SUB | NIEDERSÄCHSISCHE STAATS- UND UNIVERSITÄTSBIBLIOTHEK GÖTTINGEN

Research data in library context

Dr Jan Brase, Head of R&D

10th Anniversary IGeLU Conference in Budapest, Hungary. September 2nd

Science Paradigms

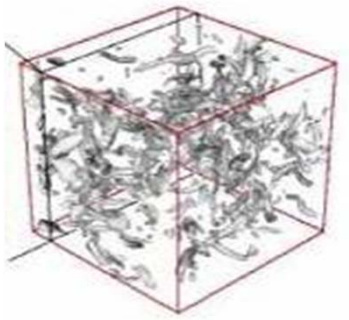
- Thousand years ago:
  science was **empirical**
  describing natural phenomena

- Last few hundred years:
  theoretical branch
  using models, generalizations

- Last few decades:
  a **computational** branch
  simulating complex phenomena

- Today:
  data exploration (eScience)
  unify theory, experiment, and simulation

$$\left(\frac{\dot{a}}{a}\right)^2 = \frac{4\pi G\rho}{3} - \mathrm{K}\frac{c^2}{a^2}$$



- ***Jim Gray**, eScience Group, Microsoft Research*

Consequences for Libraries

- Scientific Information is more than a journal article or a book
- Libraries should open their catalogues to any kind of information

- The catalogue of the future is NOT ONLY a window to the library‘s holding, but

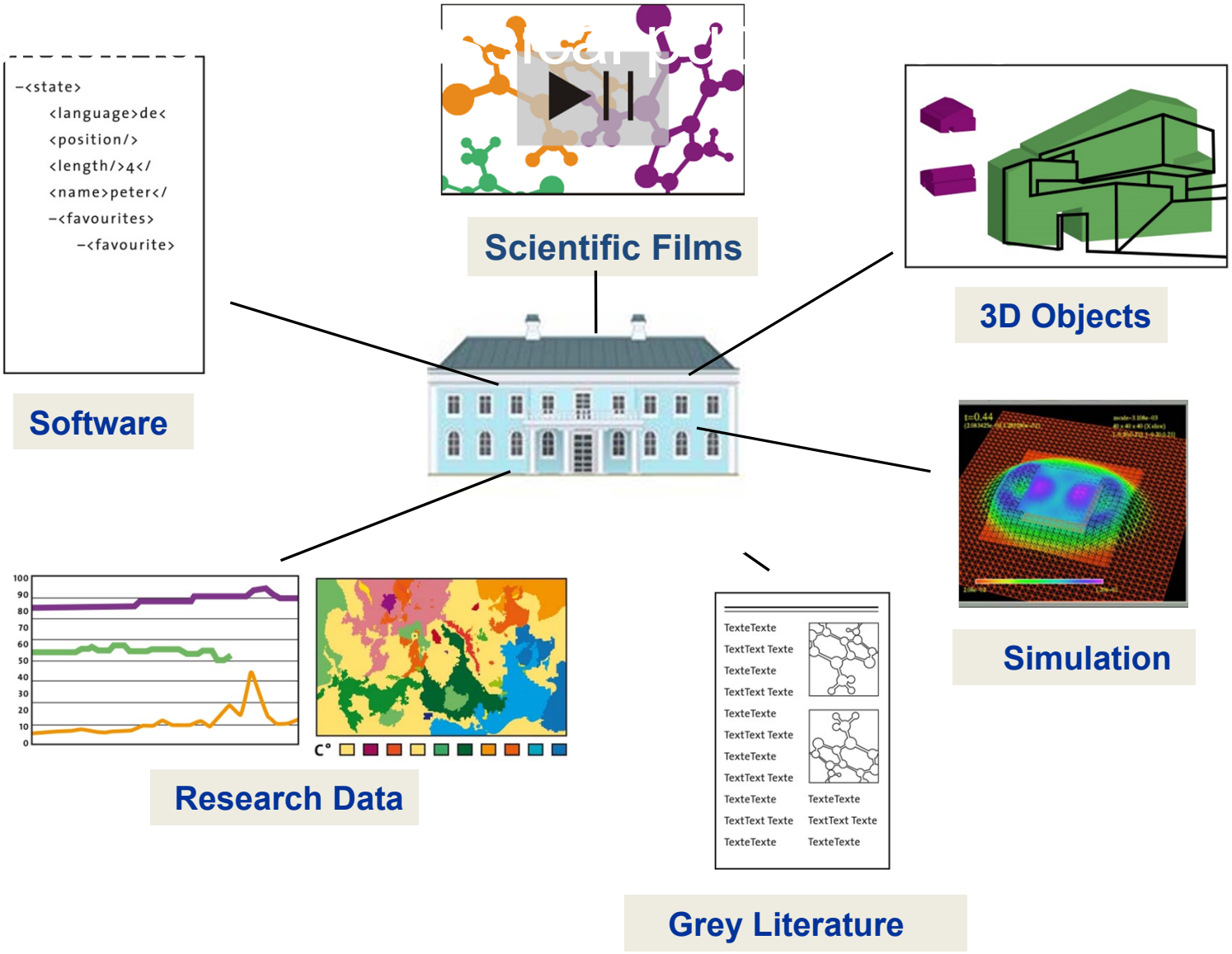
- A portal in a net of trusted providers of scientific content

We do not have it

BUT

We know where you can find

And here is the link to it!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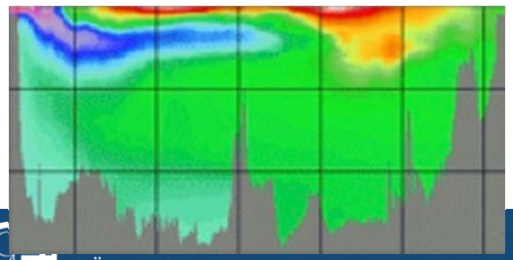
Software
Scientific Films
3D Objects
Simulation
Research Data
Grey Literature
TexteTexte
TextText Texte

Why is this a role for libraries?

- Libraries have a history in bringing information to the public
- Libraries have a tendency to be persistent
  - A project will be forgotten in 40 years, the library will very likely still exist then
- Library are very trustworthy organisations

What type of data are we talking about?

- Earth quake events => doi:10.1594/GFZ.GEOFON.gfz2009kciu
- Climate models => doi:10.1594/WDCC/dphase_mpeps
- Sea bed photos => doi:10.1594/PANGAEA.757741
- Distributes samples => doi:10.1594/PANGAEA.51749
- Medical case studies => doi:10.1594/eaacinet2007/CR/5-270407
- Computational model => doi:10.4225/02/4E9F69C011BC8
- Audio record => doi:10.1594/PANGAEA.339110
- Grey Literature => doi:10.2314/GBV:489185967
- Videos => doi:10.3207/2959859860



Anything that is the foundation of further reserach is research data

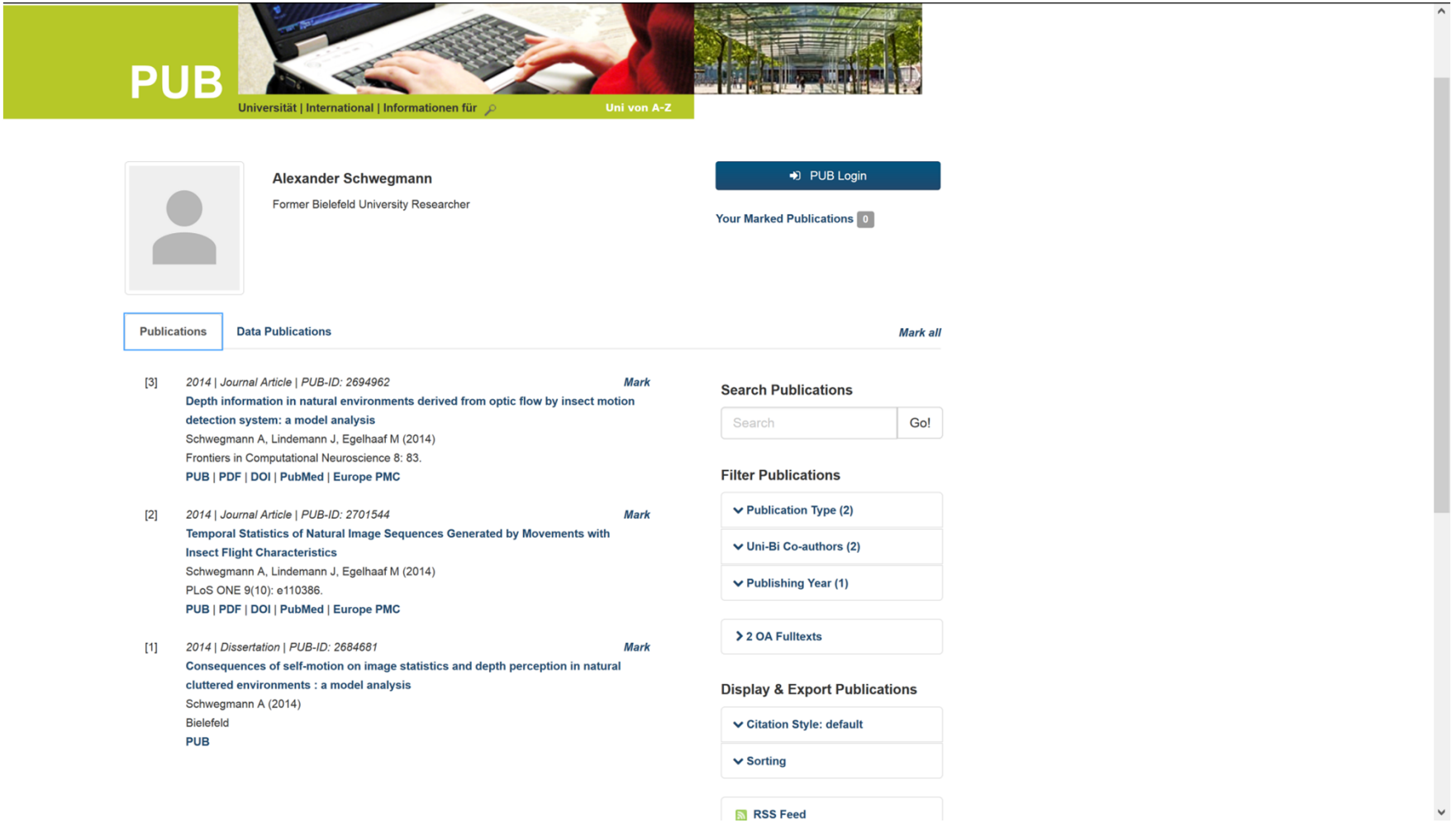
Data is evidence

Examples

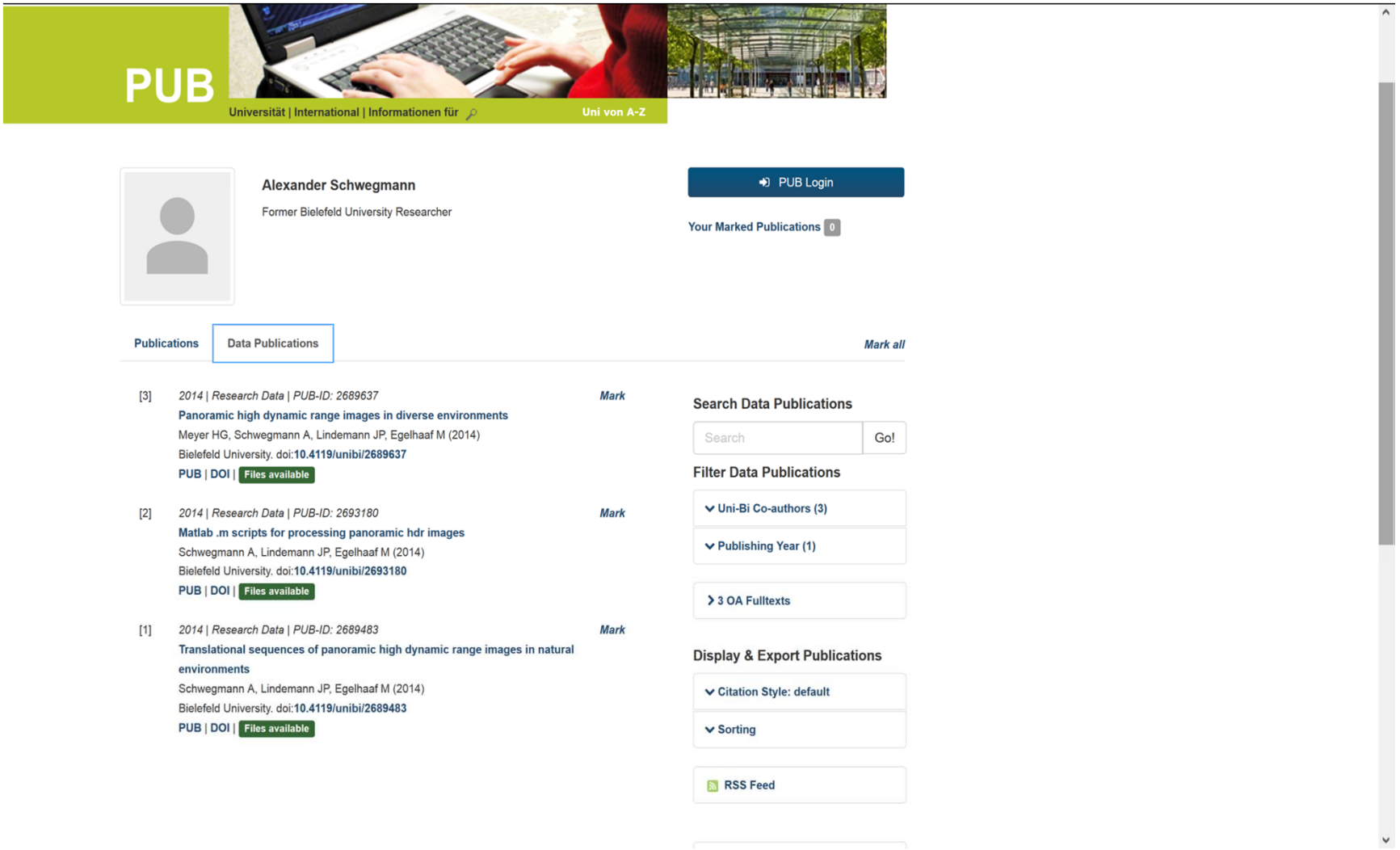
German National Library of Science and Technology


GFZ
Helmholtz Centre
POTSDAM
Impressum
HELMHOLTZ CENTRE POTSDAM
GFZ GERMAN RESEARCH CENTRE
FOR GEOSCIENCES
Dataset
SAFOD borehole trajectory data in absolute coordinates (UTM) and in coordinates relative to drilling platform
Released
Cite as:
SAFOD (2007): SAFOD borehole trajectory data in absolute coordinates (UTM) and in coordinates relative to drilling platform. Deutsches GeoForschungsZentrum GFZ. http://dx.doi.org/10.1594/GFZ.SDDB.1081
Data Files
data.csv 117724 Bytes
License: cc-by
Related Work
Find More Research Data
http://bib.telegrafenberg.de/finden/datenbanken/forschungsdaten/
Abstract
SAFOD is motivated by the need to answer fundamental questions about the physical and chemical processes controlling faulting and earthquake generation within a major plate-bounding fault. SAFOD will drill and instrument an inclined borehole across the San Andreas Fault Zone to a depth of 3.2 km, targeting a repeating microearthquake source. The drill site is located west of the vertical San Andreas Fault on a segment of the fault that moves through a combination of aseismic creep and repeating microearthquakes. It lies at the extreme northern end of the rupture zone of the 1966, Magnitude 6 Parkfield earthquake, the most recent in a series of events that have ruptured the fault five times since 1857. The Parkfield region is the most comprehensively instrumented section of a fault anywhere in the world, and has been the focus of intensive study for the past two decades. This data set contains SAFOD borehole trajectory data.
Keywords
Solid Earth, Deep Drilling, Geology, Azimuth, Dog Leg Severity, Easting (Departure), Easting UTM NAD27, Inclination, Land based, Northing (Latitude), Northing UTM NAD27, San Andreas Fault-Zone Observatory at Depth, True Vertical Depth, Vertical Section
GCMD Science Keywords
EARTH SCIENCE > Solid Earth > Deep Drilling > Well-Logging
More Metadata
iso19115: view inline / download xml
datacite: view inline / download xml
dif: view inline / download xml
escidoc: view inline / download xml
Location
Northern Latitude: 35.9713 Southern Latitude: 35.9712
Eastern Longitude: -120.5512 Western Longitude: -120.5513

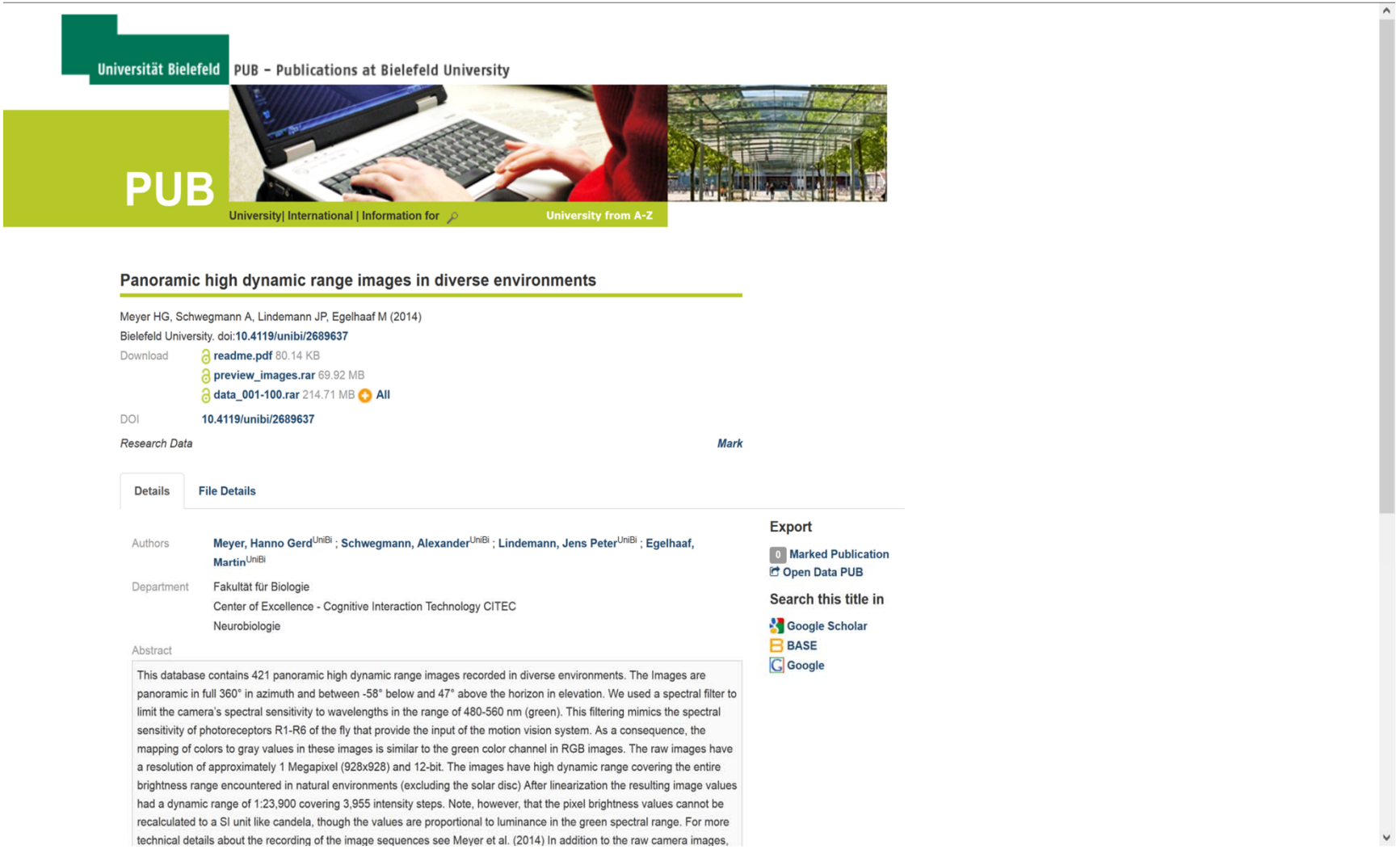
University Library of Bielefeld



University Library of Bielefeld



University Library of Bielefeld

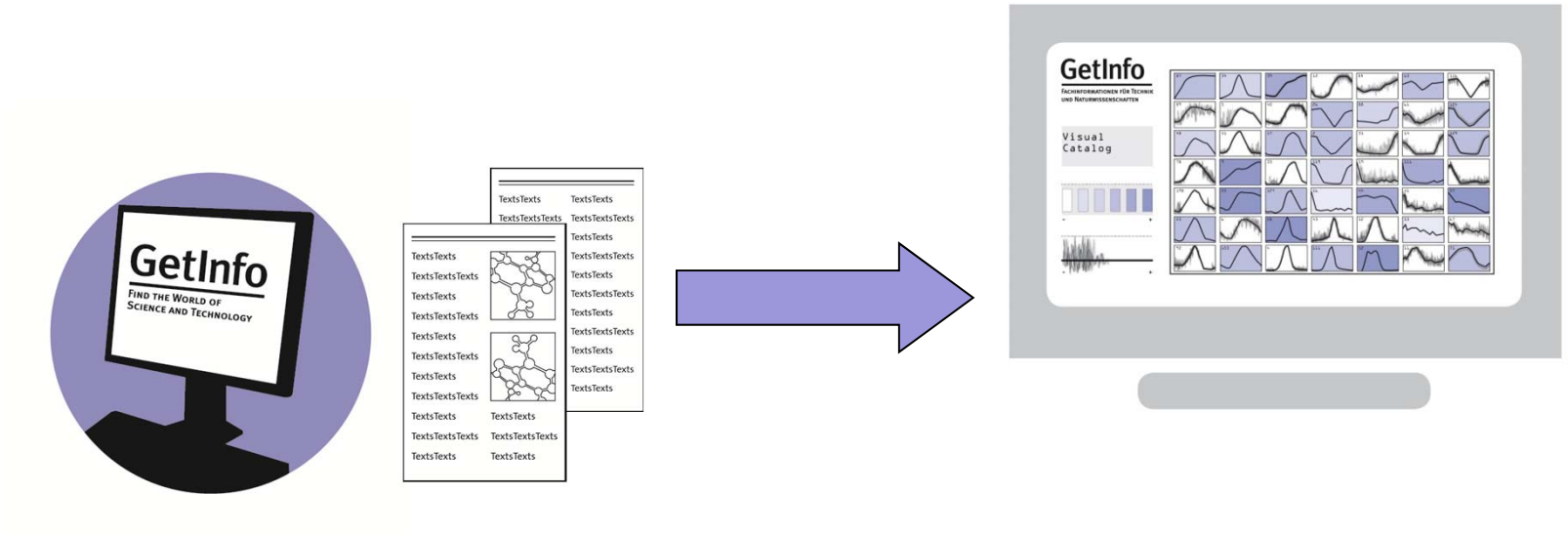


Research data in Library context- Tools

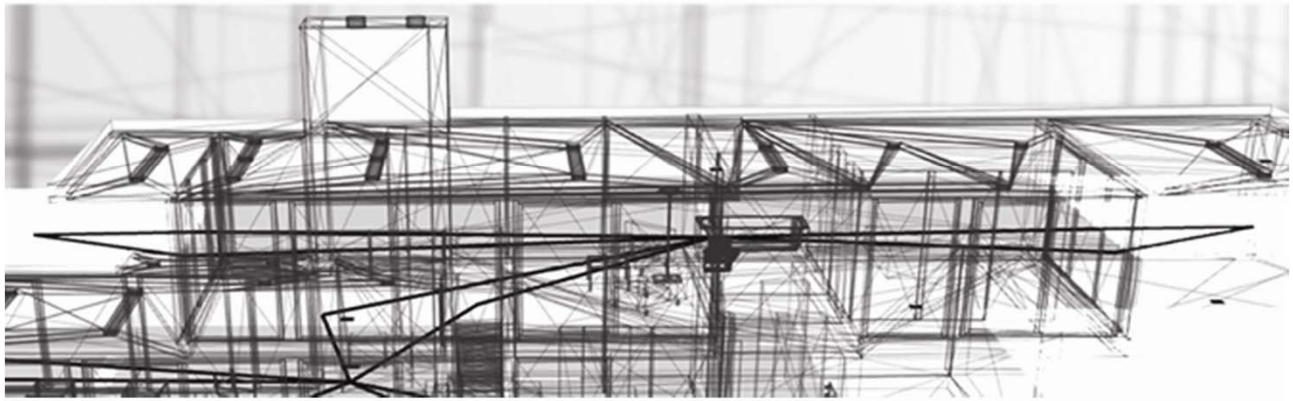
- Make more scientific and technical content searchable

  – Develop tools to address each type of scientific and technical Information

  ➔ Present systems are designed to handle text formats

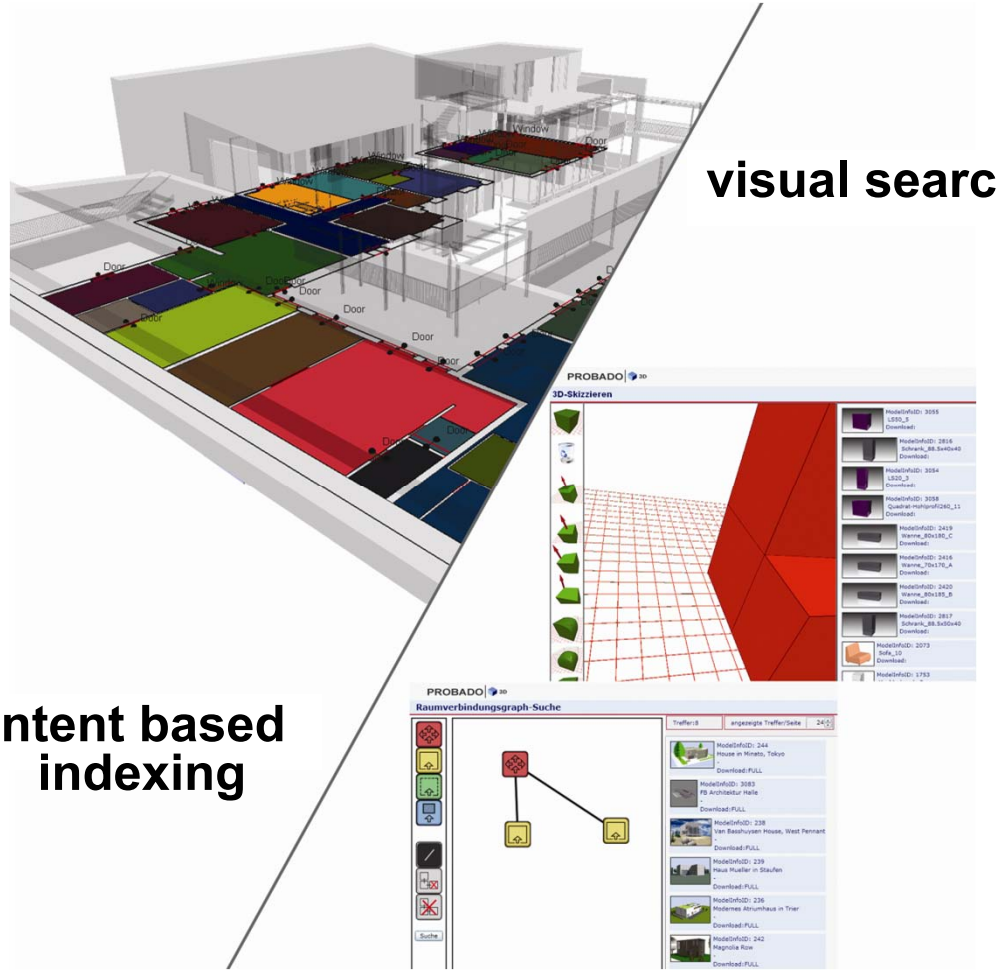


PROBADO | 3D

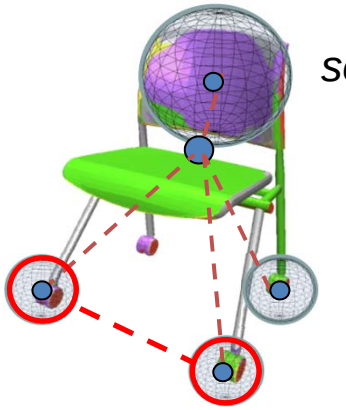


TECHNISCHE UNIVERSITÄT DARMSTADT | universitätbonn | TU Graz | TIB Technische Informationsbibliothek | DFG

Indexing and search

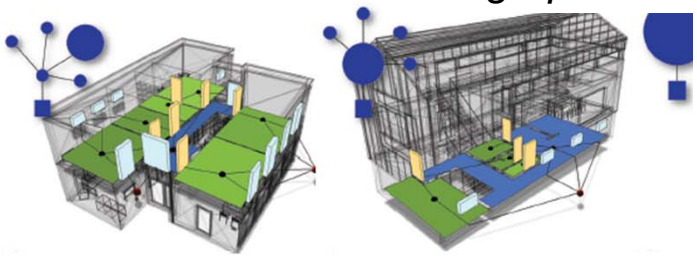


> content based indexing



segmentation with
form-primitives

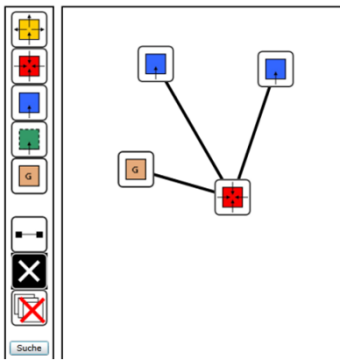
extraction of
room connectivity graphs



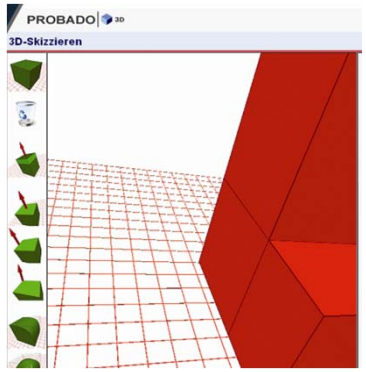
(a) corridor type (b) distributor type

classification of floor types
→ machine learning

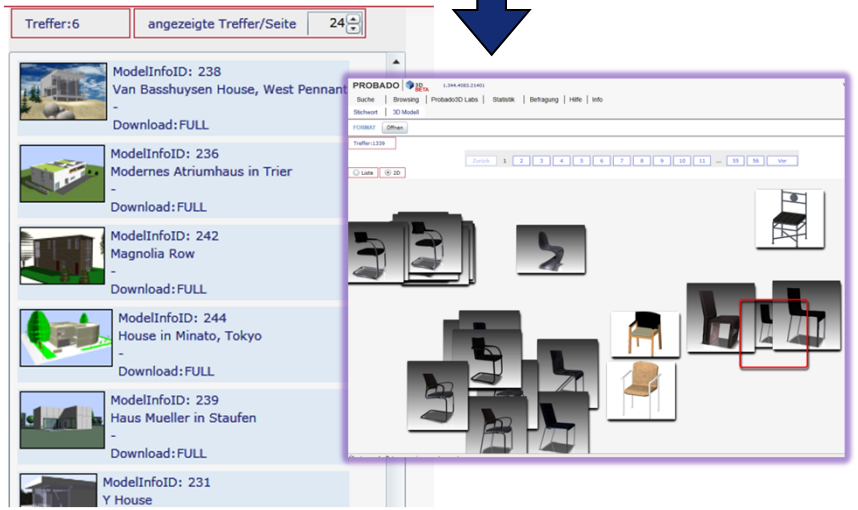
> visual search



attributed graph



3D sketch



result visualization

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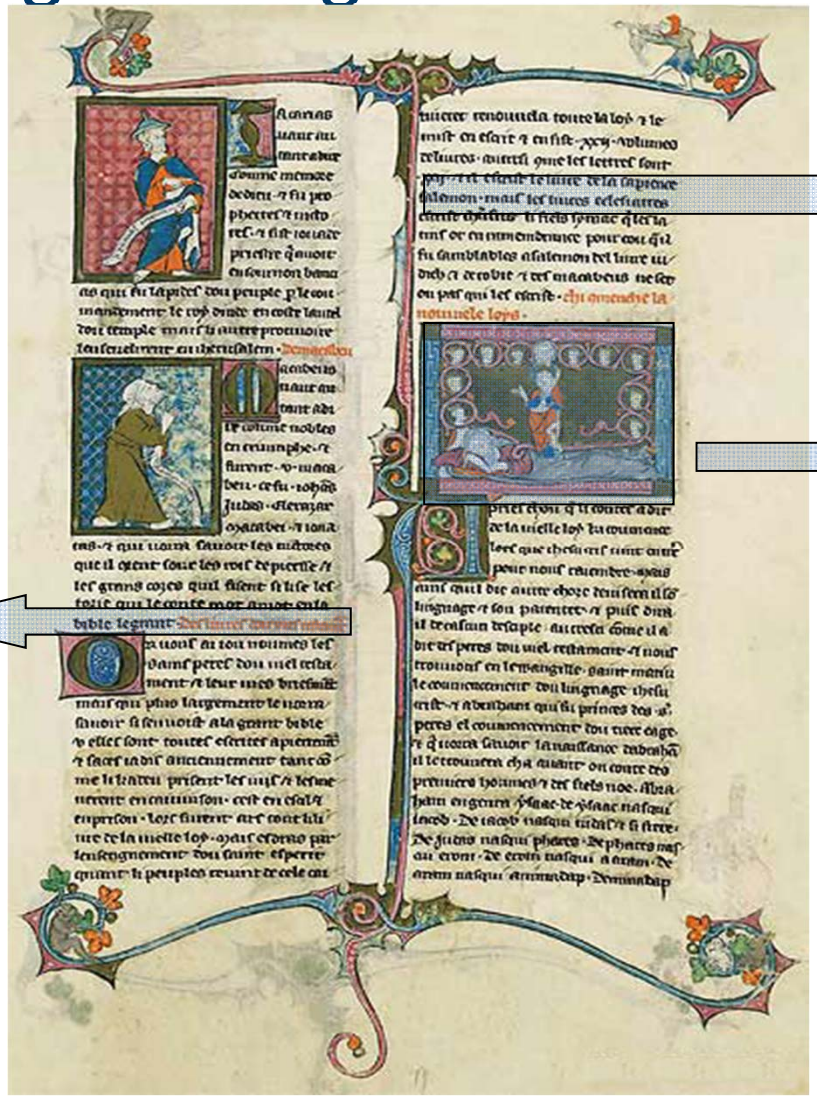


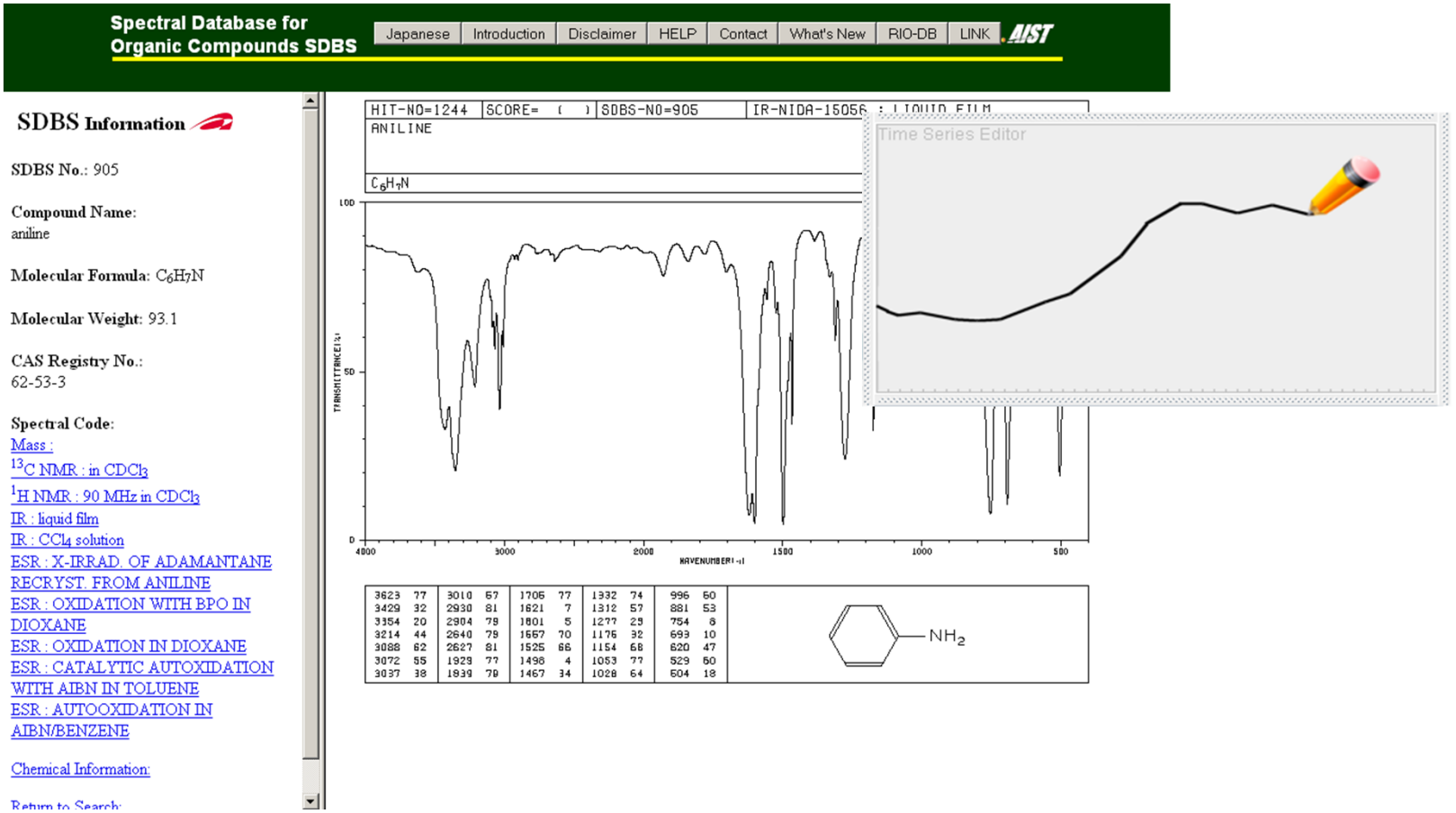
Historical Places

Links to other Digital objects

Historical People

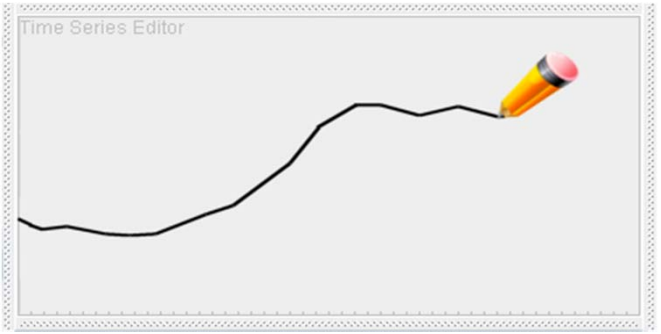
Chemical search

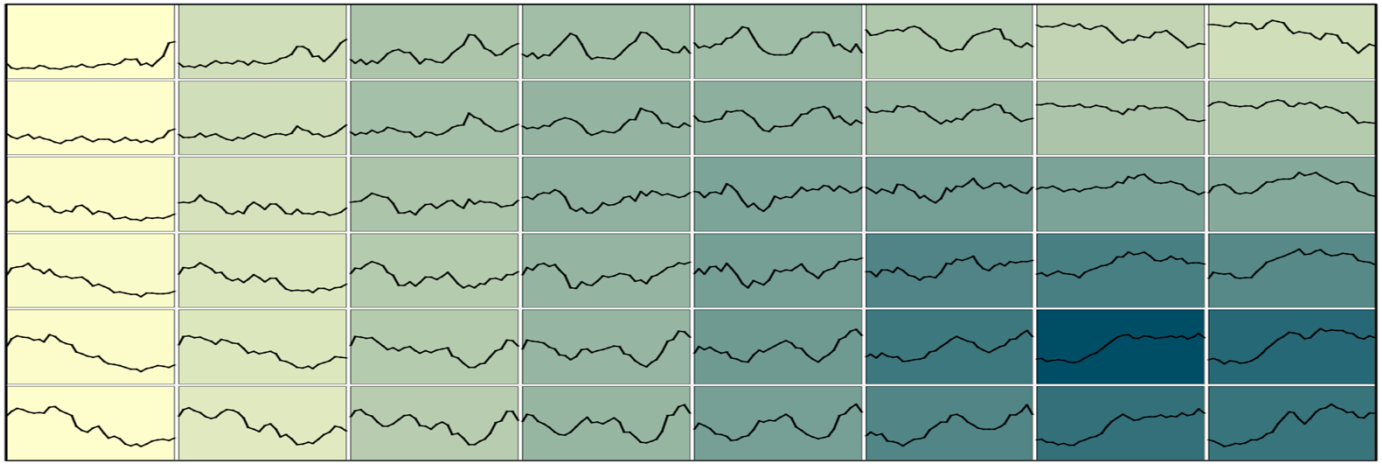
Content based search



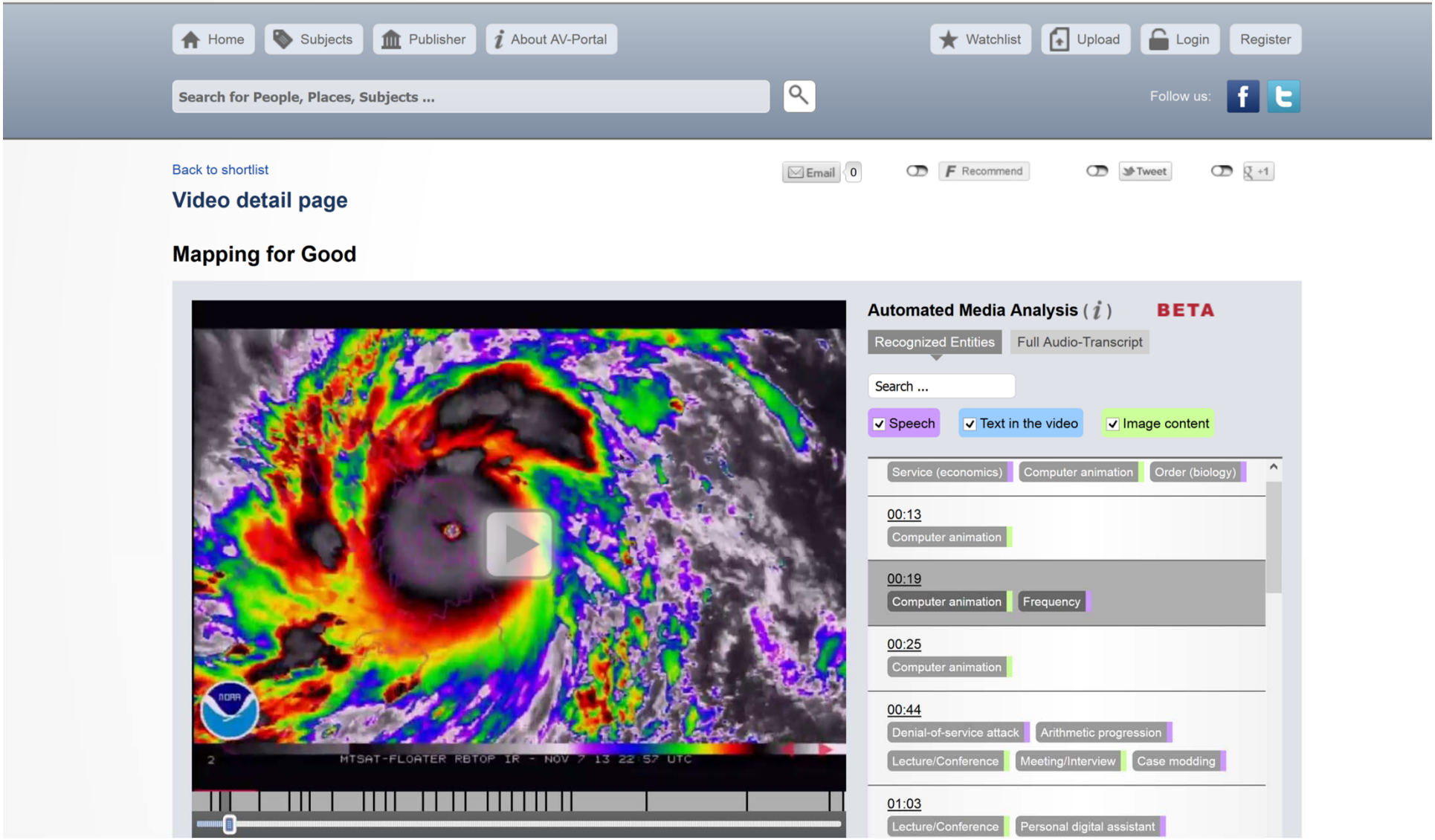
Visual Search in Time series

- Query-by-Example, Query-by-Sketch
- Visual Catalog as result list
- Colormaps for the indication of similarity





Video cataloging with automatic indexing



DataCite

What if any kind of scientific content would be citable?

- High visability of the content
- Easy re-use and verification.
- Scientific reputation for the collection and documentation of content (Citation Index)
- Encouraging the *Brussels declaration on STM publishing*
- Avoiding duplications
- Motivation for new research

DOI names for citations

URLs are not persistent

- (e.g. Wren JD: **URL decay in MEDLINE- a 4-year follow-up study**. Bioinformatics. 2008, Jun 1;24(11):1381-5).

Digital Object Identifiers (DOI names) offer a solution

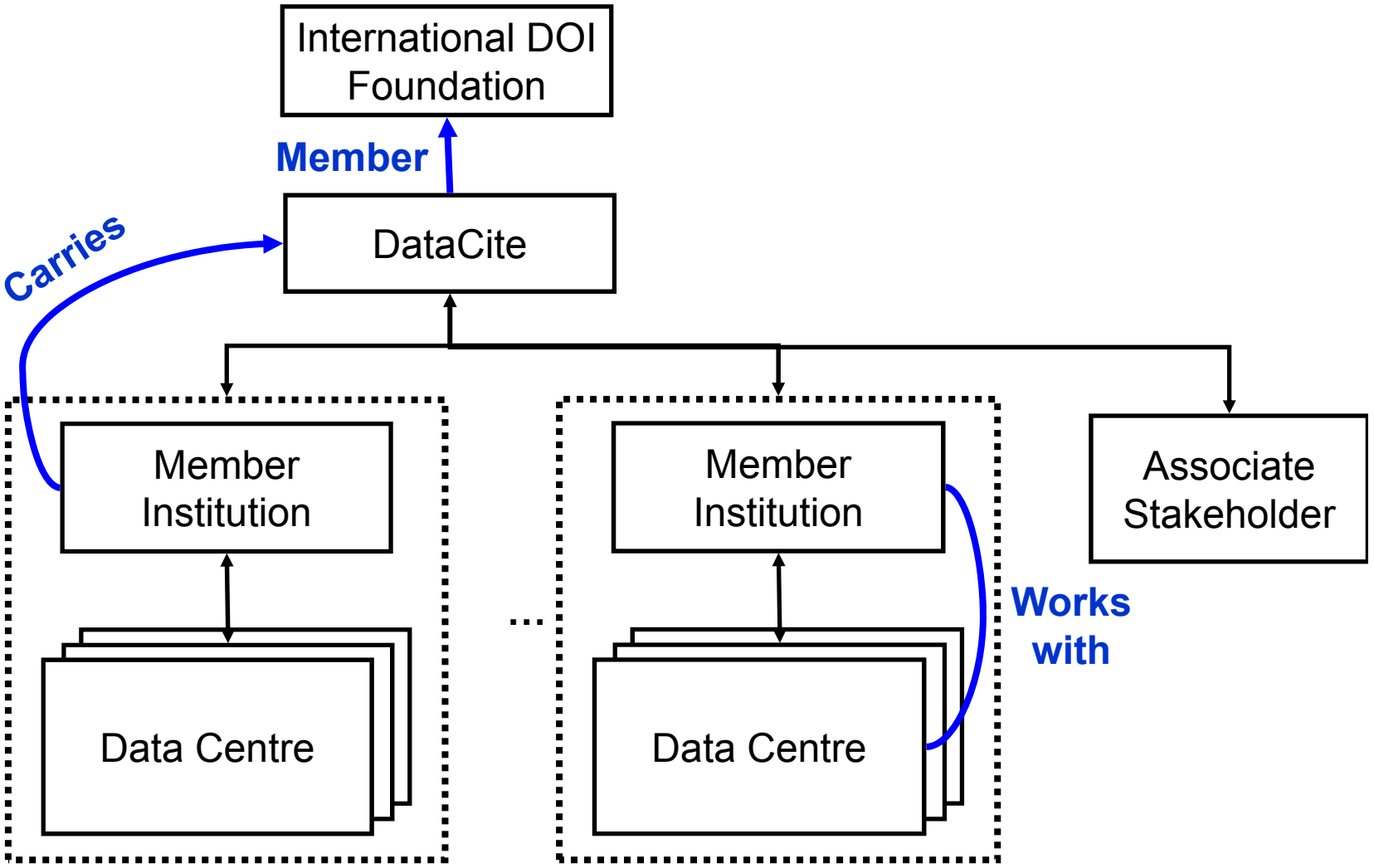
- Mostly widely used identifier for scientific articles
- Researchers, authors, publishers know how to use them
- Put datasets on the same playing field as articles

Dataset
Yancheva et al (2007). Analyses on sediment of Lake Maar. PANGAEA.
doi:10.1594/PANGAEA.587840

DataCite

- Global consortium carried by local institutions mostly libraries
- focused on improving the scholarly infrastructure around datasets and other non-textual information
- focused on working with data centres and organisations that hold content
- Providing standards, workflows and best-practice
- Initially, but not exclusivly based on the DOI system
- Founded December 1st 2009 in London

DataCite structure



DataCite members

1. Technische Informationsbibliothek (TIB), Gemany
2. Göttingen State and University Library (SUB), Germany
3. ZB MED, Germany
4. ZBW, Germany
5. Gesis, Germany
6. Library of TU Delft, The Netherlands
7. Technical Information Center of Denmark
8. The British Library
9. Library of ETH Zürich
10. L'Institut de l'Information Scientifique et Technique (INIST), France
14. Swedish National Data Service (SND)
15. Australian National Data Service (ANDS)
16. Conferenza dei Rettori delle Università Italiane (CRUI)
17. National Research Council of Thailand (NRCT)
18. The Hungarian Academy of Sciences
19. University of Tartu, Estonia
20. Bibsys, Norway
21. Canada Institute for Scientific and Technical Information (CISTI),
22. California Digital Library, USA
23. Purdue University, USA
24. Office of Scientific and Technical Information (OSTI), USA
25. Japan Link Center (JaLC)
26. South African Environmental Observation Network (SAEON)
27. European Organisation for Nuclear Research (CERN)

Affiliated members:

1. Digital Curation Center (UK)
2. Microsoft Research
3. Interuniversity Consortium for Political and Social Research (ICPSR)
4. Korea Institute of Science and Technology Information (KISTI)
5. Bejiing Genomic Institute (BGI)
6. IEEE
7. Harvard University Library
8. GWDG

Example

The dataset:

Storz, D et al. (2009):

Planktic foraminiferal flux and faunal composition of sediment trap L1_K276 in the northeastern Atlantic.

http://dx.doi.org/10.1594/PANGAEA.724325

Is supplement to the article:

Storz, David; Schulz, Hartmut; Waniek, Joanna J; Schulz-Bull, Detlef; Kucera, Michal (2009): *Seasonal and interannual variability of the planktic foraminiferal flux in the vicinity of the Azores Current.*

Deep-Sea Research Part I-Oceanographic Research Papers, **56(1),** 107-124,

http://dx.doi.org/10.1016/j.dsr.2008.08.009

More Data example

- **Higgs particle**

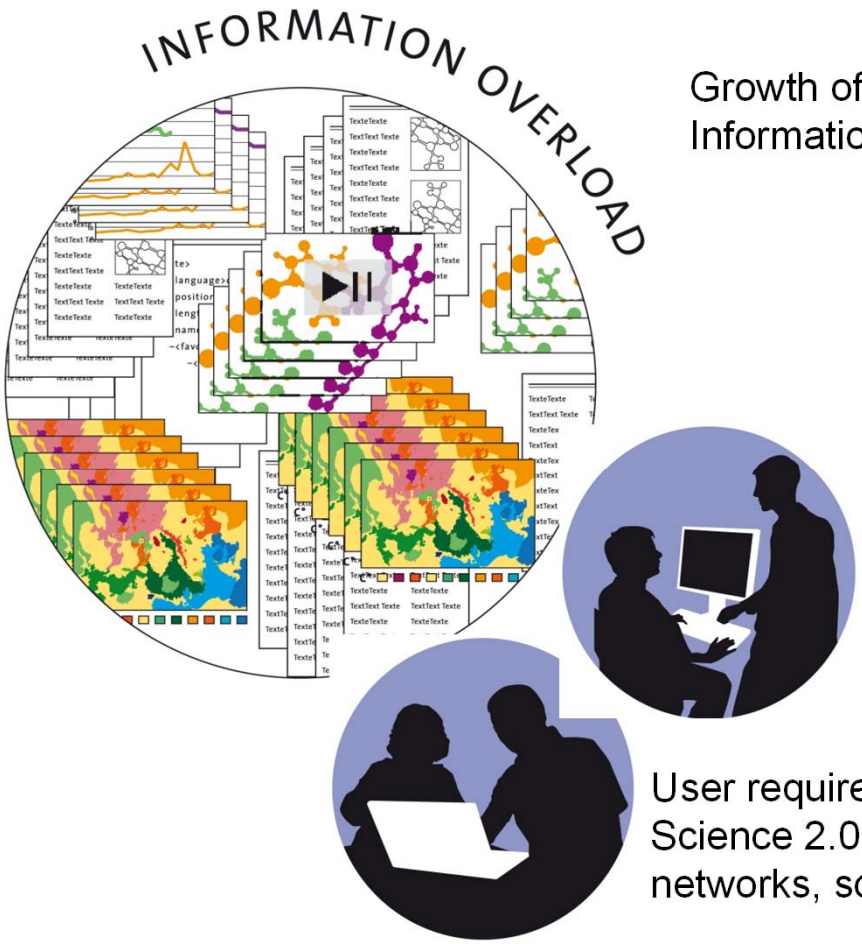
  ATLAS Collaboration (2013) HepData,
  http://doi.org/10.7484/INSPIREHEP.DATA.A78C.HK44

- **ECOLI outbreak**

  Li, D et al (2011):
  Genomic data from Escherichia coli O104:H4 isolate TY-2482.
  BGI Shenzhen.
  http://dx.doi.org/10.5524/100001

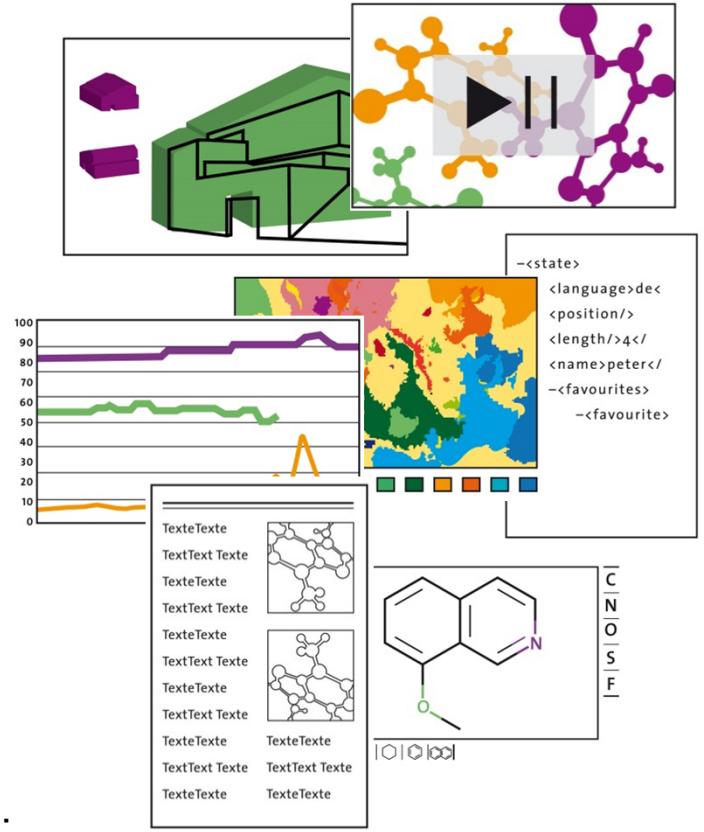
Now what?

The wave



Growth of Information –

User requirements – e. g. : Science 2.0, collaborative networks, social media



Diversity of media types and formats

A threat?

- Information overload is only a problem for manual curation.
- Google is not complaining about data deluge—they're constantly trying to get *more* data.
- The more data you throw, the better the filter gets.
- **To develop and maintain these tools is a classical tasks for libraries!**
- **Don't turn off the taps, build boats.**

It is not only a challenge …

… it is an opportunity

Libraries should ride the wave …

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