Leveraging Metadata Standards for Supporting Interoperability in ArcGIS

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Leveraging Metadata Standards in ArcGIS for Interoperability

• Why metadata and metadata standards?
• Overview of metadata standards
• ArcGIS for Desktop standards support
• Notes for specific metadata styles
• Customizing the metadata editor
• What’s next for metadata standards?
Why metadata and metadata standards?

Why create geospatial metadata?

- Geospatial data: representation of the real world
Why metadata and metadata standards?
Metadata is useful!

- Communicate the assumptions, limitations, approximations, simplifications
  - Enables understanding
- Support decisions, discovery, and reuse
- Identify a resource’s worth
- Archive information
Why metadata and metadata standards?

Why follow metadata standards?

- **Content checklist for authors**
- **Common understanding of geospatial data**
  - Between countries
  - Between communities
- **Publish to metadata catalogs**
- **Consistent terminology for global search**
Why metadata and metadata standards?

Why follow metadata standards?

Published  Accessible  Discoverable  Associations

Good  Better  Best
Overview of metadata standards

Different types of metadata standards

• Content standards
  - What to write
  - Optionality
Overview of metadata standards

Different types of metadata standards

• Implementation specifications
  - Format
  - Validity
Overview of Metadata Standards

- ISO metadata standards change regularly
  - Create a new standard
  - Official corrections or amendments
  - Create a profile to modify or extend for a community
  - Review and potential revision every 5 years
Overview of Metadata Standards

- Relationship between content standards and implementation specifications
Overview of Metadata Standards

- **Content Standard for Digital Geospatial Metadata (CSDGM)**
- mp, XML DTD, XML Schema
Overview of Metadata Standards

- **ISO 19115:2003 Geographic information – Metadata**
  - Includes data quality content
  - References other data type standards
  - ISO 19115:2006 Technical Corrigendum 1

- **ISO 19139:2007 Geographic Information -- Metadata -- XML Schema implementation**
  - References GML schemas for time and geometry
Overview of Metadata Standards

- ISO 19119:2005 *Geographic Information -- Services*
  - ISO 19119:2008 Amendment 1
- OpenGIS *Catalogue Service Implementation Specification*
  - Catalogue Service for the Web (CSW)
Overview of Metadata Standards

- ISO 19110:2005 *Geographic Information -- Methodology for feature cataloguing*
- ISO 19110:2011 *Geographic Information -- Methodology for feature cataloguing* Amendment 1, Annex E
Overview of Metadata Standards

- ISO 19115-2:2009 Geographic Information -- Metadata -- Part 2: Extensions for imagery and gridded data
Overview of Metadata Standards

Overview of Metadata Standards
Overview of Metadata Standards

• A few profiles of ISO 19115:2003
  - Australia-New Zealand Profile
  - INSPIRE Metadata Directive
  - North American Profile (NAP)
  - UK GEMINI
  - DISDI Geospatial Metadata Profile (DGMP)
  - Energy Industry Profile
Overview of Metadata Standards

• Content standards
  - ISO 19110:2005 under revision—work in progress
  - ISO 19115-2:2009 revision will begin

• Implementation specifications
  - ISO 19139 under revision as ISO 19115-3—work in progress
  - ISO 19157-2 new standard—work in progress
Overview of Metadata Standards

1. Identification Information
   - Some coded domain values

2. Data Quality Information

3. Spatial Data Organization Information
   - Some coded domain values

4. Spatial Reference Information

5. Entity and Attribute Information

6. Distribution Information
   - Some coded domain values

7. Metadata Information
   - Some coded domain values

8. Citation Information

9. Time Period Information

10. Contact Information

Extensions for Remote Sensing Metadata

ISO 19115:2003/Cor.1 2006

ISO 19110:2005

ISO 19115-2:2009

North American 19115 (v1.2 2008)

Content standards

ISO TC 211

ISO metadata community profiles
Overview of Metadata Standards

- FGDC CSDGM Metadata
  1. Identification Information
  2. Data Quality Information
  3. Spatial Data Organization Information
  4. Spatial Reference Information
  5. Entity and Attribute Information
  6. Distribution Information
  7. Metadata Information
  8. Citation Information
  9. Time Period Information
  10. Contact Information

- ISO TC 211 content standards
  - ISO 19115-1:2014
  - ISO 19157:2013
  - ISO 19110:2005
  - ISO 19115-2:2009

- Extensions for Remote Sensing Metadata
Overview of Metadata Standards

XML Schema validation

- Implementation specification XML Schemas published on the web by standards organizations
  - Schemas published in several different locations
  - No one location provides all schemas
  - TC 211 XML Management Committee to create new single repository
Overview of Metadata Standards

Schematron validation

• What are schematrons?
  - Supplement to XML Schemas
  - With to evaluate content standard rules not evaluated by XML Schemas
  - Profiles may provide to evaluate profile-specific rules
  - Run Schematrons as XSLTs to produce a report
ArcGIS for Desktop standards support

Before formal metadata

FGDC CSDGM 1998

Early advocates

ISO 19115:2003

Full support in ArcCatalog

ISO 19139:2007

Early support for drafts

ISO 19115-1:2014

Full support for compliant XML and profiles

Preparing to support 19115-1 and 19115-2

Participate in standards development

Leveraging Metadata Standards for Supporting Interoperability in ArcGIS

Early advocates

Full support in ArcCatalog

Preparing to support 19115-1 and 19115-2

Participate in standards development
ArcGIS for Desktop standards support

- *Content Standard for Digital Geospatial Metadata (CSDGM)*
ArcGIS for Desktop standards support

- Profiles
  - North American Profile of ISO 19115:2003 (NAP)
  - INSPIRE Metadata Directive
- Both are based on ISO 19115/19139
- Both reference ISO 19119 content
ArcGIS for Desktop standards support

- Content stored in the ArcGIS metadata format
- Includes all concepts for supported standards and profiles
ArcGIS for Desktop standards support

Workflow

- **Set your ArcGIS Metadata Style**
  - Filters the full set of concepts
  - Associated with a metadata standard
  - Set in Options dialog box
ArcGIS for Desktop standards support

Workflow

- Author metadata content in ArcGIS for Desktop
- Export metadata to standard format
- Validate metadata for standard
- Publish to metadata catalog
ArcGIS for Desktop standards support

- A flexible system that adapts to changing standards
- Enhances interoperability
ArcGIS for Desktop standards support
Set the ArcGIS Metadata Style

- Pages added to or removed from the ArcGIS metadata editor
ArcGIS for Desktop standards support
Set the ArcGIS Metadata Style

- Elements added to or removed from a page

NAP style adds required country code

Removes hierarchy level name
ArcGIS for Desktop standards support

Author metadata content

- Messages based on standard conditions and guidelines
- Provide content indicated by editor
- Messages update automatically as you type
ArcGIS for Desktop standards support
Author metadata content
ArcGIS for Desktop standards support
Author metadata content

Missing content
ArcGIS for Desktop standards support

Content OK
ArcGIS for Desktop standards support

Export content to standard formats

• Export ArcGIS Metadata content to a standard format XML file
  - Export button in Description tab
  - Export Metadata gp tool
• Result stored in a stand-alone XML file
ArcGIS for Desktop standards support

Validate content with standard XML Schemas

- Validate exported file using XML schema provided by standards organization
  - Validate button in Description tab
  - Validate Metadata gp tool

- Validates file using Microsoft .NET Framework XML capabilities
  - Provides warning and error messages
ArcGIS for Desktop standards support

Publish exported metadata file

- Publish standard-format XML file to a metadata catalog
  - Some catalogs incorporate validation into the publishing process
ArcGIS for Desktop standards support

- Change your metadata standard—change the metadata style
  - Edit metadata, check if other content required
  - Export metadata to another standard format
  - Validate metadata for another standard
  - Publish to another metadata catalog
ArcGIS for Desktop standards support

- ArcGIS Metadata
  - FGDC
  - CSDGM
  - XML
  - ISO 19139 (NAP) XML
  - ISO 19139 (INSPIRE) XML

- ISO 19115-3 XML
- ISO 19139 XML
FGDC CSDGM Metadata Style

• Prompt to upgrade FGDC CSDGM-format metadata (e.g., created in 9.x)
  - Content appears at the bottom of metadata display
  - Read-only in the Description tab
• Allow ArcGIS to automatically update content
FGDC CSDGM Metadata Style

• Search ArcGIS 10.2.x Help with keyword FGDC
• Creating and managing FGDC metadata
  - Guides you through the transition
  - Exporting additional CSDGM file formats, e.g. text and HTML
  - Importing from a CSDGM-format text file
• Differences between ArcGIS and CSDGM metadata
• Complete illustrated guide
FGDC CSDGM Metadata Style

- Validation with online FGDC-provided XML DTD for validation
- Can validate metadata with mp using custom model or script
  - Export metadata to CSDGM-format XML file
  - Run USGS MP Metadata Translator tool with Conversion Type = None
  - Warning and error messages produced by mp
ISO 19139 Metadata Styles

• Two ISO 19139 metadata styles provided with 10.2.1 and 10.2.2
  - ISO 19139 Metadata Implementation Specification
  - ISO 19139 Metadata Implementation Specification GML 3.2
    - Provided with 10.2.1

• Same content and rules
ISO 19139 Metadata Styles

• Validate button: validates using online ISO XML Schemas
• Reference ISO 19139 XML Schemas provided in different locations on the web
  - Original style references online XML Schemas using GML 3.2.0
  - GML 3.2 style references online XML Schemas using GML 3.2.1
ISO 19139 Metadata Style

• No difference in validation for metadata created in ArcGIS for Desktop
• Some metadata catalogs or tools may require XML files that support GML 3.2.1
North American Profile (NAP) Style

- Additional codelist values and mandatory elements
  - Supports tighter transition from CSDGM
- NAP-specific rules available in the editor
- No NAP-specific XML Schemas
- Exported metadata validates with ISO 19139 for data or CSW for services
INSPIRE Metadata Directive Style

- Supports creating ISO metadata that conforms to the INSPIRE Metadata Directive
- Limited codelist values in the editor as appropriate
- INSPIRE-specific rules available in the editor
- Exported metadata validates with ISO 19139 for data or CSW for services
Other ISO Standards and Profiles

- Complete ISO 19139 content is supported with the ISO 19139 metadata style
- Follow the rules for your standard or profile, ignoring 19139-specific rules as appropriate
Other ISO Standards and Profiles

• Use the ArcGIS Metadata Toolkit to customize the ArcGIS metadata editor
  - Download from support.esri.com
  - Latest version supports 10.2.1 and 10.2.2
  - Create a custom metadata style
  - Documents the ArcGIS metadata format
Other ISO Standards and Profiles

• Toolkit provides code for all pages in the metadata editor
  - C# WPF application with XAML forms
  - Modify elements on existing pages
  - Add custom pages
  - Change codelist values
  - Change validation rules

• Programming guide
• Sample project
What’s next for ArcGIS for Desktop?

- Add support for ISO 19115-1 when XML Schemas are finalized
  - Include support for ISO 19115-2 at the same time
- Update styles to reference schemas from new repository if one becomes available
Leveraging Metadata Standards in ArcGIS for Interoperability

• Data interoperability requires metadata interoperability

• Metadata important in ArcGIS for Desktop
  - Can be customized
  - Supports many standards, versions of “ISO metadata”
  - The best tool for anyone concerned with interoperability
Remaining metadata sessions at this UC

• Working with Metadata in ArcGIS
  - 10:15 - 11:30   Room 31 C
Where to find us
Thank you...

• Please fill out the session survey:

Offering ID: 1418

Online – www.esri.com/ucsessionssurveys
Paper – pick up and put in drop box