International Workshop on Sharing, Citation and Publication of Scientific Data across Disciplines

NiPR National Institute of Polar Research

Joint Support-Center for Data Science Research (DS), Tokyo
5–7 December 2017

This photo of Ryoanji Temple is courtesy of TripAdvisor.

How many rocks of Ryōn-ji's Zen garden can be seen from any place?
Only 14, but there are 15 rocks! What does it mean?

Vocabulary Broker application connecting data, information and literature across various scientific domains

B. Ritschel (Physicist and Data Scientist) berndritschel@yahoo.de,
G. Neher (University of Applied Sciences Potsdam),
T. Iyemori (京都大学)

http://wdcosf.kugi.kyoto-u.ac.jp

World Data System Vocabulary Broker - Proof of Concept

Linking Research Data

- A +

Home | GCMD Keywords | SPASE Keywords | ESPAS Keywords | UAT Keywords

GCMD

- GCMD Climate Indicators
- GCMD Solid Earth
- GCMD Sun-Earth Interactions
- GCMD Land Surface
- GCMD Spectral/Engineering
- GCMD Terrestrial Hydrosphere
- GCMD Earth Science Services
- GCMD Oceans
- GCMD Biosphere
- GCMD Agriculture
- GCMD Atmosphere
- GCMD Paleoclimate
- GCMD Cryosphere
- GCMD Human Dimensions
- GCMD Biological Classification

Magnetic Field

prefLabel	• Magnetic Field
definition	• Pertaining to the magnetic field generated by the Earth, consisting of both the dipole and non-dipole components.
narrower	• Magnetic Declination • Magnetic Inclination • Geomagnetic Induction • Magnetic Intensity • Magnetic Anomalies
inScheme	• GCMD Solid Earth
closeMatch	• Magnetic fields • Magnetic Field • Magnetic Field • Magnetic Field
broader	• Geomagnetism

Concept Search

magnetic field

Search

Recent blog posts

esults

ext-

query

ng

More

Experimental: on the fly from DBPedia

A magnetic field is the magnetic effect of electric currents and magnetic materials. The magnetic field at any given point is specified by both a direction and a magnitude (or strength); as such it is a vector field. The term is used for two distinct but closely related fields denoted by the symbols B and H, where H is measured in units of amperes per meter (symbol: A·m−1 or A/m) in the SI. B is measured in teslas (symbol:T) and newtons per meter per ampere (symbol: N·m−1·A−1 or N/(m·A)) in the SI. B is most commonly defined in terms of the Lorentz force it exerts on moving electric charges. Magnetic fields can be produced by moving electric charges and the intrinsic magnetic moments of elementary particles associated with a fundamental quantum property, their spin. In special relativity, electric and magnetic fields are two interrelated aspects of a single object, called the electromagnetic tensor; the split of this tensor into electric and magnetic fields depends on the relative velocity of the observer and charge. In quantum physics, the electromagnetic field is quantized and electromagnetic interactions result from the exchange of photons. In everyday life, magnetic fields are most often encountered as a force created by permanent magnets, which pull on ferromagnetic materials such as iron, cobalt, or nickel, and attract or repel other magnets. Magnetic fields are widely used throughout modern technology, particularly in electrical engineering and electromechanics. The Earth produces its own magnetic field, which is important in navigation, and it shields the Earth's atmosphere from solar wind. Rotating magnetic fields are used in both electric motors and generators. Magnetic forces give information about the charge carriers in a material through the Hall effect. The interaction of magnetic fields in electric devices such as transformers is studied in the discipline of magnetic circuits.

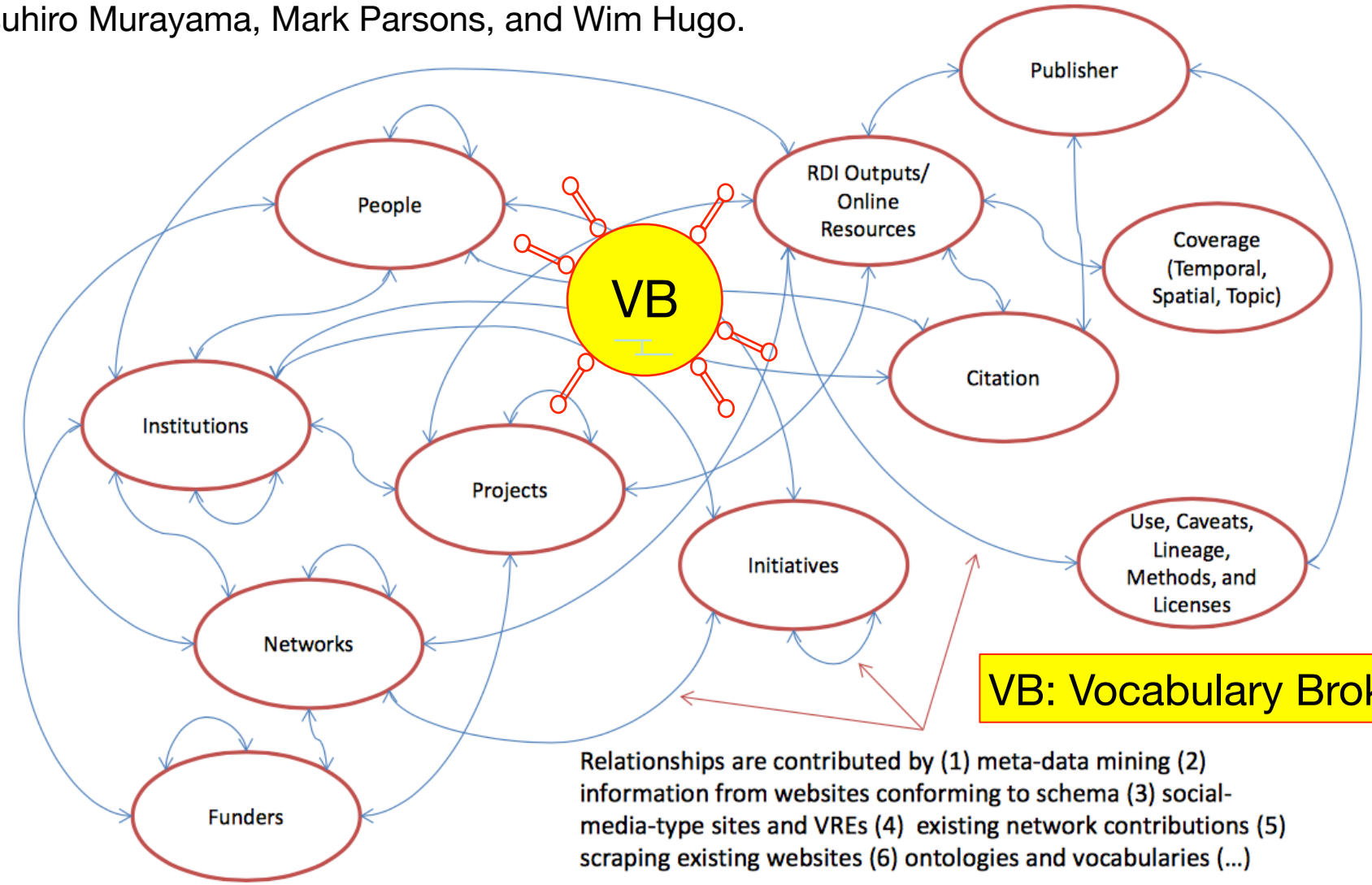
http://wdcosf.kugi.kyoto-u.ac.jp/resources/gcmd-204b482b-449b-42c9-a5bb-f6da42bee3a4/

01/07/2013

Source: ICSU-WDS Knowledge Network Concept

https://www.icsu-wds.org/files/wds-knowledge-network-concept-summary.pdf

Contributions from: Kim Finney, Michael Diepenbroek, Rob Atkinson, Peter Fox, Jane Hunter, Mustapha Mokrane, Yasuhiro Murayama, Mark Parsons, and Wim Hugo.



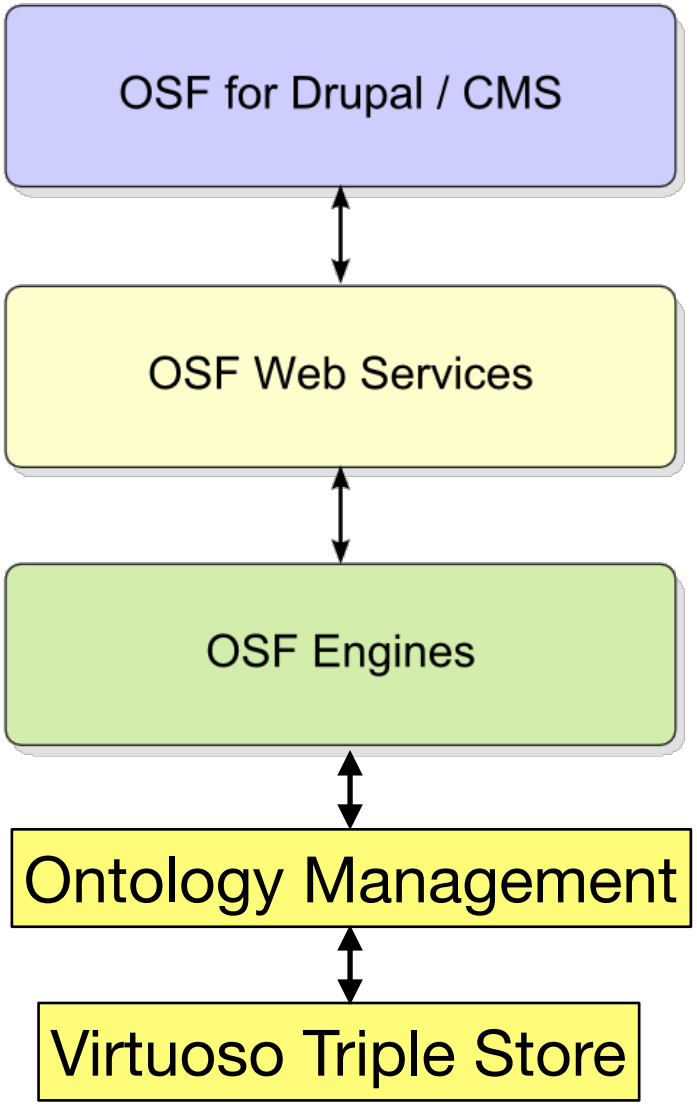
Open Semantic Framework (OSF)

Frédérick Giasson

STRUCTURED DYNAMICS

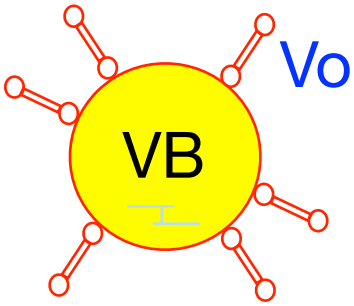
Web-oriented architecture

- Data is generally exposed/open and universally available as linked data
- SPARQL endpoints and APIs are generally RESTful in design
- The overall architecture is modular, with inherent decentralized and distributed aspects
- All display and visualization aspects are cross-browser ready and capable.



http://opensemanticframework.org/
http://structureddynamics.com/index.php
http://fgiasson.com/blog/

Vocabulary Broker Components and Workflow

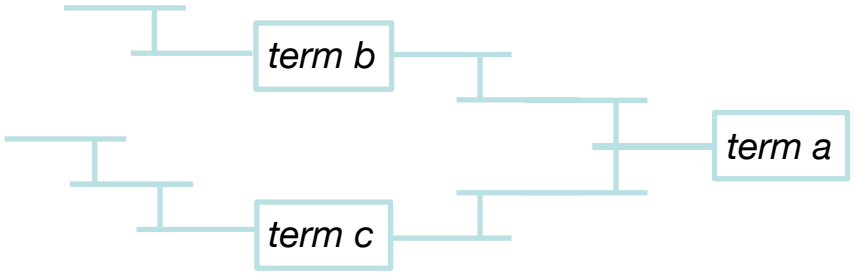


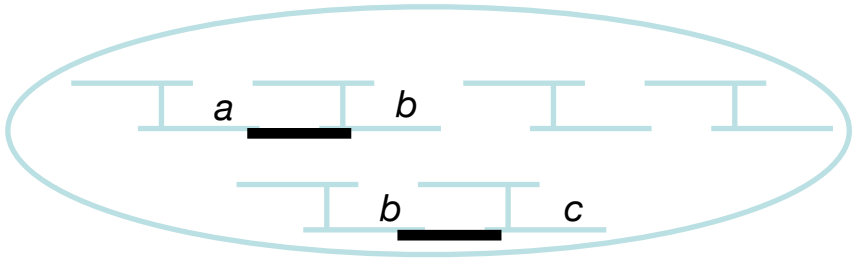
Search

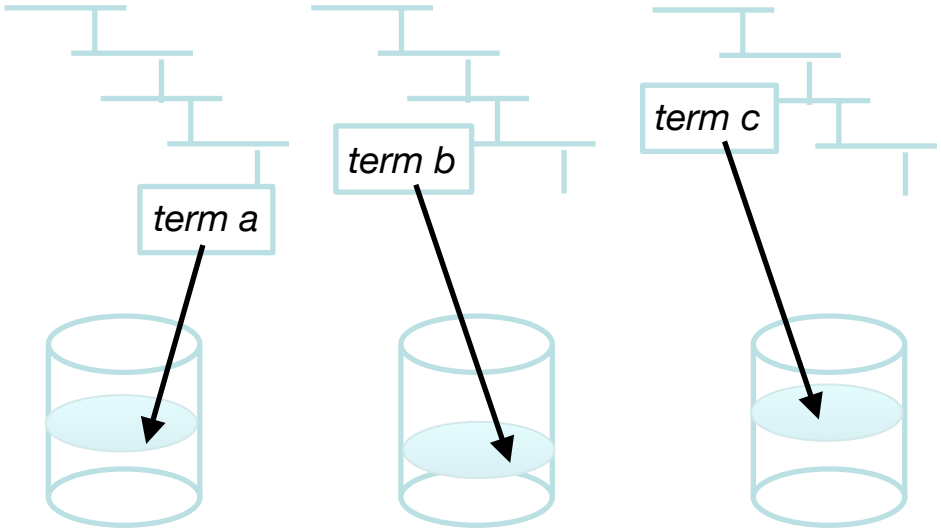
Mapping

Vocabulary

Repository







workflow

Term/Keyword search

Vocabulary Broker

Vocabulary/Term mapping

Skotheme

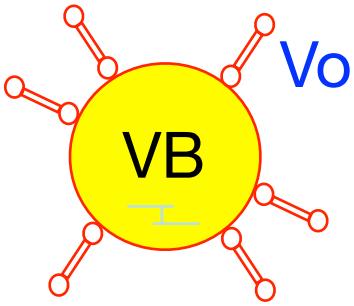
Vocabulary design

Protégé

Metadata editing

Editor

Vocabulary Broker Components and Workflow



Search

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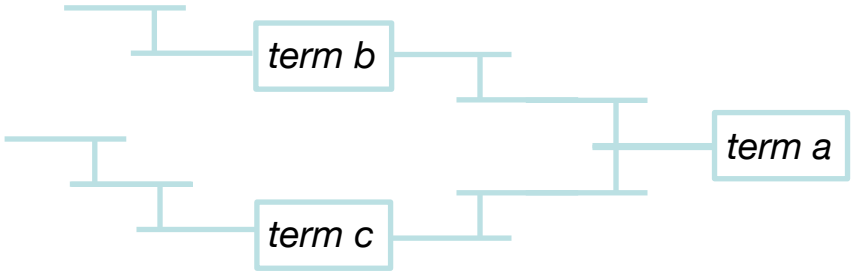

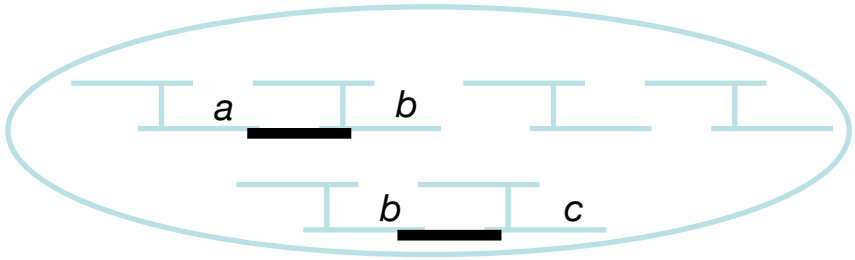

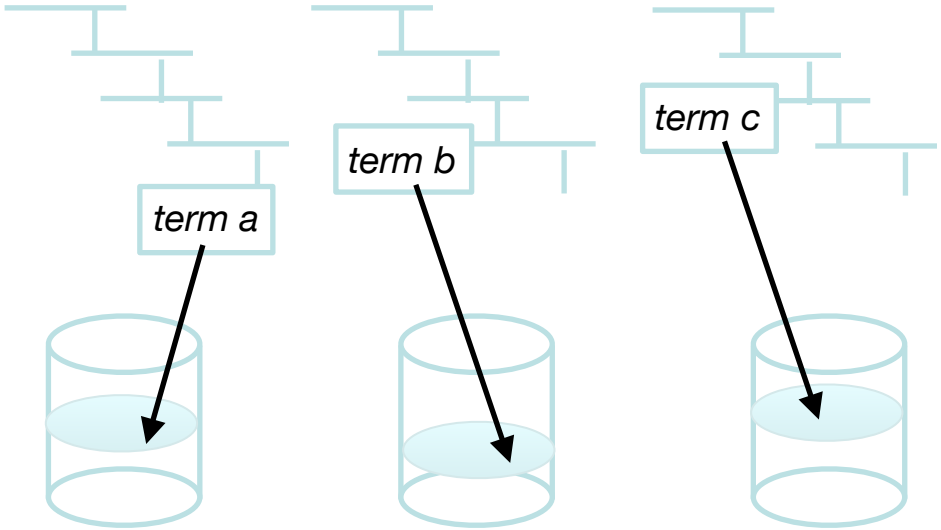

workflow

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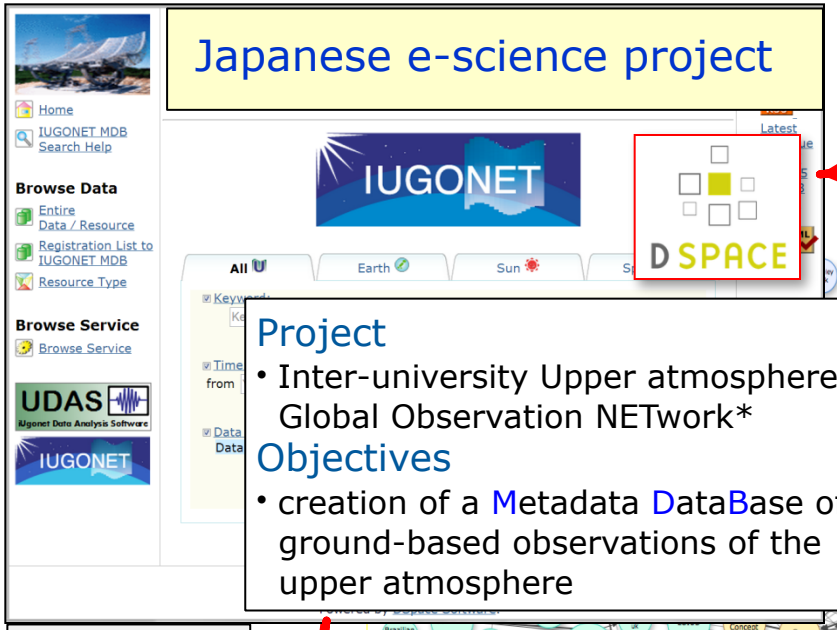
Japanese e-science project



Project

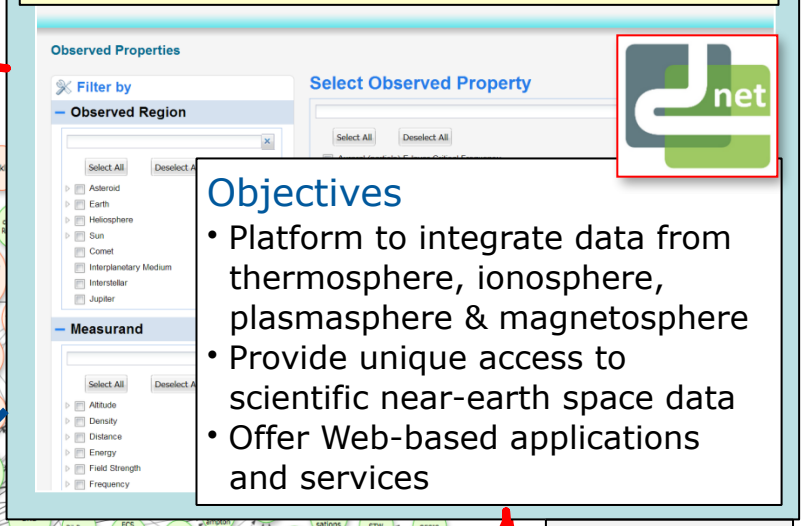
- Inter-university Upper atmosphere Global Observation NETwork*

Objectives

- creation of a Metadata DataBase of ground-based observations of the upper atmosphere

www.iugonet.org

espas EU 7th framework project

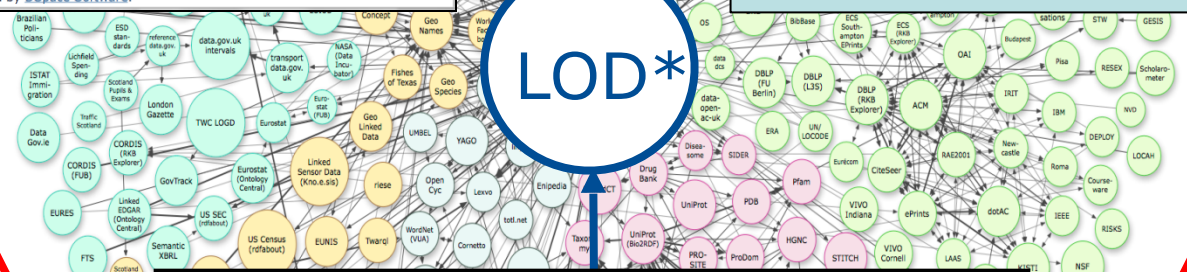


Objectives

- Platform to integrate data from thermosphere, ionosphere, plasmasphere & magnetosphere
- Provide unique access to scientific near-earth space data
- Offer Web-based applications and services

www.espas-fp7.eu

LOD*



Domain Ontology Merging

- FOAH
- BIBO
- GeoNames
- dbPedia
- SPASE

Terminological Ontology Merging

- GCMD Keywords
- GEMET
- SPASE
- PDS
- IVOA

GFZ ISDC Drupal 7 proof of concept

Information model & resources

- ISDC ontology network
- Keyword vocabularies
- GFZ RDF+RDB data, LOD data

Technical implementation

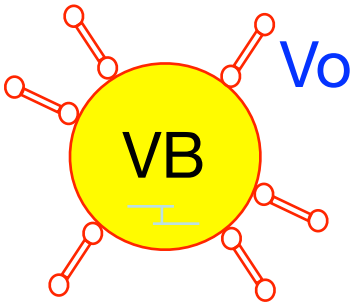
- Drupal CMS, Virtuoso Triple Store
- **Open Semantic Framework OSF**

Resources

- Geodetic data
- Magnetic field data
- Atmosphere data

*Linked open Data
http://lod-cloud.net/

Vocabulary Broker Components and Workflow

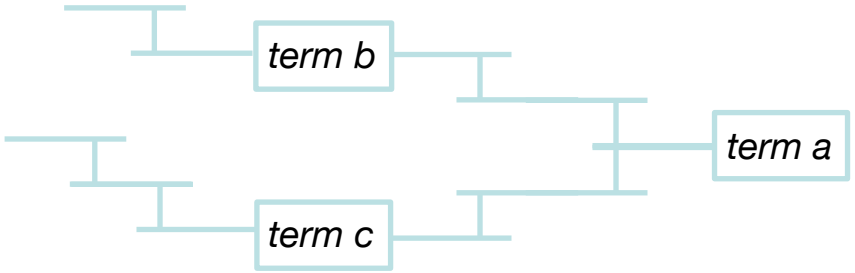


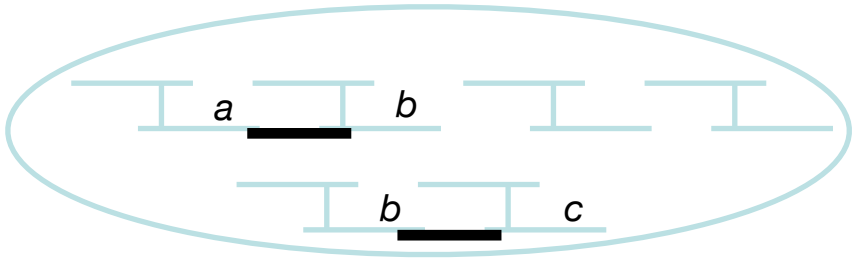
Search

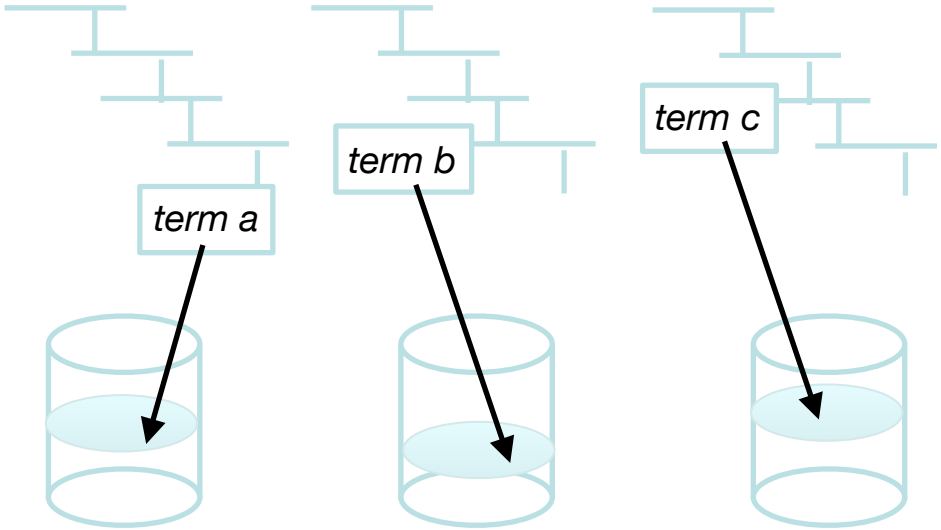
Mapping

Vocabulary

Repository







workflow

Term/Keyword search

Vocabulary Broker

Vocabulary/Term mapping

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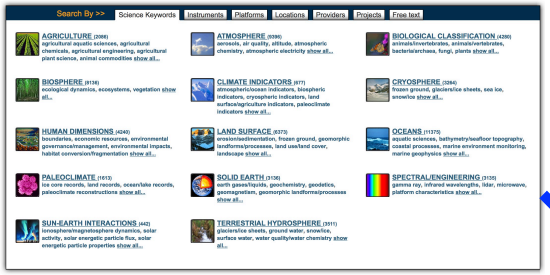
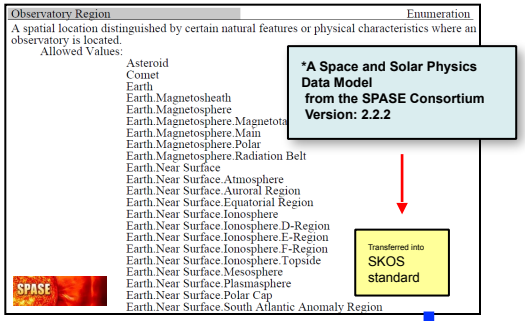
Managing Terminological Ontologies

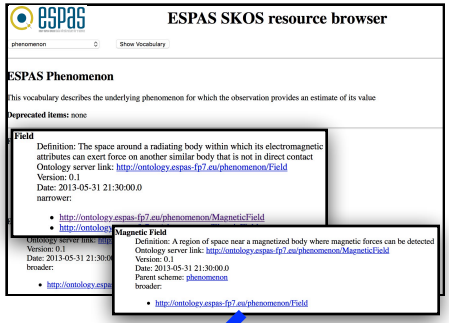
GCMD Keywords



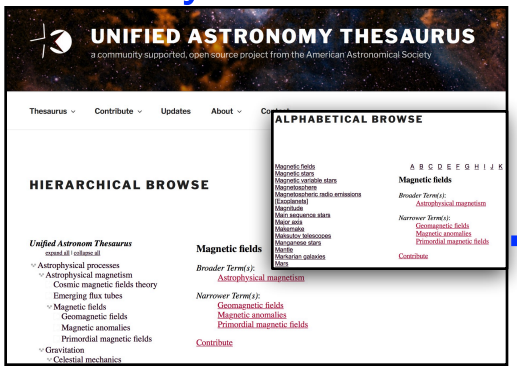
SPASE Keywords



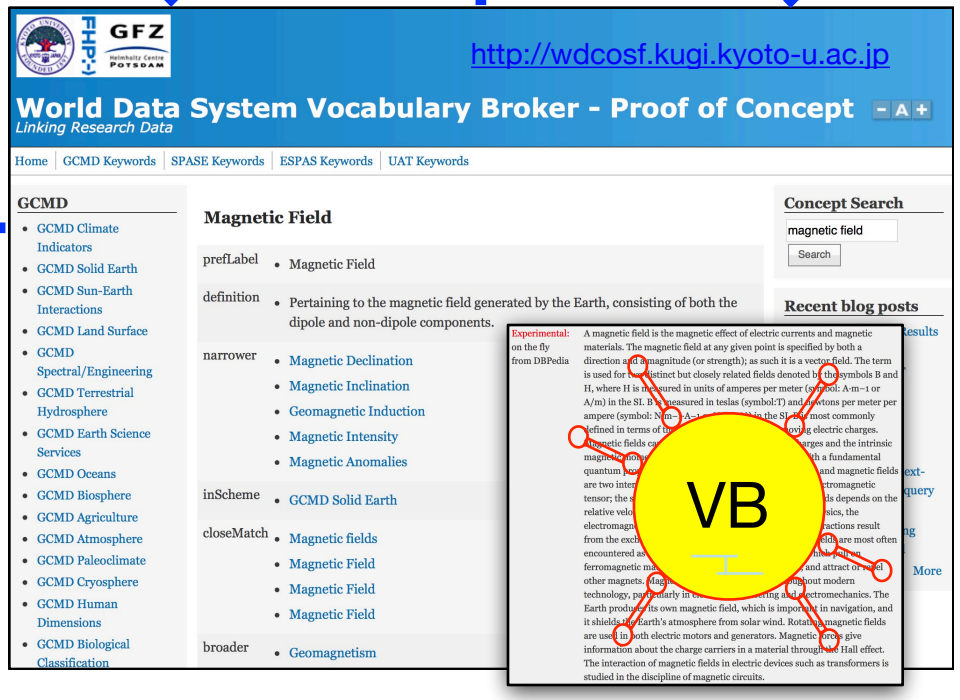
ESPAS Keywords



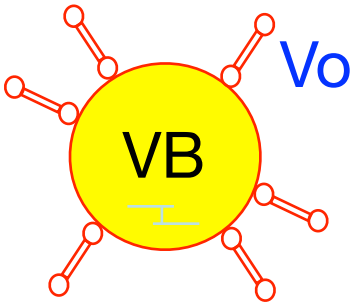
UAT Keywords



The Vocabulary Broker manages the terminological ontologies of NASA's GCMD, from SPASE and ESPAS as well as the UAT. In addition to the initial data, a merged terminological ontology generated with the program Skotheme is also managed by the VB.



Vocabulary Broker Components and Workflow

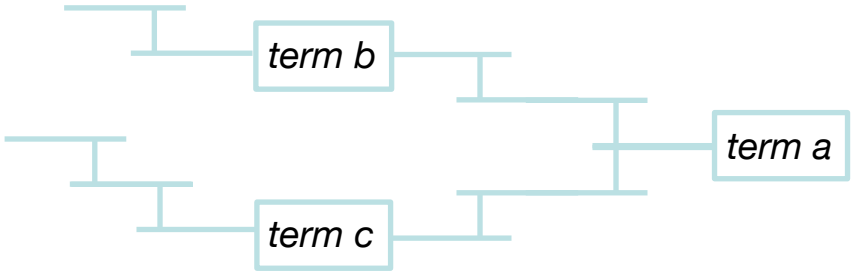


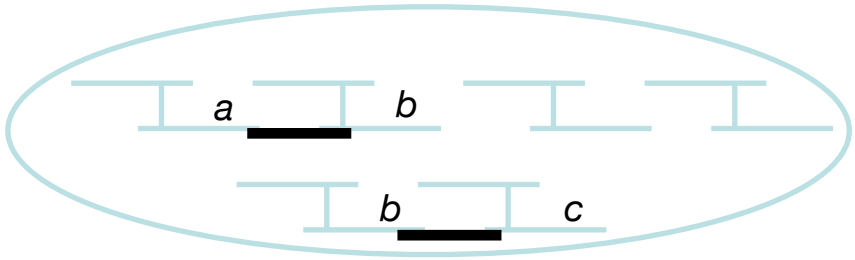
Search

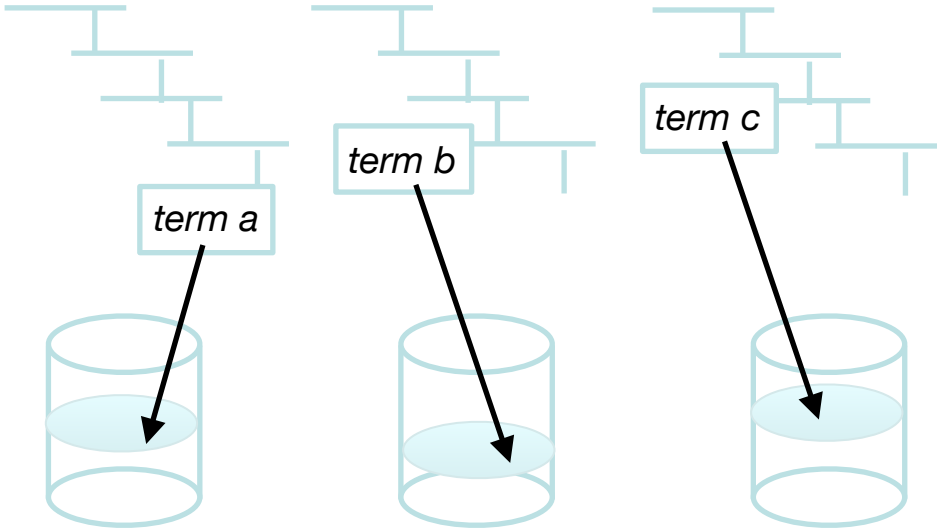
Mapping

Vocabulary

Repository







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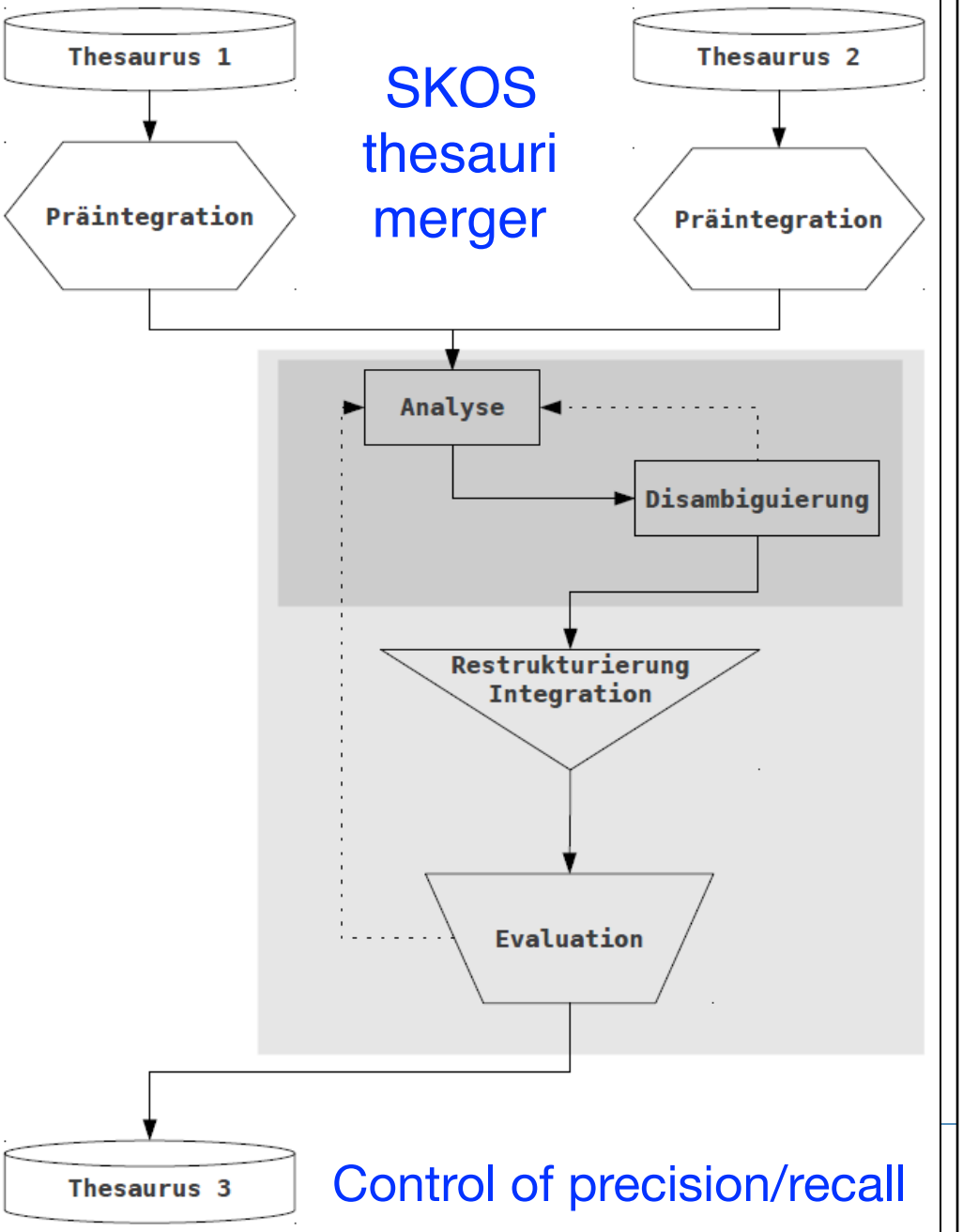
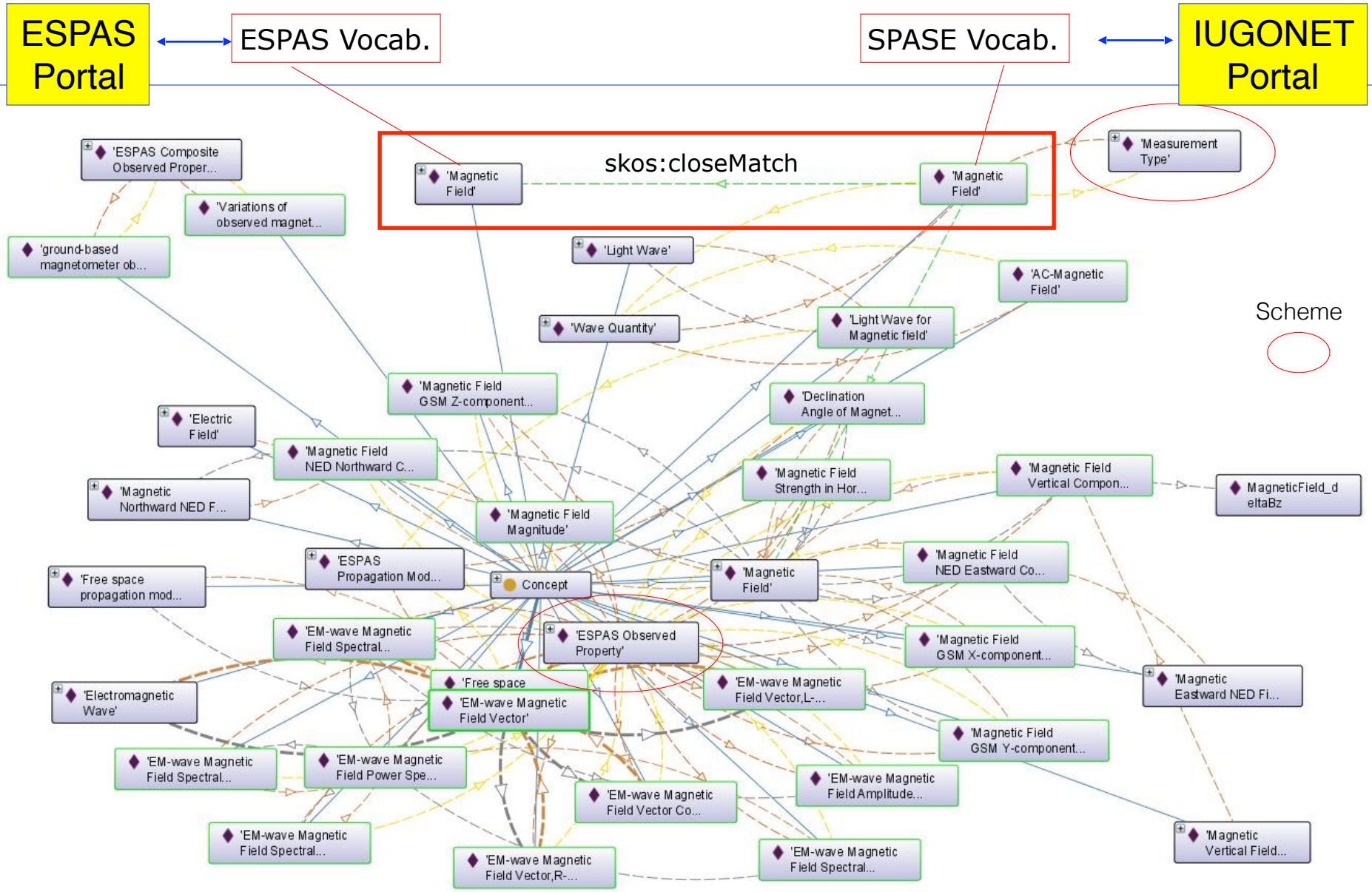
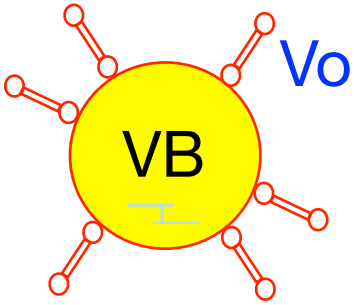


- ISO 25964-1:2011 - Thesauri for information retrieval
- Mapping of **SKOS** Thesauri
- Ontology Matching method
  - syntactic diffs
  - conceptual diffs
  - semiotic diffs
  - terminological diffs
- Pre-Integration (stop words, normalization (diacritical marks, upper and lower case, stemming)
- Lexical analysis (substring comparison, N-Gramm similarity, Term signature)
- Structural analysis(Child or parent match technique)
- Entity based analysis

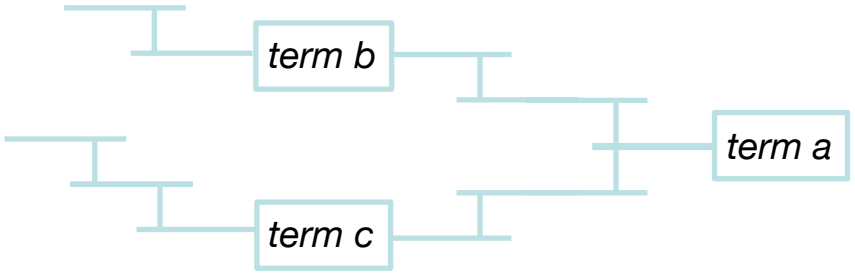
Vocabulary Broker connecting ESPAS and IUGONET „Magnetic Field“ tagged data



Vocabulary Broker Components and Workflow



Search



workflow

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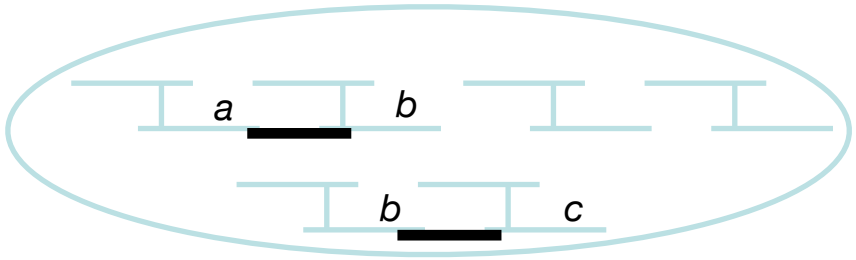
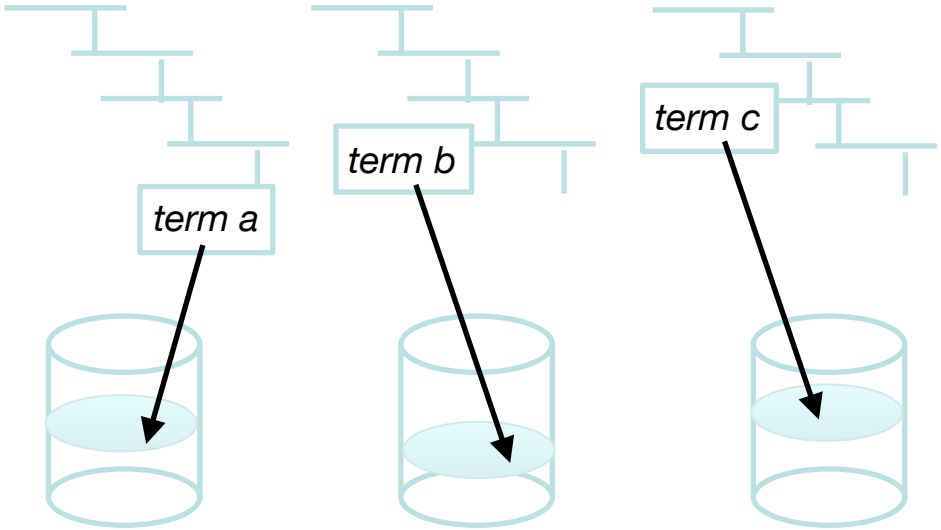


Vocabulary/Term mapping

Skotheme

Vocabulary



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Linking Research Data

- A +

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- GCMD Earth Science Services
- GCMD Oceans
- GCMD Biosphere
- GCMD Agriculture
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narrower	• Magnetic Declination • Magnetic Inclination • Geomagnetic Induction • Magnetic Intensity • Magnetic Anomalies
inScheme	• GCMD Solid Earth
closeMatch	• Magnetic fields • Magnetic Field • Magnetic Field • Magnetic Field
broader	• Geomagnetism

Concept Search

magnetic field

Search

Recent blog posts

esults

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More

Experimental: on the fly from DBPedia

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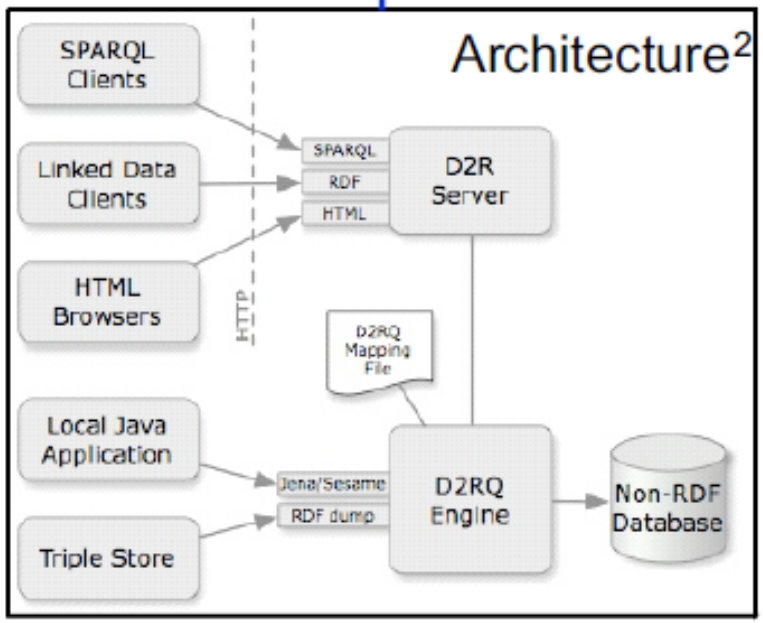
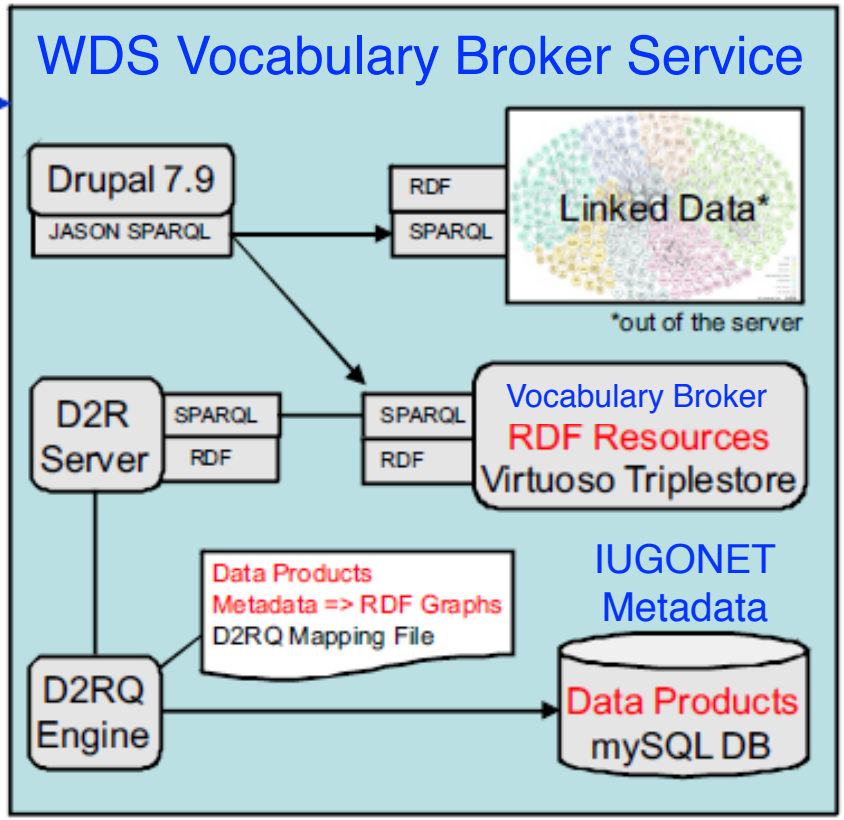
http://wdcosf.kugi.kyoto-u.ac.jp/resources/gcmd-204b482b-449b-42c9-a5bb-f6da42bee3a4/

D2RQ for mashup of RDBMS with Triple Stores

- D2RQ Platform: accessing relational databases as virtual, read only RDF graphs[1]
- D2R Server: tool for publishing content of relational databases on the Semantic Web





[1]http://d2rq.org/

[2]http://d2rq.org/images/architecture.png

Vocabulary Broker application connecting IUGONET's scientific data, appropriate paper and data publications

IUGONET Data Repository

Vocabulary Broker

Publication

Keywords:
- *Magnetic Field*
- *Geomagnetism*
- *…*

Numerical Data:
Guam geomagnetic field 1-hour digital data in WDC format

Magnetic Field

match

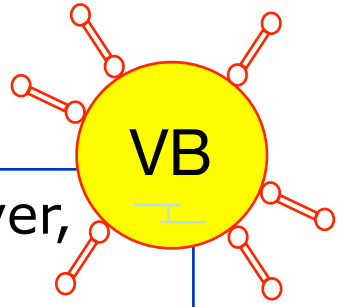
Magnetosphere

Title:
Rise time of geomagnetic sudden commencements —Statistical analysis of ground geomagnetic data

Keywords:
- *Magnetosphere*
- *Geomagnetic Storm*
- *…*

Scientific paper published in journals, such as „Earth Planet and Space" or abstracts submitted to scientific conferences, such as JpGU, AGU or EGU, more and more are tagged with domain related controlled or free keywords. These keywords mapped with appropriate keywords managed by the Vocabulary Broker almost automatically mashups the scientific data form various data repositories with related publications.

Vocabular Broker Applications



- Mashup of near earth space data systems and server, e.g. IUGONET, ESPAS, GFZ ISDC
- Inferring ciplinary relationsh s phenomena
- Cross-do ropriate publicatic
- Integratic ources for disaster r bjectives
  - e.g. i space weath derived challe iety
- Usage of ation for educatior
- Essential etwork

If you are interested in my/ our expertise in information sciences, and in the reuse of our Vocabulary Broker idea and tool box for research or commercial applications and/or products please contact me.

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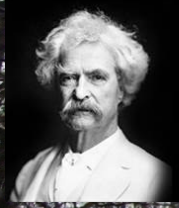
Vocabular Broker Demo => http://wdcosf.kugi.kyoto-u.ac.jp

The difference between the right word and the almost right word is the difference between lightning and a lightning bug.



Mark Twain
American Author and Humorist
(1835-1910)

QuoteHD.com

Beware of fake news.

None are more hopelessly enslaved than those who falsely believe they are free.

Johann Wolfgang von Goethe
(1749-1832)

ありがとうございました。

質問が ありますか。

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Thank you, Questions?