ARCTICDATACOMMITTEE

IASC SAON

From Data Collection to Long-Term Preservation and Use: Arctic data as part of a global system

Peter L. Pulsifer

Research Scientist, National Snow and Ice Data Center, University of Colorado Boulder

Chair, IASC-SAON Arctic Data Committee

Co-Lead, **IARPC** Arctic Data Sub-Team

Co-Lead GEO Cold Regions Initiative

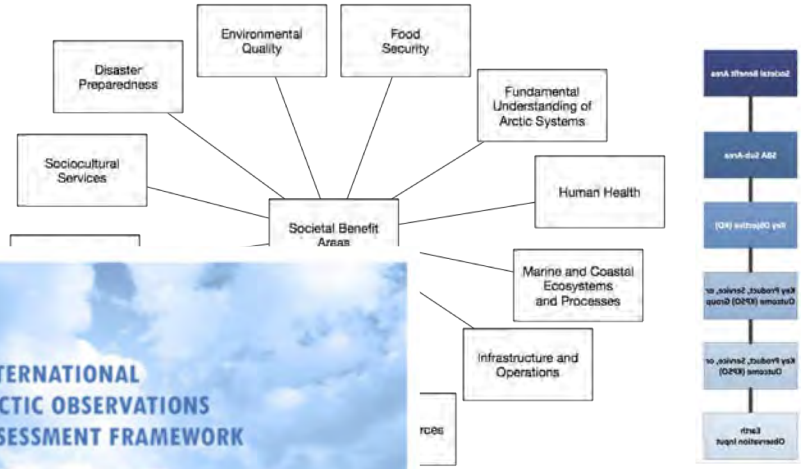
3 December 2018, UAK Research School, Longyearbyen, Svalbard, Norway

NSIDC National Snow and Ice Data Center *Supporting Cryospheric Research Since 1976*

The World of Data

Polar Data in the Global Data System

Why Does Data Matter?



ervations Assessment Framework. IDA Science and Technology Policy Institute, s, Oslo, Norway, 73 pp

https://www.skepticalscience.com/

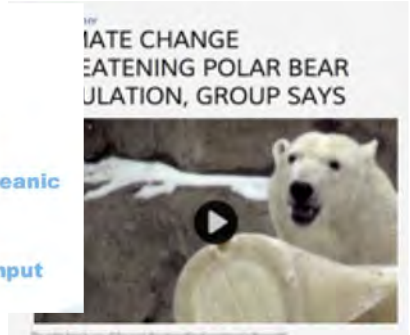
https://osf.io/

SAON

IDA SCIENCE AND TECHNOLOGY POLICY INSTITUTE

Arctic Observation Value Tree Analysis
- assessment for physical and oceanic variables

Mikko Strahlendorff, FMI
thanks to IDA STPI and SAON input



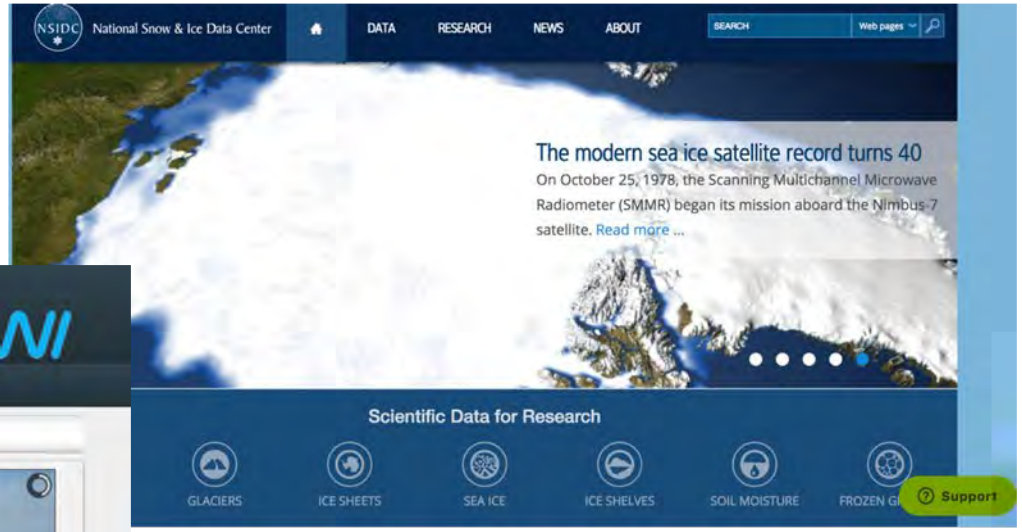
Recent History of Arctic and Polar Data

Polar Data Forum Series

Domains of Data

The Many Flavours of Data

Physical Sciences

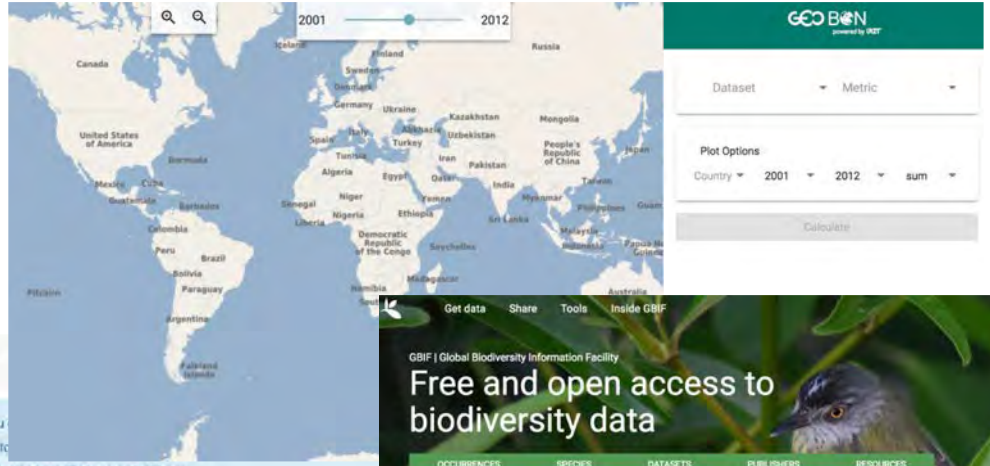


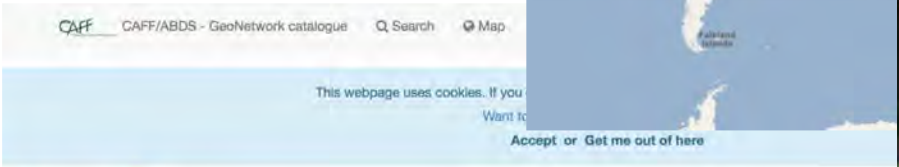
https://nsidc.org/

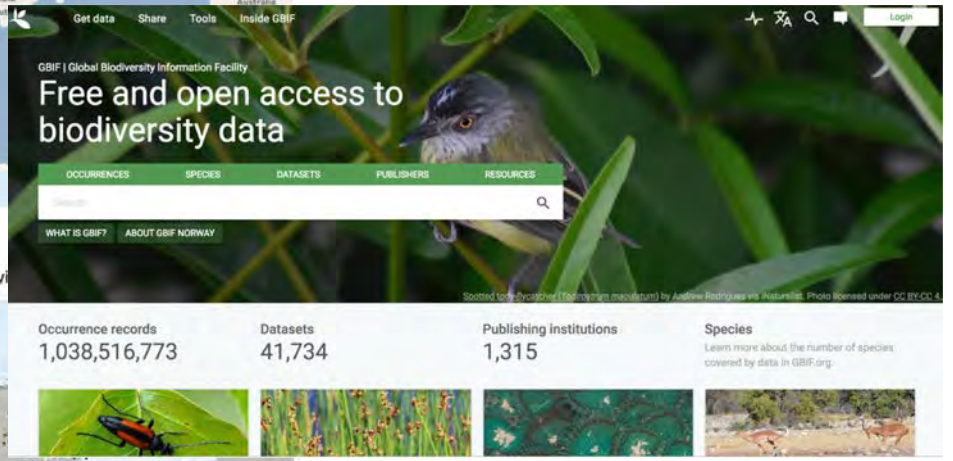
https://gtnp.arcticportal.org/

https://geobon.org/

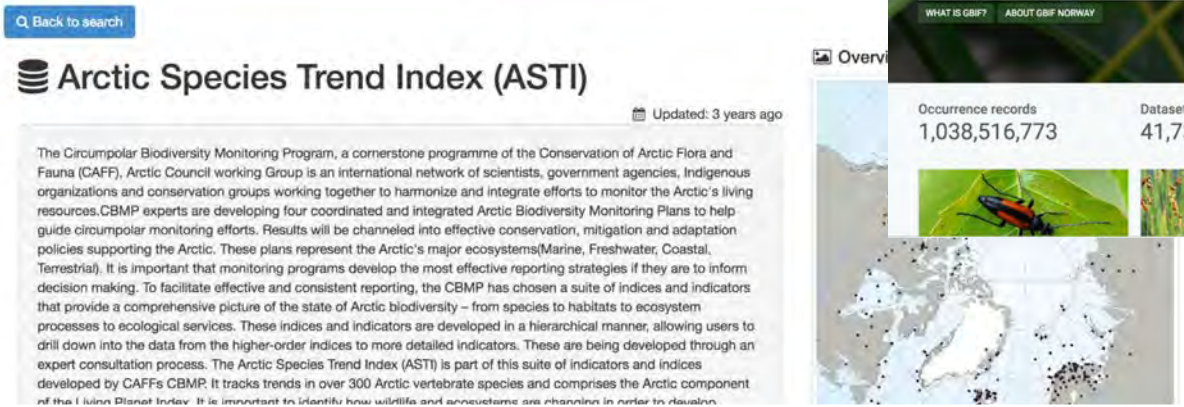
Life Sciences







https://www.gbif.org/

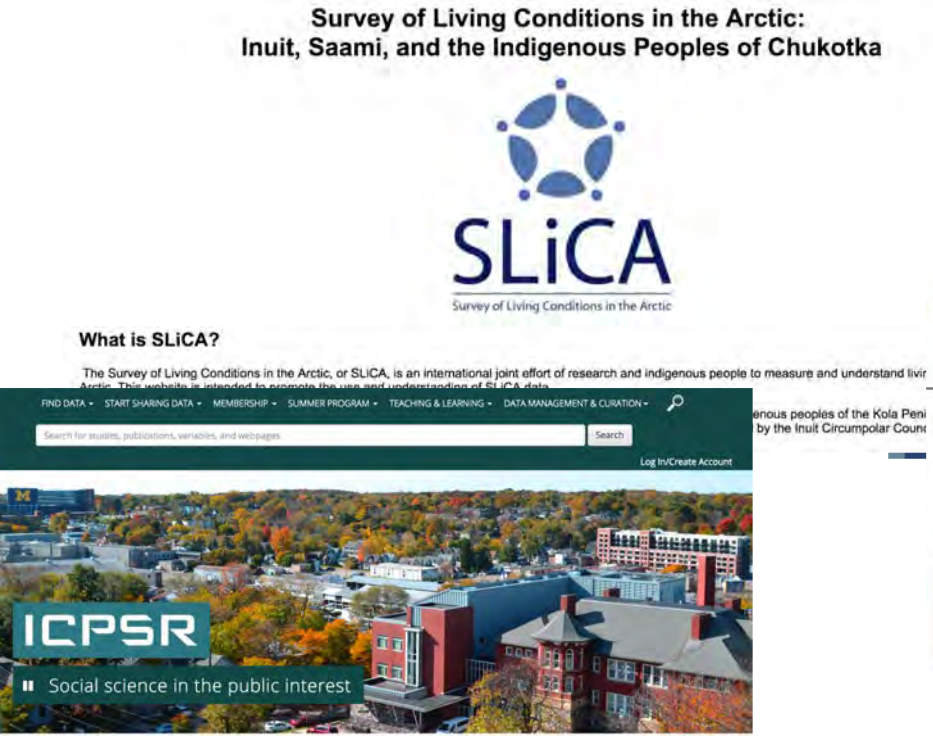


https://www.caff.is/asti/

Social Sciences

http://www.arctichorizons.org/

https://iseralaska.org/static/living_conditions/microdata.htm



https://www.icpsr.umich.edu/icpsrweb/

https://www.ddialliance.org/

Indigenous Knowledge, CBM and Information Systems

- Growing group actively working to share Indigenous Knowledge, information and data
- Progress needed on bridging worldviews, concepts and semantics represented in information systems
- Indigenous Peoples must lead engagement and work with their knowledge – information sovereignty important

http://www.inuitknowledge.ca/

http://www.arcticcbm.org/index.html

http://ittaq.ca/

ELOKA

http://eloka-arctic.org/

Nunaliit

Nunaliit Atlas Framework

http://nunaliit.org/

http://www.inuitcircumpolar.com/community-based-monitoring.html

SMARTICE

https://www.smartice.org/

Trailmark

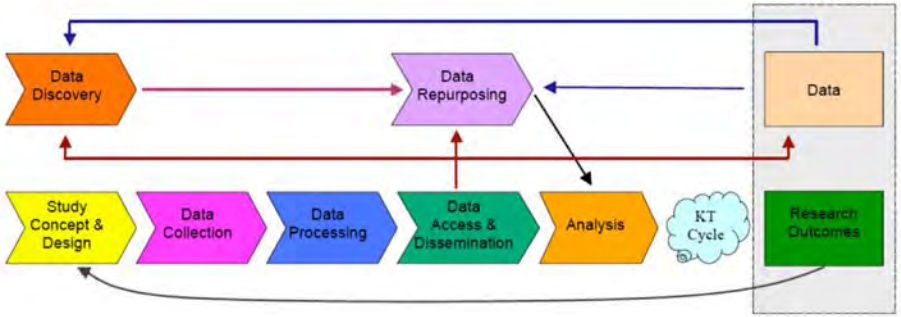
http://trailmarksys.com/

https://arcticeider.com/siku

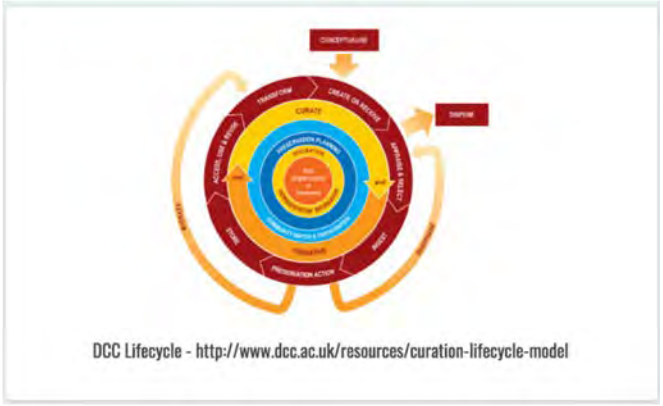
The Data Lifecycle

End to End Management and Use of Your Data

The Data Lifecycle



http://datalib.library.ualberta.ca/~humphrey/lifecycle-science060308.doc.

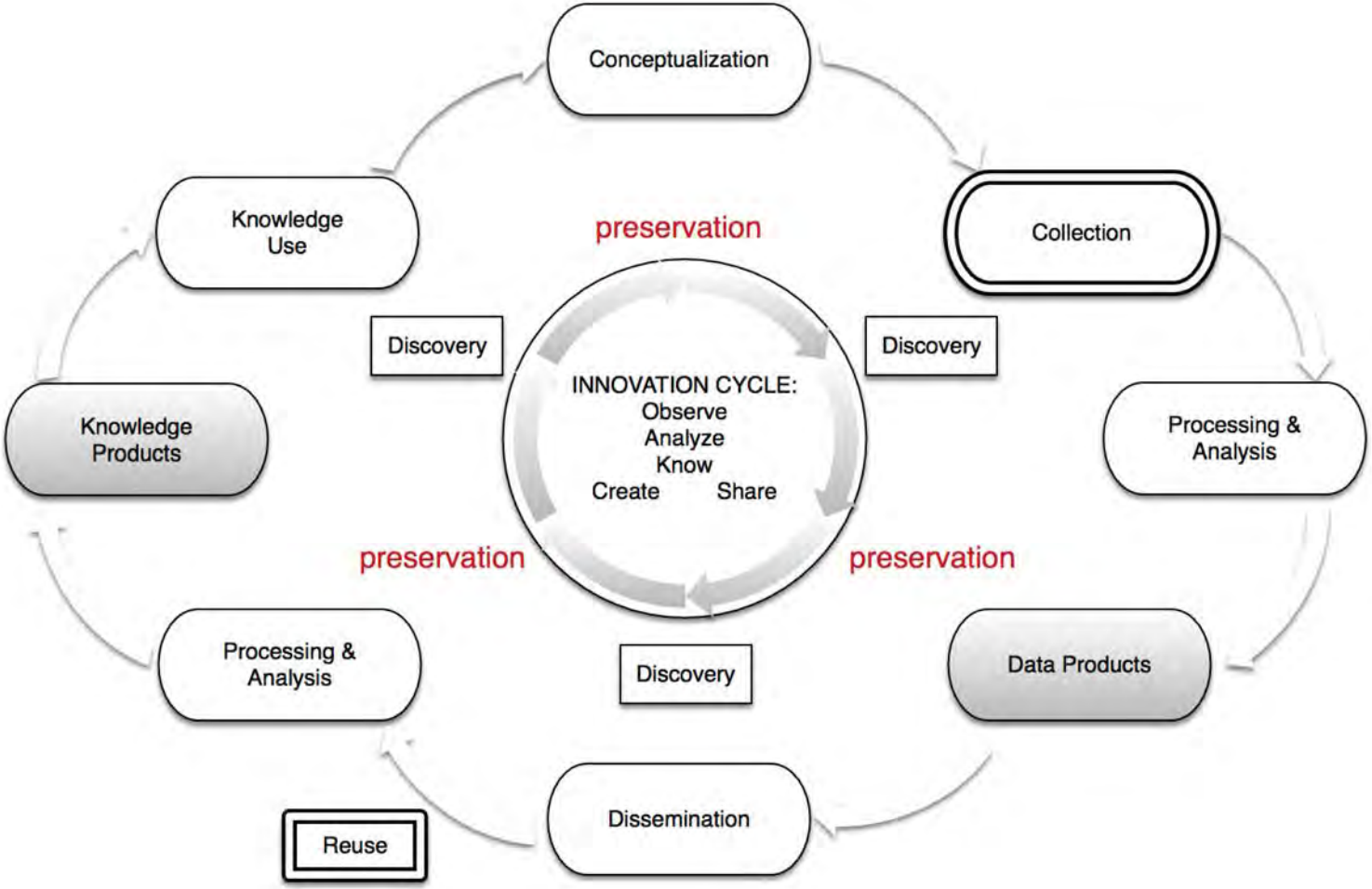


Research Data Canada

FGDC Lifecycle - https://www.fgdc.gov/policyandplanning/a-16/stages-of-geospatial-data-lifecycle-a16.pdf

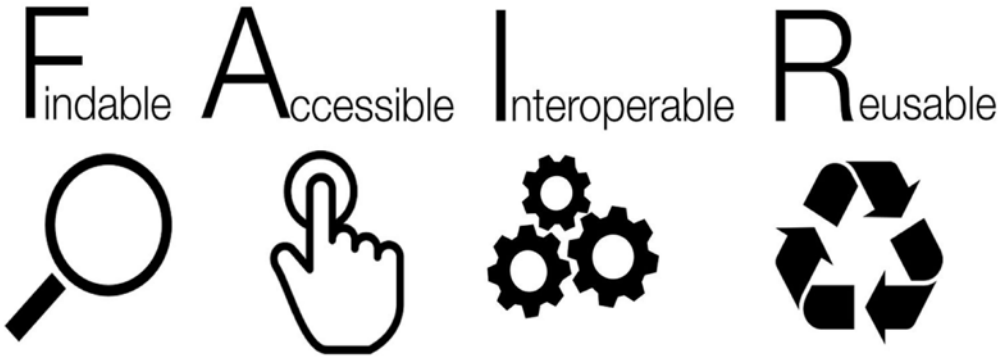
DataONE Life Cycle - https://www.dataone.org/data-life-cycle

http://dmtclearinghouse.esipfed.org/


Conceptualization
Collection
Processing & Analysis
Data Products
Dissemination
Reuse
Processing & Analysis
Knowledge Products
Knowledge Use
preservation
Discovery
Discovery
INNOVATION CYCLE:
Observe
Analyze
Know
Create
Share
preservation
preservation
Discovery

Grounding the Lifecycle Approach

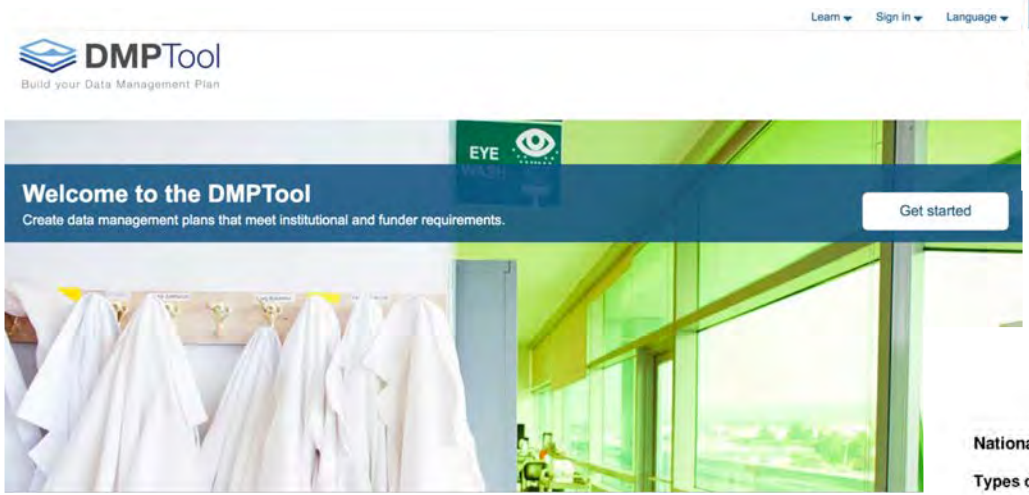
- **F**indable
- **A**ccessible
- **I**nteroperable
- **R**eusable
- “FAIR” principles



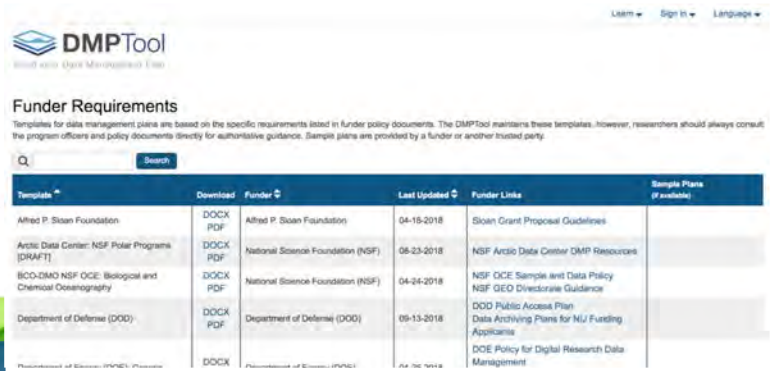
https://commons.wikimedia.org/wiki/File:FAIR_data_principles.jpg

https://www.force11.org/group/fairgroup/fairprinciples

Data Management Planning



https://dmptool.org/



https://dmptool.org/public_templates

National Science Foundation (NSF): NSF-GEN: Generic

Types of data produced

The types of data, samples, physical collections, software, curriculum materials, and other materials to be produced in the course of the project.

Guidance:

- NSF Proposal & Award Policies & Procedures Guide (PAPPG)
- NSF plans for data management and sharing of the products of research (PAPPG)
- NSF Dissemination and Sharing of Research Results
- NSF Frequently Asked Questions (FAQs) for Public Access

Data and metadata standards

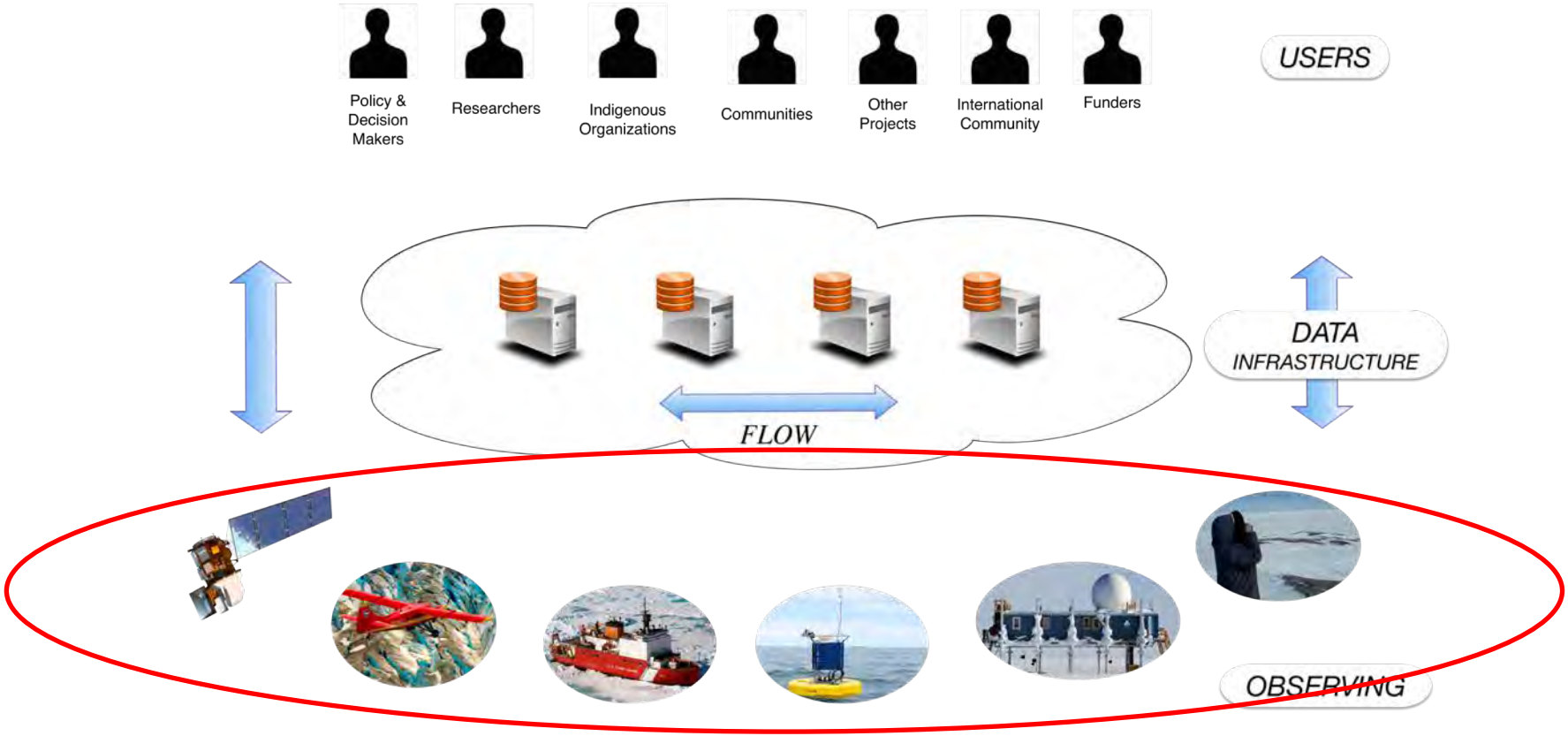
The standards to be used for data and metadata format and content (where existing standards are absent or deemed inadequate, this should be documented along with any proposed solutions or remedies).

Guidance:

Data Collection

The Many Forms of Data Creation

Observations Become Data



Data Sharing

Making Your Data Available to the World for the Greater Good and Credit

Different Ways of Sharing

Dropbox

https://multimedia.journalism.berkeley.edu/tutorials/ftp/

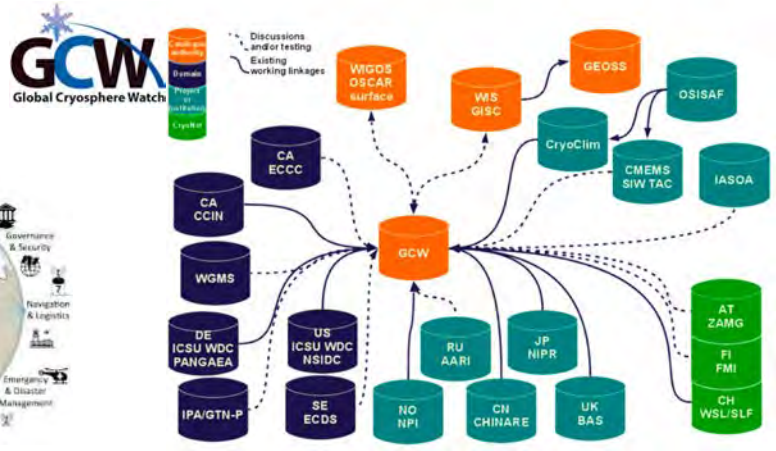
https://www.pmel.noaa.gov/arctic-zone/data.html

Data Interoperability

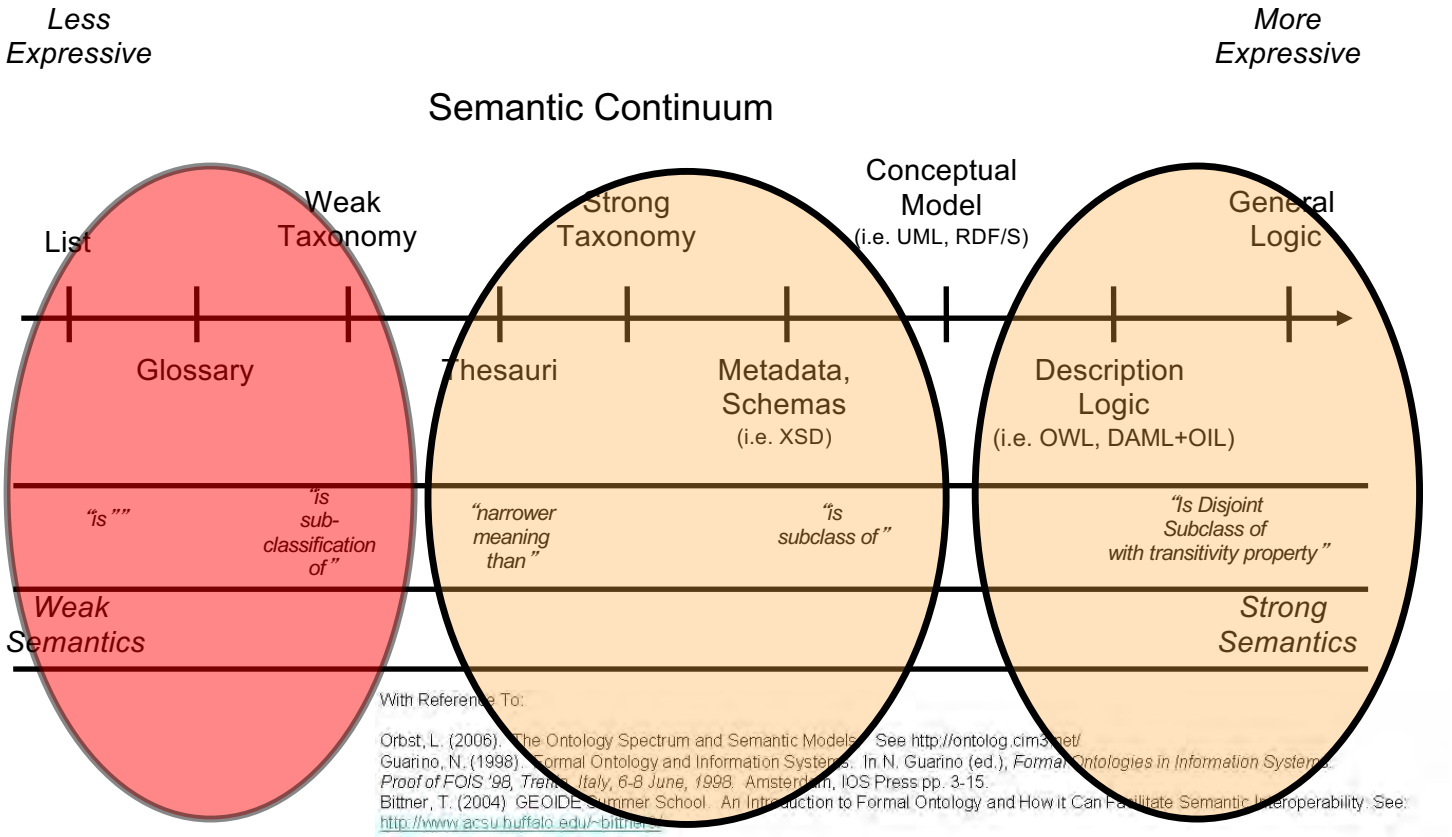
- “Live” data sharing between and among systems
- Standards and specifications
  - Discovery standards
  - Data standards

- “Services” (**Data as a Service**) use standards to make the data widely available “**on demand**”

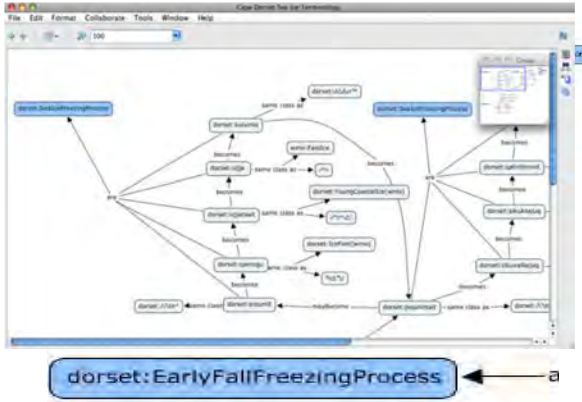
OAI-PMH

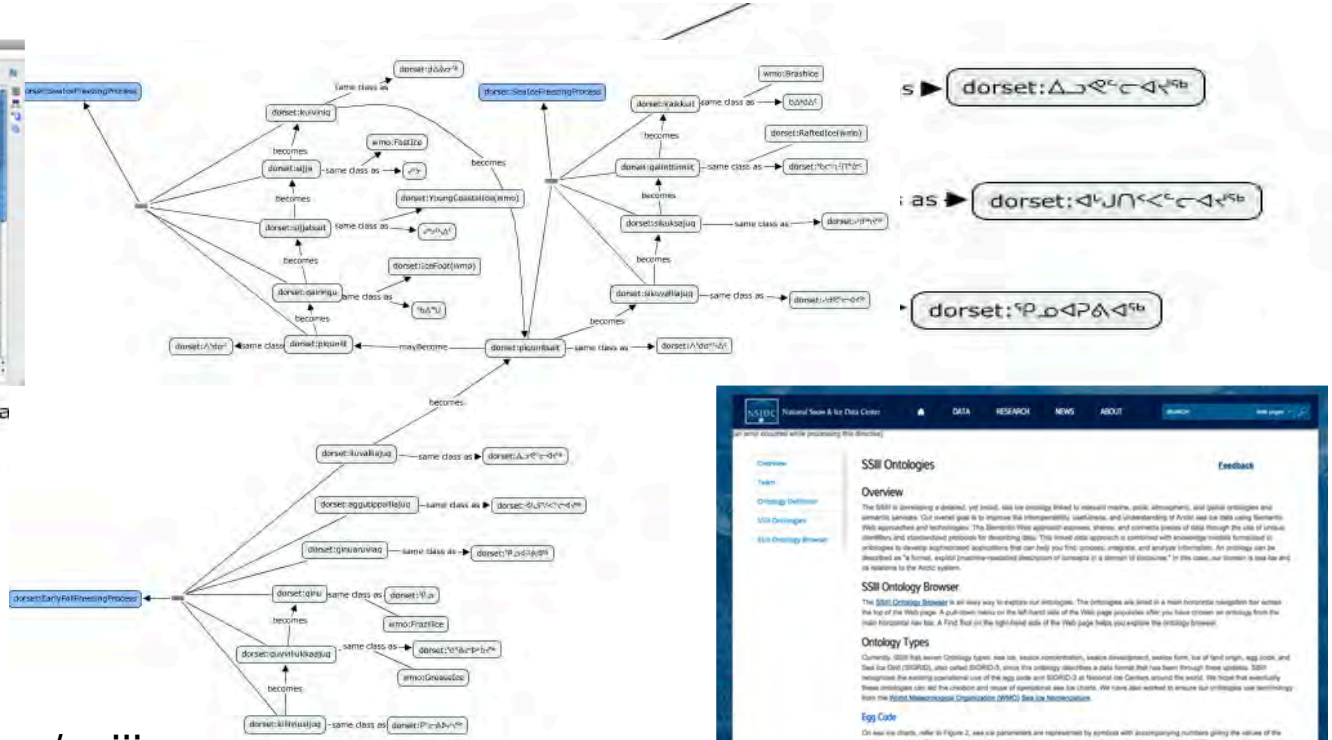


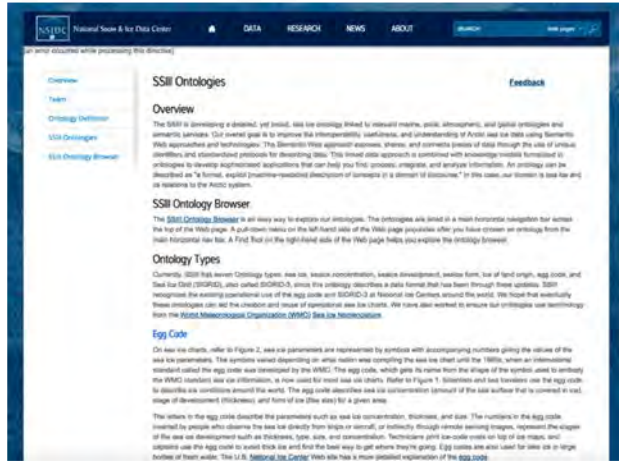
What is the meaning of this! … data semantics



Semantic Sea Ice Interoperability Initiative





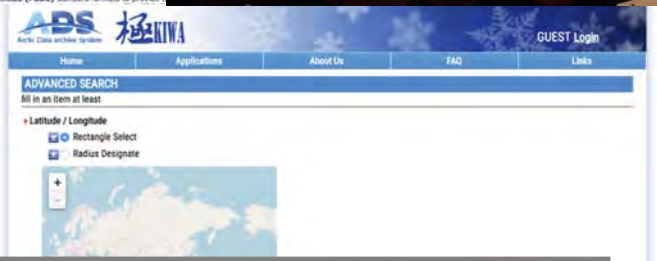


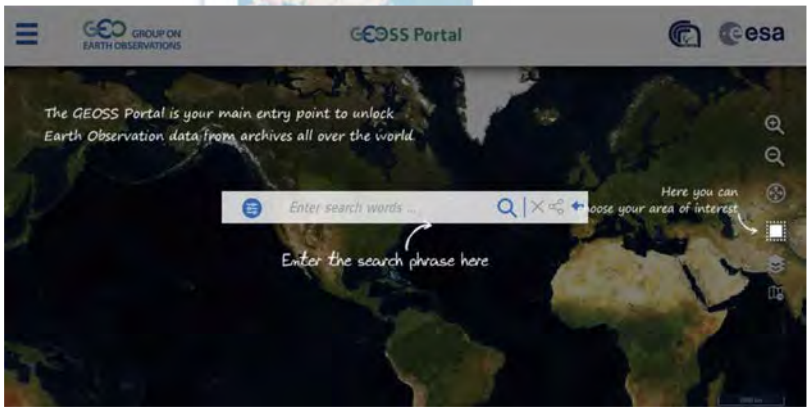
https://github.com/rduerr/ssiii

Data Discovery

Finding Data and Making Your Data Findable and Citable

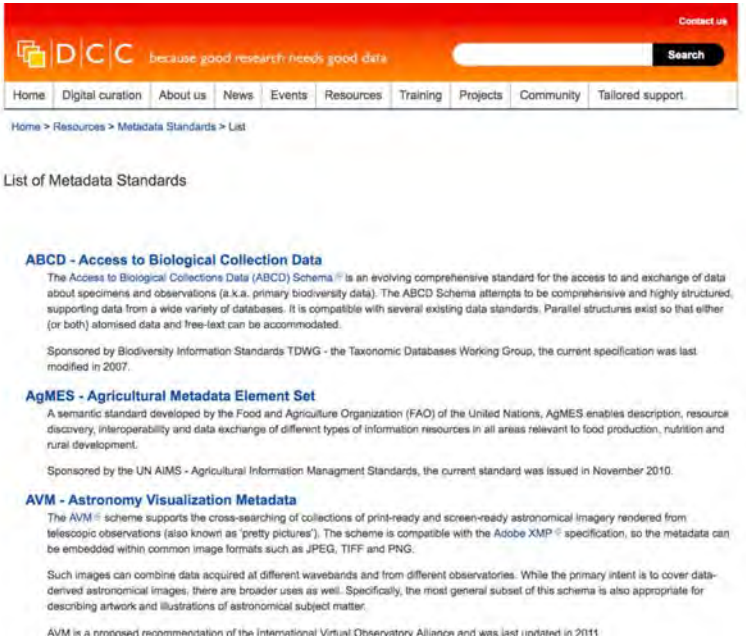
Data Discovery Tools





Metadata Standards

- Digital Object Identifier (publication, data)
- Dublin Core (general)
- DIF (Science)
- ISO 19115 (Geo)
- FGDC (Geo)
- Data Documentation Initiative (Soc. Sci)

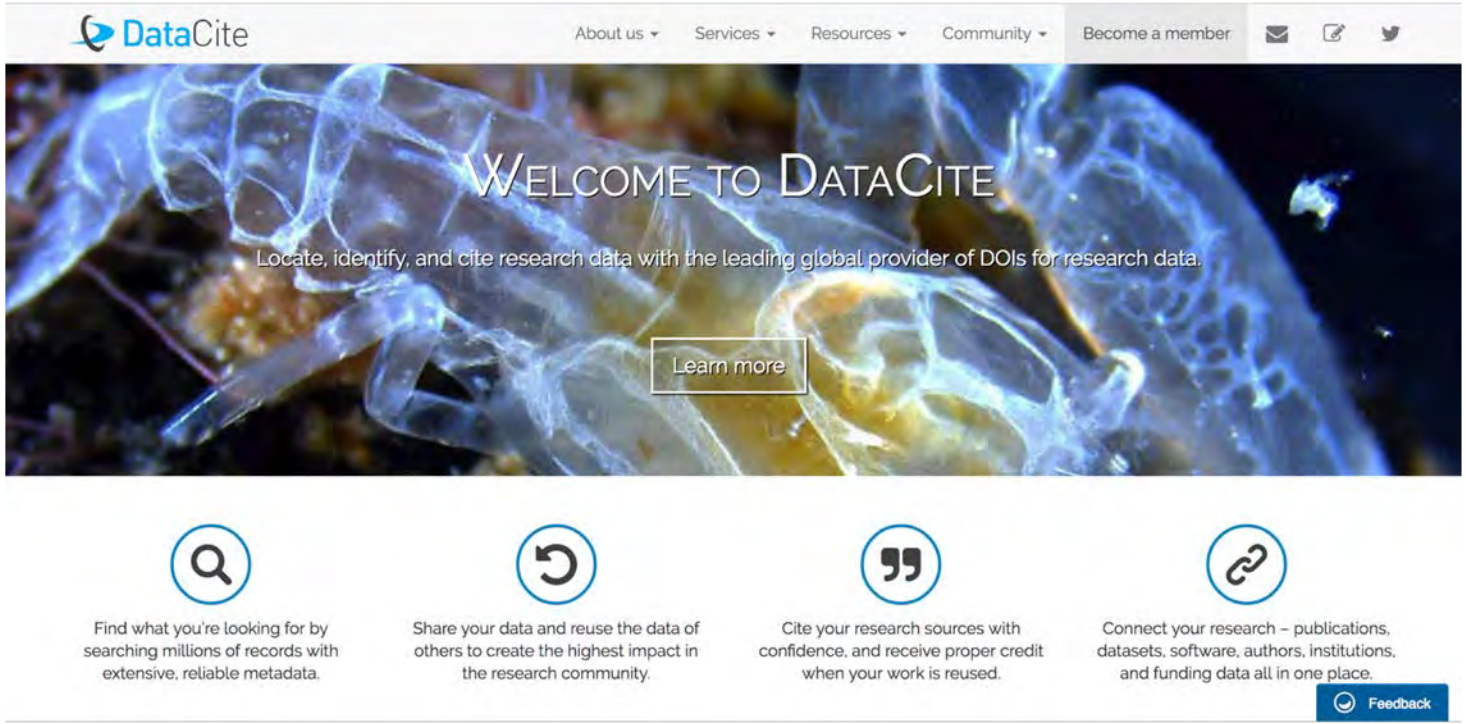


http://www.dcc.ac.uk/resources/metadata-standards/list

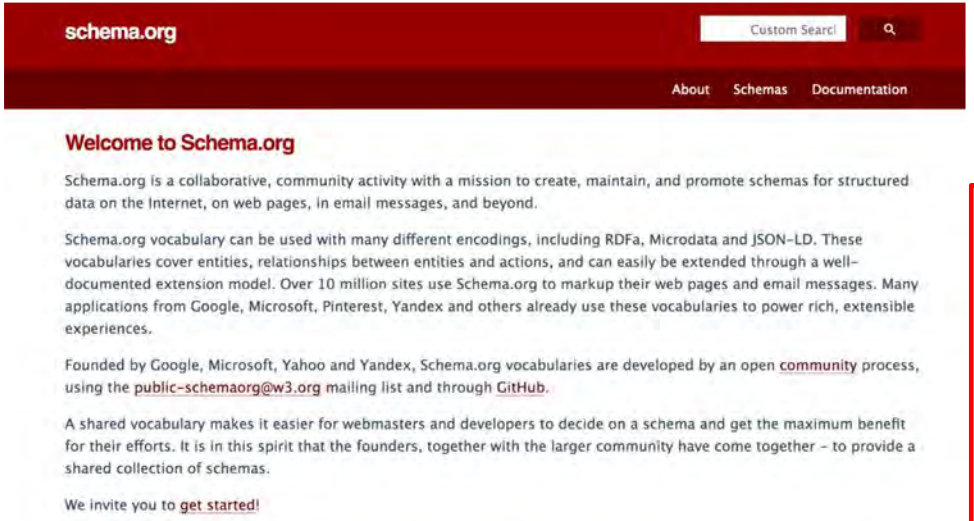
http://bit.ly/MDStandards

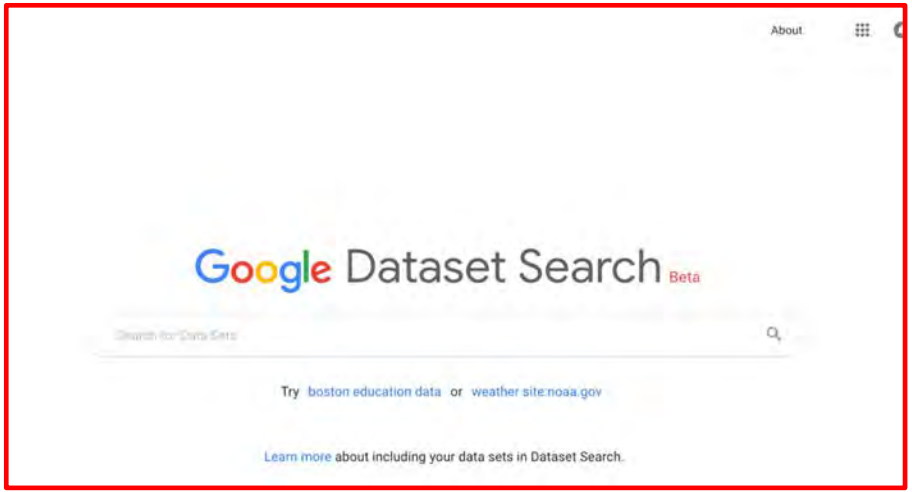
Data Publication

https://www.datacite.org/



Schema.org + Google Data Search





https://toolbox.google.com/datasetsearch

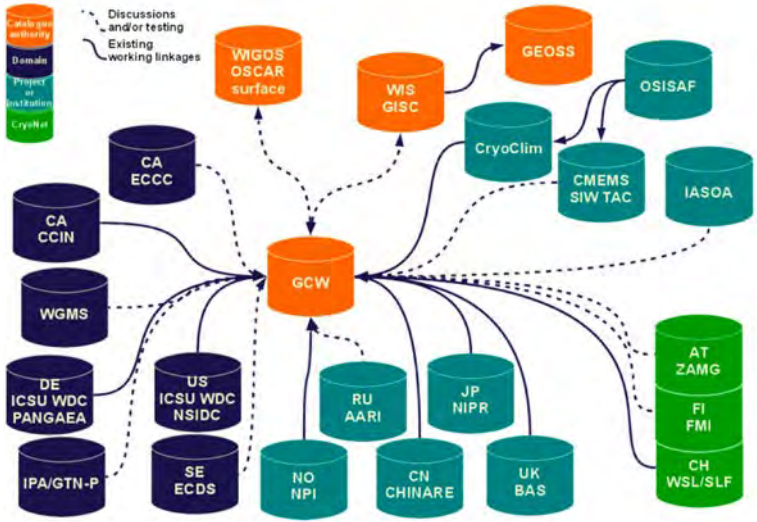
Data Reuse

Create Once, Use Many Times

OGC®
Making location count.

ISO

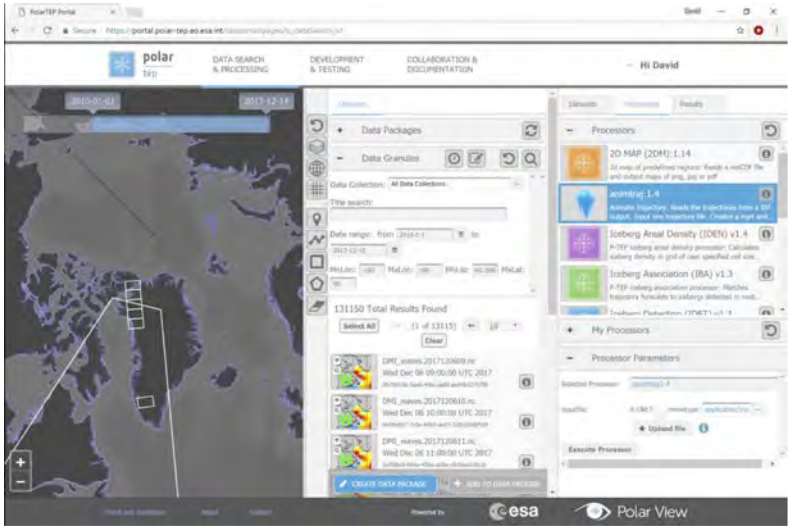
netCDF



OPeNDAP

Cloud Platforms/Virtual Research Environments

https://portal.polar-tep.eo.esa.int



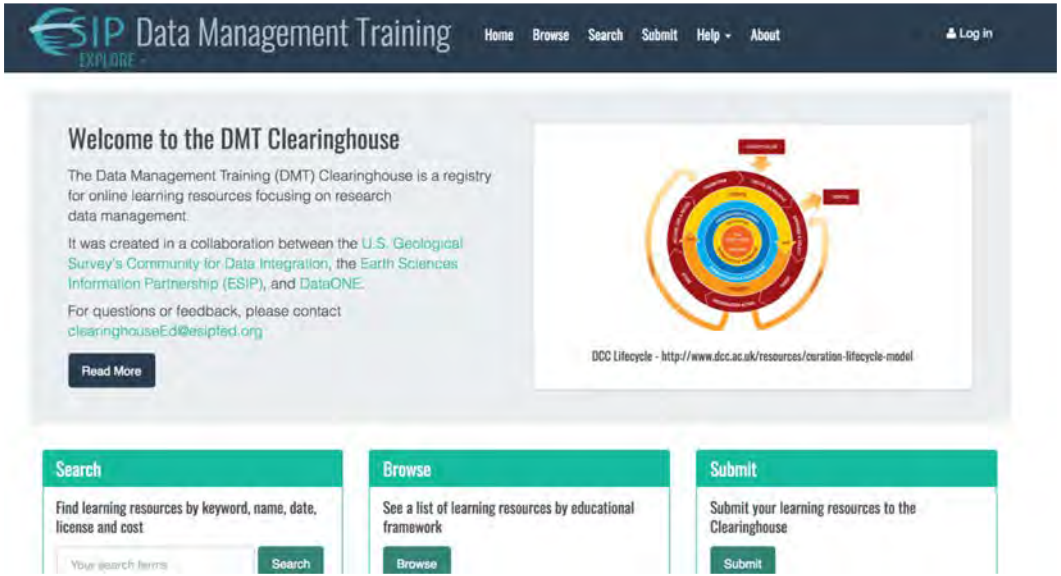
Polar Thematic Exploration Platform

https://researchworkspace.com

https://earthengine.google.com

Google Earth Engine

Training Activities and Resources



NSF
ARCTIC
DATA
CENTER

http://dmtclearinghouse.esipfed.org/

Arctic Data Community

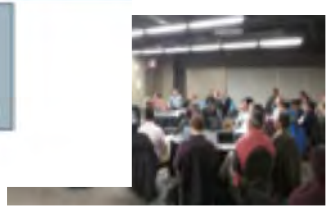
Working Together for Science and Society

Data Sharing: Cooperation from Local to Global

- Significant progress made since International Polar Year
- Framework for cooperation exists
- Recent collaboration being leveraged to establish concrete “architecture”
- All perspectives and actors must be included

Arctic Data Committee

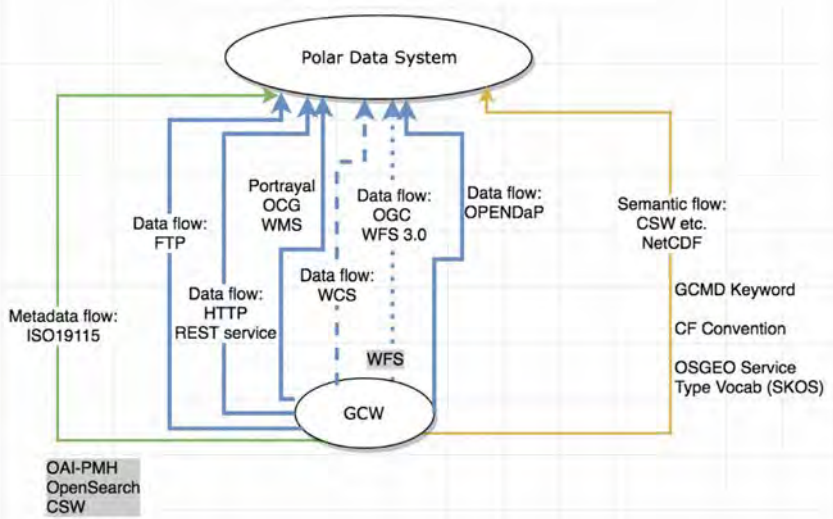
- Formed Nov '14
- IASC-SAON partnership
- National and voluntary members + Indigenous (2017)
- Promote and enable:
  - **Understanding the system**
  - **Effective data policy**
  - **Infrastructure**
  - **Ethically open access**
  - **Attribution**
  - **Standards and interoperability**

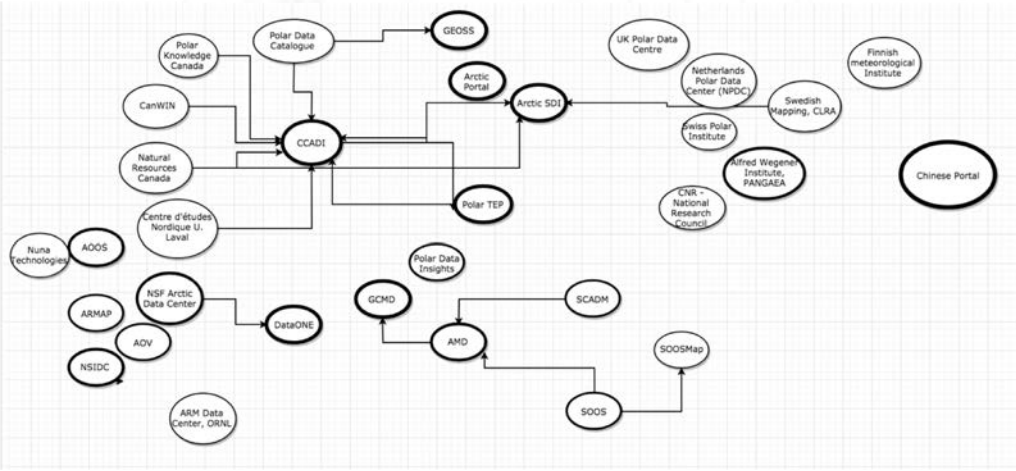


http://arcticdc.org

Polar Data and Systems Architecture Workshop

28 – 30 November 2018, Geneva





Conclusions

- Think beyond your research project to broader sharing and data reuse – your data matters to the world!
- Think win-win
- Take advantage of the activities of the data community to help support your data management activities (e.g. identifying training materials, standards, repositories etc.)

Thank you!