



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?

This photo of Ryoanji Temple is courtesy of TripAdvisor.



# Connecting vocabularies cross-domain - benefits and challenges

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# Confucius - Correctness of words



Chinese teacher, editor and philosopher (551 BC – 479 BC)

*\*If names be not correct, language is not in accordance with the truth of things. If language be not in accordance with the truth of things, affairs cannot be carried on to success. When affairs cannot be carried on to success, proprieties and music do not flourish. When proprieties and music do not flourish, punishments will not be properly awarded. When punishments are not properly awarded, the people do not know how to move hand or foot. Therefore a superior man considers it necessary that the names he uses may be spoken appropriately, and also that what he speaks may be carried out appropriately. **What the superior man requires is just that in his words there may be nothing incorrect.***

In *The Analects\* of Confucius: Parallel English and Chinese*, S. [85](#))

<http://juttas-schreibtipps.blogspot.jp/2012/06/uber-die-richtigstellung-der-begriffe.html>



# Ian Hacking - Clearness of words

The important thing is to be able to understand anyone who has something useful to say. - There is a general moral here. **Be very careful and very clear about what you say.** But do not be dogmatic about your own language.

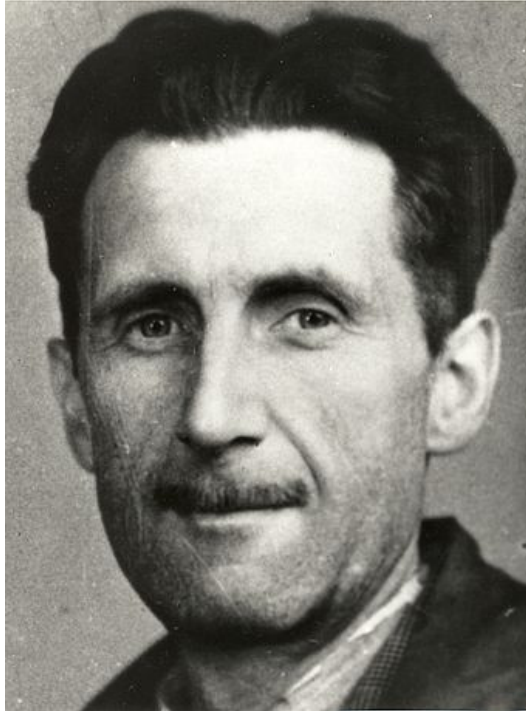
Be prepared to express any careful thought in the language your audience will understand. And be prepared to learn from someone who talks a language with which you are not familiar.



Ian Hacking (2001). "An Introduction to Probability and Inductive Logic Desk Examination Edition", p.38, Cambridge University Press

\*Canadian philosopher specializing in the philosophy of science.

# George Orwell - Newspeak and PC\*

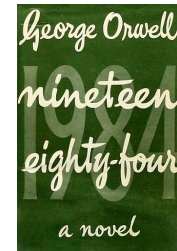


**Eric Arthur Blair**  
(25 June 1903 – 21 January 1950)

\*Political Correctness

“But if thought corrupts language,  
language can also corrupt thought.”

“War is peace.  
Freedom is slavery.  
Ignorance is strength.”



“Doublethink means the power of  
holding two contradictory beliefs in  
one's mind simultaneously, and  
accepting both of them.”

“Freedom is the freedom to say that  
two plus two make four. If that is  
granted, all else follows.”

# Terms and history of semantics

- Memory of words (Ian Hacking)

"Begriffe haben Erinnerungen an Ereignisse, die wir vergessen haben"\*

Terms have a memory, they refer to a history of the term which is richer than most language users are able to estimate...

Terms have memories of events that we have forgotten.

- History of words in semantics and using
- Changing of meaning of words in time

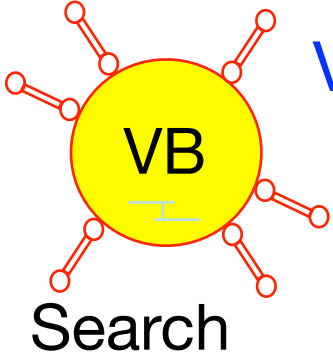
Germany (2015 -2018):

**Fugitive => ...=> ... => ... => ... => ... => Migrant**

\*<https://www.heise.de/tp/features/Viele-interessante-Begriffe-haben-eine-Wanderungsgeschichte-hinter-sich-3952651.html>



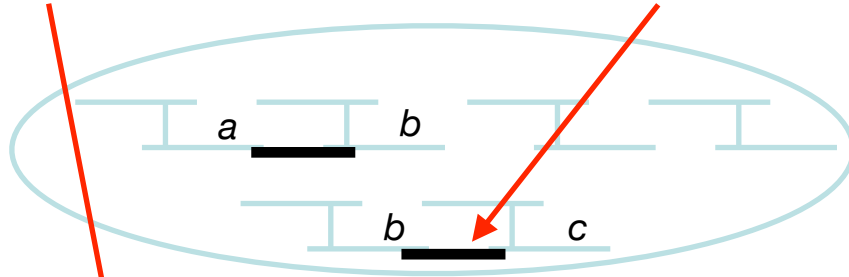
# Vocabulary Broker Components and Workflow



## Context enrichment of terms and relationships

- Related domain and scheme
- History of terms
- Cause and effect relations, ...

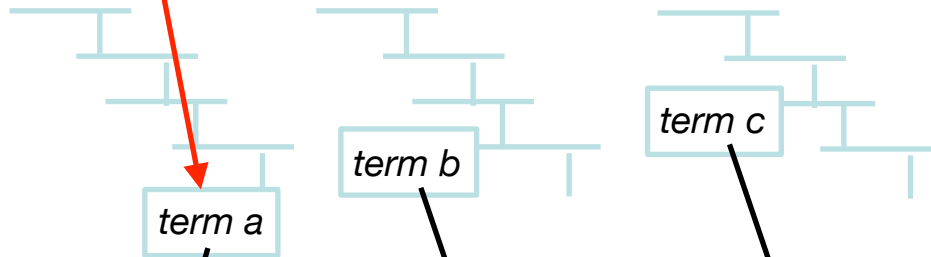
Mapping



Vocabulary/Term  
mapping



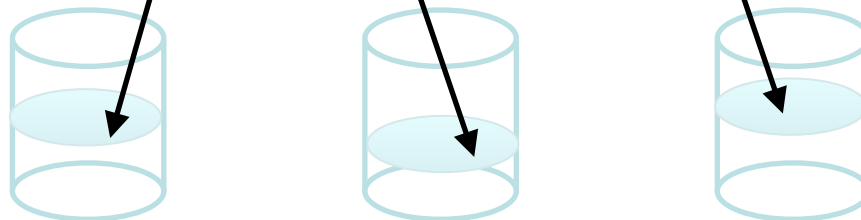
Vocabulary



Vocabulary  
design



Repository

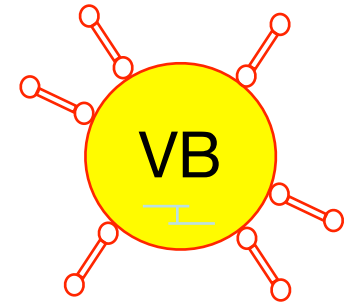


Metadata  
editing

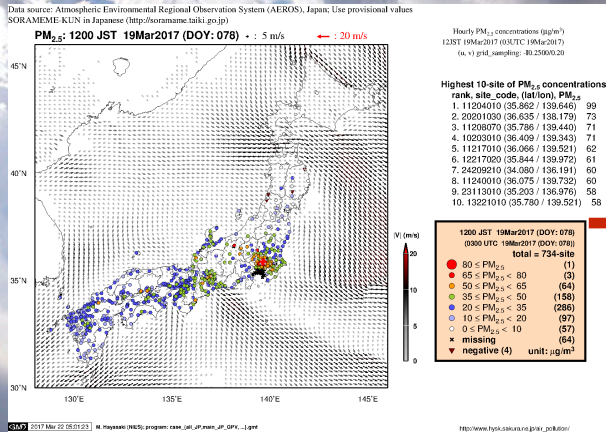


Workflow  
Vocabulary  
broker

# Vocabulary Broker application connecting scientific data and societal decision support



## AEROS Japan: Spatial distribution of hourly concentration of PM2.5 in 12JST 19 03 2015



## Dusty atmosphere above Kyoto city on 8 May 2017



Photo by Bernd Ritschel



Kyoto Tower (zoomed in)

## Gobi Desert: Fast approaching sandstorm.

Source: The Gobi March 2015: 250km Journey Through Snowstorms, Sandstorms and The Gobi Desert, Photo By Zandy Mangold. [https://ullalarse.files.wordpress.com/2015/06/blog\\_20150605restday0101\\_14.jpg](https://ullalarse.files.wordpress.com/2015/06/blog_20150605restday0101_14.jpg)

Mapping the terminological ontologies corresponding to the ESPAS and SPASE information model, some almost identical concordances are found, even the related schema are different. In this case the identical keywords „Magnetic Field“ mapped with „skos:closeMatch“ come from „Observed Property“ respectively Measurement Type.



Kyoto Tower (zoomed in)



Kyoto city on 28 September 2017

Photo by Bernd Ritschel

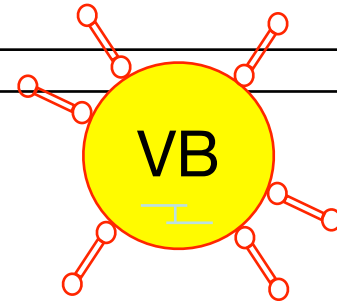
# Dust and Sandstorm (DSS) Phenomenon and Impacts

## DSS phenomenon

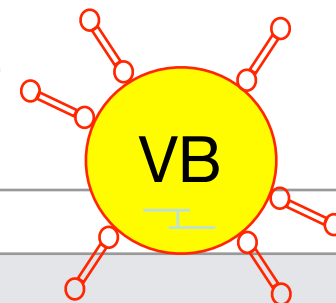
- harmful influences on the agricultural production of crops
- significant health hazard to the people
- the sand particles remain suspended in the atmosphere and affects global climate

## DSS causes

- collapse of trees
- destruction of factory products
- soiling of cars and laundries
- disappearance and worse, death of the residents
- buried institutions and railway tracks
- the (most) massive damage on the agricultural sector
- airline flight cancellation
- traffic jam
- respiratory and ocular disorders in the people's health



# Yellow Sand or Dust and Sandstorm Keywords



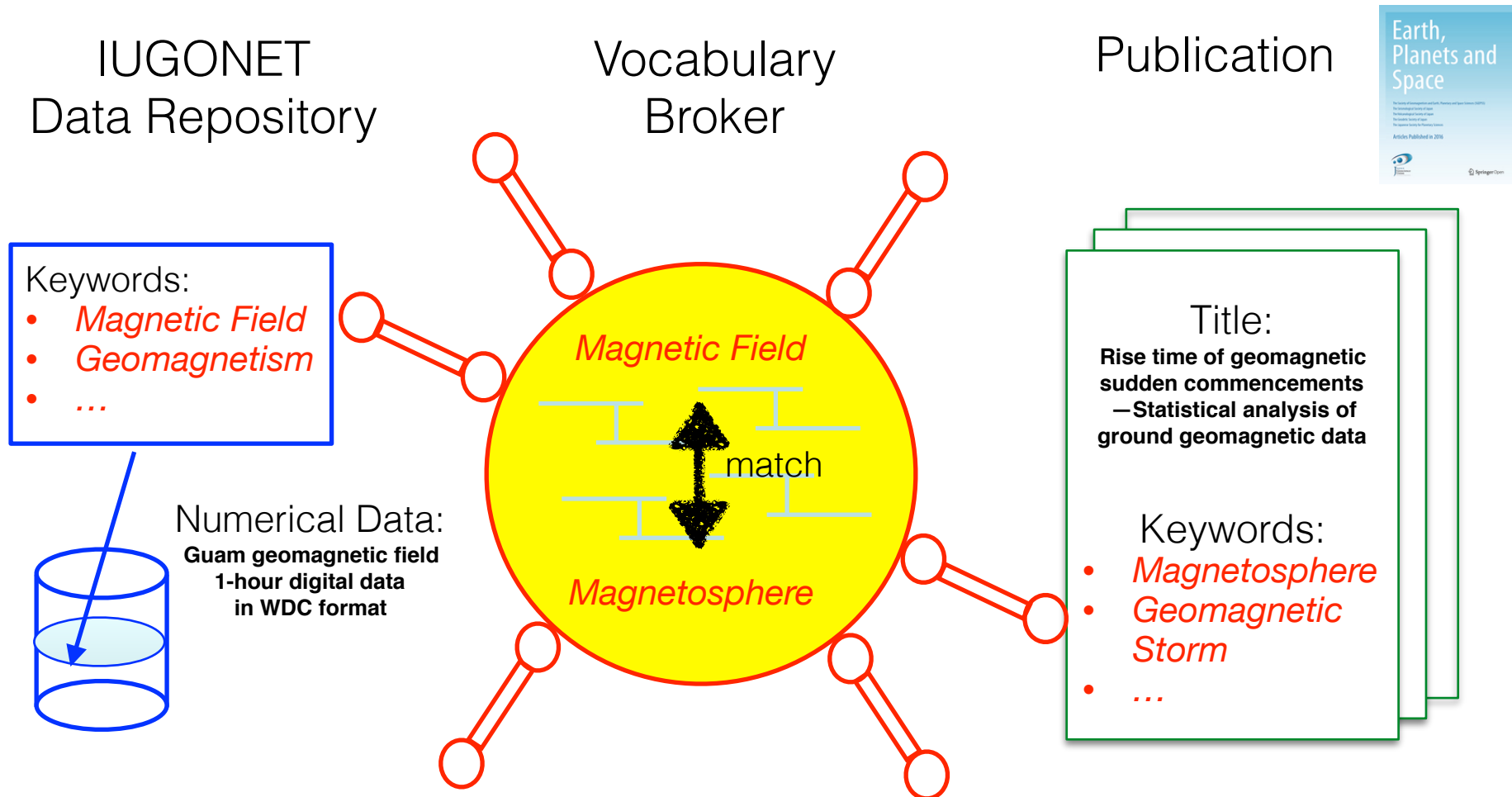
kosadust and sandstorm(DSS)
Taklamakan Desert
Gobi DesertLoess Plateau in inland China
erosion
fine particle ⇔ coarse particle
the prevailing westerlies
deposition
spring haze
Ministry of the Environment MOE
National Institute for Environmental Studies
sandstorm
natural phenomena⇔anthropogenic factor
particle size(distribution)
quartzfeldsparmica
kaolinite

sulfate ionnitric ion
ammonium ion
suspended particulate matter (SPM) (suspended)
visibility
LIDAR : Light Detection And Ranging
laser
radar: Radio Detection and Ranging
remote sensing
basic
neutralization
global warming effect
plankton
depletion of forests desertification
soil degradation
environmental capacity
kosa model(modeling)DSS model



Design of a Dust and Sandstorm Ontology

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



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.

# Managing Terminological Ontologies

# ESPAS Keywords

## GCMD Keywords

**Observatory Region** Enumeration  
 A spatial location distinguished by certain natural features or physical characteristics where an observatory is located.  
 Allowed Values:  
 Asteroid  
 Comet  
 Earth  
 Earth.Magnetosheath  
 Earth.Magnetosphere  
 Earth.Magnetosphere.Magnetotail  
 Earth.Magnetosphere.Main  
 Earth.Magnetosphere.Polar  
 Earth.Magnetosphere.Radiation Belt  
 Earth.Near Surface  
 Earth.Near Surface.Atmosphere  
 Earth.Near Surface.Auroral Region  
 Earth.Near Surface.Equatorial Region  
 Earth.Near Surface.Ionosphere  
 Earth.Near Surface.Ionosphere.D-Region  
 Earth.Near Surface.Ionosphere.E-Region  
 Earth.Near Surface.Ionosphere.F-Region  
 Earth.Near Surface.Ionosphere.Topside  
 Earth.Near Surface.Mesosphere  
 Earth.Near Surface.Plasmasphere  
 Earth.Near Surface.Polar Cap  
 Earth.Near Surface.South Atlantic Anomaly Region

**\*A Space and Solar Physics Data Model from the SPASE Consortium Version: 2.2.2**

Transferred into SKOS standard

## SPASE Keywords

## GEMET Keywords

## UAT Keywords

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

**World Data System Vocabulary Broker - Proof of Concept**

Linking Research Data

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**

**Experimental:** 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 distinct but closely related fields denoted by the symbols  $B$  and  $H$ , where  $H$  is measured in units of amperes per meter (symbol:  $A \cdot m^{-1}$  or  $A/m$ ) in the SI.  $B$  is measured in teslas (symbol:  $T$ ) and is defined as newton per meter per ampere (symbol:  $N \cdot m^{-1} \cdot A^{-1}$ ) in the SI.  $H$  is most commonly defined in terms of the circulation of electric charges and the intrinsic magnetic properties of materials with a fundamental quantum mechanical origin.  $B$  and magnetic fields are two interrelated vector fields.  $B$  is an electromagnetic tensor; the relative velocity of the charges depends on the relative velocity of the charges and the electric fields. The electric and magnetic fields are most often encountered as electromagnetic waves.  $B$  and  $H$  are other magnets, magnetic materials, and modern technology, particularly in the design of electric and electronic devices. The Earth produces its own magnetic field, which is important in navigation, and it shields the Earth's atmosphere from solar wind. Remote sensing magnetic fields are used in both electric motors and generators. Magnetic fields 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.

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



## EIONET

### European Environment Information and Observation Network

- EIONET is a partnership network of the [European Environment Agency](#) (EEA) and its member and cooperating countries involving approximately 1000 experts and more than 350 national institutions.

## REPORTNET

<http://svn.eionet.europa.eu/projects/Reportnet/wiki/SPARQL>

- REPORTNET is EIONET's infrastructure software project for supporting and improving data and information flows
- Integrated suite of IT tools for the [European Environmental Information System](#) and building on a shared information infrastructure

**atmospheric ozone**

**Definition:**

A triatomic molecule of oxygen; a natural component of the atmosphere in the stratosphere; it is found at a level between 10 and 50 km above the Earth's surface. It is a natural shield which prevents some of the ultraviolet radiation from reaching the Earth's surface, which causes skin cancer and threatens plant life, from reaching the Earth's surface. The main chemicals that are depleting stratospheric ozone are chlorofluorocarbons (CFCs) and halons, which are used as propellants, aerosols and as cleaners in many industries and household products. The damage is caused when these chemicals release highly reactive forms of chlorine and bromine.

- broader terms**
  - atmospheric component
- narrower terms**
  - tropospheric ozone
- related terms**
  - ozone

**Scope note:**  
scope note is not available

**Groups:**  
ATMOSPHERE (air, climate)

**Themes:**  
air  
chemistry  
climate

- broader terms**
  - atmospheric composition
- narrower terms**
  - atmospheric ozone
- related terms**
  - aerosol
  - atmospheric aerosol
  - carbon
  - oxygen

- broader terms**
  - atmospheric ozone
- related terms**
  - ozone

- broader terms**
  - oxygen
- related terms**
  - atmospheric ozone
  - tropospheric ozone

with the highest concentration in the stratosphere. It is a natural shield which prevents some of the ultraviolet radiation from reaching the Earth's surface, which causes skin cancer and threatens plant life, from reaching the Earth's surface. The main chemicals that are depleting stratospheric ozone are chlorofluorocarbons (CFCs) and halons, which are used as propellants, aerosols and as cleaners in many industries and household products. The damage is caused when these chemicals release highly reactive forms of chlorine and bromine. (WRIGHT)

- Arabic:** أوزون الغلاف الجوي
- Basque:** atmosferako ozono
- Bulgarian:** Атмосферен озон
- Catalan:** ozó atmosfèric
- Chinese:** 大气臭氧
- Czech:** ozón atmosférický

- Danish:** atmosfærisk ozon
- Dutch:** atmosferische ozon
- English (US):** atmospheric ozone
- Estonian:** atmosfääriosoon
- Finnish:** ilmäkehään otsoni
- French:** ozone
- German:** element of group VI
- Greek:** ozon
- Hungarian:** ozon
- Irish:** ozon
- Italian:** ozono
- Latvian:** atmosfēriskais ozons

- broader terms**
  - air
- narrower terms**
  - atmospheric component

- broader terms**
  - atmosphere
- narrower terms**
  - atmospheric composition

- broader terms**
  - element of group VI
- narrower terms**
  - ozone
- related terms**
  - atmospheric component

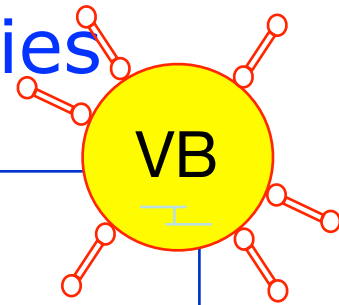
# Vocabulary Broker news and next steps

- Mashup of UAT version 2.0
- Integration of (parts of) the GEMET thesaurus
- Mashup of publications and data publications of the GFZ library
  - OAI-PMH (mashup via GCMD keywords)
  - Integration of former GCMD complaint DIF documents
- Introducing of new properties into the terminological ontologies (vocabularies)
  - wdcosf.causedBy and wdcosf.effectedBy
  - history of term's semantic



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

# Cross-domain mashup of vocabularies



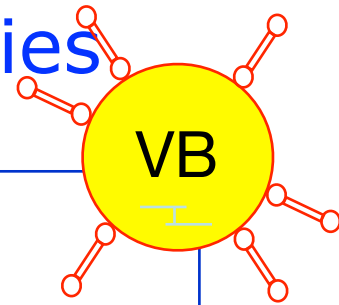
- **Benefits:**

- Mashup of scientific resources, publications and applications across disciplines
- Inferring of „unknown“ cross- and trans-disciplinary relationships
- Mashup of scientific and societal data resources for decision support and impact assessment

- **Challenges:**

- Research, modelling and presentation of semantical change of terms
- Political and ideological driven impact on the semantics of terms
- Borders and limits of „free“ science and education, especially related to humanities and societal impact

# Cross-domain mashup of vocabularies



- **Bene**

- Ma
- ap
- Inf
- rel
- Ma
- de

- **Chall**

- Re
- ch
- Po
- se
- Bo
- es

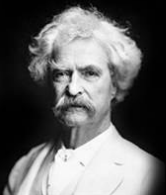
*If you are interested in our expertise in information sciences, and in the reuse of our Vocabulary Broker idea and tool box for research or commercial applications and/or products please contact us.*

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**g.neher@fh-potsdam.de**

d  
linary  
s for  
ntical  
tion,  
mpact



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



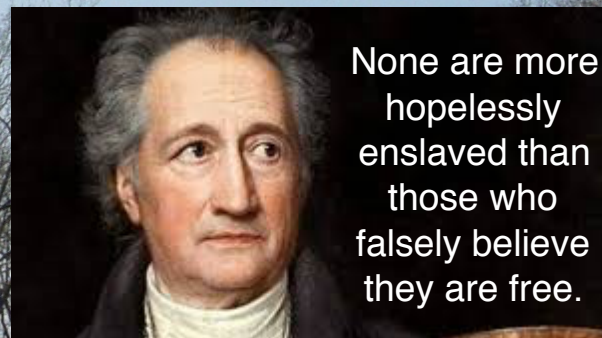
**Mark Twain**

*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。

[berndritschel@yahoo.de](mailto:berndritschel@yahoo.de)

**Thank you, Questions?**