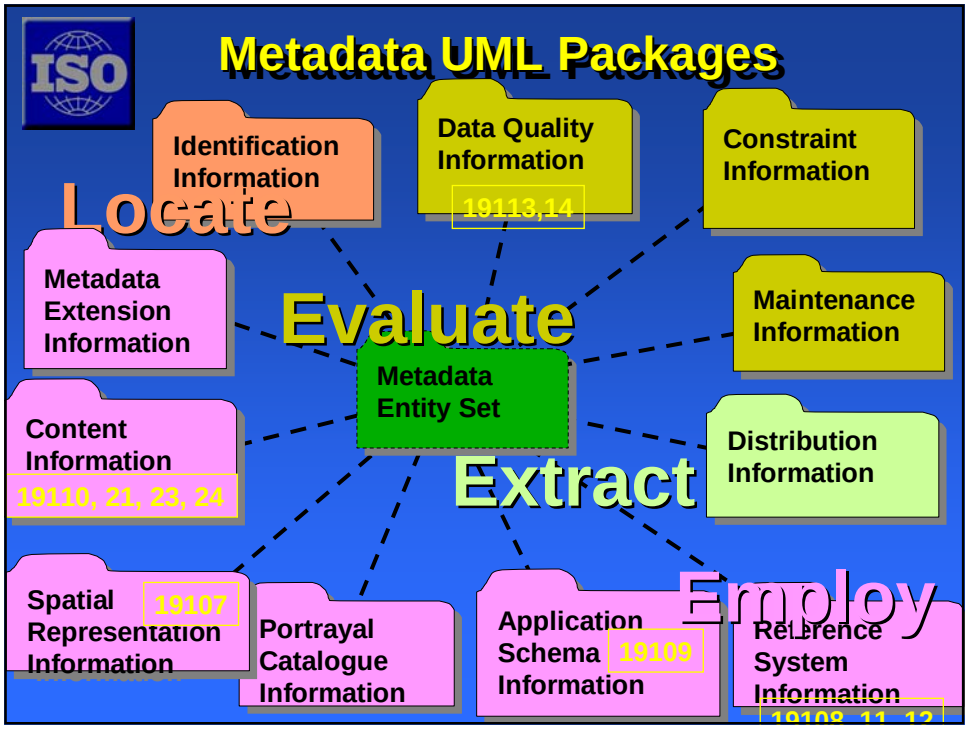
1. Provides **data producers** with appropriate information to characterize their geographic data properly.
   - Provides an idea of the metadata they should be collecting
2. **Users** will be better able to locate, access, evaluate, purchase and utilize geographic data.

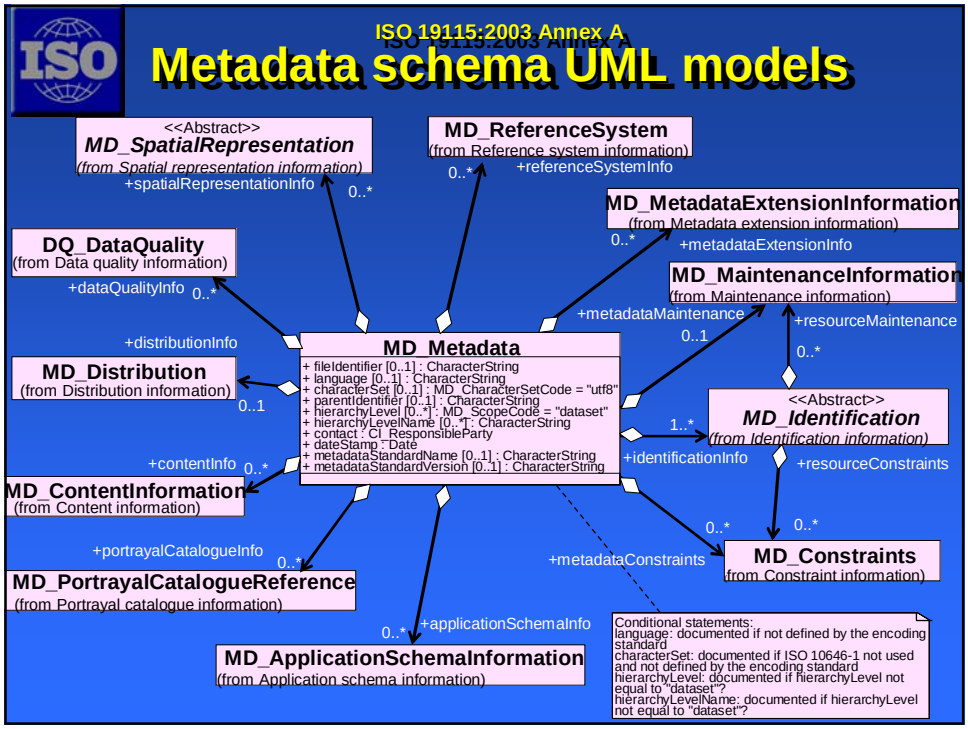
Semantic Interoperability

ISO 19115:2003

Metadata applications




Metadata UML Packages
Identification Information
Data Quality Information
19113,14
Constraint Information
Locate
Metadata Extension Information
Evaluate
Maintenance Information
Metadata Entity Set
Content Information
19110, 21, 23, 24
Distribution Information
Extract
Spatial Representation Information
19107
Portrayal Catalogue Information
Application Schema Information
19109
Employ
Reference System Information


ISO 19115:2003 Annex A
Metadata schema UML models
<<Abstract>>
MD_SpatialRepresentation
(from Spatial representation information)
+spatialRepresentationInfo
0..*
MD_ReferenceSystem
(from Reference system information)
+referenceSystemInfo
MD_MetadataExtensionInformation
(from Metadata extension information)
+metadataExtensionInfo
DQ_DataQuality
(from Data quality information)
+dataQualityInfo
MD_MaintenanceInformation
(from Maintenance information)
+metadataMaintenance
+resourceMaintenance
0..1
+distributionInfo
MD_Metadata
+ fileIdentifier [0..1] : CharacterString
+ language [0..1] : CharacterString
+ characterSet [0..1] : MD_CharacterSetCode = "utf8"
+ parentIdentifier [0..1] : CharacterString
+ hierarchyLevel [0..*] : MD_ScopeCode = "dataset"
+ hierarchyLevelName [0..*] : CharacterString
+ contact : CI_ResponsibleParty
+ dateStamp : Date
+ metadataStandardName [0..1] : CharacterString
+ metadataStandardVersion [0..1] : CharacterString
MD_Distribution
(from Distribution information)
<<Abstract>>
MD_Identification
(from Identification information)
+identificationInfo
+resourceConstraints
+contentInfo
MD_ContentInformation
(from Content information)
+portrayalCatalogueInfo
MD_PortrayalCatalogueReference
(from Portrayal catalogue information)
+metadataConstraints
MD_Constraints
(from Constraint information)
+applicationSchemaInfo
MD_ApplicationSchemaInformation
(from Application schema information)
Conditional statements:
language: documented if not defined by the encoding standard
characterSet: documented if ISO 10646-1 not used and not defined by the encoding standard
hierarchyLevel: documented if hierarchyLevel not equal to "dataset"?
hierarchyLevelName: documented if hierarchyLevel not equal to "dataset"?

ISO 19115:2003 Annex B
Metadata data dictionary

	Name/Role Name	Short Name	Definition	Obligation/ Condition	Maximum occurrence	Data type	Domain
29	MD_Identification	ident	basic information required to uniquely identify a resource	Use obligation from referencing object	Use maximum occurrence for referencing object	Aggregated Class (MD_Metadata) <<Abstract>>	Lines 30-41
30	citation	idCitation	citation data for the resource	M	1	Class	CI_Citation <<DataType>> (B3.2)
31	abstract	idAbs	brief narratiave summary	M	1	CharacterString	Free text
32	purpose	idPurp	summary of the intentions with which the resource was developed	O	1	CharacterString	Free text
33	credit	idCredit	recognition of those who contributed to the resource	O	1	CharacterString	Free text
34	statusCode	idStatCode	status of resource	O	N	Class	MD_ProgressCode <<CodeList>> (B.6.26)

Recommended core metadata for geographic datasets

- **Dataset title**
- **Dataset reference date**
- **Dataset responsible party**
- **Geographic location of the dataset (by four coordinates or by geographic identifiers)**
- **Dataset language**
- **Dataset character set**
- **Dataset topic category**
- Spatial Resolution
- **Abstract describing the dataset**
- Distribution format
- Additional extent information (vertical and temporal)
- Spatial representation type
- Reference system
- Lineage statement
- On-line resource
- Metadata file identifier
- Metadata standard name
- Metadata standard version
- **Metadata language**
- **Metadata character set**
- **Metadata point of contact**
- **Metadata time stamp**

Mandatory

New Metadata Work Items

- ISO/TS 19139 *Geographic Information – Metadata* – XML Schema Specification
- ISO 19115-2 *Geographic Information – Metadata* – Part 2 Extensions for Imagery and Gridded Data

ISO 19139

Geographic Information - Metadata XML Schema Implementation

- Defines geographic metadata (gmd) XML encoding
  - an XML Schema implementation derived from ISO 19115- Geographic information – Metadata
- XML Schema
  - More rigorous validation of compliance
  - More exact representation of UML
- Based on Comprehensive Profile ISO 19115
- Separate from ISO 19115
  - More easily evolve with changes in technology
  - Quickly establish implementation of ISO 19115

Technical Interoperability

ISO 19139 Specification

- Uses ISO 19115 UML to produce ISO 19139 XML Schema
- Identification of additional 19100 entities
  - 19103, 7, 8, 9, 18
- gmd XML encoding rules
- Other (19100) encoding rules
  - gmd – XML Schema of ISO 19115
  - gss – ISO 19107 Spatial Schema realized by ISO 19136 GML
  - gts – ISO 19108 Temporal XML Schema
  - gsr – ISO 19111 Spatial Referencing realized by ISO 19136 GML
  - gco – ISO 19118 Encoding – basic types realized by XML Schema and GML example: gml UOM dictionaries
  - gmx – extended geographic metadata XML schemas for codelists, etc
- Clauses defining
  - Cultural and linguistic support
    - multiple languages, etc
  - Metadata for transfer
  - Dataset and Aggregate dataset metadata
  - Codelists
- Implementation examples
- gmdXML (XML schema) provided on-line
  - http://www.iso.org/iso/en/ittf/PubliclyAvailableStandards/ISO_19139_Schemas

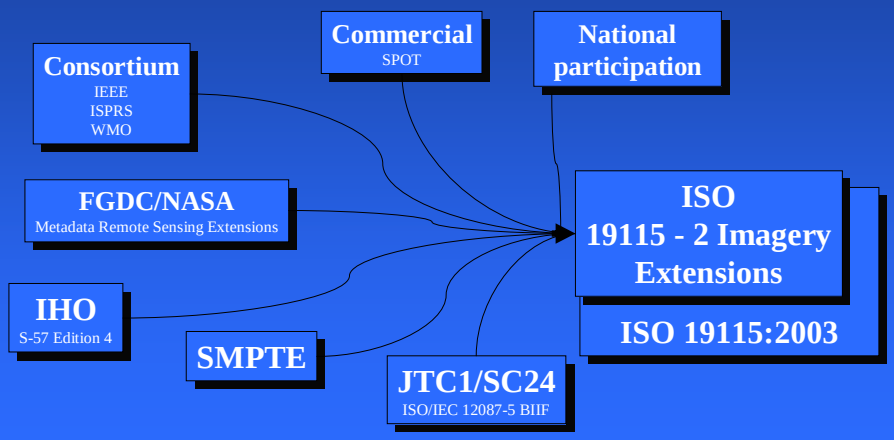
ISO 19139 Schedule

- Working Draft2: 2003-09
- Working Draft3: 2004-03
- Preliminary Draft TS: 2004-06
- Draft TS: 2005-04
- Technical Specification: 2005-06

ISO 19115-2 *Geographic Information – Metadata* – Part 2 Extensions for Imagery and Gridded Data

- "This International Standard extends ISO 19115:2003 Geographic information — Metadata by defining the schema and additional metadata required for imagery and gridded data"
- Metadata to support the whole lifecycle of:
  - Georeferenceable Imagery
  - Gridded data (raster, matrix, TIN, etc.)
  - Georeferenceable Motion imagery

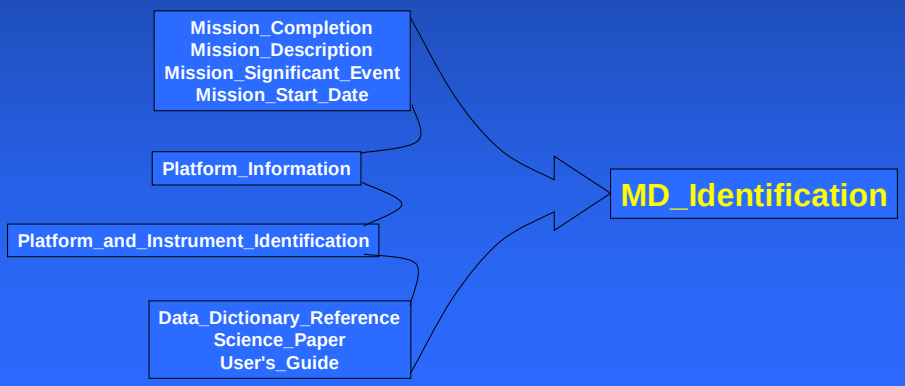
Liaison Organizations and Related Work



Please join in

Proposed Extensions
Identification Information

New Imagery Elements and Existing Classes



ISO 19115-2
Schedule

- Working Draft: 2003-09
- Working Draft2: 2004-09
- Committee Draft: 2005-05
- Draft International Standard: 2005-09
- Final DIS: 2006-05
- IS: 2006-08

Summary
ISO Metadata

- Metadata – a key factor enabling interoperability
- Essential for all aspects of spatial data handling
  - Locate
  - Evaluate
  - Extract
  - Employ
- ISO 19115:2003
- Designed:
  - to support geographic information;
  - to work with wider information technology standards and practices;
  - to serve the global community, in a multi-national, multi-language environment;
  - based on a foundation of national, regional, and special information community standards and experiences
  - Developed through a rigorous, consensus ISO process
- Metadata in the ISO 19115 standard
  - Provides a common understanding
  - Expanded networks
  - Global Interoperability
  - Semantic interoperability
- ISO TC 211 is taking the next steps
  - Expanding for imagery
  - Implementation specification
  - Technical interoperability

Thank you

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