Architecture References & Links, June 17, 2016

This is a companion document to the EarthCube Architecture Workshop 2016 Final Report. This reference section organizes numerous materials considered before and during the workshop. Many of the links below are to copies of the materials collected in the Architecture Workshop Library folder. Additional materials may be found in that folder; not all are cited here.

Permalink to this document: http://earthcube.org/document/2016/archws2016-finalreport

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EarthCube Governance

- EarthCube Strategic Vision (May 2015)
- EarthCube Charter (May 2015)
- All EarthCube Governance docs
- EarthCube Committees and Teams
- Council of Data Facilities and Registry Survey
  - Category A: NSF-funded not-for-profit or academic data facilities
  - Category B: Federally Funded Research and Development Centers (FFRDCs) and other federal, state, and local data facilities.
    - Data facilities and centers operated by NASA, NOAA, USGS, and other U.S. federal, state, and local agencies.
  - Category C: International, private, and other not-for-profit or academic data facilities.
    - Data facilities and centers with a substantial portion of their funding and mission associated with international agencies, private foundations, or other sources.
  - Category D: Associate members
    - Professional associations, publishers, commercial entities, foundations, and consortia in the geosciences, cyber sciences, informatics, and related domains; and individuals not affiliated with a data facility, but supportive of the Council.
- EarthCube Reverse Site Visit, Feb 2016 - Final Report
EarthCube Architecture Workshop 2016: Architecture References (June 16, 2016)

- Section 2.1 Recommendation 2: “Articulate a concise and clear definition of EarthCube that embraces the innovation aspects of the program as well as the concrete objective of creating usable infrastructure.”
- Section 2.3 Recommendation: “If ‘System of Systems’ represents the guiding paradigm for realization of the kind of data-enable science advanced by EarthCube, then the phrase must be defined in a way that lends itself to an implementation strategy.” Also Section 5 Next Steps: “Write down the guiding principles for what is clearly meant by the system of systems and what standards it would need to address so that the community expectations can be channeled.”
- Section 3.1 Recommendation 1: “Roadmap documents should be... an ‘implementation plan’...[that] should include specific prioritized milestones, and clearly defined metrics against which program progress is to be measured.”
- Recommendation 2: “Short-term explicitly defined solutions are needed to avoid volunteer fatigue and external criticism.”
- Section 4.1 Finding: There should be encouragement for research in the area of data science, rather than just focusing on data curation.”

EarthCube Funded Projects

- All EarthCube Funded Projects
- EarthCube Project Workspaces
  - (see architecture section below for Conceptual Designs)
  - EarthCube Building Blocks
    - CINERGI Inventory Portal, EC page
    - GeoWS EC page; Web services summary
    - BCube EC page; Discovery Broker description
    - ECITE EC page
    - GeoLink EC Page
    - GeoDataSpace EC page
    - Digital Crust
  - EarthCube Integrative Activities
    - Advancing CF/netCDF EC page
    - Alliance Testbed EC page
    - X-DOMES EC page
  - EarthCube Research Coordination Networks

EarthCube Architecture Development

- TAC Architecture WG Final Reports includes:
  - EC Architecture Workshop, San Diego, June 2015 (google folder); Summary Presentation; Workshop Report
  - Roadmap
  - WG final report
- EC Architecture Workshop AHM 2014 (google folder) Summary presentation
- EC SoS Process Evolution Oct 2015 (pptx) Presentation for LC
- EarthCube Conceptual Designs
EarthCube Architecture Workshop 2016: Architecture References (June 16, 2016)

- [GEAR landing page](#) [GEAR Executive Summary](#)
- [Scalable Community- Driven Architecture (SC-DA) summary](#) and [draft report](#)
- [Data-Oriented Human-Centric Enterprise Architecture DaSHER summary](#) and [wiki](#)

Other EC Technology and Architecture Committee (TAC) WG reports

- TAC Standards WG outputs
  - Standards Compilation Matrix ([google sheet](#))
  - Report of the [Standards Working Group](#)
  - [Standards Workplan](#) (27-Apr-2016)
- [TAC Gap Analysis draft final report](#) ([googledoc](#))
  - Gap Analysis files ([google folder](#))
- TAC Use Cases WG landing page and links
- TAC Testbed WG landing page and links

System of Systems References

- IEEE Society for Systems Engineering
- Introduction to systems of systems (Jamshidi, 2008) ([SoS definitions on p.2](#))
- William Crossley, *System of Systems: An Introduction of Purdue University Schools of Engineering’s Signature Area*, (SoS definition on pg. 2). Academic view of research topics from DOD/aerospace perspective.
- US GEO, Common Framework for Earth Observation Data, March 2016 ([pdf](#))
- [GEO XII Summit, Data Management Principles Implementation Guidelines, Nov 2015](#) ([pdf](#))
Mapping the EarthCube Landscape

An inventory of organizations external, but very relevant, to the NSF EarthCube initiative.

Exemplar systems

- **ESGF** Earth System Grid Federation
- **NASA DAACs**
- **NOAA - NCEI; Data Stewardship Maturity Matrix (DSMM)**
- **USGS - CIDA / NWIS** (historical interest-- NWIS conceptual design from 1987)
- **CUAHSI - Presentation from 2007**
- **Datanet Federation Consortium (DFC), RENCI**
- **XSEDE**
- **CyVerse**
- **NCI Australia**
- **IEDA**
- **GeoPrisms**
- **DataONE**
- **UNOLS**
- **GEOSS - GeoPortal - GEO DAB Portal - GEO DAB API**
- **ORNL Mercury**
- **NCSA Brown Dog**
- **Agave Platform**
- **A collection of NASA EOSDIS Architecture design/documentation (dropbox folder)**
- **DMPTool.org** - website of templates for most national agencies’ Data Mgmt Plan requirements

Enterprise Architecture References

- **FEA CRM 2007**

Metamodel References

- **Metamodel vs. Reference Model** discussion (re: metamodel reference in Final Report, Milestone 2 text): is this a metamodel or a reference model? Answer is ‘metamodel’.

**Argument1**: (for Reference Model) per Wikipedia,

- A **Reference Model** in systems, enterprise, and software engineering is an abstract framework or domain-specific ontology consisting of an interlinked set of clearly defined concepts produced by an expert or body of experts in order to encourage clear communication.

- **Metamodel** or surrogate model is a model of a model, and metamodelling is the process of generating such metamodels. Metamodelling or meta-modelling is the analysis, construction and development of the frames, rules, constraints, models and theories applicable and useful for modeling a predefined class of problems.
**Argument2**: (for Metamodel) Fair enough - I offer more context.

- The IDEF1X explains it better and puts the metamodel link you note about into context.
- Also I'd offer this is a [better wiki page for metadata modeling](http://www.software.ac.uk/).
- Finally, a non-wiki example of doing [LDM (logical data modeling) for metadata in a tool](http://wssspe.researchcomputing.org.uk/).

All that given, I didn't want to prescribe IDEF1x, but instead logical data model which allows the designer to choose the LDM notation level.

**Argument1**: metadata modeling <> metamodeling; the IBM link is a metamodel (the model elements represent things in a model, not in a model instance); is a model of an "Rational System Architect encyclopedia"; instances of this encyclopedia would represent an actual data model for a domain. Not clear how metadata modeling as defined by the web page is different from a metamodel. What that page presents is essentially a metamodel for UML.

**Argument2**: Agreed - Definitely not defending wikipedias pages :) . The links provided explains it well. Also, I just put in the workshop library references directory [US Dept of Interior Architecture metamodel work](http://wssspe.researchcomputing.org.uk/) - high-level intro and the master LDM view (have several other views as well).

**Resolved**: it's a metamodel not a reference model. Interesting discussion highlighting once again the challenges of cross domain (EA and data modeling in this case) communication.

**Further clarification**, entered as footnote in final report, p.19:

- A metamodel is the schema for the metadata that will be stored in the resource registry. Working in terms of the metamodel reduces the maintenance for database applications. This positions the registry to be implemented either as a RDBMS Catalog or a Metadata Repository. The latter would allow for flexible, agile changes to the metamodel without having to re-write the database structure. This can be explored more in the solution architecture.

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**Software Sustainability References**

- UK Software Sustainability Institute: [http://www.software.ac.uk/](http://www.software.ac.uk/)
- [JOURNAL SPECIAL ISSUE](http://www.software.ac.uk/)