class: center, middle, inverse

Report on EarthCube CDF Registry Working Group

Work to Date

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Group Members

People	Institute	Facility
Time Ahern	IRIS	IRIS
Bob Arko	LDEO / Columbia	R2R
Doug Fils	Ocean Leadership	Open Core Data
Danie Kinkade	WHOI	BCO-DMO
Lynne Schreiber	EarthCube ESSO	Ucar
Adam Shepherd	WHOI	BCO-DMO
Shelley Stall	AGU	COPDESS
Mike Stults	IRIS	IRIS

Michael Witt	Purdue	re3data

Acknowledgement: This work is support by the NSF EarthCube Program and the EarthCube Science Support Office (ESSO) which provides infrastructure and administrative support for the group.

We are a working group.. NOT a funded project.

Code, docs and other products at:

- https://github.com/fils/CDFRegistryWG
- https://github.com/fils/contextBuilder

Objectives and Benefits

Objectives

1. Formalize a set of repository parameters-of-interest to CDF members.
2. Review the alignment of those parameters with re3data and COPDESS.
3. Demonstrate a web platform based approach to encode this information in a machine readable format.
4. Demonstrate strategies for CDF members to express/expose this information via the web
5. Demonstrate the use of schema.org patterns for publishing and accessing this metadata.
6. Leverage re3data as a reference implementation for collecting and utilizing this metadata.

Benefits

- Repositories have control over their metadata and can maintain one copy for multiple users.

- Web platform / architecture based leveraging existing strong standards guidance and governance
- A base common vocabulary with domain or community extensibility

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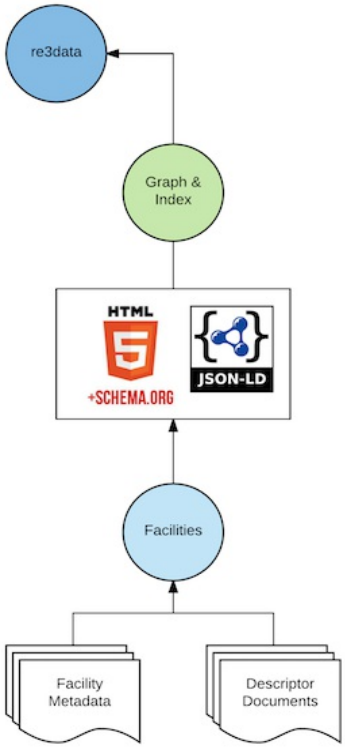
Objectives and Benefits

Current work flow

- Encode in JSON-LD (schema.org/Organization and re3data vocabularies (mostly))
- Encode basic facility / repository metadata and links to service description documents (OGC, Swagger, VoID, etc)
- Harvest via simple whitelist crawl
- Generate graph and index and explore use of these products (simple JSON-LD transform)
- Starting to implement schema.org/DataCatalog and DataSet to explore extension to data



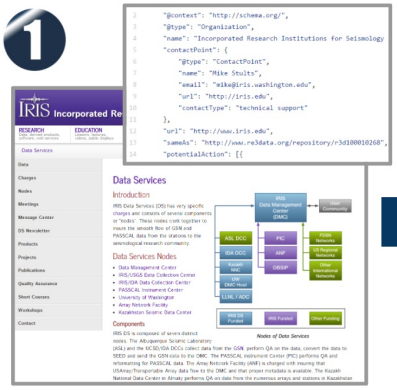
Working group deliverables to support workflow

1. A draft ontology based on the re3data XML schema (https://github.com/fils/CDFRegistryWG/tree/master/Vocabulary) (A basis to encode extension review to re3 voc)
2. Table of possible extensions (terms) to the base re3data XML schema to support CDF facility description

3. A reference approach to implementing facility description using scehma.org type Organization and the developed ontology. (Reference example: https://github.com/fils/CDFRegistryWG/blob/master/opencore.json)
4. A crawler software package (re-purposed) that extracts JSON-LD, converts to RDF triples and generates a full text index (https://github.com/fils/contextBuilder) See also https://github.com/fils/CDFRegistryWG/blob/master/onHarvesting.md (which is old and out of date)
5. RDF graph and text index explored with SPARQL/Gremlin and Bleve
6. A simple client to explore interface options on the graph and index. Client provides feedback on usability aspects of these products to aid assessment and development. (http://repograph.net/)

Reference use case

re3data "harvest" option



Facility exposes metadata about itself using JSON-LD embedded in its landing web page

Metadata to be harvested by re3data: the green elements above map directly to the re3data schema, orange elements will be extended using schema.org

Mock-up of extended facility information represented in the re3data web interface after it has been harvested

Testers

Live testing by providers self hosting metadata (Thank you!)

Institute	People	Status and Link
R2R	Bob Arko	Published
Open Core Data	Doug Fils	Published
BCO-DMO	Adam Shepherd / Danie Kinkade	Published
IRIS	Mike Stults / Tim Ahern	Published
UNAVCO	Jim Riley / Chuck Meertens	Published
Open Topology	Vishu Nandigam / Christopher Crosby	Published
UNIDATA	Ethan Davis	Published
Martha's Vineyard Coastal Observatory (WHOI)	Janet Fredericks	Published
GeoLink	Adam Shepherd	Published

- Check the URLs for contact point if you want to discuss this
- Publishing patterns are evolving (would love some shared experiences)

Publishing self hosting metadata

Semantic Search Optimization (Semantic SEO)

Authority, Relevance and Trust

The approach has benefit beyond EarthCube's goals as arguably both a semantic metadata publishing and outreach activity for facilities.

Some value add arguments for web platform semantic metadata publishing

1. Google, Bing, etc will index these pages and index schema.org types (or external voc references to those types)
2. Self publishing and harvesting means the facilities are responsible for the "freshness" of the metadata locally, not at N sites
3. Web arch based harvesting can be implemented by many consumers (Consumers distinguish themselves by their "value add")
4. Common community governed vocabularies can be used (and improved) broadly

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Effort required by Publishers

- Not doing much, so effort low 😀
  - We are just publishing facility metadata and some service document links
  - Can be done manually at this time (both document creation and publishing)
- Document contains links, if any, to existing service description documents or other digital documents

This is a very simple 1st step.

.small[

```
<html lang="en">
<head>
    ...
```

```
<script type="application/ld+json">
    {
        "@context": "http://schema.org/",
        "@type": "Organization",
        "name": "Open Core Data",
        "contactPoint": {
            "@type": "ContactPoint",
            ...
```

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We are still refining the use and encoding of schema.org types and re3data terms (plus extensions)

Thoughts on scaling by providers

Web platform based, so scaling in that aspect is fine. _Scaling the facility implementation of the approach is the key though! _

Need to address

- Integration at facility domains
    - Leverage existing data pipelines the data facilities are doing now.
      Shared experiences via EarthCube, ESIP, others...
- Tooling, well in hand
    - There are many good JSON-LD libraries and tools: https://json-ld.org/
    - Google and others also have structured data testing tools. reference
- Some working group members (Open Core Data, BCO-DMO) are currently generating schema.org (JSON-LD) for our data set landing

pages.
- Connecting to these via type DataCatalog is being tested

How do we

- Leverage our current facility metadata approaches and data work flows
- Allow a simplified and portable pattern to be shared with other providers

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Harvesting

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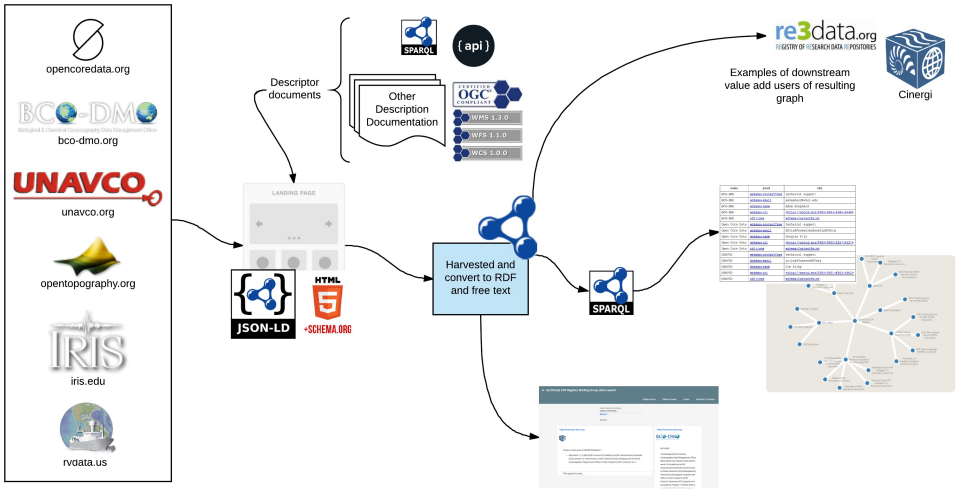
1. Harvest code (simple whitelist) contextBuilder:
2. Results in triples from JSON-LD and simple text index
3. A more advanced JSON-LD walker guided by hypermedia extracted vis JSON-LD frames is in development

NOTE: The code is re-purposed from a previous abandoned experiment by me.
So for a package with "context" in the name.. there is very little context.



Search and visualize

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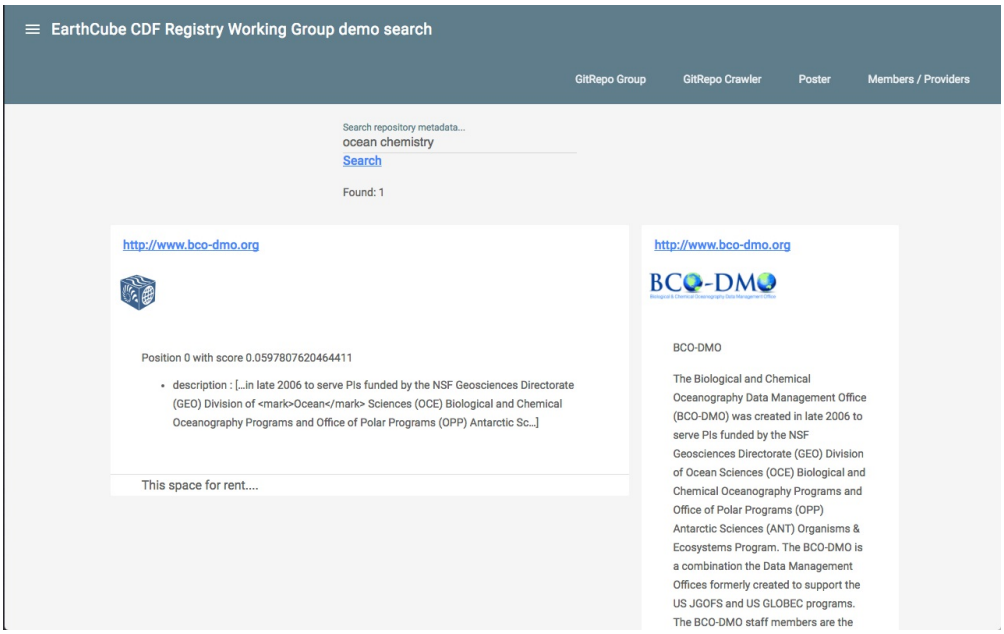
1. The resulting graph is TINY.. so it's mostly explored by simple inspection with tools like Gephi, Cayley and Cytoscape

2. Simple search UI to exercise the index and graph. http://repograph.net/?q=ocean+chemistry



Thoughts on work to date

~~Will provide~~ Provided a report to CDF at Summer ESIP (2017)

To support **integration with schema.org the ontology development does have to take on certain practices**. These practices facilitate an external ontology connecting to schema.org types. An “external vocabulary” is one of three approaches to working with scheme.org. All three approaches are valid and may fit various goals and situations. Ontologies can be used in JSON-LD without being a “external vocabulary” in schema.org space.

Use of schema.org + extensions is a viable approach. However, it does take a level of governance to ensure term coverage and mapping is taking place and well documented for both providers and consumers.

JSON-LD harvesting works but there are approaches to hypermedia navigation of the interconnected JSON-LD graph fragments that could make it simpler. Rather than employing whitelists or web crawling approaches. These include potential use of Hyda vocabulary or JSON-LD fragments.

The resulting graph is heavy with blank nodes under typical authoring and publishing approaches to JSON-LD. These may incur an impedance to using the resulting graph is a fully Linked Open Data approach. However, the situation can be addressed with authoring policy and guidelines and may not be a huge LOD publishing pattern issue in practice.

The graph and index are a product that can be used by any 3rd party. This might include the in group use case represented by re3data or another group like Cinergi or DataOne. However, text indexes are very package specific and this project is not using the popular Solr index. Rather another package (bleve) was used that was in line with coding skills present in the group. It's likely it would be better to simply cache the JSON-LD documents (easy) and allow 3rd parties to build their own indexes from this cache.

The approach benefits both structured domain specific indexing as well as larger organic search systems (ala Google, Bing, Yandex, etc)

Future

- Complete pilot effort to test potential recommendations. Review those recommendations with larger CDF community to gather feedback and comments.
- Describe how to potentially coordinate with schema.org and re3data on an external vocabulary for repository metadata for on-going management and governance.

Next steps

- Exploring extending the connection down to DataCatalog (then to DataSet from there)
- Exploring use of schema.org proposed types: MeasurementTechnique and VariablesMeasured (leverage CSV for the Web patterns)
- JSON-LD walking leveraging JSON-LD Framing https://github.com/ESIPFed/snapHacks/tree/master/sh01-jsonldCrawl/simpleCrawler
- Making products and patterns more usable by a wider range of value add 3rd parties (publishers and consumers)

- more...

#UseThePlatform

Thanks

Contact us

https://github.com/fils/CDFRegistryWG/blob/master/members.md

Public reports of group work:

- EarthCube All Hands June 2017 Poster
- ESIP Semantic Committee June 2017 Presentation
- DataONE Members Meeting July 2017 Poster
- EarthCube CDF July 2017 Report out at ESIP Summer 2017
- TAC report
- RDA Montreal (potentially)