

IPT WORKSHOP BRIEFING TEMPLATE

The NOAA IOOS Program shares the goal of improved data interoperability with many other programs. These groups universally understand that high-quality metadata are a critical part of any significant step towards that goal. Understanding where we are is an important initial step in the metadata improvement process. This document provides a snapshot of metadata from three IOOS Data Providers and is a first step towards the goal of high-quality, standards-compliant metadata for all NOAA data.

The Metadata Standards Spectrum described in detail in Appendix 1 provides a simplified picture of a path towards that goal with metadata standards or states as signposts along that path. Figure 2 shows where the metadata we examined presently is along that path and the discussion above describes why. We also identified several specific recommendations for each data provider (listed below).

The metadata sections of the NDBC Interoperability Plans suggested a set of steps required to migrate their metadata and systems towards standards compliance:

Acquire metadata expertise, Compile and publish vocabulary, Design a data management system to validate FGDC, Software development, Achieve FGDC Compliance, Register metadata

NDBC suggested that 3-4 FTE's would be required for two years to accomplish these steps. A similar migration path was proposed by CO-OPS for their non-FGDC datasets. They estimated that, depending on IOOS DIF WSDE workload, this effort may be pushed off to late FY2009 or early FY2010.

The NGDC experience with IOOS Data Providers and many others suggests that these steps should be taken as part of a larger metadata training and management program that builds partnerships that take advantage of existing metadata expertise and examples. The Metadata Team at NGDC has a good track record of working with NOAA data providers to create and maintain high-quality metadata. The DART metadata created along with NGDC is a good example of the positive results of such a partnership.

Specifically, in terms of the steps listed above, NGDC already has metadata expertise, and a well developed system for managing metadata that 1) can validate metadata against FGDC and ISO standards, 2) takes advantage of several controlled vocabularies, 3) provides metadata in several popular standards (FGDC, DIF and soon in ISO), and 4) registers those metadata with Geospatial One-Stop, the NASA Global Change Master Directory (GCMD), and FirstGov. Currently this system, the NOAA Metadata Manager and Repository, manages nearly 20,000 metadata records from NOS, NESDIS, NGDC, and NCDC using FGDC Remote Sensing Extensions and ISO OnLine Resources. We are currently evaluating an open source replacement for the NMMR that adds support for the ISO 19115 and 19115-2 standards (GeoNetwork).

Given this experience and these existing resources, we suggest that 3-4 FTE's at NGDC could satisfy these requirements for all NOAA IOOS Data Providers and products presently included in the IOOS DIF. In addition, we could migrate those metadata to the endpoint of the Metadata Standards Spectrum: high-quality ISO metadata with important extensions and service metadata. This approach would also provide a strong foundation for partnerships to extend this work to the broader NOAA community. In fact, the NGDC Metadata Team is already working on metadata for NPP/NPOES and GOES-R.

This ambitious proposal is clearly outside of the scope of current IOOS metadata resources. Tasks that might be addressed by NGDC during FY 2009 include:

Work with IOOS Data Providers to improve existing metadata for all products and services. The Metadata Standards Spectrum could be used to identify specific goals for each existing product.

Develop training materials based specifically on IOOS examples.

Register IOOS Services with GEOSS Registry and GCMD.

Develop approaches for integration of on-going quality monitoring results with standard metadata.

Develop approaches for encoding the IOOS Data Content Standards using National and International metadata standards.

Of course, these need to be discussed with the IOOS Program Office, lined up with existing resources and cast into a Statement of Work.

CoastWatch:

The CoastWatch team is actively improving their metadata through on-going partnerships with metadata experts at the NOAA Data Centers. The results of this partnership are clear in the next generation of the CoastWatch collection-level metadata presently available through CLASS. The Entities and Attributes sections of these metadata need to be incorporated into the CoastWatch Central metadata provision system to move the metadata to the "Complete FGDC" state on the MSS. Once that is done, we need to work towards including extended content in the CoastWatch metadata.

Tables 1 and 2 in Appendix 1 clearly indicate significant overlap between the CoastWatch granule metadata and the ISO 19115 and 19115-2 standards. The CoastWatch team should explore approaches that take advantage of this overlap as part of a comprehensive documentation system.

CO-OPS:

The CO-OPS/NGDC partnership has worked well for the one-minute water level data. The resulting high-quality metadata are ready to migrate towards ISO. That effort needs to be expanded to encompass other CO-OPS datasets.

CO-OPS is clearly a leader in providing access to data using web services. The area of standard service metadata (using ISO 19119) is closely related to dataset metadata (ISO 19115). This is an area in which CO-OPS could clearly provide good leadership.

NDBC:

NDBC provides data and metadata in several standard formats (WMO Pub47 and F291). These formats are widely used and contain a significant amount of useful metadata. Developing a mechanism for making that information available in standard ways could be very useful.

In addition, NDBC could benefit from working with metadata experts to migrate their station metadata towards standard representations. Specifically, the information on the measurement and units page (<http://www.ndbc.noaa.gov/rsa.shtml>) could be combined with information from a station inventory page (like http://www.ndbc.noaa.gov/data_availability/data_avail.php?station=41017) to create excellent FGDC-compliant entity and attribute section and quality sections for each station.



Metadata Working Group

The NOAA IOOS Metadata Working Group (NIMWG) includes experts from several NOAA Line Offices. They held bi-weekly telecons to discuss IOOS metadata requirements.

How does your project/working group compliment or link with DIF activities?

Data integration efforts like IOOS face many technical barriers. Once those barriers are overcome, the real work – understanding the integrated picture – begins. That can not be done without understanding the data. That requires readily available and understandable documentation - metadata.

What is the current status? Provide brief update.

This working group formulated some recommendations to be presented to the IOOS Program at this meeting.

Milestones and Challenges

Success stories, project accomplishments, benefits.

The group used the GEO-IDE Wiki as a home base and a significant amount of material was added to that wiki by Ted (metadata) and Alex (DMAC Data Management Guide). We also came to understand how some simple capabilities that are build into the wiki (categories) could be helpful in arranging content and making it more findable.

In the time since this group started – the North American Profile of the ISO Metadata Standard has been approved and general consensus is forming across NOAA that the ISO metadata standards are the target at this time.

*What have been the challenges (technical or strategic) to this project/working group?
How were challenges resolved?*

Engaging a volunteer community is difficult in a situation where everyone is already overwhelmed with their own tasks. This challenge has yet to be resolved.

Wiki: <http://www.nosc.noaa.gov/dmc/swg/wiki> IOOS Metadata Working Group

Next Steps/ Recommendations

What is the next phase of your project/working group?

We are using the best tools for collecting community input and guidance. We need to expand the contributing portion of the IOOS community.

Provide recommendations for going forward

We have recommendations in three areas: Standards, Tools, and Terminology and questions about a registry.

Metadata Recommendations: Standards

The Program needs to identify and document metadata content that is required to support all data related capabilities and services.

Guidance for representing that content needs to be provided for the ISO 191*, FGDC with appropriate extensions, and Directory Interchange Format (DIF) metadata standards, in that order of priority.

Content already identified as important includes: file formats and structures, data attribute details, data transformations, quality control procedures, quality flags (with definitions), and data error characteristics.

Metadata Recommendations: Tools

The Program needs to identify and help document metadata tools that are 1) being used by IOOS Data Providers and 2) other groups or programs to create and maintain standard metadata. This guidance should be focused and integrated with the service and capability descriptions described above.

The Program should identify, document, and help test tools and stylesheets (XSLTs) for translating existing metadata into the ISO 191* standards and for translating metadata content from the ISO Standards into other standards. If tools supporting specific translations can not be identified, the Program should consider leading the development of those tools.

Metadata Recommendations: Terminology

The Program should evaluate existing vocabularies related to ocean observations and identify a small number (2-3) to focus adaptation or development efforts on.

The Program should work with the Marine Metadata Initiative to engage the broader IOOS community in this process.

The Program should focus on vocabularies related to ocean observations rather than data taxonomies or other higher-level items.

Metadata Recommendations: Registry

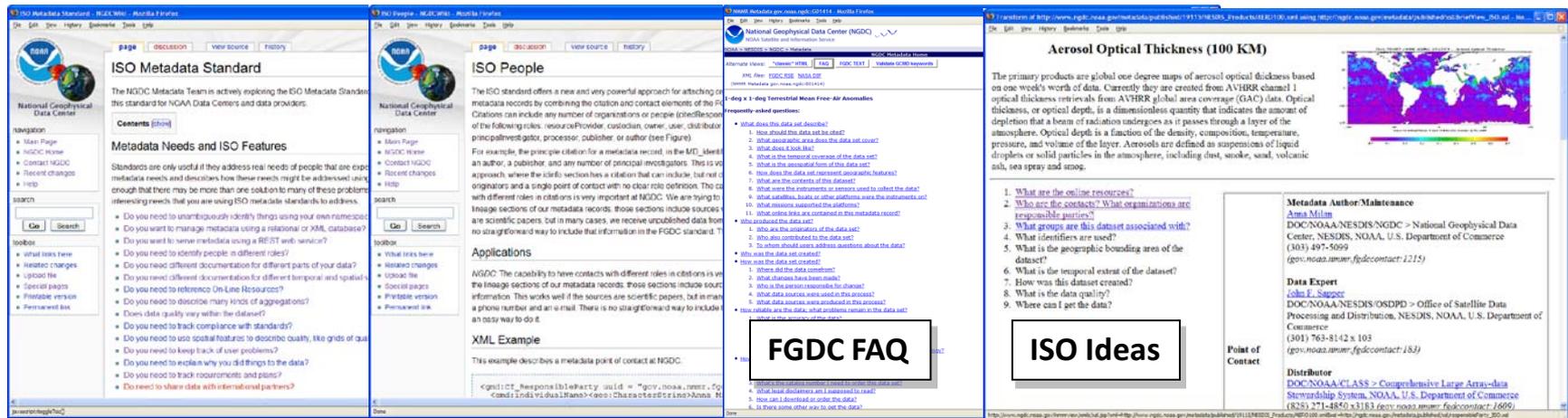
What would this registry contain (metadata, URNs)?

What is the scope of the registry? It would clearly include metadata for environmental datasets. Would it also include information about regulatory, administrative, legal enforcement, protected resources, habitat data?

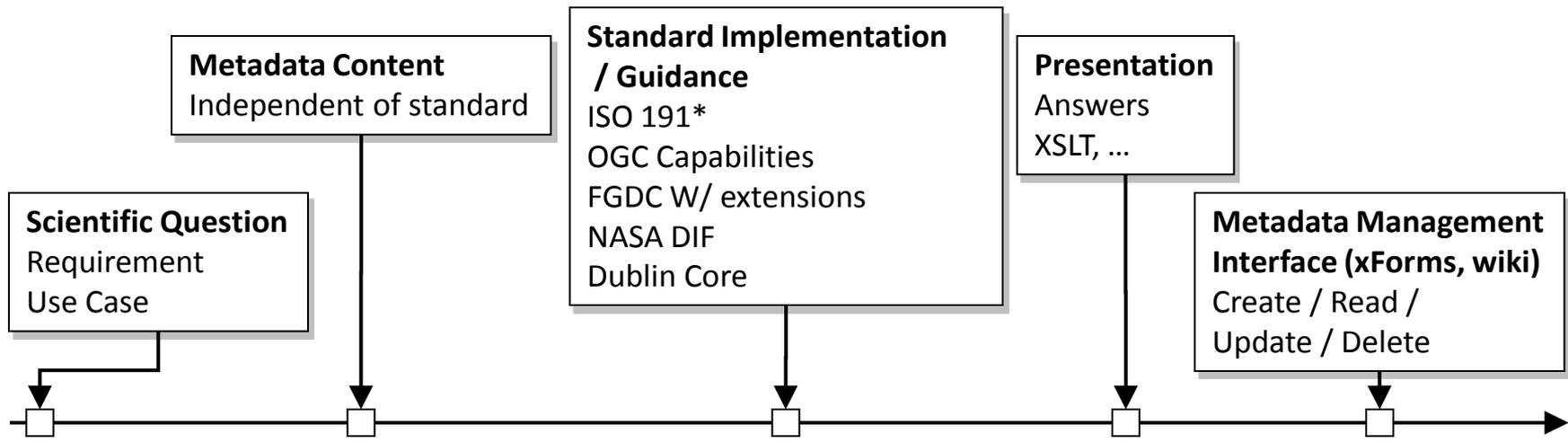
What is the relationship between an IOOS registry and others?
How can we use existing registries effectively?

How are the linkages between metadata in the registry and the data they describe tested and maintained?

Use Case to CRUD

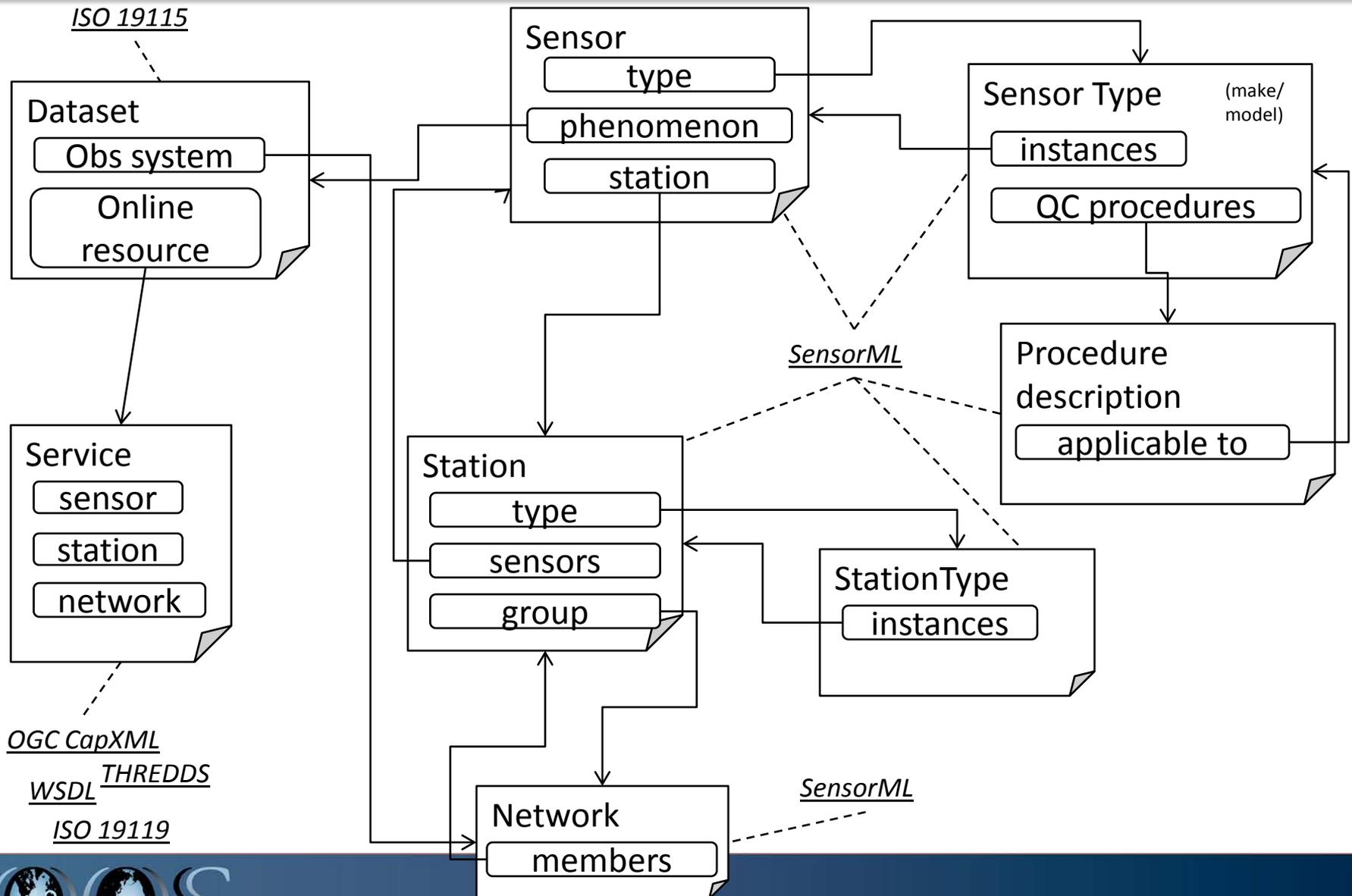


Data Providers / Scientists Metadata Standards Experts Technologists



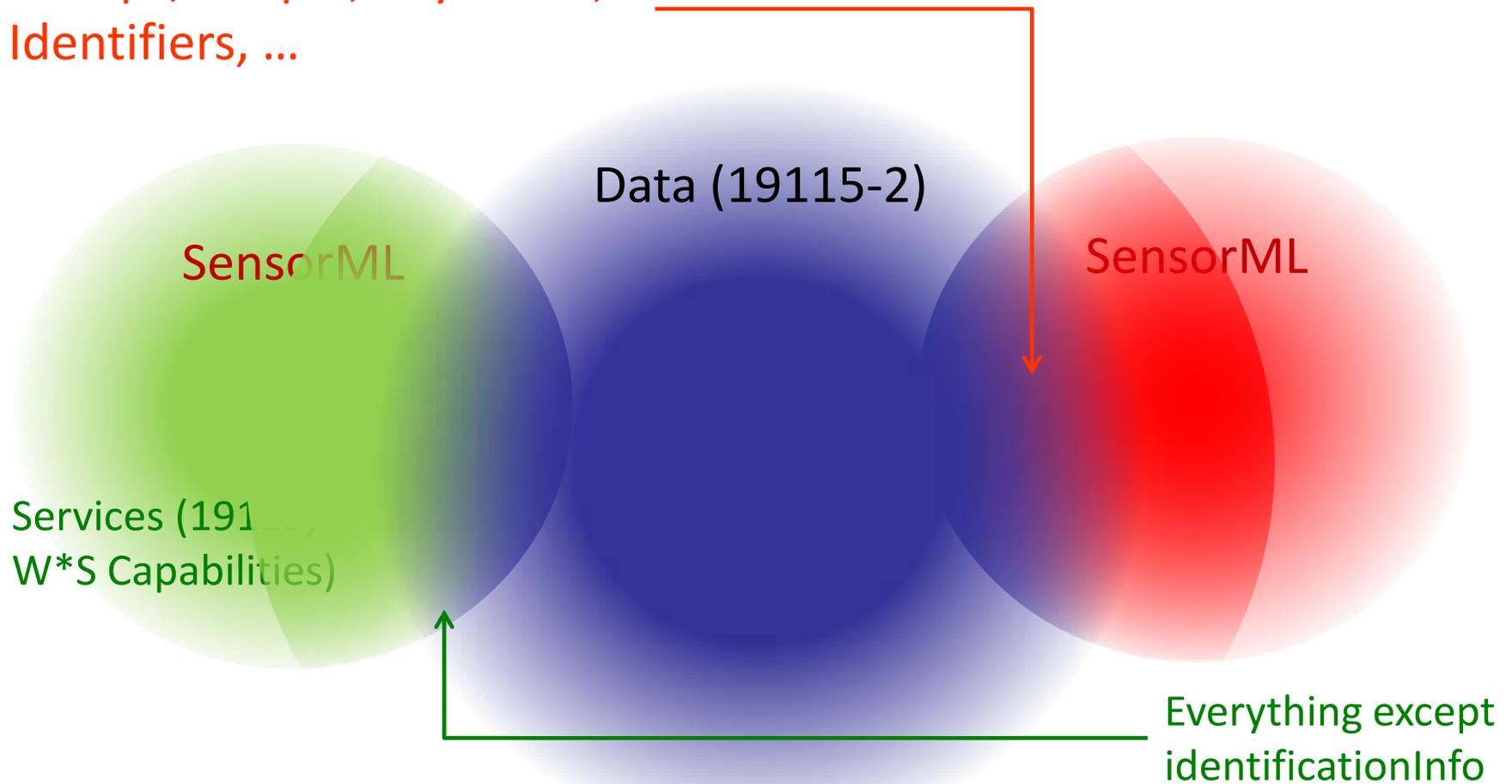
IOOS Metadata Linkage Model

(Sensors, Stations, Networks, Datasets and Services)



IOOS Metadata Linkage Model II

Groups, People, Keywords,
Identifiers, ...



The Working Group Home Page

The screenshot shows a Mozilla Firefox browser window displaying the NOAA IOOS Metadata Working Group home page. The browser's address bar shows the URL <http://opendap.c...PS%3A%3A8454000>. The page title is "IOOS Metadata Working Group - GEO-IDE Guidelines and Best Practices Wiki - Mozilla Firefox".

The page content includes the NOAA logo and the National Geophysical Data Center logo. The main heading is "IOOS Metadata Working Group". Below the heading, there is a "Contents" section with a "[show]" link. The main content area is divided into several sections:

- Overview and purpose of NOAA IOOS Metadata Working Group (NIMWG)** [edit]

The purpose of the NOAA IOOS Metadata Working Group (NIMWG), which is being led by Ted Habermann, is to develop recommendations regarding metadata for the IOOS Integrated Products Team (IPT) to consider at their Summer 2009 workshop (currently scheduled for August 2009). We are also working to identify and document *outstanding opportunities and use cases* for DIF metadata. Please feel free to use the talk feature (found by clicking on the "discussion" link) to post comments or thoughts on this material. If you are interested in joining the working group please contact Ted.
- NOAA IOOS Metadata Requirements** [edit]
- Approach** [edit]

The NIMWG embraces the overall IOOS guiding vision of "Adopt, Adapt, and only as a last resort, Develop" and has evaluated the existing metadata requirements with that vision in mind. As a result, our recommendations lean significantly towards the adopt end of this spectrum.
- Metadata Existence and Availability** [edit]

The NOAA IOOS Program, henceforth The Program, should work with Data Providers to ensure that standard metadata is created and maintained for all IOOS datasets and services. These metadata should be available through the NASA Global Change Master Directory (Directory Interchange Format), Geospatial One-Stop (FGDC + appropriate ex-tensions), and the Global Earth Observing System of Systems (ISO 19115, 19115-2, and 19119, OCG Capabilities).
- Metadata Standards** [edit]

The Program needs to identify and document metadata content that is required to support all data related capabilities and services. Guidance for representing that content needs to be provided for the ISO 191*, FGDC with appropriate extensions, and Directory Interchange Format (DIF) metadata standards, in that order of priority. Content already identified as important includes: file formats and structures, data attribute details, data transformations, quality control procedures, quality flags (with definitions), and data error characteristics. Services and capabilities supported using this content need to be elucidated.
- Consistent Terminology** [edit]

The Program should evaluate existing vocabularies related to ocean observations and identify a small number (2-3) to focus adaptation or development efforts on. The Pro-gram should work with the Marine Metadata Initiative to engage the broader IOOS community in this process. The Program should focus on vocabularies related to ocean observations rather than data taxonomies or other higher level items.

The browser's status bar at the bottom shows "Done" and the URL www.nosc.noaa.gov.



Categories Arrange Content

Categories - GEO-IDE Guidelines and Best Practices Wiki - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Categories - GEO-IDE Guidelines ... http://opendap.c...PS%3A%3A8454000 2.5 Lineage

Haber my talk my preferences my watchlist my contributions log out

special

Categories

The following categories contain pages or media.

Categories

Display categories starting at:

(first | last) View (previous 50) (next 50) (20 | 50 | 100 | 250 | 500)

- **DART Metadata** (3 members)
- **FGDC CSDGM** (1 member)
- **Fast Track Standards** (2 members)
- **GEO-IDE** (4 members)
- **IOOS DIF** (5 members)
- **ISO 19115** (23 members)
- **ISO 19119** (2 members)
- **ISO 19139** (4 members)
- **Integrated Ocean Observing System (IOOS)** (7 members)
- **Metadata** (9 members)
- **Metadata Examples** (1 member)
- **Metadata Standards** (8 members)
- **Metadata Working Group** (3 members)
- **Multidimensional Grids** (4 members)
- **OceanSITES Metadata** (1 member)
- **Open Geospatial Consortium Standards** (2 members)
- **Other Standards** (2 members)
- **Proposed Best Practice or Standard** (7 members)
- **SensorML** (2 members)
- **Standards** (4 members)

(first | last) View (previous 50) (next 50) (20 | 50 | 100 | 250 | 500)

Privacy policy About GEO-IDE Guidelines and Best Practices Wiki Disclaimers

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Find: OR Match case

Done www.nosc.noaa.gov

Opportunities and Use Cases

The screenshot shows a Mozilla Firefox browser window displaying a Wikipedia page titled "Metadata Opportunities and Use Cases" on the National Geophysical Data Center (NOAA) website. The browser's address bar shows the URL "http://opendap.c...PS%3A%3A8454000". The page content includes a navigation menu, a search box, and a list of questions related to metadata needs and ISO features.

Metadata Opportunities and Use Cases

Metadata Needs and ISO Features

Metadata is are only useful if it addresses real *needs* of people. This section presents a number of potential metadata needs and describes how these needs might be addressed using ISO metadata. Of course, the standards are broad and flexible enough that there may be more than one solution to many of these problems. Please add alternative solutions that you have found useful or interesting needs that you are using ISO metadata standards to address.

- Do you need to unambiguously identify things using your own namespace?
- Do you want to manage metadata using a relational or XML database?
- Do you want to serve metadata using a REST web service?
- Do you need to identify people in different roles?
- Do you need different documentation for different parts of your data?
- Do you need different documentation for different temporal and spatial subsets?
- Do you have datasets with multiple sources?
- Do you need to reference On-Line Resources?
- Do you need to describe many kinds of aggregations?
- Does data quality vary within the dataset?
- Do you need to track processing for multiple data sources?
- Do you need to track compliance with standards?
- Do you need to use spatial features to describe quality, like grids of quality flags?
- Do you need to keep track of user problems?
- Do you need to explain why you did things to the data?
- Do you need to track requirements and plans?
- Do you need to share data with international partners?
- Do you need to describe data formats and structures?
- Do you have datasets in multiple locations?
- Do you need to track data transformations and processing?
- Do you need to describe instruments used to make observations?

Data Attribute Details



The Data Provider Guide

The screenshot shows a Mozilla Firefox browser window displaying the "IOOS DIF DATA PROVIDER GUIDE - GEO-IDE Guidelines and Best Practices Wiki". The browser's address bar shows the URL: <http://opendap.c...PS%3A%3A8454000>. The page title is "IOOS DIF DATA PROVIDER GUIDE".

The page content includes a navigation sidebar on the left with the NOAA logo and "National Geophysical Data Center" text. The sidebar contains sections for "navigation" (Main Page, Categories, Recent changes, Help), "search" (with a search box and "Go" and "Search" buttons), and "toolbox" (What links here, Related changes, Upload file, Special pages, Printable version, Permanent link).

The main content area features the title "IOOS DIF DATA PROVIDER GUIDE" and a "Contents [show]" link. Below this is the section "Document purpose and history" with an "[edit]" link. The text in this section reads: "The IOOS has enormous potential to present geospatial data on open oceans, coastal waters, and Great Lakes in the formats, rates, and scales required by scientists, managers, businesses, governments, and general public to support research and inform decision-making. However, because there are so many incompatible standards in the geo-information technology area, sharing data between systems and between user communities requires considerable time and expertise. DIF goal is to facilitate data sharing by establishing certain standards in data formats, encoding and transport, and let any data provider to participate in IOOS program." It continues: "The present document has been developed in addition to and in elaboration of the *Guide for IOOS Data Providers* [12]. The *Guide for IOOS Data Providers* was compiled in 2006, and has not been updated since then; it offers high-level recommendations for selection, development and implementation of DMAC-compliant services and data formats. Most of these recommendations are of limited practical importance; some of them are completely obsolete." It then states: "In contrast to the previous version of the Guide, the present document is focused on practical needs of prospective data providers. It accumulates the practical experience of IOOS Data Integration Framework (DIF) of development and implementation of standardized data encoding methods and transport mechanisms for a limited number of core IOOS data variables. Recommendations offered by the present document are completely based on real projects; the document goal is to facilitate the implementation of trusted solutions." Finally, it notes: "However, since DIF is an ongoing project, the current version of the Guide is not fully developed. It is expected that the members of community will The ultimate goal of the Wiki version of the document is to provide a vehicle for community members to share their valuable experience and knowledge by adding and editing the content."

Below this is the section "Basic Web Services Concepts" with an "[edit]" link. The text reads: "IOOS DIF encompasses standard protocols and Web services, e.g. HTTP, Simple Object Access Protocol (SOAP), Web Services Description Language (WSDL), Extensible Markup Language (XML); information technology committees such as the World Wide Web Consortium (W3C) and Open Geospatial Consortium (OGC) are addressing these comprehensive standards." It concludes: "In order to join the data provider must agree to provide access to their data through one or more of the specifications adopted by the IOOS DIF. However, this does not require data providers to change the internal data storage formats."

The browser's status bar at the bottom shows "Done" and the address "www.nosc.noaa.gov".

DART Instrument Descriptions

The screenshot shows a Mozilla Firefox browser window displaying a wiki page. The page title is "Entity Attribute DART FGDC - GEO-IDE Guidelines and Best Practices Wiki". The browser's address bar shows the URL: <http://opendap.c...PS%3A%3A8454000>. The page content includes a NOAA logo and the text "National Geophysical Data Center". The main heading is "Entity Attribute DART FGDC". Below this, there are sections for "Entities and Attributes" and "Instrument Information as Entities and Attributes". The "Instrument Information as Entities and Attributes" section contains a metadata record for a Bottom Pressure Recorder (BPR) with XML tags like `<enttyp>`, `<enttypd>`, and `<enttypds>`. The XML content is as follows:

```
<eainfo>
  <detailed>
    <enttyp>
      <enttyp1>
        Bottom Pressure Recorder
      </enttyp1>
      <enttypd>
        An acoustic modem, acoustic release unit and battery pack bolted to a platform, to which a disposable anchor, flo
      </enttypd>
      <enttypds>
        http://nctr.pmel.noaa.gov/Dart/dart_bmoor.html
      </enttypds>
    </enttyp>
    <attr>
      <attr1abl>
        Depth
      </attr1abl>
    </attr>
  </detailed>
</eainfo>
```

The browser's status bar at the bottom shows "Done" and the URL "www.nosc.noaa.gov".

