

Semantische Interoperabilität „gain & pain“ fuer operative Services.

Chris Schubert  **Bibliothek**
Your knowledge hub

Roland Grillmayer  **umweltbundesamt**^u
ENVIRONMENT AGENCY AUSTRIA



Outline

- Kurze Einführung
 - Motivation, Definition, Modelle & Tools
- Knowledge Graph & Fallbeispiele Spatial Data
 - Exploring needs
- Gemeinsame Diskussion
 - Offene Fragen, Was sind Hürden & Barrieren
 - Was wären Nächste Schritte → real showcases im INSPIRE Kontext



EUROPEAN DATA SPACES

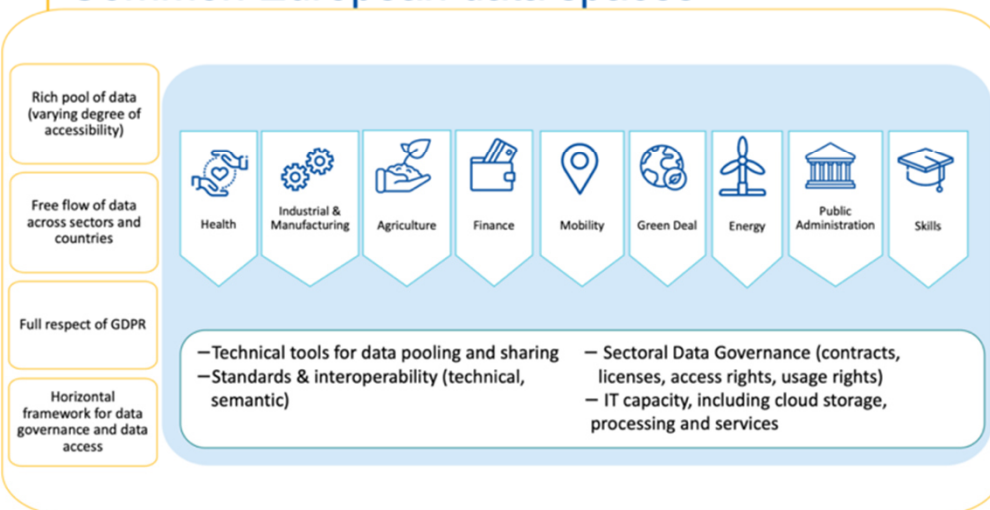
European Strategy for Data

A common European data space, a single market for data

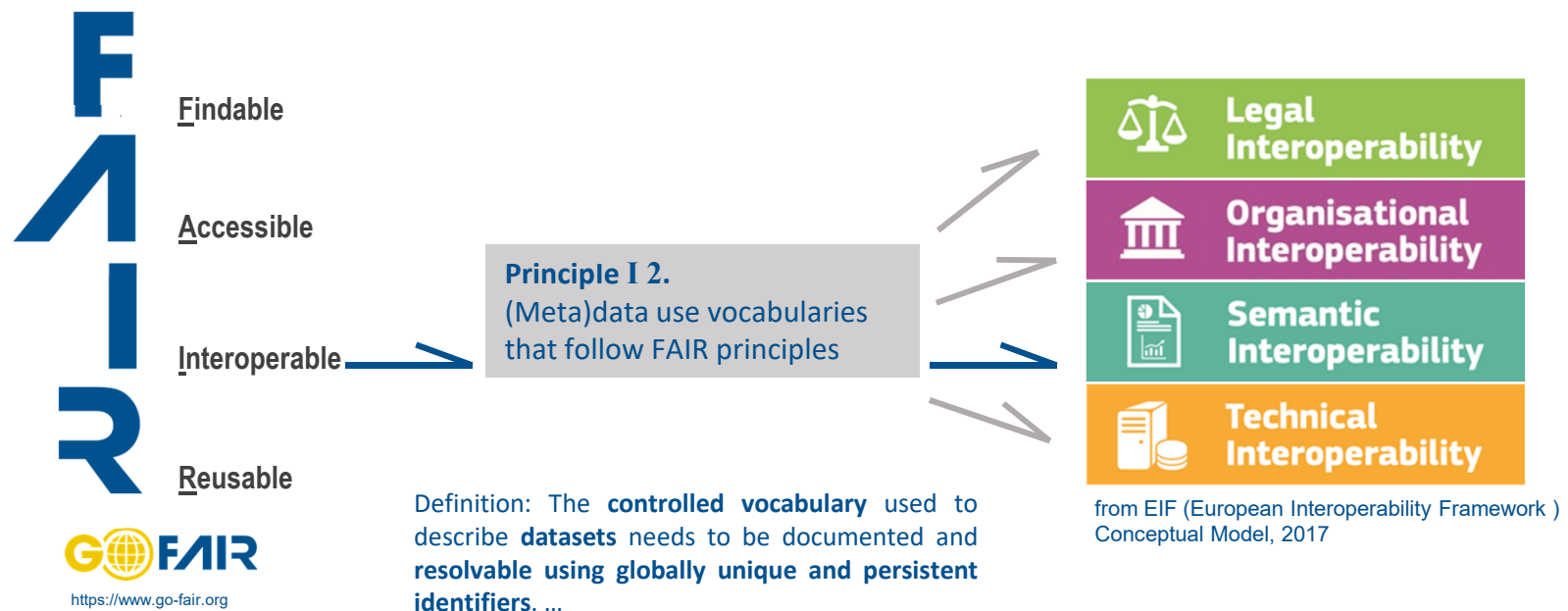
Common European data spaces

Availability of high quality data to create and innovate

Rules for access and use of data are fair, practical and clear & clear data governance mechanisms are in place



FAIR VOCABULARY FOR DATA SPACES



Ist kontrolliertes Vokabular schon ausreichend für interoperable services?

AUSTRIAN INSPIRE Registry

Austrian INSPIRE Registry > Austrian code list register > specific exposed element type

specific exposed element type

ID: <https://registry.inspire.gv.at/codelist/specificHazardTypeValue>
 This version: <https://registry.inspire.gv.at/codelist/specificHazardTypeValue:1>
 Latest version: <https://registry.inspire.gv.at/codelist/specificHazardTypeValue>

Label: **specific exposed element type**
 Definition: Denomination of exposed elements.

Governance level: WLW
 Status: Valid

Themes: <http://inspire.ec.europa.eu/theme/nz>
 Application schema: <http://inspire.ec.europa.eu/applicationschema/nz>
 Extensibility: Extensible with values at any level

Other formats: XML Registry XML ISO 19135 RDF/XML JSON Atom CSV

Code list values

Filter Label	Filter Parent	Filter Governance level	Filter Status
Label	Parent	Governance level	Status
(gravitational) slope deformation	mass movement	national-technical	Valid ☐
airburst	near earth objects	national-technical	Valid ☐
allergens	biological	national-technical	Valid ☐
animal Incident	biological	national-technical	Valid ☐
ash fall	volcanic activity	national-technical	Valid ☐
bacterial disease	disease	national-technical	Valid ☐
biological	natural disaster	national-technical	Valid ☐
blind tromben	wind	national-technical	Valid ☐
boulder fall	(gravitational) slope deformation	national-technical	Valid ☐
climatological	natural disaster	national-technical	Valid ☐

2019

Key pillars of data interoperability

Conceptual data models

- spatial objects and their properties and relationships
- cross-domain harmonization
- based on a common modelling framework
- managed in a common UML repository

Encoding

- e.g. GML or RDF application schemas as standard

Harmonised vocabularies

- to overcome interoperability issues caused by free-text

Registers

- provide unique and persistent identifiers for resources

Harmonised vocabularies

- to overcome interoperability issues caused by free-text and/or multi-lingual content
- allow more specific terms from local vocabularies in addition to the harmonized terms

Registers

- provide unique and persistent identifiers for resources
- allow their consistent management and versioning
- items can be made unique and referred to unambiguously

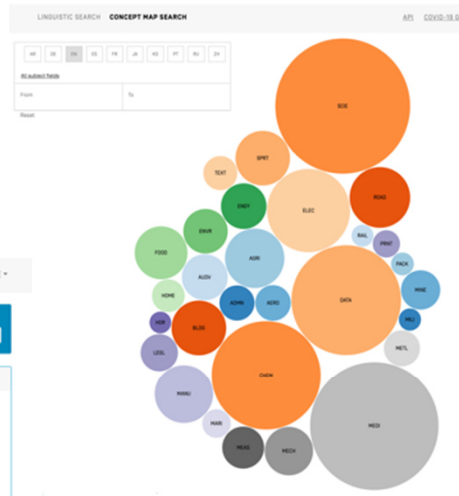


VOCABULARY SERVICES, REGISTRIES existieren ...

Epimorphics is a commercial solution with a bulk of services for linked data. One Service is a registry solution, a current implementation by BRGM is shown in figure 12.

The screenshot shows a web interface for a registry. The main content area displays an 'Entity: MultiDisciplinary Scientific Research'. It includes a 'Name' field with the value 'MultiDisciplinary Scientific Research', a 'URI' field with a long URL, and a 'Created' field with the date '2021-11-18 14:45:27'. There are also buttons for 'About this item' and 'Download'. The interface is clean and modern, with a navigation bar at the top.

The screenshot shows a website from the Geologische Bundesanstalt. The main heading is 'Sedimentäres Material'. Below it, there is a 'thesaurus' search box and a 'Go' button. The text describes sedimentary material as 'An der Erdoberfläche natürlich vorkommendes Material, welches aus festen Partikeln besteht, angehäuft durch einen oder mehrere Ablagerungsprozesse in fluiden Systemen (flüssig oder gasförmig), welche granuläre und/oder kristalline Partikel erzeugen, die in Form von Schichten oder Körpern auftreten. Das Konzept beinhaltet Sedimente und Sedimentgesteine (SLTT Appendix C, 2004)'. There are also sections for 'Verwandte Begriffe, Relationen' and 'Lithologie (Thema)'.



The screenshot shows the EIONET Data Dictionary interface. The main heading is 'EIONET Data Dictionary'. Below it, there is a 'Browse vocabularies' section. The table lists several vocabularies with their IDs and reporting periods:

Search vocabularies	Search concepts
18	18
art12_2012	(Air Quality Directive - Reporting)
art12_2018	(Birds directive Art. 12 reporting)
art12_2018	(Birds directive Art. 12 reporting in year 2018)
art17_2006	(Habitats directive Art. 17 reporting in year 2006)

The screenshot shows the WIPO Pearl interface. The main heading is 'WIPO Pearl'. Below it, there is a 'Linguistic Search' and a 'Concept Map Search' section. The 'Linguistic Search' section has a search box and a 'Go' button. The 'Concept Map Search' section has a search box and a 'Go' button. The interface is clean and modern, with a navigation bar at the top.

The logo for CF Metadata is shown. Below it, the conventions are listed: 'Conventions: Latest release (1.10) HTML PDF Working draft HTML PDF'. The text is in a stylized font with a globe icon.

<https://data.geoscience.earth/ncl/>
<https://thesaurus.geolba.ac.at>
<https://dd.eionet.europa.eu/vocabularies>
<https://wipopearl.wipo.int/en/linguistic>




VOCABULARY SERVICES, REGISTRIES existieren ...

Application Schema: NaturalRiskZones

Version:
3.0

Spatial Object Type: AbstractExposedElement

AbstractExposedElement	
Definition:	SOURCE : [UNISDR, 2009] People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses.
Description:	This type is abstract.
Supertype of:	ExposedElement ExposedElementCoverage
Type:	Spatial Object Type
Attribute:	
Name:	inspireId
Definition:	External object identifier of the exposed element.
Voidable:	false
Multiplicity:	1
Value type:	Identifier (data type)
Attribute:	
Name:	beginLifeSpanVersion
Definition:	Date and time at which this version of the spatial object was inserted or changed in the spatial data set.
Voidable:	true
Multiplicity:	1
Value type:	DateTime
Attribute:	
Name:	endLifeSpanVersion
Definition:	Date and time at which this version of the spatial object was superseded or retired in the spatial data set.
Voidable:	true
Multiplicity:	0..1
Value type:	DateTime

Identifier 



Improve keywords taxonomy



Merge keywords, subject and broad subjects



Apply ANSI/NISO Z39.19 thesaurus conventions



Link with other taxonomies



Publish in SKOS RDF

nach „Kneebone, Les. Consolidating approaches how the Public Policy Taxonomy was made, [Vocabulary Symposium 2022](#)“



VOCABULARY SERVICES, REGISTRIES existieren ...

Beispiel Feature Type

<http://def.isotc211.org/iso19109/2015/GeneralFeatureModel#FeatureType>

```
</owl:Class>
<!--*****-->
<!-- Class: FeatureType -->
<!--*****-->
<owl:Class rdf:about="http://def.isotc211.org/iso19109/2015/GeneralFeatureModel#FeatureType">
  <rdfs:label>FeatureType</rdfs:label>
  <skos:definition>feature: abstraction of real world phenomena NOTE: A feature may occur as a type or an instance. Feature type or feature instance
  <rdfs:isDefinedBy>http://standards.iso.org/iso/19109/ed-2/en/</rdfs:isDefinedBy>
  <iso19150-2:constraint>name is mandatory</iso19150-2:constraint>
  <rdfs:subClassOf rdf:resource="http://def.isotc211.org/iso19109/2015/GeneralFeatureModel#IdentifiedType"/>
  <rdfs:subClassOf>
    <owl:Restriction>
      <owl:onProperty rdf:resource="http://def.isotc211.org/iso19109/2015/GeneralFeatureModel#FeatureType.isAbstract"/>
      <owl:cardinality rdf:datatype="http://www.w3.org/2001/XMLSchema#nonNegativeInteger">1</owl:cardinality>
    </owl:Restriction>
  </rdfs:subClassOf>
</owl:Class>
```



 Improve keywords taxonomy

Large keywords, subject broad subjects

Only ANSI/NISO Z39.19 Saurus conventions



404

Page not found :(
The requested page could not be found.

 Link with other taxonomies

 Publish in SKOS RDF

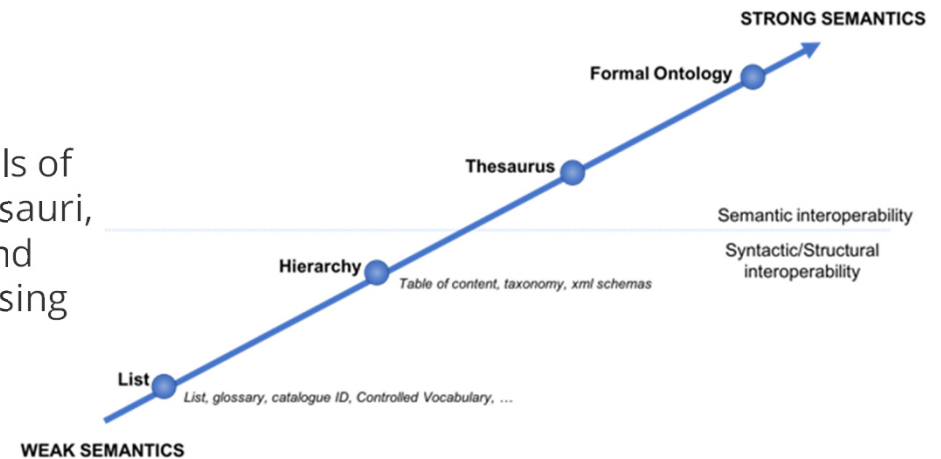
nach „Kneebone, Les. Consolidating approaches how the Public Policy Taxonomy was made, [Vocabulary Symposium 2022](#)“



Semantisches Ecosystem, Anforderungen

Semantic artefacts defined

Semantic artefacts are machine readable models of knowledge such as controlled vocabularies, thesauri, and ontologies which facilitate the extraction and representation of knowledge within data sets using annotations or assertions. [<https://www.fairsfair.eu/>]

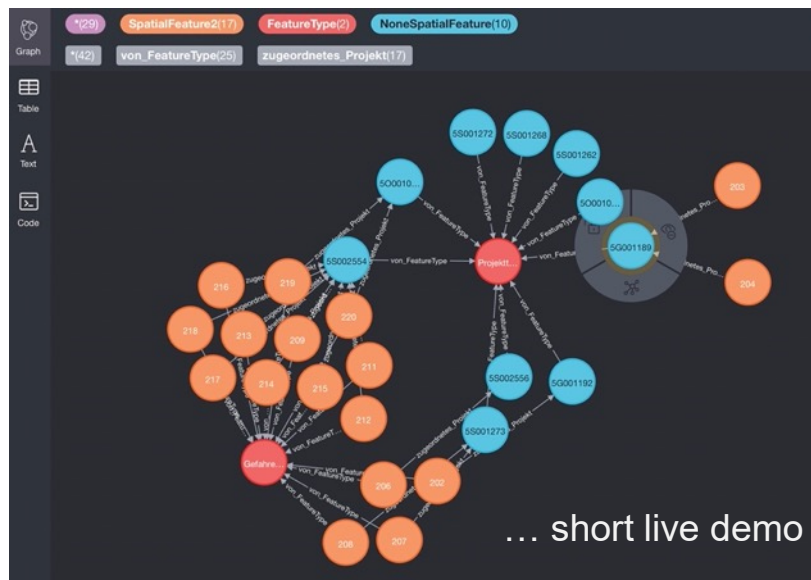


- Plus Metadaten Profile & Schemen,
- Versionierung von Konzepten
- Historie - Provenance Models
- Reference (indexing) of concepts
- Semantic Mapping / Crosswalk zwischen semantic artefacts (persistente services & scripts)
- Interlinking services, e.g. PID Graphs
- Annotation systems/services
- Governance & Maintenance Modelle

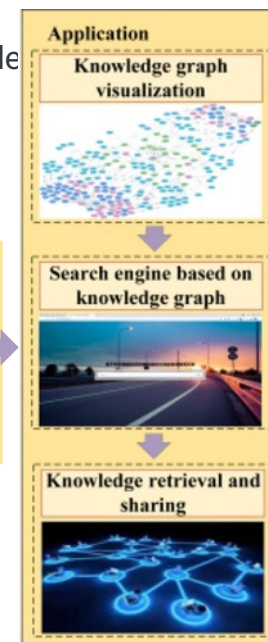


Knowledge Graphen für Geodaten

- ist eine strukturierte Beschreibung identifizierbarer Abhängigkeiten und Beziehungen von Elementen (semantic artefacts). Neben den formalisierten, nach semantischen Standards, beschriebenen Modelle, wird der Vorteil in dem einfachen Zugang (Verständnis) der Konzepte und der Abfragemöglichkeiten (Antworten auf einen Blick) gesehen.



Extracting Knowledge
by
Entity extraction
Relation extraction
Attribute extraction



Nach Yang, Z., et al. (2022).
<https://doi.org/10.1038/s41598-022-11604-y>

