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AI in research software
Part X: Research Data Management

RESEARCH DATA UNIT HEIDELBERG

Dr. Sebastian Zangerle
Heidelberg University Library
sebastian.zangerle@ub.uni-heidelberg.de

Dr. Georg Schwesinger
Heidelberg University Library
schwesinger@ub.uni-heidelberg.de

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Research Data Unit at Heidelberg University

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http://data.uni-heidelberg.de/

Project Planning

- Data Management Plans
- Courses & workshops
- Technical &

Data processing

- heiBOX
- heiCLOUD
- SDS@hd
- High Performance Computing

Data Archiving & Publication

- heiDATA
- heidICON
- Archive – your data preserved
- heiARCHIVE

Pictures: © Universität Heidelberg, Kommunikation und Marketing

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Newsletter Research Data Unit (RDU)

Update information regarding RDM at Heidelberg University:

- new services
- current workshops
- Training courses

- Please subscribe to the mailing list: DATA-NEWS@LISTSERV.UNI-HEIDELBERG.DE
- https://listserv.uni-heidelberg.de/cgi-bin/wa?A0=DATA-NEWS

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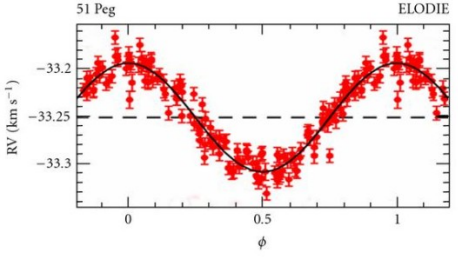

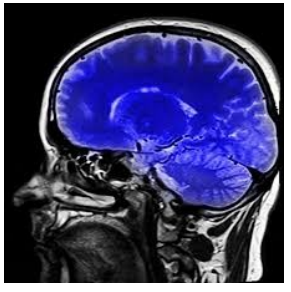

WHAT IS RDM ABOUT?

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Data Driven Research

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The Economist | Topics | Print edition | More

Regulating the internet giants

The world's most valu
resource is no longer

The data economy demands a new appr

Neelie Kroes

nt of the European Commission responsible for the
la

the new gold

Check Against Delivery
Seul le texte prononcé fait foi
Es gilt das gesprochene Wort

Opening Remarks, Press Conference on Open Data Strategy

Brussels, 12th December 2011

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Data Driven Research?

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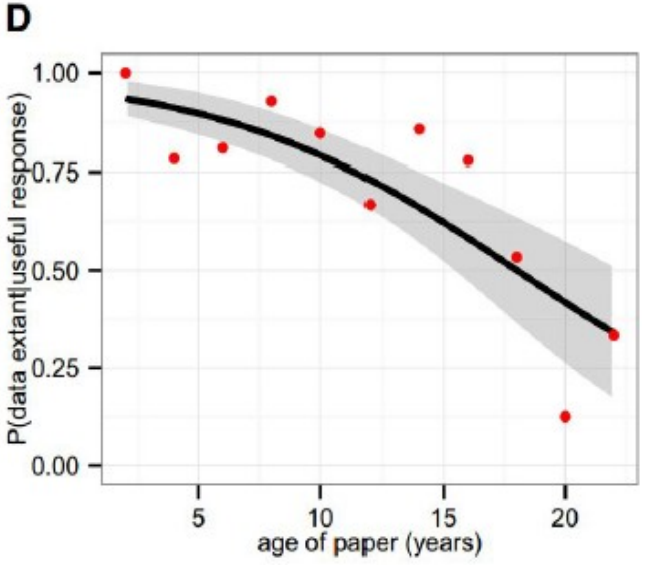
"The underlying data researchers analyze to come to their published conclusions ... **becomes less and less accessible to researchers over the years.**" (Vines et al, 2014; Dehnhard, Weichselgartner & Krampen, 2013; Wicherts et al, 2006)



(D) Predicted probability that the data were extant (either "shared" or "exist but unwilling to share") given that we received a useful response.

Slide: Dehnhard 2014

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Data Driven Research?

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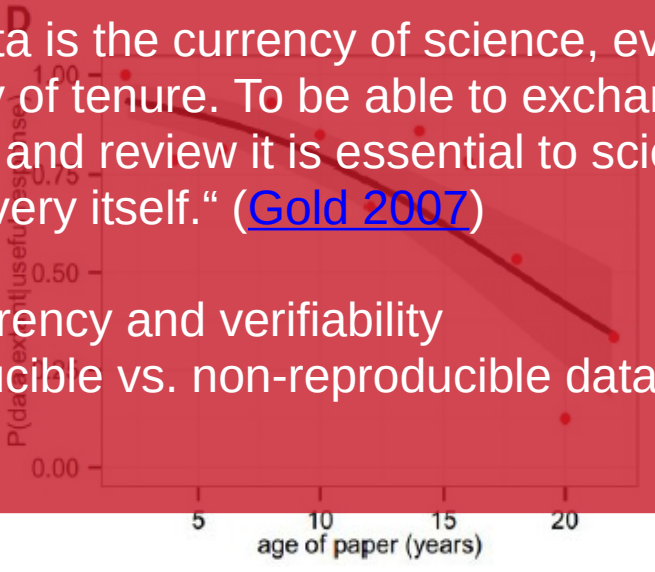
"The underlying data researchers analyze to come to their published conclusions … **becomes less and less accessible to researchers over the years.**" (Vines et al, 2014; Dehnhard, Weichselgartner & Krampen, 2013; Wicherts et al, 2006)

Why is that disastrous?

- „ […] data is the currency of science, even if publications are still the currency of tenure. To be able to exchange data, communicate it, mine it, reuse it, and review it is essential to scientific productivity, collaboration, and to discovery itself.“ (Gold 2007)

- Transparency and verifiability
- Reproducible vs. non-reproducible data
- Re-use



(D) Predicted data were extant (either "shared" or "exist but unwilling to share") given that we received a useful response.

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Slide: Dehnhard 2014

What is research data management?

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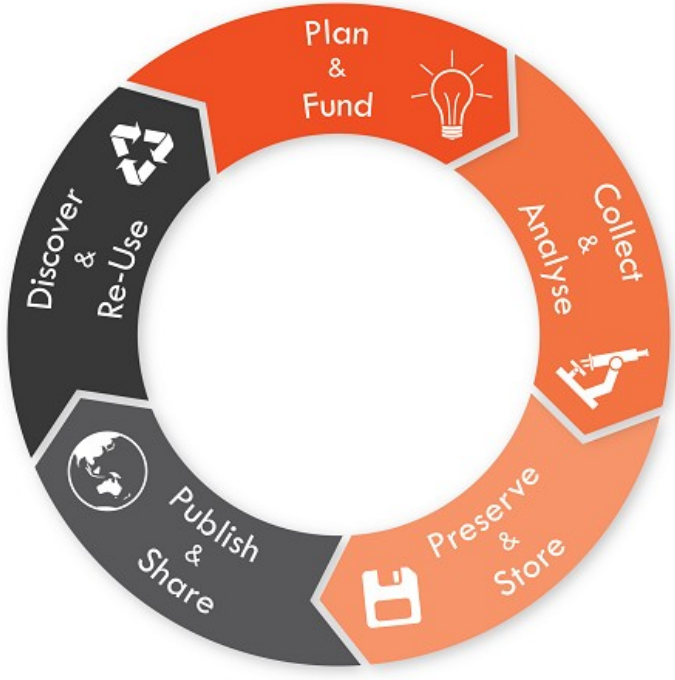
Research data management

"Research data management concerns the organisation of data, from its entry to the research cycle through to the dissemination and archiving of valuable results. It aims to ensure reliable verification of results, and permits new and innovative research built on existing information."

(Whyte, A., Tedds, J. (2011). 'Making the Case for Research Data Management'. DCC Briefing Papers. Edinburgh: Digital Curation Centre.)



https://library.sydney.edu.au/research/data-management/research-data-management.html

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FAIR Data Principles

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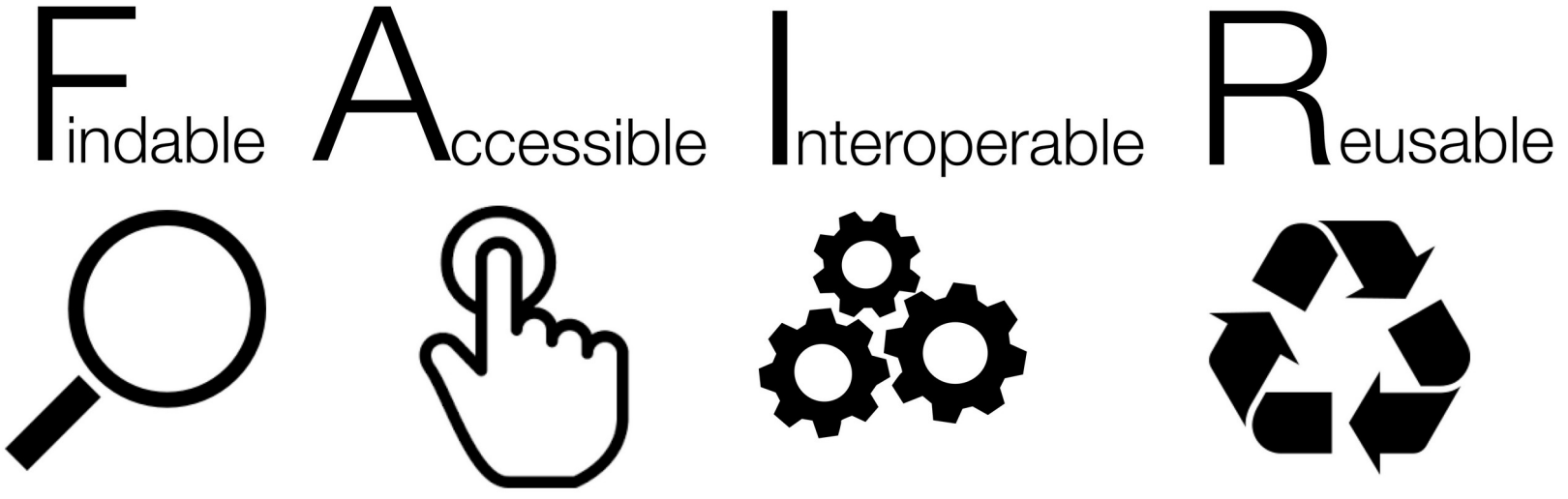

- FAIR Data Principles
- Wilkinson et al. (2016), The FAIR Guiding Principles for scientific data management and stewardship, Scientific Data 3, doi:10.1038/sdata.2016.18
- SNF: Explanation of the FAIR Data Principles

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FAIR Data Principles

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F = findable

Others can discover your data.

- described via rich metadata,
- persistent identifiers (e.g. DOI),
- indexed in catalogues or databases

- FAIR Data Principles
- Wilkinson et al. (2016), The FAIR Guiding Principles for scientific data management and stewardship, Scientific Data 3, doi:10.1038/sdata.2016.18
- SNF: Explanation of the FAIR Data Principles

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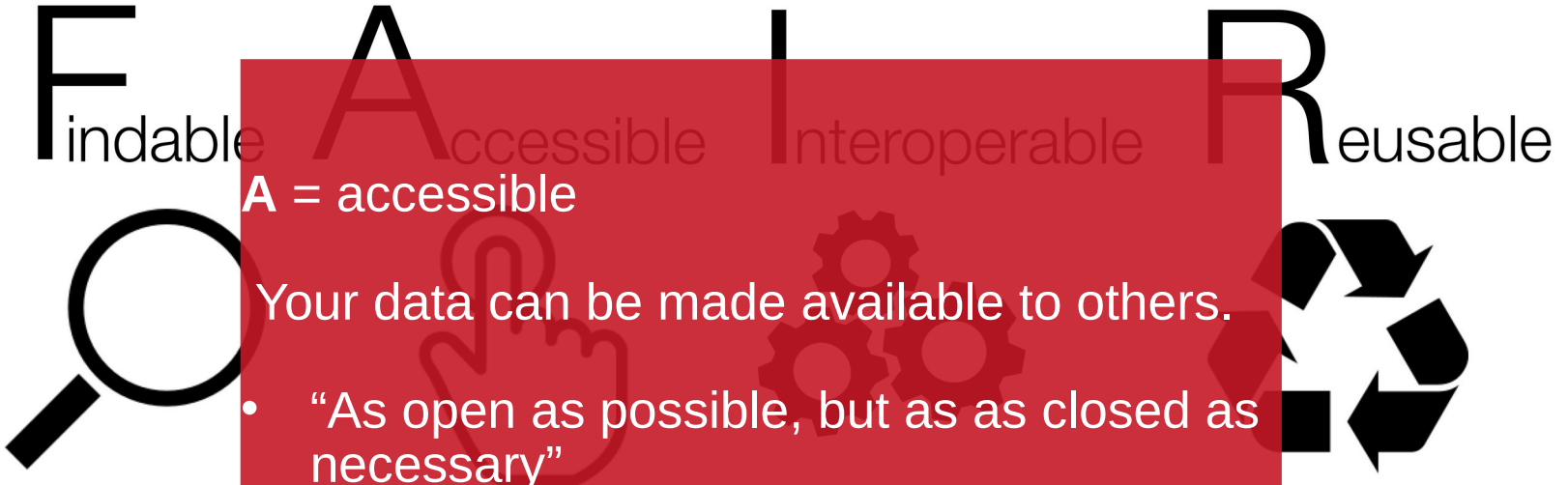
FAIR Data Principles



A = accessible

Your data can be made available to others.

- "As open as possible, but as as closed as necessary"

- FAIR Data Principles
- Wilkinson et al. (2016), The FAIR Guiding Principles for scientific data management and stewardship, Scientific Data 3, doi:10.1038/sdata.2016.18
- SNF: Explanation of the FAIR Data Principles

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FAIR Data Principles

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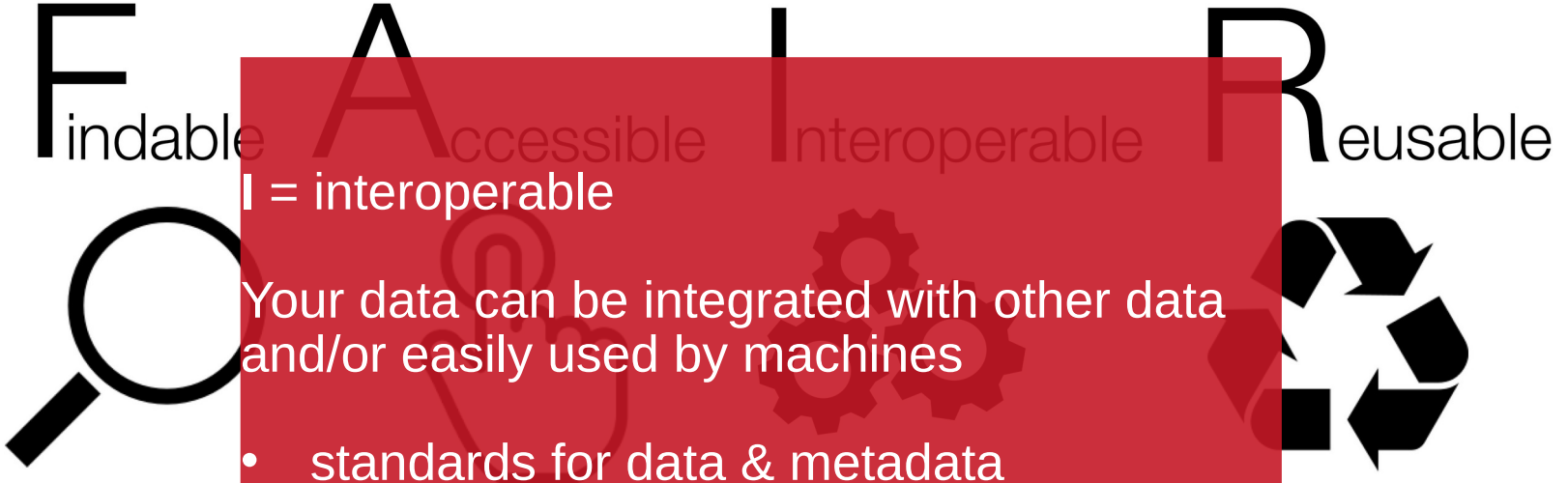

I = interoperable

Your data can be integrated with other data and/or easily used by machines

- standards for data & metadata
- non-proprietary file formats
- references to other (meta-)data

- FAIR Data Principles
- Wilkinson et al. (2016), The FAIR Guiding Principles for scientific data management and stewardship, Scientific Data 3, doi:10.1038/sdata.2016.18
- SNF: Explanation of the FAIR Data Principles

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FAIR Data Principles

R = re-usable

Your data can be used for new research as well as for replications.

- Data are comprehensibly described with relevant attributes,
- domain-relevant standards,
- open licenses,
- provenance

- FAIR Data Principles
- Wilkinson et al. (2016). The FAIR Guiding Principles for scientific data management and stewardship, Scientific Data 3, doi:10.1038/sdata.2016.18
- SNF: Explanation of the FAIR Data Principles

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Picture: Ainsley Seago. doi:10.1371/journal.pbio.1001779.g001

OPEN RESEARCH DATA

NFDI

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Gemeinsame Wissenschaftskonferenz GWK

- **National Research Data Infrastructure**

- The National Research Data Infrastructure (NFDI) has the objective to systematically index, edit, interconnect and make available the valuable stock of data from science and research.
- Funding for subject- and/or methods-specific consortia
- Overall budget: 85 Mio € per year for 10 years
- 27 subject-specific consortia

- https://www.nfdi.de/

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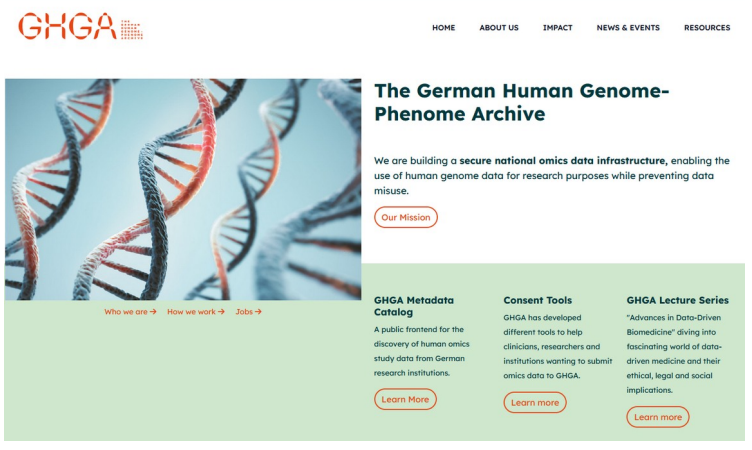

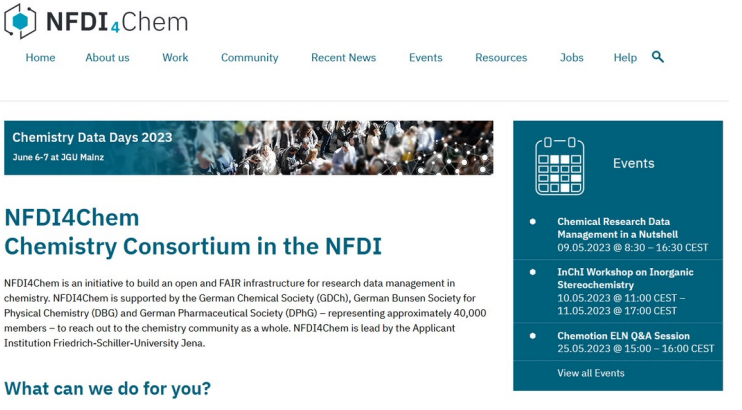

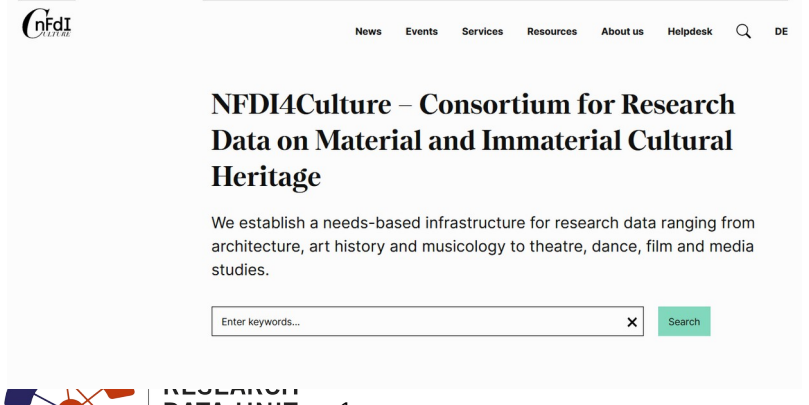

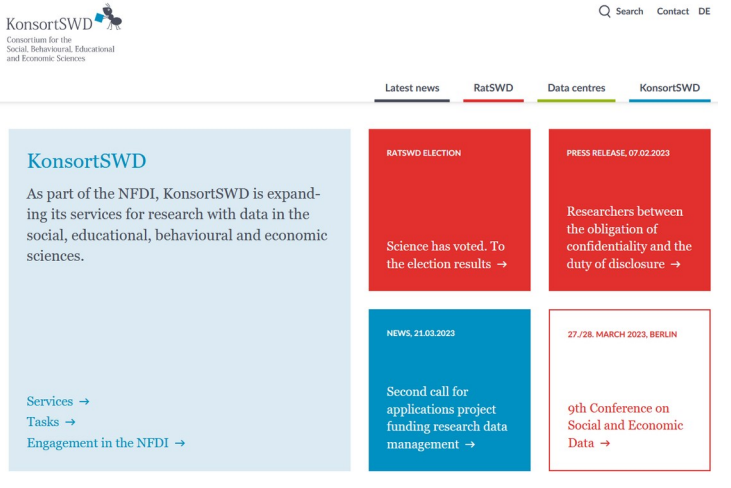

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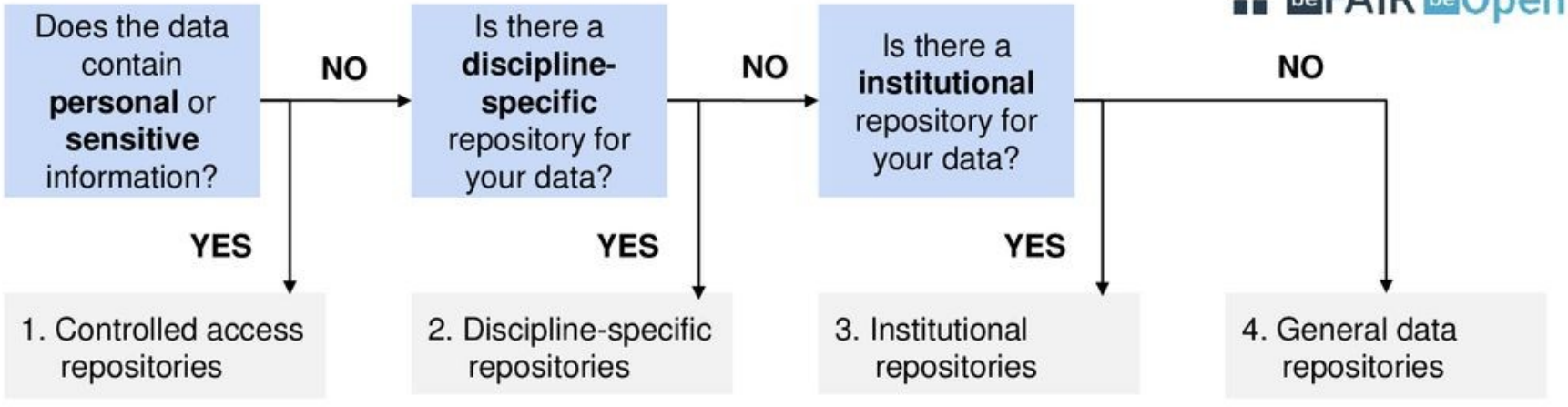
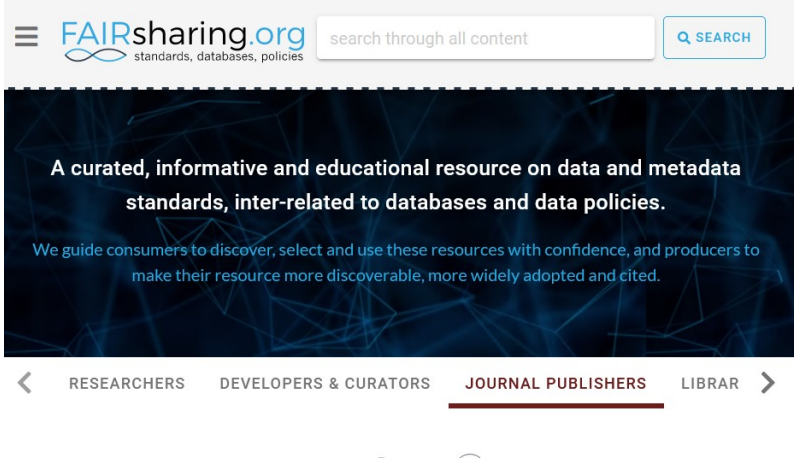
Repositories



Etc...

Slide adapted from: N. Jareborg (2019), „Data management and repositories“, https://player.slideplayer.com/105/17629367/.

Finding repositories



https://www.re3data.org/

https://fairsharing.org/

Publisher Guidelines

- https://www.nature.com/sdata/policies/repositories
- https://journals.plos.org/plosone/s/recommended-repositories
- https://www.springernature.com/gp/authors/research-data-policy/recommended-repositories

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Data publication

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machine learning — Search

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UCI Machine Learning Repository

UC Irvine Machine Learning Repository

Subject(s)	Communication Science; Artificial Intelligence, Image and Language Processing; Computer Science; Social Sciences; Social and Behavioural Sciences; Humanities and Social Sciences; Computer Science, Electrical and System Engineering; Engineering Sciences
Content type(s)	Standard office documents; Archived data; Plain text; Databases
Country	United States

The UCI Machine Learning Repository is a collection of databases, domain theories, and data generators that are used by the machine learning community for the empirical analysis of machine learning algorithms. It is used by students, educators, and researchers all over the world as a primary source of machine learning data sets. As an indication of the impact of the archive, it has been cited over 1000 times.

OpenML

Open Machine Learning

Subject(s)	Education Sciences; Computer Science; Social and Behavioural Sciences; Humanities and Social Sciences; Computer Science, Electrical and System Engineering; Engineering Sciences
Content type(s)	Standard office documents; Structured graphics; Plain text; Software applications; Source code; Configuration data; other; Databases
Country	Belgium; European Union; Netherlands

OpenML is an open ecosystem for machine learning. By organizing all resources and results online, research becomes more efficient, useful and fun. OpenML is a platform to share detailed experimental results with the community at large and organize them for future reuse. Moreover, it will be directly integrated in today's most popular data mining tools (for now: R, KNIME, RapidMiner and WEKA). Such an easy and free exchange of experiments has tremendous potential to speed up machine learning research, to engender larger, more detailed studies and to offer accurate advice to practitioners. Finally, it will also be a valuable resource for education in machine learning and data mining.

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Repository details

OpenML

General | Institutions | Terms | Standards

Name of repository	**OpenML**
Additional name(s)	Open Machine Learning
Repository URL	http://www.openml.org/
Subject(s)	Education Sciences; Computer Science; Social and Behavioural Sciences; Humanities and Social Sciences; Computer Science, Electrical and System Engineering; Engineering Sciences
Description	OpenML is an open ecosystem for machine learning. By organizing all resources and results online, research becomes more efficient, useful and fun. OpenML is a platform to share detailed experimental results with the community at large and organize them for future reuse. Moreover, it will be directly integrated in today's most popular data mining tools (for now: R, KNIME, RapidMiner and WEKA). Such an easy and free exchange of experiments has tremendous potential to speed up machine learning research, to engender larger, more detailed studies and to offer accurate advice to practitioners. Finally, it will also be a valuable resource for education in machine learning and data mining.
Contact	openmachinelearning@gmail.com
Content type(s)	Standard office documents; Structured graphics; Plain text; Software applications; Source code; Configuration data; other; Databases
Keyword(s)	machine learning; meta-learning; experimental methodology; datasets; algorithms; experiments
Repository size	1700000 machine learning experiments on 19630 datasets and 3370 implementations
Repository type(s)	disciplinary
Mission statement for designated community	http://www.openml.org

Repository details

heiDATA

General | Institutions | Terms | Standards

Name of repository	**heiDATA**
Additional name(s)	heiDATA Institutional Repository for Research Data of Heidelberg University
Repository URL	https://heidata.uni-heidelberg.de
Subject(s)	Humanities; Social and Behavioural Sciences; Economics; Jurisprudence; Biology; Medicine; Microbiology, Virology and Immunology; Agriculture, Forestry, Horticulture and Veterinary Medicine; Chemistry; Physics; Geosciences (including Geography); Computer Science, Electrical and System Engineering; Humanities and Social Sciences; Life Sciences; Agriculture, Forestry, Horticulture and Veterinary Medicine; Natural Sciences; Engineering Sciences
Description	heiDATA is Heidelberg University's research data repository. It is managed by the Competence Centre for Research Data, a joint institution of the University Library and the Computing Centre. All researchers affiliated with Heidelberg University can use this service for archiving and publishing their data.
Contact	http://www.data.uni-heidelberg.de/contact.html
Content type(s)	Standard office documents; Databases; Raw data; Structured text; Source code; other; Images; Structured graphics; Audiovisual data; Scientific and statistical data formats; Plain text; Structured text; Archived data
Keyword(s)	data processing; computer science; linguistics; economics; geograhy; history; mathematics; social science; chemistry; earth sciences; modern languages

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heiDATA | Heidelberg Open Research Data

heiDATA (Heidelberg University) Competence Centre for Research Data

Metrics 61,905 Downloads

Contact Share

heiDATA is an institutional repository for Open Research Data from Heidelberg University. It is managed by the Competence Centre for Research Data, a joint institution of the University Library and the Computing Centre. If you are interested in publishing your data here, please see our author instructions and get in touch with us.

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3D Spatial Data Processing

ALFRED-WEBER-INSTITUTE FOR ECONOMICS
AWI Experimental Economics

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Publication Year

1 to 10 of 419 Results Sort

Accuracy of rapid point-of-care antigen-based diagnostics for SARS-CoV-2: an updated systematic review and meta-analysis with meta regression analyzing influencing factors [Research Data]

Feb 25, 2022 - Tropical Medicine

Brümmer, Lukas E.; Katzenschlager, Stephan; McGrath, Sean; Schmitz, Stephani; Gaeddert, Mary; Erdmann, Christian; Bota, Marc; Grilli, Maurizio; Larmann, Jan; Weigand, Markus A.; Pollock, Nira R.; Macé, Aurélien; Erkosar, Berra; Carmona, Sergio; Sacks, Jilian A.; Ongarello, Stefano; Denkinger, Claudia M., 2022, "Accuracy of rapid point-of-care antigen-based diagnostics for SARS-CoV-2: an updated systematic review and meta-analysis with meta regression analyzing influencing factors [Research Data]", https://doi.org/10.11588/data/T3MIB0, heiDATA, V1

Background Comprehensive information about the accuracy of antigen rapid diagnostic tests (Ag-RDTs) for SARS-CoV-2 is essential to guide public health decision makers in choosing the best tests and testing policies. In August 2021, we published a systematic review and meta-analys

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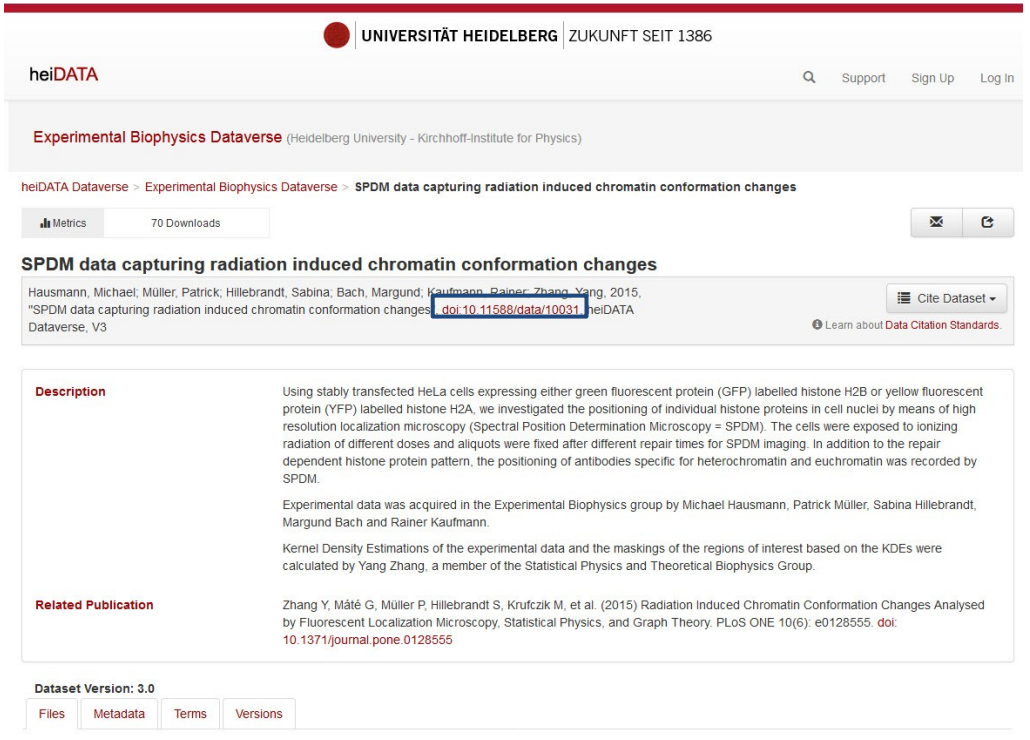

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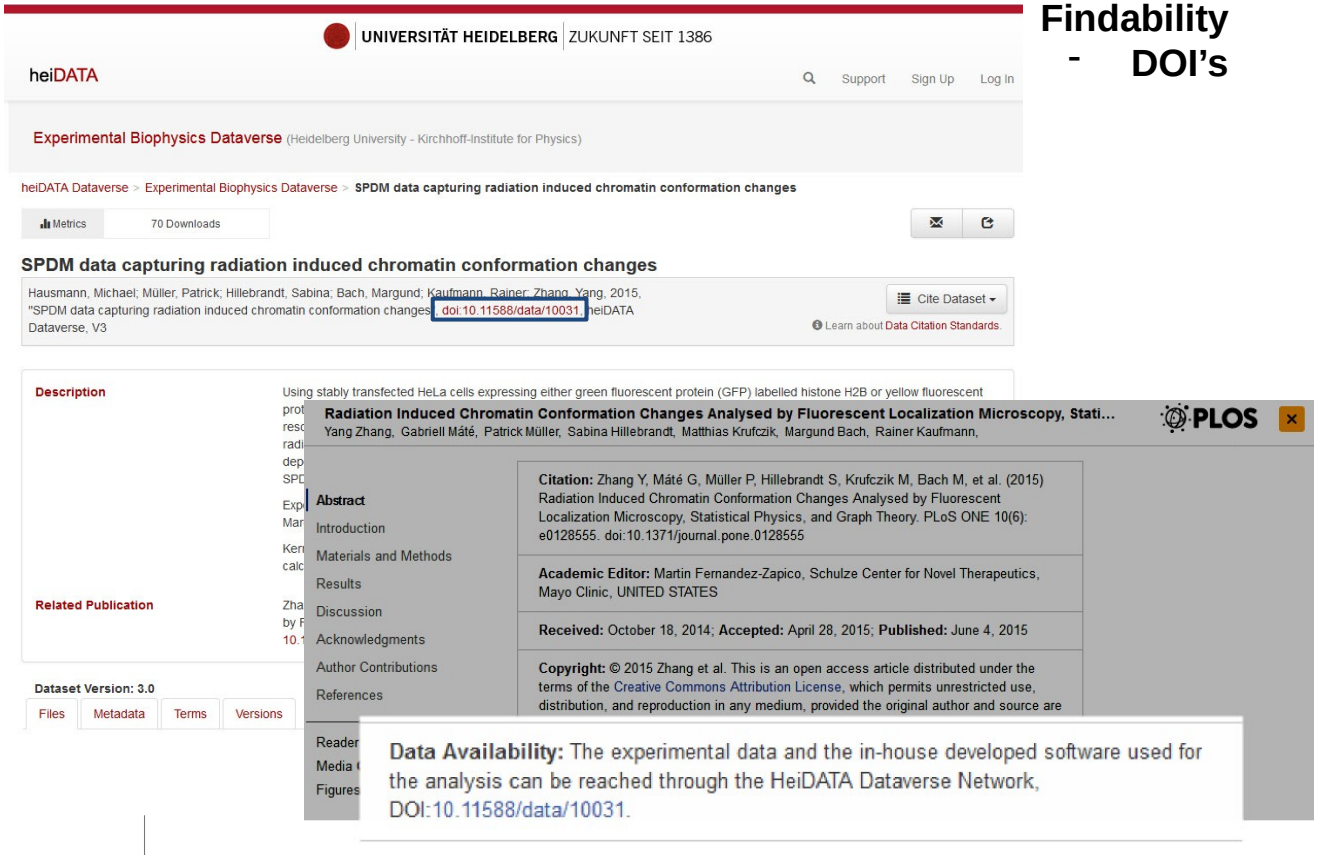

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AGU100 ADVANCING EARTH AND SPACE SCIENCE

JGR

Journal of Geophysical Research: Oceans

RESEARCH ARTICLE

10.1002/2017JC013678

Key Points:
- First bomb-^{14}C peak reconstruction in the high-latitude NW Pacific made with a high-resolution analysis of long-lived bivalve shells
- Relatively high bomb-^{14}C peak, though at high latitude (40°N), is due to water transport by Kuroshio Current
- Bomb-^{14}C record provides a reliable tracer of water mixing

Bomb-^{14}C Peak in the North Pacific Recorded in Long-Lived Bivalve Shells (*Mercenaria stimpsoni*)

Kaoru Kubota[1,2,3], Kotaro Shirai[2], Naoko Murakami-Sugihara[2], Koji Seike[2,4], Masayo Minami[5], Toshio Nakamura[3], and Kazushige Tanabe[5]

[1]Kochi Institute for Core Sample Research, Japan Agency for Marine-Earth Science and Technology, Nankoku, Japan, [2]Atmosphere and Ocean Research Institute, University of Tokyo, Chiba, Japan, [3]Institute for Space-Earth Environmental Research, Nagoya University, Furo-cho, Nagoya, Japan, [4]Now at Geological Survey of Japan, National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan, [5]Department of Earth and Planetary Science, University of Tokyo, Bunkyo, Japan

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AGU100 ADVANCING EARTH AND SPACE SCIENCE

JGR

Journal of Geophysical Research: Oceans

RESEARCH ARTICLE Bomb-^{14}C Peak in the North Pacific Recorded in Long-Lived

Proceedings of the National Academy of Sciences of the United States of America, 112, 9542–9545.

Guilderson, T. P., Schrag, D. P., Kashgarian, M., & Southon, J. (1998). Radiocarbon variability in the western equatorial Pacific inferred from a high-resolution coral record from Nauru Island. *Journal of Geophysical Research, 103*, 24641–24650.

Hammer, S., & Levin, I. (2017). *Monthly mean atmospheric* $\Delta^{14}CO_2$ *at Jungfraujoch and Schauinsland from 1986 to 2016* (heiDATA Dataverse V2). Heidelberg: Heidelberg Univerity. https://doi.org/10.11588/data/10100

Hanawa, K. (1983). Sea surface temperature off Sanriku coast and east of Tsugaru Strait monitored by ferry Ishikari (I). *Tohoku Geophysical Journal, 29*, 129–149.

Hanawa, K., & Mitsudera, H. (1986). Variation of water system distribution in the Sanriku Coastal Area. *Journal of the Oceanographic Society of Japan, 42*, 435–446.

Hua, Q., Barbetti, M., & Rakowski, A. Z. (2013). Atmospheric radiocarbon for the period 1950–2010. *Radiocarbon, 55*, 2059–2072.

Ishizu, M., Itoh, S., & Tanaka, K. (2016). Influence of the Oyashio Current and Tsugaru Warm Current on the circulation and water properties

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Title	GECCA mapped
Subtitle	Mapping Western Group Exhibitions of Contemporary Chinese Art after 1979
Author	Franziska Koch (Heidelberg Centre for Transcultural Studies, Global Art History, Heidelberg University, Germany)
Contact	Use email button above to contact. Franziska Koch (Heidelberg Centre for Transcultural Studies, Global Art History, Heidelberg University, Germany)
Description	GECCA mapped is a pilot project that visualizes and provides geo-referential metadata of sixty exhibition entries collected in the larger GECCA data base (more than 700 entries). The exhibition sample is limited to Western, i.e. Western European and Northern American group exhibitions, and excludes bi-/ triennials. With the support of the HRA (Heidelberg Research Architecture), GECCA mapped allows the user to trace the exhibition sample implemented in Google Earth. The GECCA mapped logo indicates the place where a particular exhibition was staged and is scaled according to the number of participating artists. A click on the logo opens a pop-up window presenting more information on the exhibition. The Google Earth timeline enables the user to follow the exhibition development in any chosen geographical area in the period from 1982 (earliest exhibition entry) to 2009 (latest exhibition entry). Group Exhibitions of Contemporary Chinese Art (GECCA): The medium of (group and panoramic) exhibitions has played a fundamental role in creating a global context for Chinese art within and outside of the People's Republic after the end of the "Great Proletarian Cultural Revolution" (1966-1976) and since the political reforms initiated by Deng Xiaoping in 1978/79. In economic, discursive, aesthetic and institutional terms, the Western reception of these shows was very influential for the establishment of a certain international canon of artworks, artists and curators. This particular canon in fact came to be considered representative of the whole of Chinese artistic production, although it actually tends to exclude large parts of the overall artistic activity such as "national ink painting" (guohua), conventional or conservative academic oil painting, as well as those works involving political or consumption oriented subject matter, including mass-produced decorative and popular artworks. With 60 exhibitions entries, the data that GECCA mapped visualizes is a comparatively small sample of the database GECCA - which contains more than 700 exhibition entries. The data was individually researched and includes information on the location, institution, dates, exhibition topic, participating artists and curators. The sources for the data stem from exhibition catalogues, museum websites, archival documentation of public art libraries and other archives. A typical use of the kmz-file that visualizes GECCA mapped is Google Earth.
Subject	Arts and Humanities
Keyword	contemporary Chinese art group exhibitions North America (general region) (TGN) http://vocab.getty.edu/tgn/7029440 Europe (continent) (TGN) http://vocab.getty.edu/tgn/1000003 Australia (nation) (TGN) http://vocab.getty.edu/tgn/7000490 Art, Chinese--20th century--Exhibitions (LCSH) http://id.loc.gov/authorities/subjects/sh2007101410 GECCA mapped Geographic information systems (LCSH) http://id.loc.gov/authorities/subjects/sh90001880 Digital mapping (LCSH) http://id.loc.gov/authorities/subjects/sh85037980
Related Publication	Koch, Franziska. 2016. „Die »chinesische Avantgarde« und das Dispositiv der Ausstellung: Konstruktionen chinesischer Gegenwartskunst im Spannungsfeld der Globalisierung". Bielefeld: transcript. isbn: 978-3-8376-2617-9 http://www.transcript-verlag.de/978-3-8376-2617-9/die-chinesische-avantgarde-und-das-dispositiv-der-ausstellung
Language	Chinese; English

Findability

- DOI's
- **Metadata**

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Title	GECCA mapped
Subtitle	Mapping Western Group Exhibitions of Contemporary Chinese Art after 1979
Author	Franziska Koch (Heidelberg Centre for Transcultural Studies, Global Art History, Heidelberg University, Germany)
Contact	Use email button above to contact. Franziska Koch (Heidelberg Centre for Transcultural Studies, Global Art History, Heidelberg University, Germany)
Description	GECCA mapped is a pilot project that visualizes and provides geo-referential metadata of sixty exhibition entries collected in the larger GECCA data base (more than 700 entries). The exhibition sample is limited to Western, i.e. Western European and Northern American group exhibitions, and excludes bi-/ triennials. With the support of the HRA (Heidelberg Research Architecture), GECCA mapped allows the user to trace the exhibition sample implemented in Google Earth. The GECCA mapped logo indicates the place where a particular exhibition was staged and is scaled according to the number of participating artists. A click on the logo opens a pop-up window presenting more information on the exhibition. The Google Earth timeline enables the user to follow the exhibition development in any chosen geographical area in the period from 1982 (earliest exhibition entry) to 2009 (latest exhibition entry). Group Exhibitions of Contemporary Chinese Art (GECCA): The medium of (group and panoramic) exhibitions has played a fundamental role in creating a global context for Chinese art within and outside of the People's Republic after the end of the "Great Proletarian Cultural Revolution" (1966-1976) and since the political reforms initiated by Deng Xiaoping in 1978/79. In economic, discursive, aesthetic and institutional terms, the Western reception of these shows was very influential for the establishment of a certain international canon of artworks, artists and curators. This parti the whole of Chinese artistic production, although it actually tends to e "national ink painting" (guohua), conventional or conservative academ consumption oriented subject matter, including mass-produced decora With 60 exhibitions entries, the data that GECCA mapped visualizes is which contains more than 700 exhibition entries. The data was individu institution, dates, exhibition topic, participating artists and curators. Th museum websites, archival documentation of public art libraries and o A typical use of the kmz-file that visualizes GECCA mapped is Google
Subject	Arts and Humanities
Keyword	contemporary Chinese art group exhibitions North America (general region) (TGN) http://vocab.getty.edu/tgn/7029 Europe (continent) (TGN) http://vocab.getty.edu/tgn/1000003 Australia (nation) (TGN) http://vocab.getty.edu/tgn/7000490 Art, Chinese--20th century--Exhibitions (LCSH) http://id.loc.gov/author GECCA mapped Geographic information systems (LCSH) http://id.loc.gov/authorities/subjects/sh90001880 Digital mapping (LCSH) http://id.loc.gov/authorities/subjects/sh85037980
Related Publication	Koch, Franziska. 2016. „Die »chinesische Avantgarde« und das Dispositiv der Ausstellung: Konstruktionen chinesischer Gegenwartskunst im Spannungsfeld der Globalisierung". Bielefeld: transcript. isbn: 978-3-8376-2617-9 http://www.transcript-verlag.de/978-3-8376-2617-9/die-chinesische-avantgarde-und-das-dispositiv-der-ausstellung
Language	Chinese; English

Life Sciences Metadata

Design Type	Not Specified
Factor Type	Cell Type/Cell Line; Developmental Stage; Organism
Organism	Homo sapiens; Mus musculus
Other Organism	Monodelphis domestica
Measurement Type	transcription profiling
Technology Type	nucleotide sequencing
Other Technology Type	single nucleus RNA-seq
Technology Platform	Illumina
Other Technology Platform	10x Chromium 3' protocol

Findability

- DOI's
- **Metadata**

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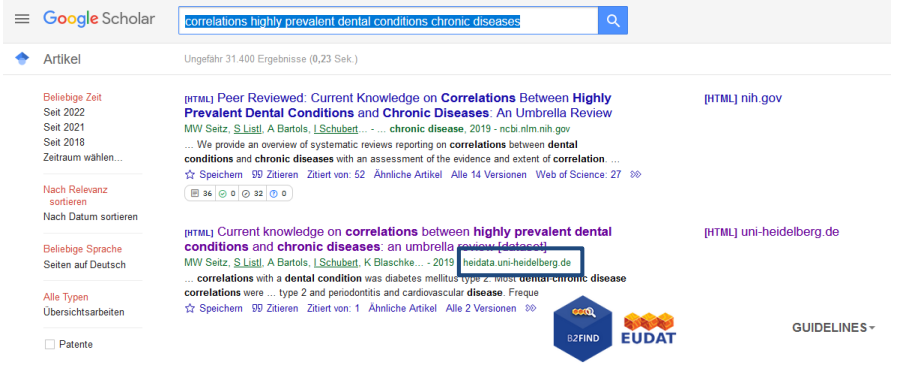
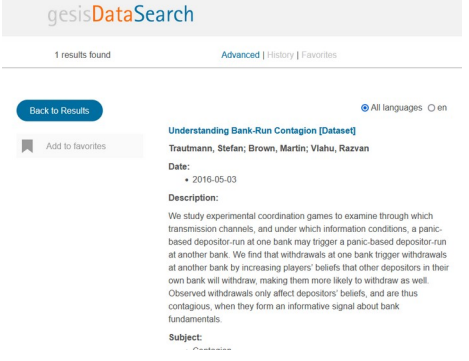
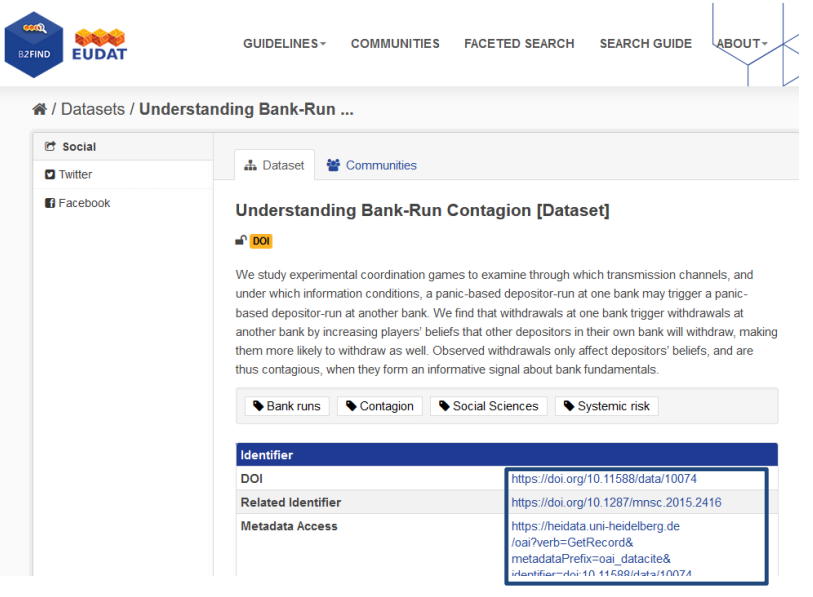


Findability

- DOI's
- Metadata
- **Indexing in catalogs and databases (enabling automatic harvesting of metadata)**





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Organization of a Dataverse Repository

Dataverse

Collection of datasets
Own administration
Own branding (& can be embedded in your site)

dataset

Citation
Metadata
Versioning
Terms/permissions
Collection of Files

File

Citation
Preview/Explore
Metadata
Versioning
Permissions

Findability

- DOI's
- Metadata
- Indexing in catalogs and databases (enabling automatic harvesting of metadata)
- **Dataverses: collection of datasets e.g. For research groups, projects,...**

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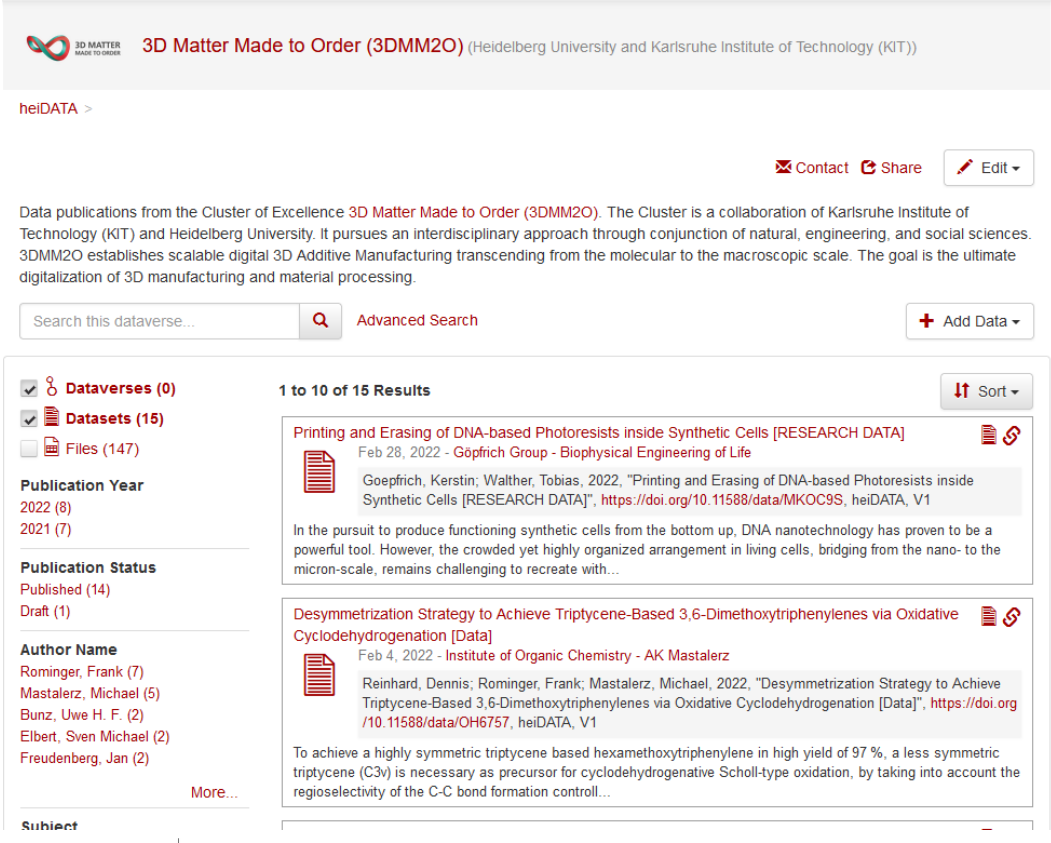

Findability

- DOI's
- Metadata
- Indexing in catalogs and databases (enabling automatic harvesting of metadata
- **Dataverses: collection of datasets e.g. For research groups, projects,...**

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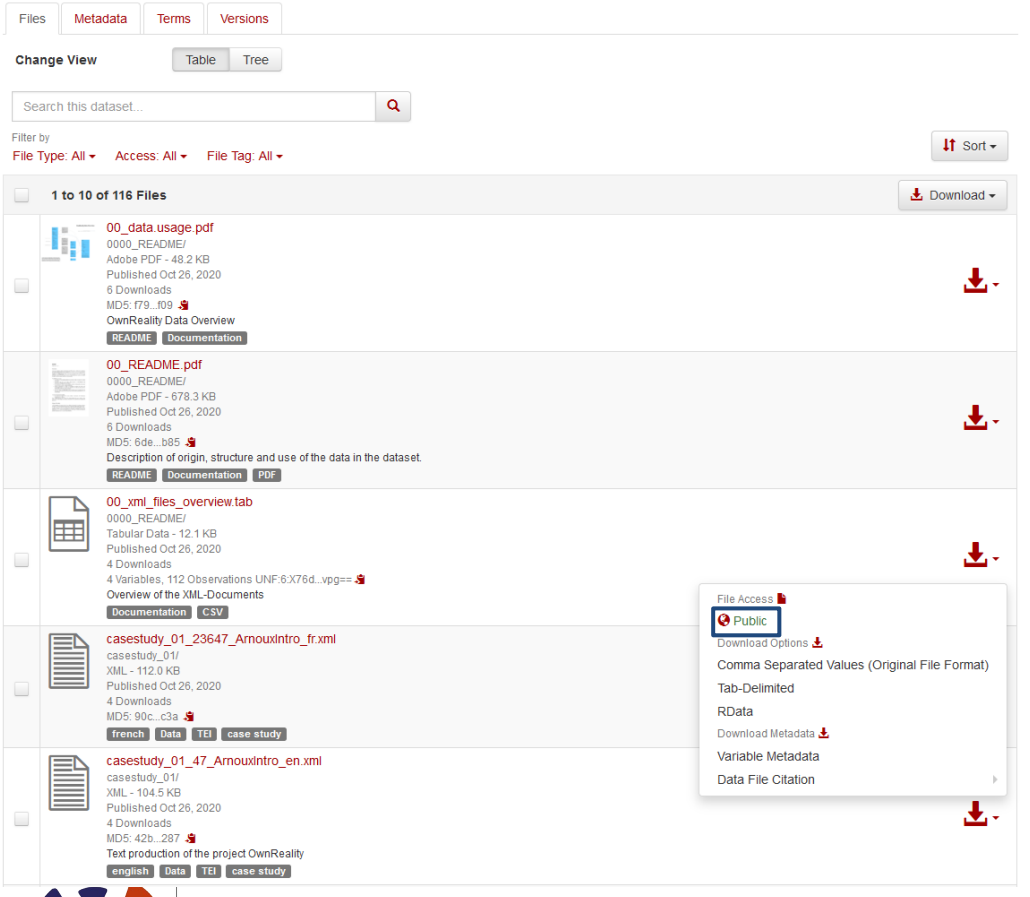

Accessibility

- **Download of public files via browser or via API**

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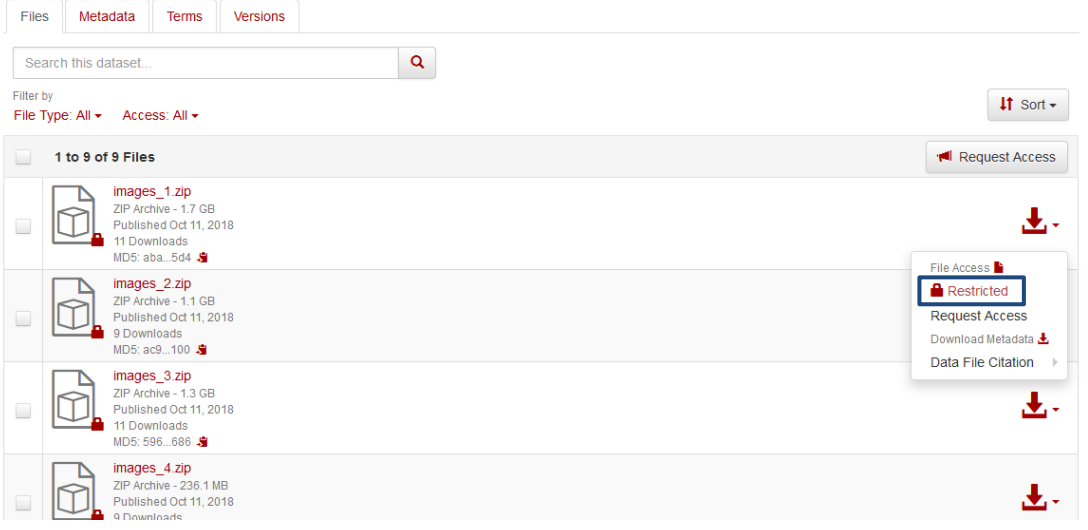
Accessibility

- Download of public files via browser or via API
- **“As open as possible, but as closed as necessary”**



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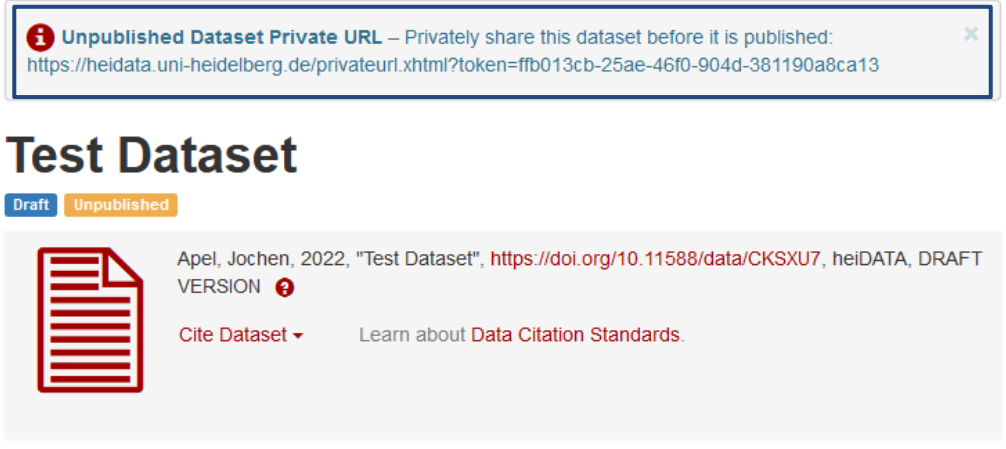

Accessibility

- Download of public files via browser or via API
- “As open as possible, but as closed as necessary”
- **Private URLs for pre-publication access (e.g. for reviewers)**

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Interoperability
- Metadata standards

Metadata References

The Dataverse Project is committed to using standard-compliant metadata to ensure that a Dataverse installation's metadata can be mapped easily to standard metadata schemas and be exported into JSON format (XML for tabular file metadata) for preservation and interoperability.

Detailed below are what metadata schemas we support for Citation and Domain Specific Metadata in the Dataverse Project:

- Citation Metadata: compliant with DDI Lite, DDI 2.5 Codebook, DataCite 3.1, and Dublin Core's DCMI Metadata Terms (see .tsv version). Language field uses ISO 639-1 controlled vocabulary.
- Geospatial Metadata: compliant with DDI Lite, DDI 2.5 Codebook, DataCite, and Dublin Core (see .tsv version). Country / Nation field uses ISO 3166-1 controlled vocabulary.
- Social Science & Humanities Metadata: compliant with DDI Lite, DDI 2.5 Codebook, and Dublin Core (see .tsv version).
- Astronomy and Astrophysics Metadata : These metadata elements can be mapped/exported to the International Virtual Observatory Alliance's (IVOA) VOResource Schema format and is based on Virtual Observatory (VO) Discovery and Provenance Metadata (see .tsv version).
- Life Sciences Metadata: based on ISA-Tab Specification, along with controlled vocabulary from subsets of the OBI Ontology and the NCBI Taxonomy for Organisms (see .tsv version).
- Journal Metadata: based on the Journal Archiving and Interchange Tag Set, version 1.2 (see .tsv version).

See also the Dataverse Software 4.0 Metadata Crosswalk: DDI, DataCite, DC, DCTerms, VO, ISA-Tab document and the Metadata Customization section of the Admin Guide.

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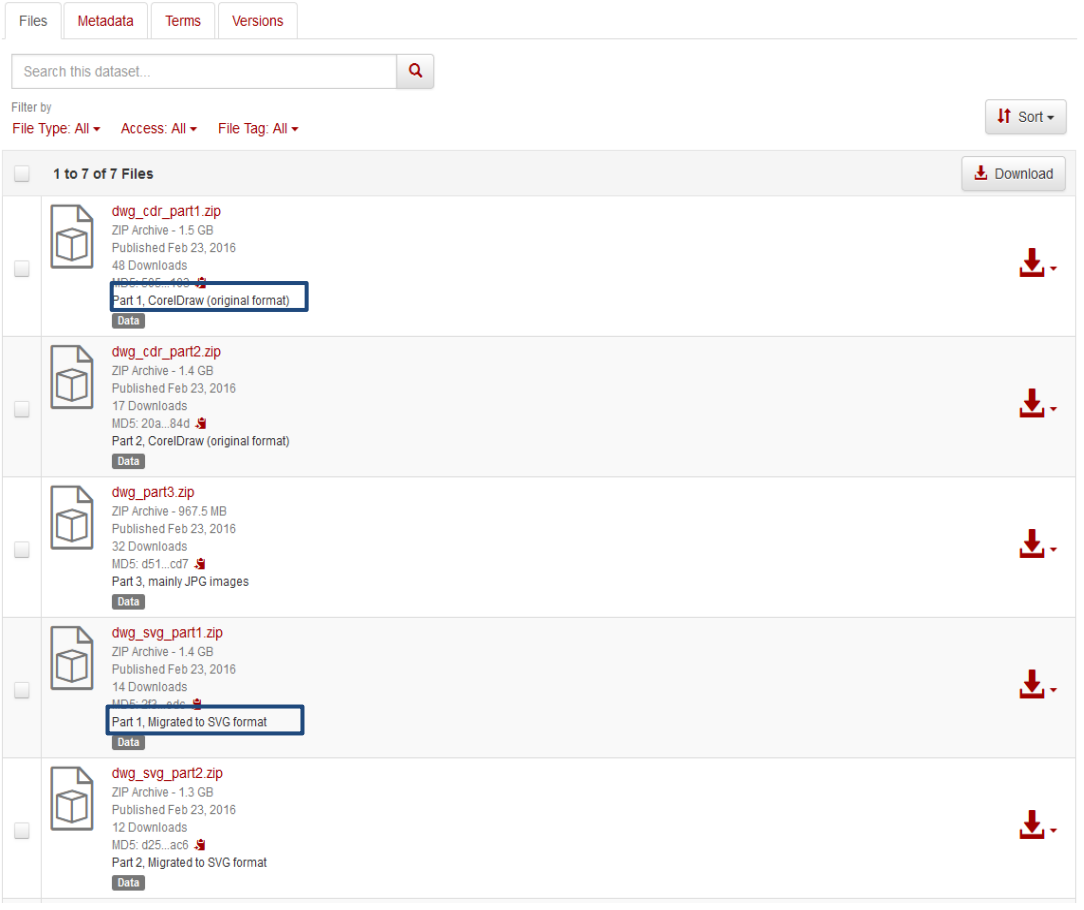

Interoperability

- Metadata standards
- **Advice on suitable file formats, support with format conversion**
- **Technical validity checks**

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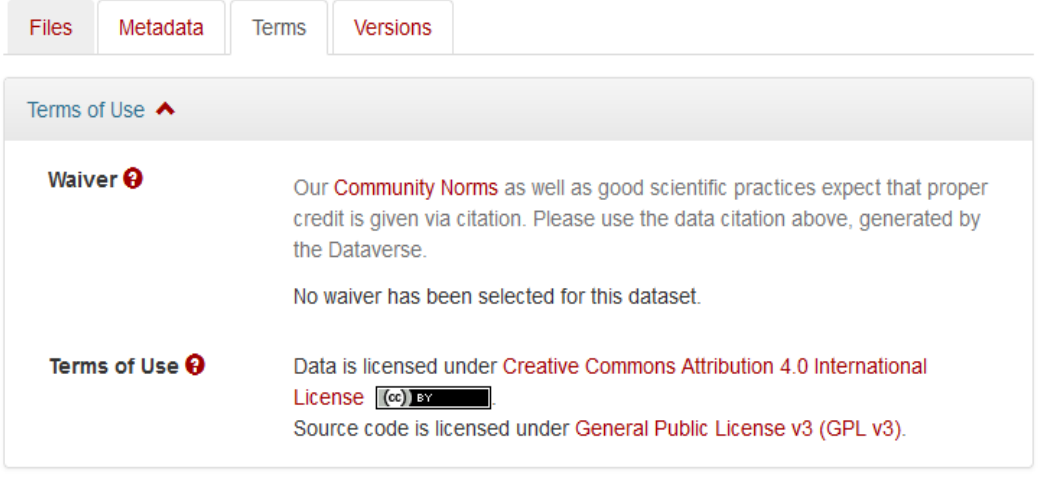
Reusability

- **Open content licenses**



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Reusability

- Open content licenses
- **Transparent versioning**

Files | Metadata | Terms | Versions

View Differences

	Dataset	Summary	Contributors	Published
☐	2.0	**Citation Metadata:** Description (1 Changed); Author (1 Changed); Related Publication (2 Added, 2 Changed); **Additional Citation Metadata:** (2 Added, 2 Changed); **Files (Added: 2; Removed: 2);** View Details	Leonhard Maylein, Jochen Apel	Mar 26, 2021
☐	1.2	**Citation Metadata:** Description (1 Changed); View Details	Jochen Apel	Jun 7, 2019
☐	1.1	**Additional Citation Metadata:** (1 Added); View Details	Jochen Apel	Jun 6, 2019
☐	1.0	This is the first published version.	Leonhard Maylein, Hubert Mara, Jochen Apel	Jun 6, 2019

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Producer	Hubert Mara (IWR, Heidelberg University) (HMara) https://orcid.org/0000-0002-2004-4153 Bartosz Bogacz (IWR, Heidelberg University) (BBogacz) https://orcid.org/0000-0002-2004-4153
Production Date	2019-03-11
Production Place	Heidelberg, Germany
Contributor	Project Member : Bayer, Paul Victor
Deposit Date	2019-02-25
Date of Collection	Start: 2018-07-24 ; End: 2018-08-22 Start: 2019-03-01 ; End: 2019-03-11
Kind of Data	Cuneiform tablets; 3D Measurement data
Software	GigaMesh Software Framework, Version: 181100 to 190300
Related Datasets	Heidelberg Cuneiform 3D Database (HeiCu3Da) for the Hilprecht Collection: https://doi.org/10.11588/heidicon.hilprecht
Origin of Sources	Hilprecht Sammlung, Jena, Germany, https://hilprecht.mpiwg-berlin.mpg.de/ Cuneiform Digital Library Initiative (CDLI) https://cdli.ucla.edu/

Reusability

- Open content licenses
- Transparent versioning
- **Provenance information**

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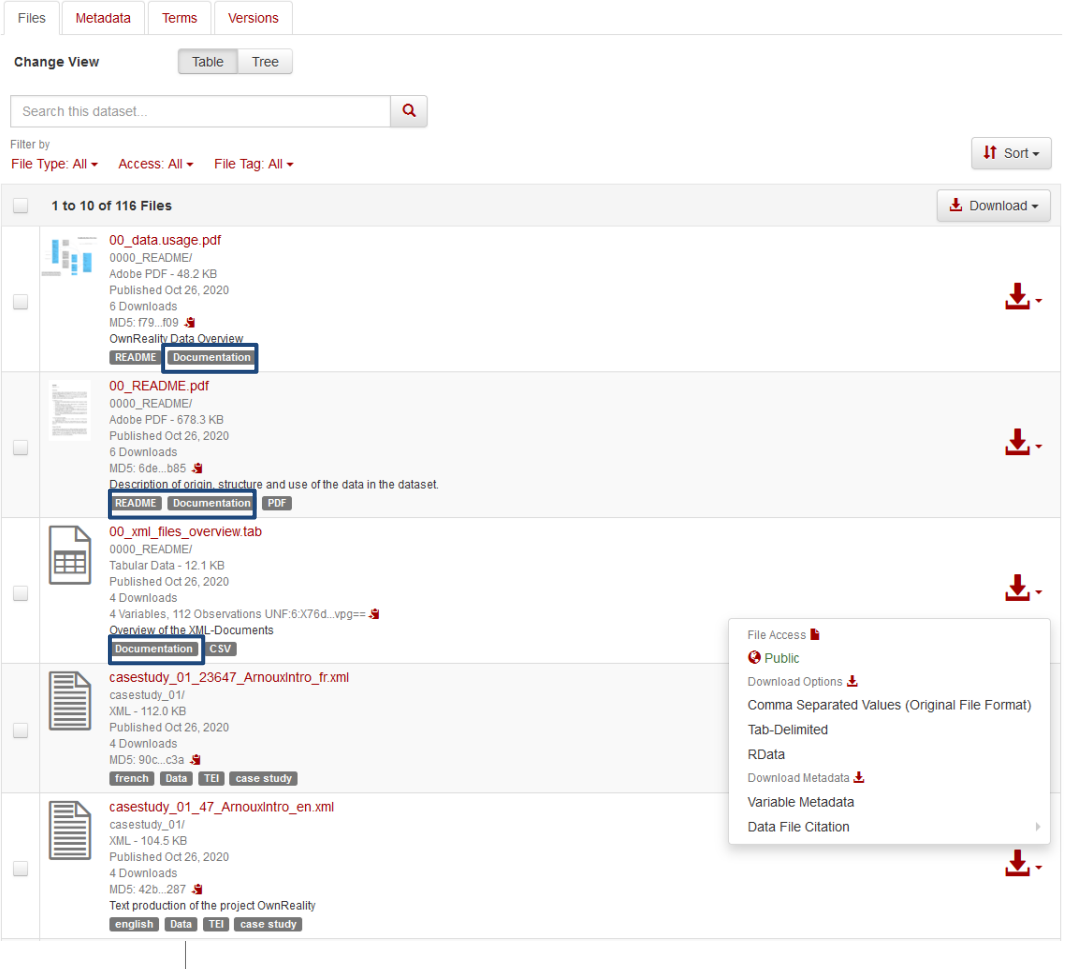

Reusability

- Open content licenses
- transparent versioning
- Provenance information
- **Documentation files**

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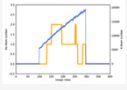
Synthetic Quantum Systems (SynQS) (Kirchhoff Institute for Physics, Heidelberg University)

heiDATA > Synthetic Quantum Systems (SynQS) >

Stochastic dynamics of a few sodium atoms in presence of a cold potassium cloud [data]

Version 2.0



Bhatt, Rohit Prasad; Kilinc, Jan; Höcker, Lilo; Jendrzejewski, Fred, 2021, "Stochastic dynamics of a few sodium atoms in presence of a cold potassium cloud [data]", https://doi.org/10.11588/data/HRCX1P, heiDATA, V2, UNF:6:JJrxDHuluVKxO7FoMyqlAw== [fileUNF]

Cite Dataset · Learn about Data Citation Standards.

Access Dataset · Edit Dataset · Link Dataset · Contact Owner · Share

Dataset Metrics
178 Downloads

Description We provide the data and our jupyter notebooks used to generate the figures of our publication. Abstract: Single particle resolution is a requirement for numerous experimental protocols that emulate the dynamics of small systems in a bath. Here, we accurately resolve through atom counting the stochastic dynamics of a few sodium atoms in presence of a cold potassium cloud. This capability enables us to rule out the effect of inter-species interaction on sodium atom number dynamics, at very low atomic densities present in these experiments. We study the noise sources for sodium and potassium in a common framework. Thereby, we assign the detection limits to 4.3 atoms for potassium and 0.2 atoms (corresponding to 96% fidelity) for sodium. This opens possibilities for future experiments with a few atoms immersed in a quantum degenerate gas.

Subject Physics

Keyword Ultracold mixture, Stochastic dynamics

Related Publication Bhatt, R., Kilinc, J., Höcker, L., Jendrzejewski, F. Stochastic dynamics of a few sodium atoms in presence of a cold potassium cloud. Sci. Rep. doi: 10.1038/s41598-022-05778-8

Notes Run jupyter notebooks with binder: https://mybinder.org/

Files · Metadata · Terms · Versions

Reusability

- Open content licenses
- transparent versioning
- Provenance information
- Documentation files
- **Integration with external services, e.g. binder (https://mybinder.org/)**

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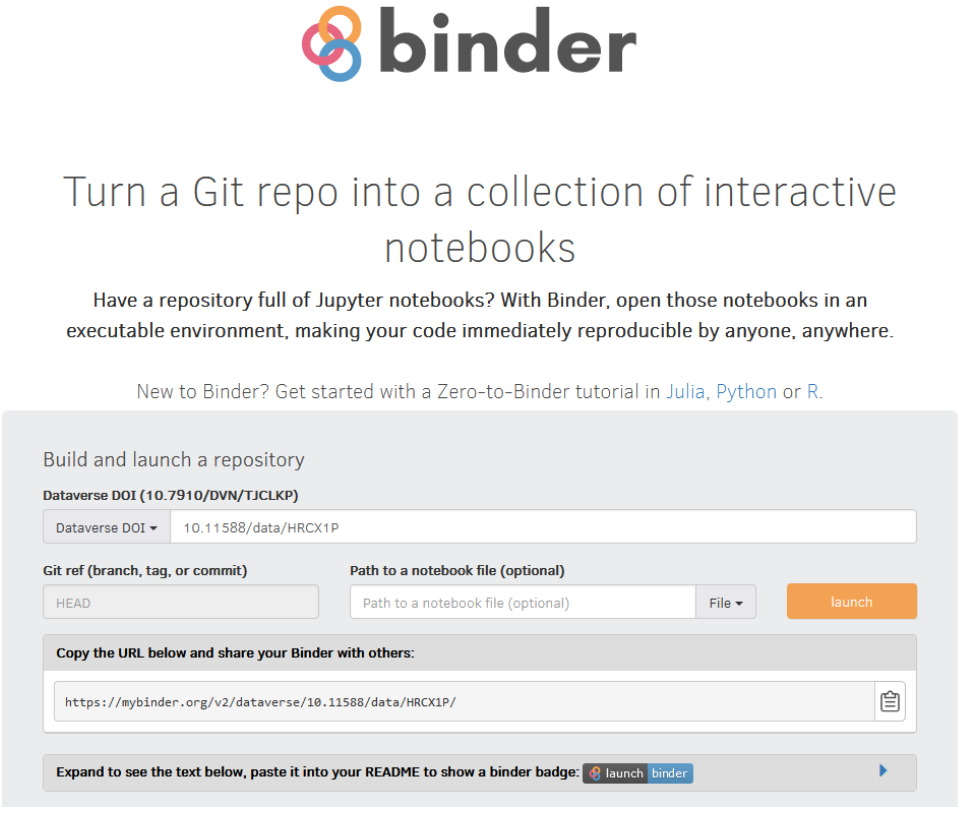

Reusability

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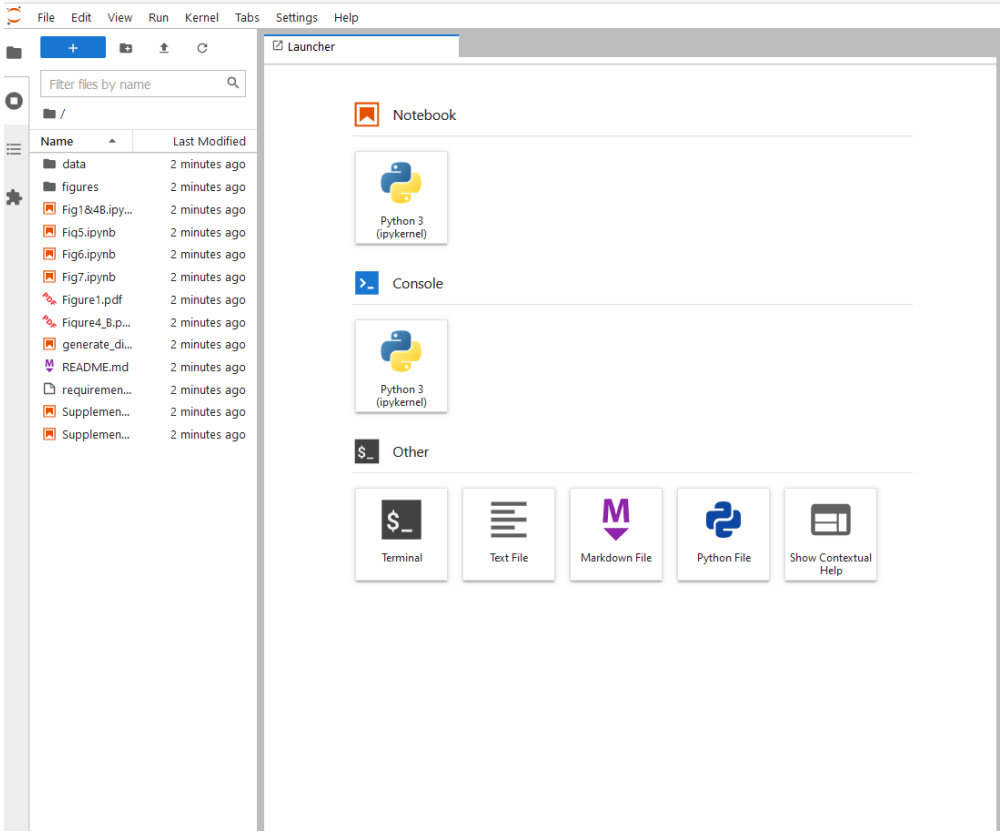

Reusability

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- Documentation files
- **Integration with external services, e.g. binder (https://mybinder.org/)**

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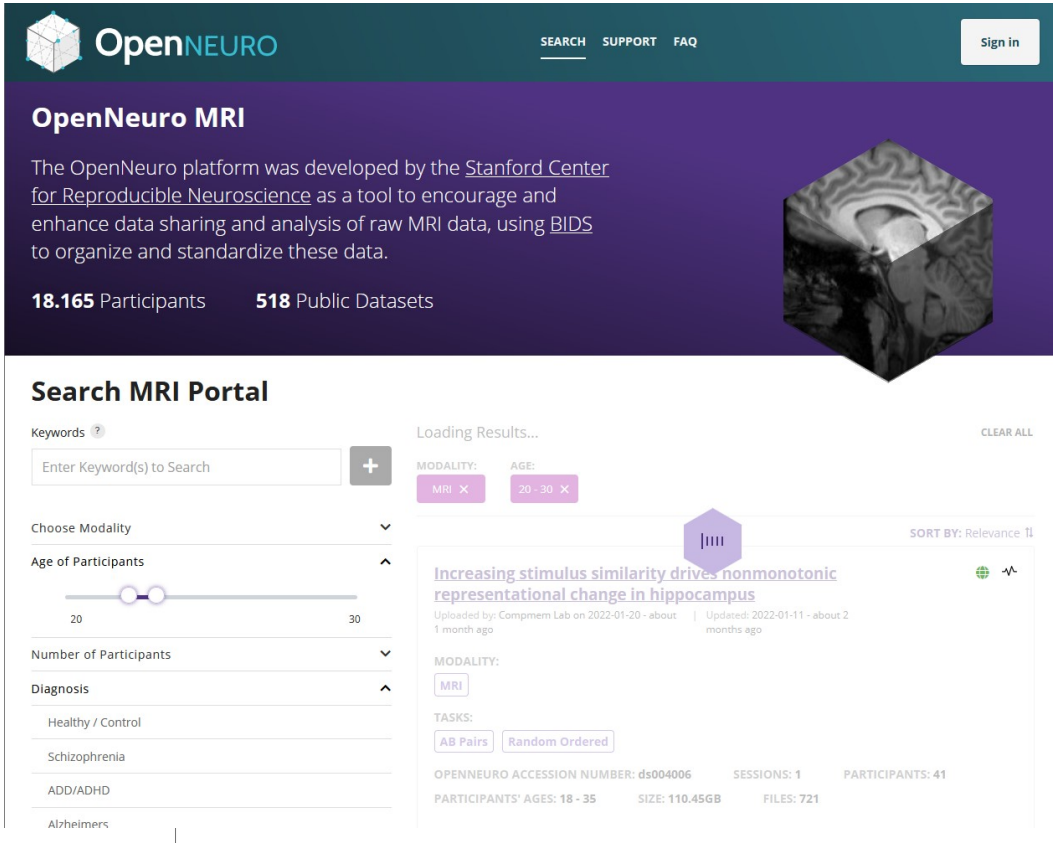
Subject-specific repositories



- **Domain-specific metadata enable specific functionalites and more effective retrieval.**

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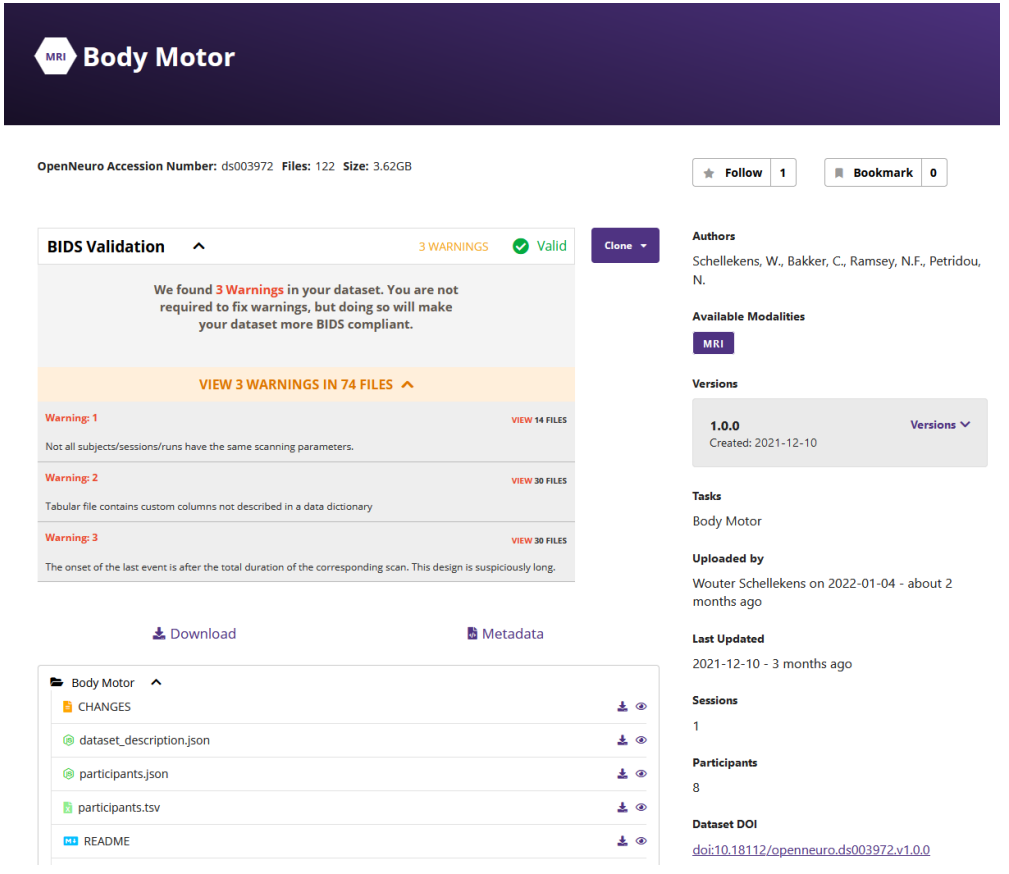
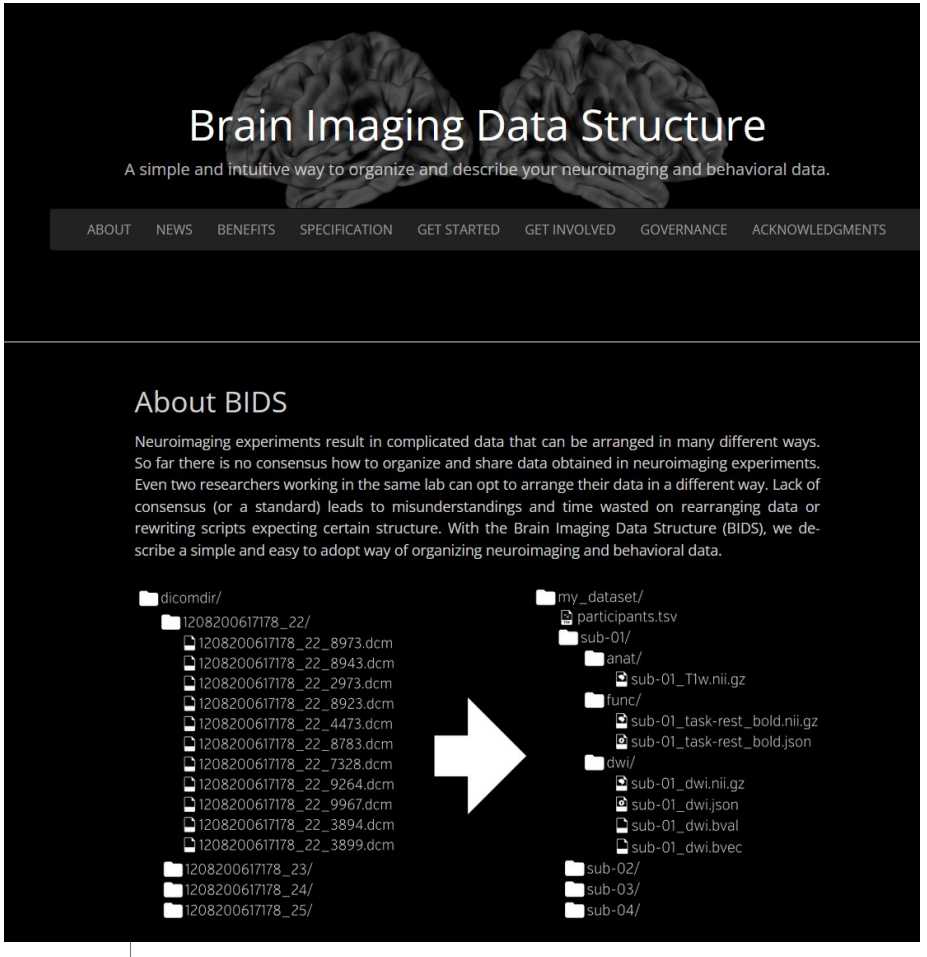
Subject-specific repositories



- Domain-specific metadata enable specific functionalites and more effective retrieval.
- **Data standards are implemented and data are validated against these standards.**

Subject-specific repositories



- Domain-specific metadata enable specific functionalites and more effective retrieval.
- **Data standards are implemented and data are validated against these standards.**

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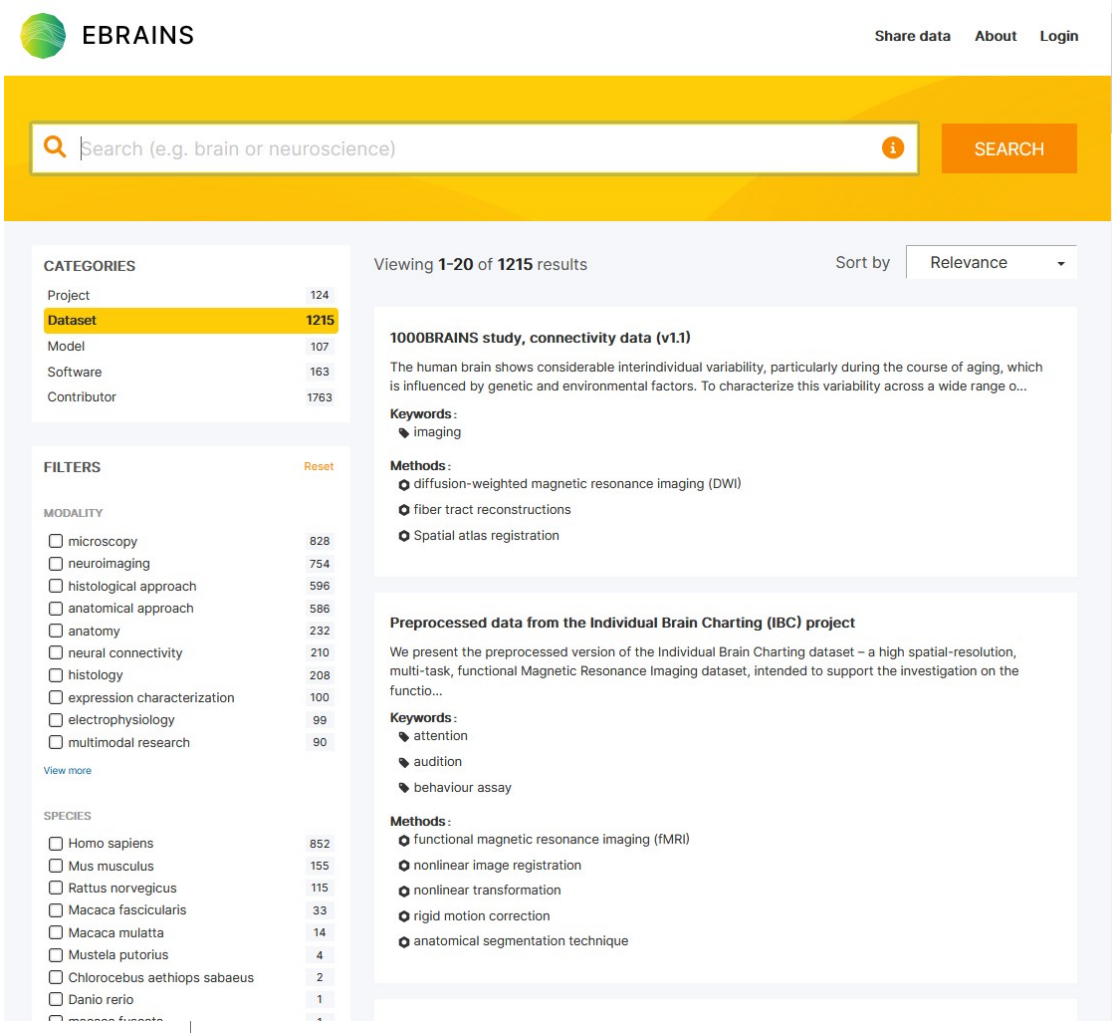
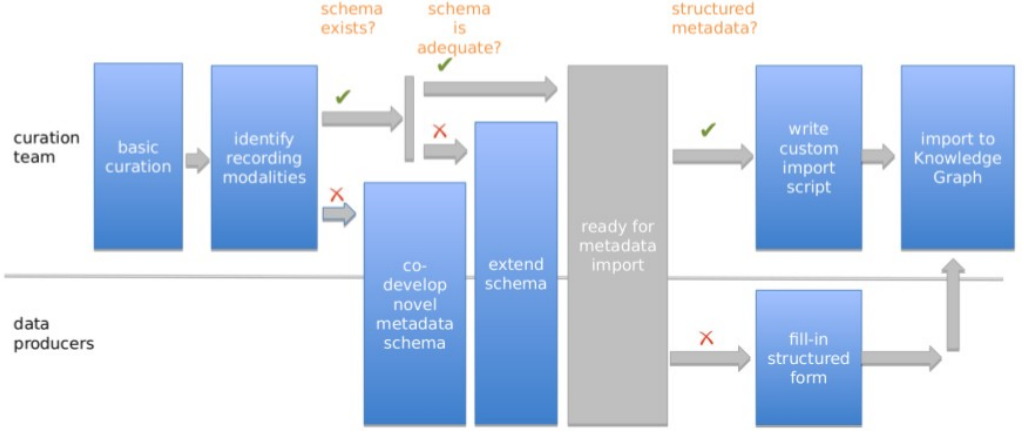
Subject-specific repositories



- Domain-specific metadata enable specific functionalites and more effective retrieval.
- Data standards are implemented and data are validated against these standards.
- **May be limited with regard to data types (e.g. OpenNeuro only accepts human-derived data)**

Subject-specific repositories



https://wiki.ebrains.eu/bin/view/Collabs/tier-3-data-curation/Data%20Curator%27s%20Handbook/

- Domain-specific metadata enable more effective retrieval or specific functionalites.
- Data standards are implemented and data are validated against these standards.
- May be limited with regard to data types (e.g. OpenNeuro only accepts human-derived data)
- **Optional, depending on the repository: Data curators with specific expertise supervise data publication and help preparing data for deposit.**

Finding data journals

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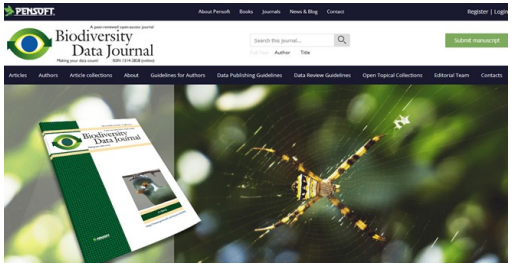
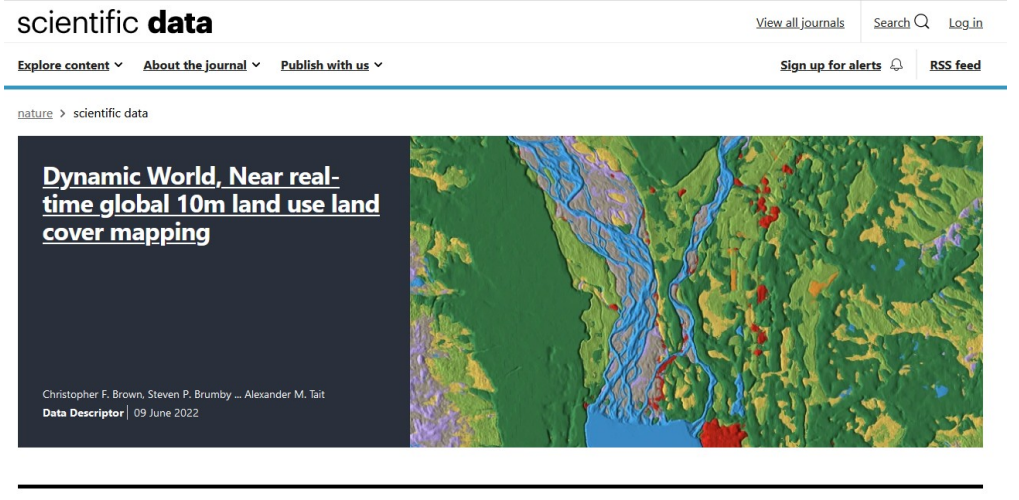
https://www.forschungsdaten.org/index.php/Data_Journals





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Data publication

Picture:
Colin Kinner (Flickr: Question mark sign) [CC-BY-2.0], via Wikimedia Commons

Data publication

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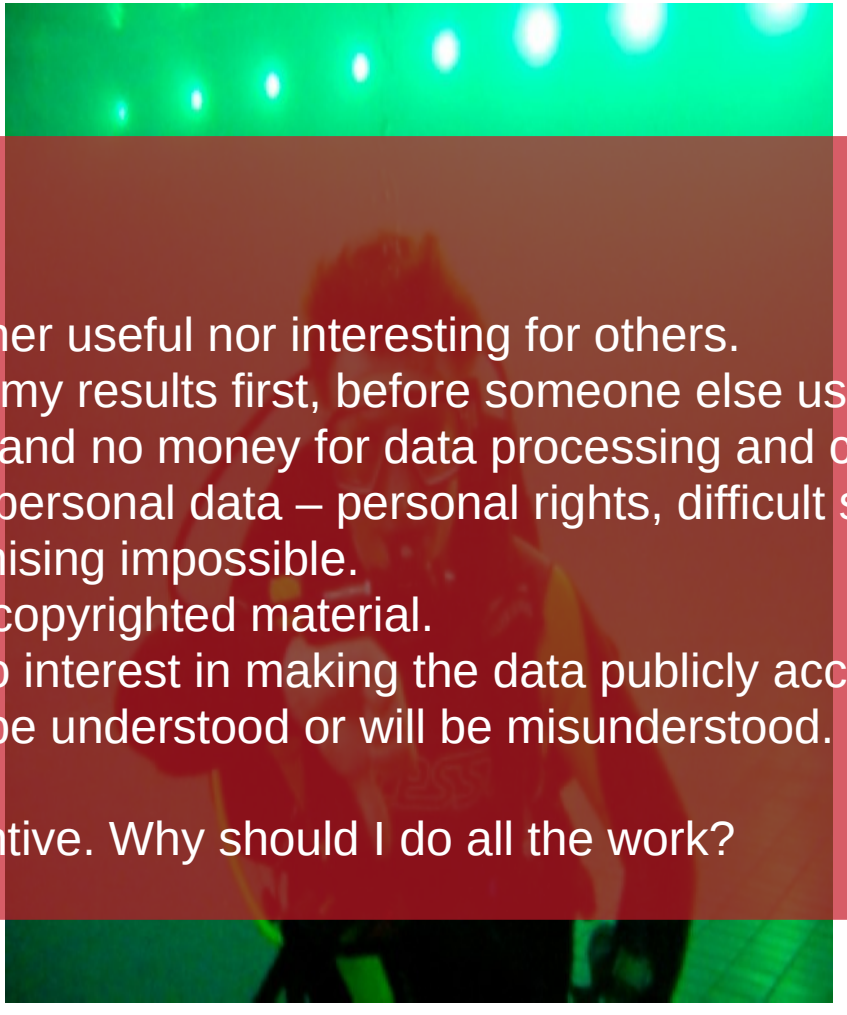

Contra

- My data are neither useful nor interesting for others.
- I want to publish my results first, before someone else uses my data.
- There is no time and no money for data processing and curation.
- My data contain personal data – personal rights, difficult search for test persons, anonymising impossible.
- My data include copyrighted material.
- My funder has no interest in making the data publicly accessible.
- My data will not be understood or will be misunderstood. People will bother me with emails.
- There is no incentive. Why should I do all the work?

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Data publication

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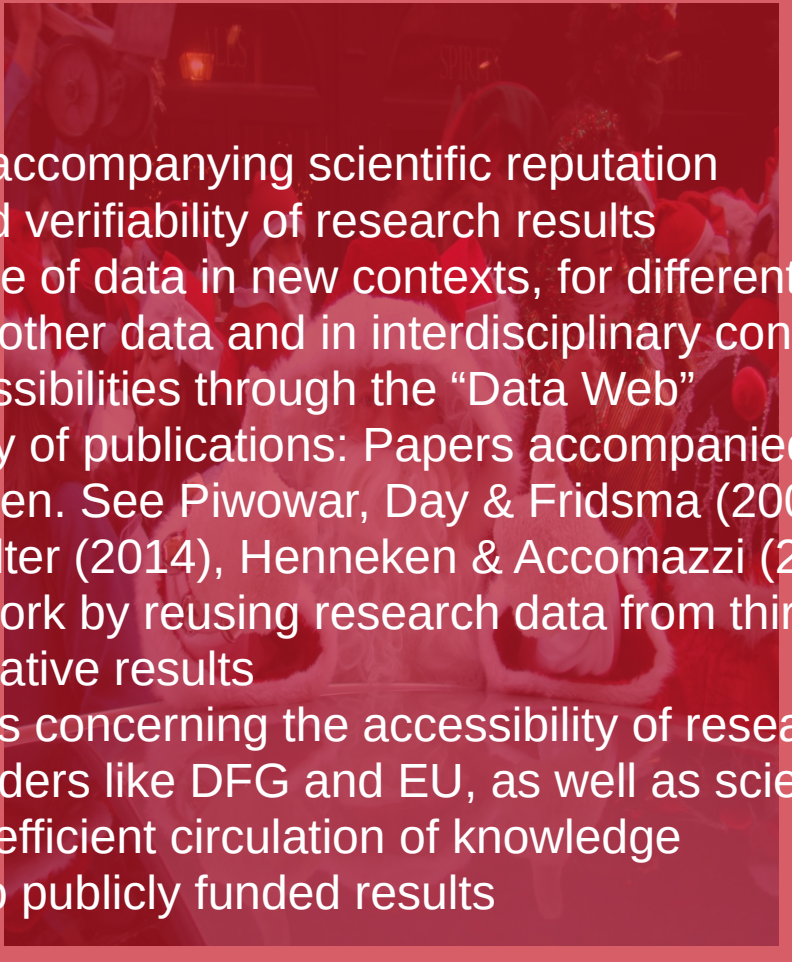
Pro



- Visibility and the accompanying scientific reputation
- Transparency and verifiability of research results
- Possibility of reuse of data in new contexts, for different problems in combination with other data and in interdisciplinary contexts
- New research possibilities through the “Data Web”
- Increased visibility of publications: Papers accompanied by research data are cited more often. See Piwowar, Day & Fridsma (2007), Piwowar & Vision (2013), Belter (2014), Henneken & Accomazzi (2011)
- Avoid duplicate work by reusing research data from third parties.
- Availability of negative results
- Fulfil requirements concerning the accessibility of research material as demanded by funders like DFG and EU, as well as scientific journals.
- Faster and more efficient circulation of knowledge
- Right of access to publicly funded results

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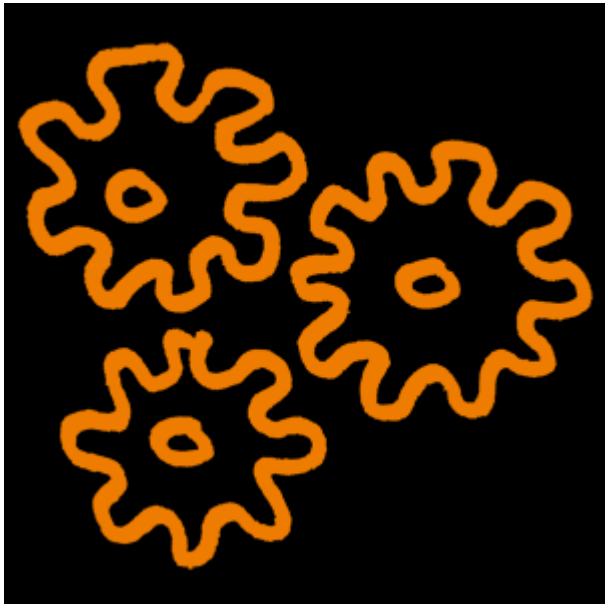
Data Handling Storage & Archiving – some practical issues….



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Piled Higher and Deeper *by Jorge Cham* **www.phdcomics.com**

title: "A story in file names" - originally published 5/28/2010

Data Handling Storage & Archiving

File handling

- Data best practices (file naming, formats, versioning,…): https://guides.library.stanford.edu/data-best-practices/
- Make different versions of data distinguishable. Conventions for file naming – for you and in your research group.
- File names should deliver context. Distinguish a file from similar but different datasets and from different versions of the same dataset.
- Files may leave their folders. File names should be unique and descriptive without a directory structure.
- **Never delete your raw data!**
- But delete versions of processed data you do not need any longer.

Data Storage & Archiving – some practical issues….

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Backup

3 … 2 … 1 … Backup!

- At least 3 copies per file…
- …on at least 2 different media…
- and 1 at a different spatial location.

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EXTERNAL REQUIREMENTS & POLICIES

Picture: https://www.flickr.com/photos/raummaschine/9214045295/

Policies & external requirements

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SATZUNG ZUR SICHERUNG GUTER WISSENSCHAFTLICHER PRAXIS UND ZUM UMGANG MIT WISSENSCHAFTLICHEM FEHLVERHALTEN

in der Fassung vom 28.09.2021

Präambel

Zur Wahrnehmung ihrer Verantwortung in den drei Handlungsfeldern Forschung, Studium und Lehre sowie Wissenstransfer trifft die Universität Heidelberg im gesetzlichen Rahmen Vorkehrungen zur Verankerung einer Kultur der guten wissenschaftlichen Praxis. Der Senat hat deshalb in seiner Sitzung vom 28.09.2021 gemäß § 3 Abs. 5 S. 4 LHG i.V.m. § 19 Abs. 1 S. 2 Nr. 10 LHG die folgenden Regelungen beschlossen, durch die die Leitlinien zur Sicherung guter wissenschaftlicher Praxis der Deutschen Forschungsgemeinschaft (DFG) vom August 2019 rechtsverbindlich umgesetzt werden:

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Policies & external requirements

Heidelberg University

Rules for safeguarding good academic practice and handling academic misconduct

§ 10 Documentation

(1) Researchers must document all information relevant to the establishment of a research result with the degree of transparency that is required and appropriate in the respective field. The same applies to individual results that do not support the research hypothesis. There must be no selection of results in such cases. Where research software is developed, the source code must be documented.

(2) The information required to understand the research, in particular research data and methodological, evaluation and analysis steps, is recorded. Third parties are to be given access to this information where this is possible.

Policies & external requirements

Heidelberg University

Rules for safeguarding good academic practice and handling academic misconduct

§ 11 Public access to research findings

“Researchers decide on their own responsibility whether, how and where to make their research findings publicly available. If they decide to publish their results, the data and principal materials upon which the published work is based must be stored in recognised archives and repositories where this is possible. The provisions of § 14 must be observed.”

Policies & external requirements

Heidelberg University

Rules for safeguarding good academic practice and handling academic misconduct

§ 16 Archiving

“(1) Once they have been made publicly available, research data and findings, and particularly the materials on which they are based, as well as the instruments and, where applicable, the research software used, must be backed up by adequate means according to the standards of the respective field and stored for the legally required time period (usually ten years). A shortening of this storage period must be justified. The storage period begins when the materials are first made publicly available.

(2) The materials are archived a) in the researchers’ home institution or b) in repositories serving several locations. In case a) the university will provide the necessary infrastructure for archiving. The selected publication medium must make reference to the archiving location in an appropriate manner.”

Policies & external requirements

UNIVERSITÄT HEIDELBERG
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RESEARCH DATA POLICY

RICHTLINIEN FÜR DAS MANAGEMENT VON FORSCHUNGSDATEN

Die Verfügbarkeit von Forschungsdaten ist die Gewähr für die Nachvollziehbarkeit und Überprüfbarkeit sowie die weitergehende Nutzung nach der Veröffentlichung. Sie ist ein zentraler Aspekt guter wissenschaftlicher Praxis der Universität. Ihr Management nach höchsten Standards baut auf diesem Prinzip auf und ist Teil der Exzellenzstrategie.

1. Die Verantwortlichkeit für den Lebenszyklus(*) von Forschungsdaten, insbesondere die Sicherstellung und Bereitstellung der Forschungsdaten zur langfristigen Archivierung liegt primär beim Projektverantwortlichen (PI).
2. Teil jedes Forschungsprojektes ist ein Plan für das Datenmanagement, der explizit adressiert, wie die Akkuratheit, Vollständigkeit, Authentizität, Integrität, Vertraulichkeit, Veröffentlichung und der offene Zugang von Daten gehandhabt werden. Dabei werden fachspezifische Besonderheiten berücksichtigt.
3. Die Universität unterstützt nach bestem Vermögen die PIs durch ein Kompetenzzentrum Forschungsdaten. Es bietet Beratung und Unterstützung bei der Entwicklung von Konzepten für ihr Datenmanagement an. Dafür ist eine frühzeitige Kontaktaufnahme vor oder zu Projektbeginn erforderlich.
4. Der Plan für das Management von Forschungsdaten stellt den Zugriff und die Nutzung unter Einhaltung von ethischen und Open Access-Prinzipien unter geeigneten Sicherheitsmaßnahmen sicher. Der Open-Access-Policy der Universität folgend ermuntert die Universitätsleitung Wissenschaftler ausdrücklich, Forschungsdaten gemäß der Grundsätze von Open Access, wie sie in der „Berliner Erklärung über offenen Zugang zu wissenschaftlichem Wissen" von 2003 beschrieben sind, zugänglich zu machen, solange keine entgegenstehenden rechtlichen Verpflichtungen bestehen (insb. Verträge mit Verlagen). Für Daten, die Grundlage von schutzfähigem, geistigem Eigentum sind, gilt grundsätzlich die Verpflichtung zur Einreichung einer Erfindungsmeldung gemäß Arbeitnehmererfindungsgesetz (§§ 5, 42 Nr. 2) und die IP-Policy der Universität Heidelberg vorrangig.
5. Die persönlichen Daten von Probanden, Patienten und andere von Datenerhebungen betroffenen Personen werden gemäß den Datenschutzrichtlinien geschützt.
6. Daten, die außerhalb der Universität als Teil des Datenmanagementplans bereitgehalten werden, sollten beim Kompetenzzentrum Forschungsdaten registriert werden. Das Kompetenzzentrum Forschungsdaten bietet eine Datenregistrierung an, die Datensätze sowohl aus universitären als auch externen Repositorien nachweist.
7. Alle Rechte an Daten, insbesondere das Recht, die Daten weitergehend zu nutzen oder zu publizieren, sollten den PIs vorbehalten sein und nicht an Dritte vergeben werden.

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RESEARCH DATA POLICY

RICHTLINIEN FÜR DAS MANAGEMENT VON FORSCHUNGSDATEN

Seven paragraphs

1) PI‘s are responsible for the whole research data lifecycle.
2) Every research project should develop a data management plan.
3) University offers support via the Research Data Unit.
4) University encourages researcher to publish open access if possible.
5) Importance of data privacy.
6) Data published outside of the university‘s webspace should be registered at the RDU.
7) PI‘s shall keep their right on data use and publication and shall not transfer it to third parties.

[Research Data Policy - Universität Heidelberg (uni-heidelberg.de)]

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Funders are pushing RDM & Open Data

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DFG Deutsche Forschungsgemeinschaft

DFG Guidelines on the Handling of Research Data

"[…] For this reason, the handling of research data and the objects on which the data is based have to be carefully planned, documented and described. Wherever possible it is important to enable subsequent use of the research data and potentially also the objects by other users.
[…]
For this reason, the DFG expects research projects to include a description of how research data is handled. The description should be based on the checklist for handling research data
[…]
Costs incurred for the project-specific handling of research data should be requested in connection with the project.[…]"

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Checklist Regarding the Handling of Research Data

1. Data description

How does your project generate new data? Is existing data reused? Which data types (in terms of data formats like image data, text data or measurement data) arise in your project and in what way are they further processed? To what extent do these arise or what is the anticipated data volume?

2. Documentation and data quality

What approaches are being taken to describe the data in a comprehensible manner (such as the use of available metadata, documentation standards or ontologies)? What measures are being adopted to ensure high data quality? Are quality controls in place and if so, how do they operate? Which digital methods and tools (e.g. software) are required to use the data?

3. Storage and technical archiving the project

How is the data to be stored and archived throughout the project duration? What is in

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Horizon 2020 & Horizon Europe: FAIR Data Management

- Participating projects will be required to develop a **Data Management Plan** (DMP)
- Participating projects are **required to deposit research data**, preferably into a research data repository
- "[…]as far as possible, projects must then **take measures to enable for third parties to access**, mine, exploit, reproduce and disseminate (free of charge for any user) this research data."
- http://www.dfg.de/foerderung/antrag_gutachter_gremien/antragstellende/nachnutzung_forschungsdaten/
- Guidelines on Open Access to Scientific Publications and Research Data in Horizon 2020 | Guidelines on Data Management in Horizon 2020

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1. Data Summary

What is the purpose of the data collection/generation and its relation to the objectives of the project?

What types and formats of data will the project generate/collect?

Will you re-use any existing data and how?

What is the origin of the data?

What is the expected size of the data?

To whom might it be useful ('data utility')?

2. FAIR data

2. 1. Making data findable, including provisions for metadata

Are the data produced and/or used in the project discoverable with metadata, identifiable and locatable by means of a standard identification mechanism (e.g. persistent and unique identifiers such as Digital Object Identifiers)?

What naming conventions do you follow?

Will search keywords be provided that optimize possibilities for re-use?

Journals: Nature

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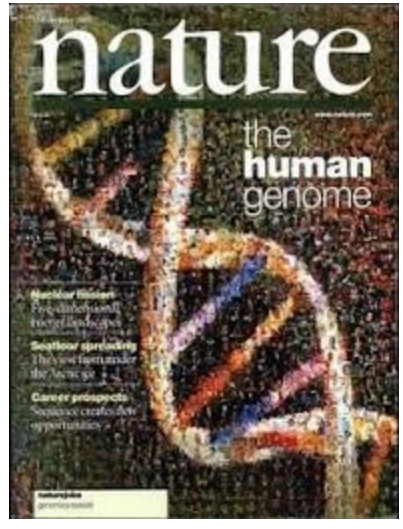
An inherent principle of publication is that others should be able to replicate and build upon the authors' published claims. A condition of publication in a Nature Portfolio journal is that **authors are required to make materials, data, code, and associated protocols promptly available to readers without undue qualifications.**



[…]Providing large datasets in supplementary information is strongly discouraged and the preferred approach is to make data available in repositories.

https://www.nature.com/nature-portfolio/editorial-policies/reporting-standards#availability-of-data

https://www.nature.com/sdata/policies/repositories

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Journals: PLOS

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Data Availability

PLOS journals require authors to make all data necessary to replicate their study's findings publicly available without restriction at the time of publication. When specific legal or ethical restrictions prohibit public sharing of a data set, authors must indicate how others may obtain access to the data.

[…]

Publication is conditional on compliance with this policy. If restrictions on access to data come to light after publication, we reserve the right to post a Correction, an Editorial Expression of Concern, contact the authors' institutions and funders, or, in extreme cases, retract the publication. […]

https://journals.plos.org/plosone/s/data-availability

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LEGAL ISSUES

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Legal issues

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Research data and copyright

- Textual data typically are protected by copyright
- Copy right holder can grant simple or exclusive usage rights
- For publications in subscription journals: typically unlimited and irrevocable transfer of rights to the publishers

- Research data? Facts like measurements generally do not reach the threshold of originality, even though the data collection can be very sophisticated.
- Therefore: According to German copyright law, research data are in many cases not copyrighted.
- But many data are in databases and there is some kind of protection for these (EU directive 96/09/EG, UrhG §§ 87a-e). Virtually all data are useless without documentation. This documentation might very well be protected by copyright.

Legal issues

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Creative Commons Licences

- Standard licences that determine the scope of use of a work
- Combination of layperson-friendly formulation and a legally proper license text adapted to the relevant national law.
- Licence content and metadata are available in machine readable form and can be added to a document. (TDM)
- Modular structure with differing “degrees of freedom”

- There are also alternatives, e.g. the Open Data Commons licenses.
- For Software there are specific software licenses

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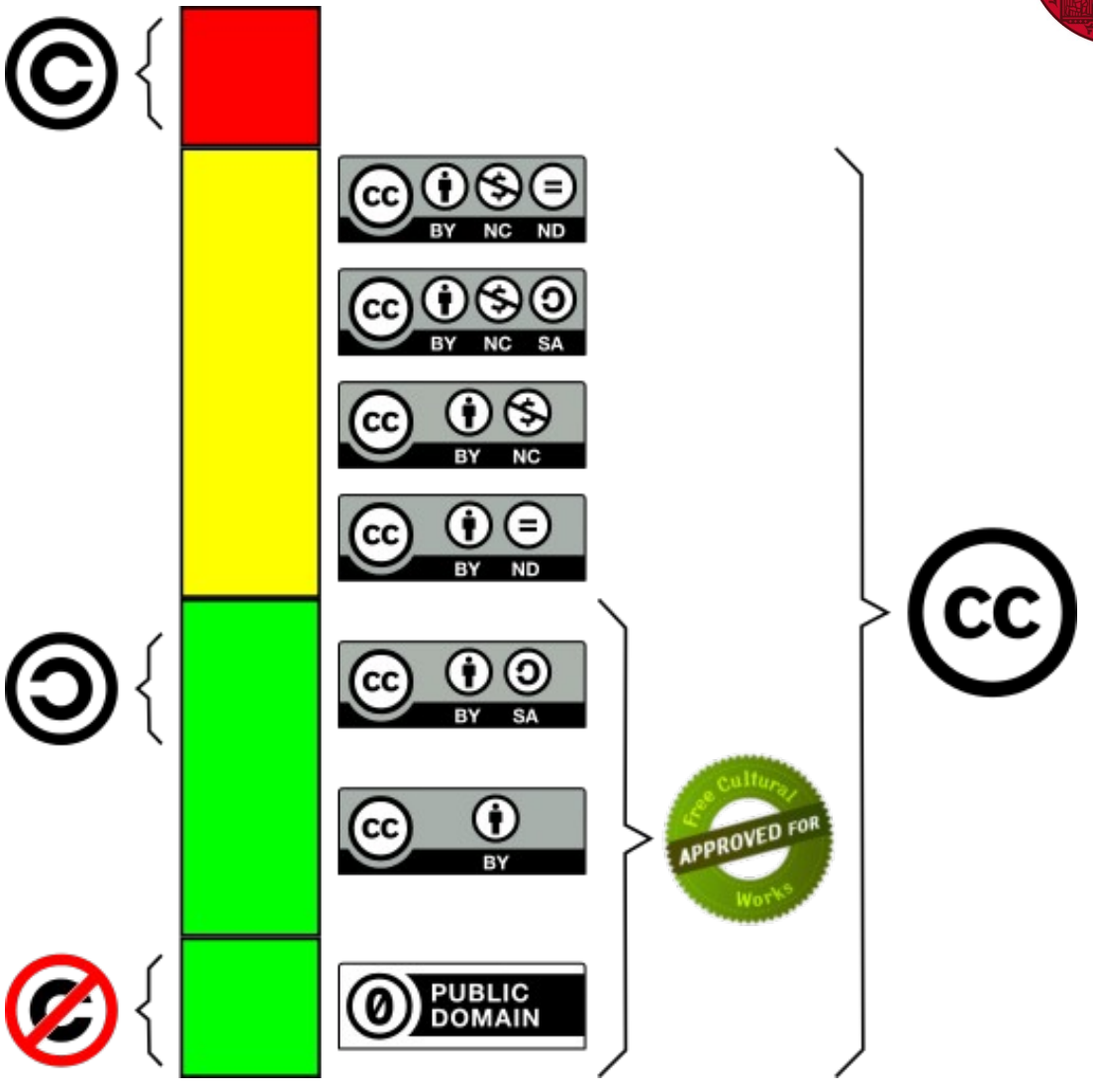
Legal issues



Picture by Marko Txopitea "Txopi" [CC0], via Wikimedia Commons, https://commons.wikimedia.org/wiki/File%3ACreative_Commons_Semaforoa.svg

Legal issues

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Data publication and data protection

- Informed consent: data sharing not excluded; information on whether and how data are disseminated

Beispiel UK Data Archive „Managing and Sharing Data“:
SAMPLE CONSENT FORM FOR INTERVIEWS

CONSENT FORM FOR [NAME OF PROJECT]

Please tick the appropriate boxes	Yes	No
Use of the information I provide for this project only		
I understand my personal details such as phone number and address will not be revealed to people outside the project.	☐	☐
I understand that my words may be quoted in publications, reports, web pages, and other research outputs.	☐	☐
Use of the information I provide beyond this project		
I agree for the data I provide to be archived at the UK Data Archive.[b]	☐	☐
I understand that other genuine researchers will have access to this data only if they agree to preserve the confidentiality of the information as requested in this form.	☐	☐
I understand that other genuine researchers may use my words in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.	☐	☐

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Thank you very much!

Dr. Georg Schwesinger
schwesinger@ub.uni-heidelberg.de

Dr. Sebastian Zangerle
sebastian.zangerle@ub.uni-heidelberg.de

Research Data Unit
https://data.uni-heidelberg.de/

General Information on RDM
https://www.forschungsdaten.info/

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