



NFDI4Objects

Research Data Infrastructure
for the Material Remains of
Human History

KLASSIK
STIFTUNG
WEIMAR



Friedrich-Alexander-Universität
Erlangen-Nürnberg



COMPETENCE IN
RESEARCH
DATA &
INFORMATION

WissKI in Use at NFDI4Objects – Ontology- and Datamodel Development for Data Integration and Harmonisation

Dr. Sarah Wagner, FAU Competence Center for Research Data & Information

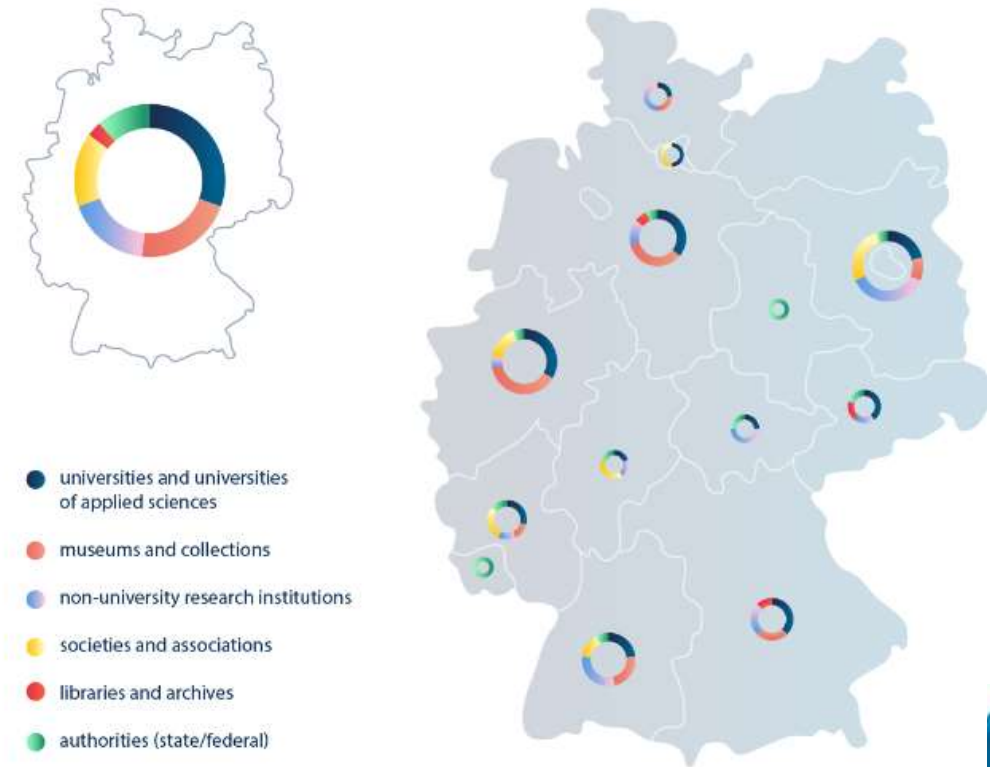
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WissKI User Meeting | November 20th 2024

NFDI4Objects

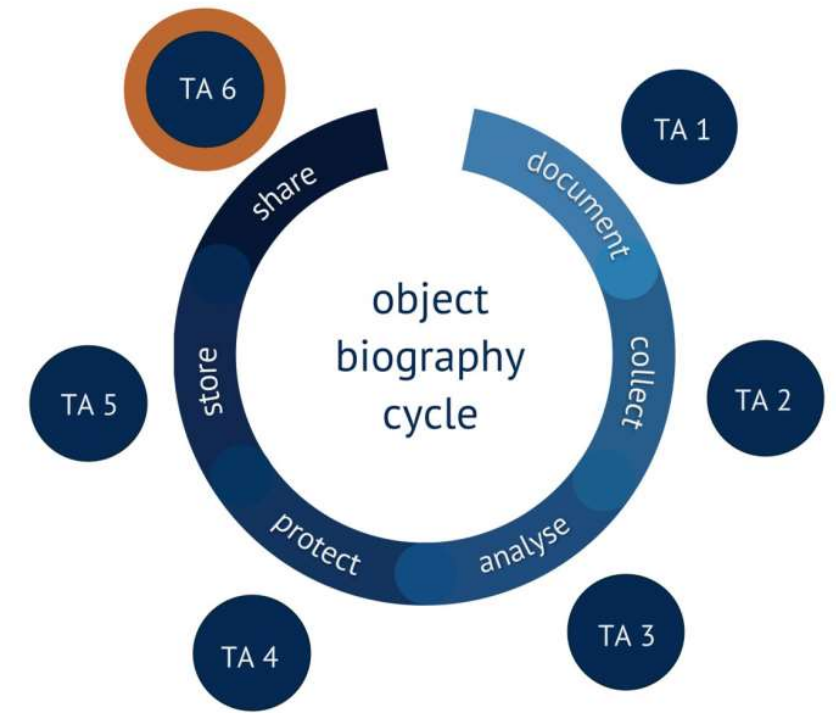
- NFDI: aims to make data from science and research FAIR in a permanent digital repository
- NFDI4O: focuses the tangible heritage of around three million years of human and environmental history
- 14 applicant institutions:
German Archeological Institute, Coin Cabinet of the Berlin State Museums, Mainz University of Applied Sciences, ...
- more than 60 Participants, e.g. University of Erlangen-Nuremberg (FAU)



<https://www.nfdi4objects.net/index.php/ueber-uns/konsortium>

NFDI4Objects Task Areas

- TA1 Documentation
- TA2 Collecting
- TA3 Analytics and Experiments
- TA4 Protecting
- TA5 Storage, Access, Dissemination
- TA6 Qualification, Integration & Harmonisation
- TA7 Support and Coordination



<https://www.nfdi4objects.net/>

- Generation of heterogeneous and multidisciplinary research data in TA 1-4, e.g. excavation data, collection and provenance information, different kinds of analyses, restoration and conservation measures
- Various formats, models, ontologies, authority files, terminologies, ...
- Processes, tools and standards for integration and harmonisation needed → TA6

Task Area 6 Qualification, Integration and Harmonisation

Co-Spokespersons and employees:

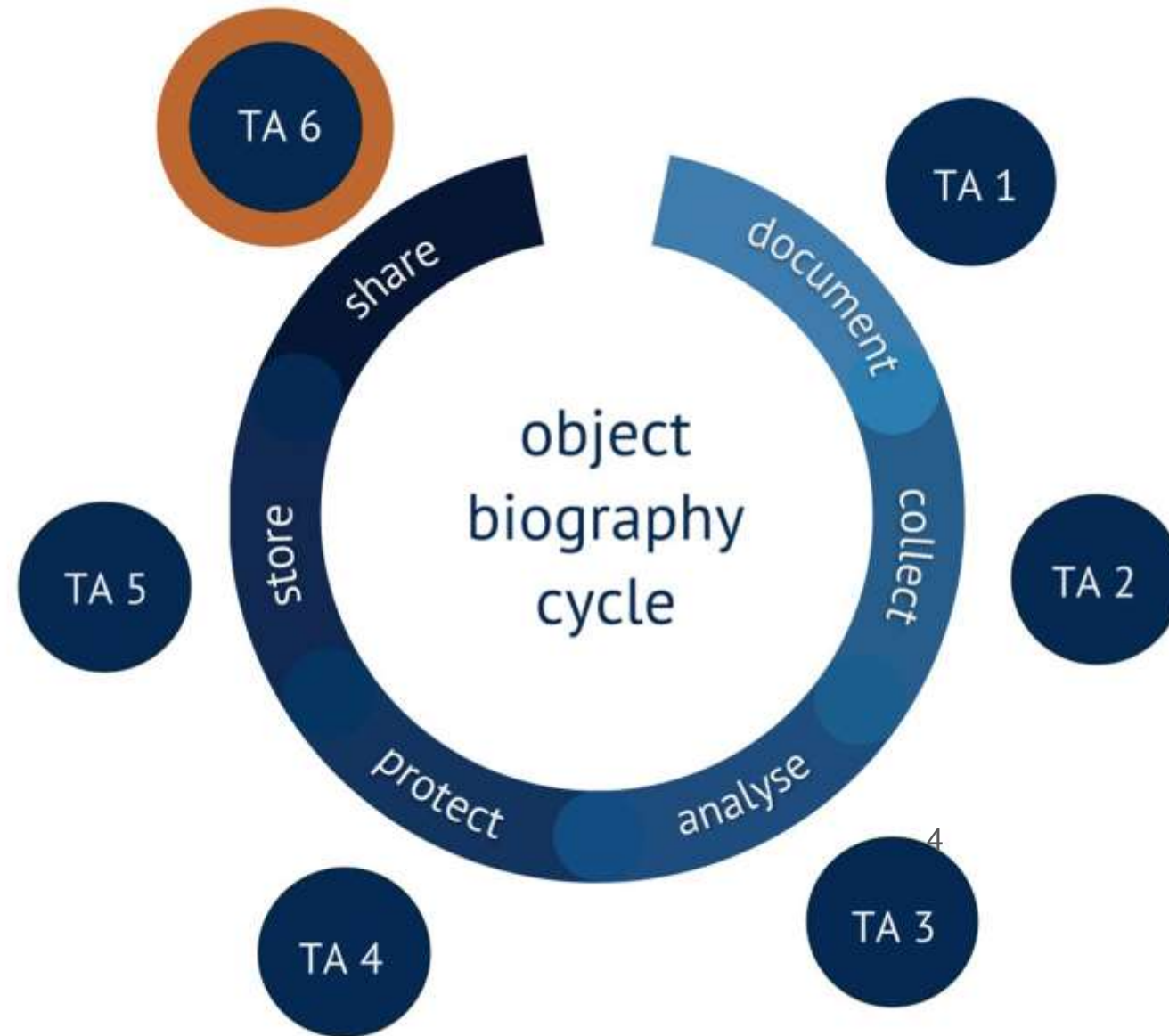
Prof. Dr. Kai-Christian Bruhn
Hochschule Mainz
Dr. Dirk Wintergrün
Klassik Stiftung Weimar

Klassik Stiftung Weimar (KSW)

Dr. Dirk Wintergrün
Anja Gerber

FAU Competence Center for Research Data and Information (FAU CDI)

Prof. Dr. Günther Görz
Prof. Dr. Michael Kohlhase
Dr. Sarah Wagner



Tasks of KSW & FAU CDI for data integration and harmonisation

- Development of the N40 **Objects Ontology** (based on ISO 21127 CIDOC CRM Version 7.1.3) for the description of the consortium's research data
- Development, implementation and proof of concept of a data model to represent **Object Biographies (Maximum Dataset)** using the **N40 Objects Ontology** and the virtual research environment **WissKI**
- Development of a **Minimal Dataset** in cooperation with TA 1-4 to represent and connect the core data of objects using the **N40 Objects Ontology**

Object Biography

Object Biography

- Transfers the concept of biography to objects of cultural heritage
- Compiles any kind of object information (contexts, paths they "traveled", hands they went through, meanings, ...)
- **Objects** (artifacts, living beings, rocks)
- **Contexts & Events**, e.g. production, usage, collection/museum context, change of ownership, research activities, ...)
- **Actors, places, time** (context specific: who? where? when?)
- **Sources** (pictorial and written material, data, findings, ...)
















Fig.: Schematic representation of an object biography © Sarah Wagner, CC-BY 4.0

Use Cases



Object biographies are not simply given and usually have to be **reconstructed in extensive research**. In order to develop and provide a data model, we need Use Cases.

Objekt
Displaying 1 - 13 of 13

 Giraffatitan brancai, MfN	 Eisenstaublung, FAU PS 091/09	 Suppenterrine mit Deckel, Zitronenknauf und Landschaftsdekor, BNM 40/496	 Behaim-Globus, GNM WI1826	 Suite geschliffener Gesteine aus Italien, E13, Creduto Plasma	 Baumfragment mit Hirschgeweih, ZMB Mam 88335, Museum für Naturkunde Berlin
 Weltallschale Kaiser Rudolfs II, SMB K 3885 a,b	 Der Große Kurfürst als Heiliger Georg, SMB 856	 Auslegerboot, Sog. "Luf-Boot", SMB VI 23116 a	 Idia-Elfenbeinanhänger, BM_Af1910_5-13_1	 Kaltwasserkarbonat Dünnschliff, FAU AM_415	 Münze GMM-2779
 Wunderblutkirche St. Nikolai					

View of the Use Cases (so far) in our WissKI N4O development instance

Selection criteria

- heterogeneous
- significant for a domain or representative of a current debate
- complex biography
- various information and source material available
- collaborations with interested domain experts

Use Case: The Behaim Globe

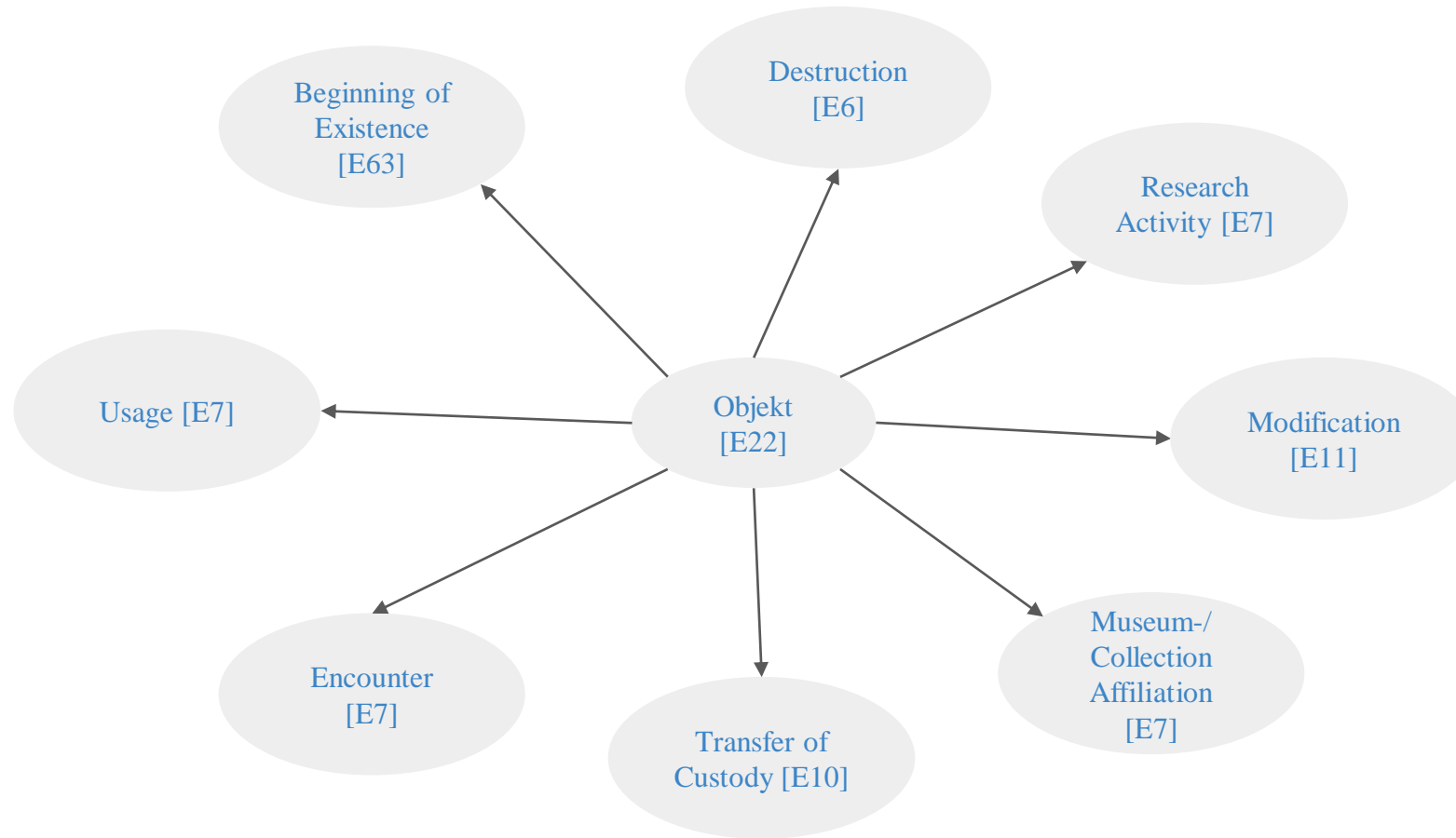
Selection criteria

- Oldest existent globe of the earth (1492)
- UNESCO World Document Heritage since 2023
- Complex object in itself (geographical map, inscriptions, miniatures, materiality, ...)
- Long exhibition and research history
- Numerous restorations and modifications
- Many copies and related objects around the world
- Still many open questions, vague information and contradictions to deal with



Behaim Globe, Germanisches Nationalmuseum, Photo: Jürgen Musolf

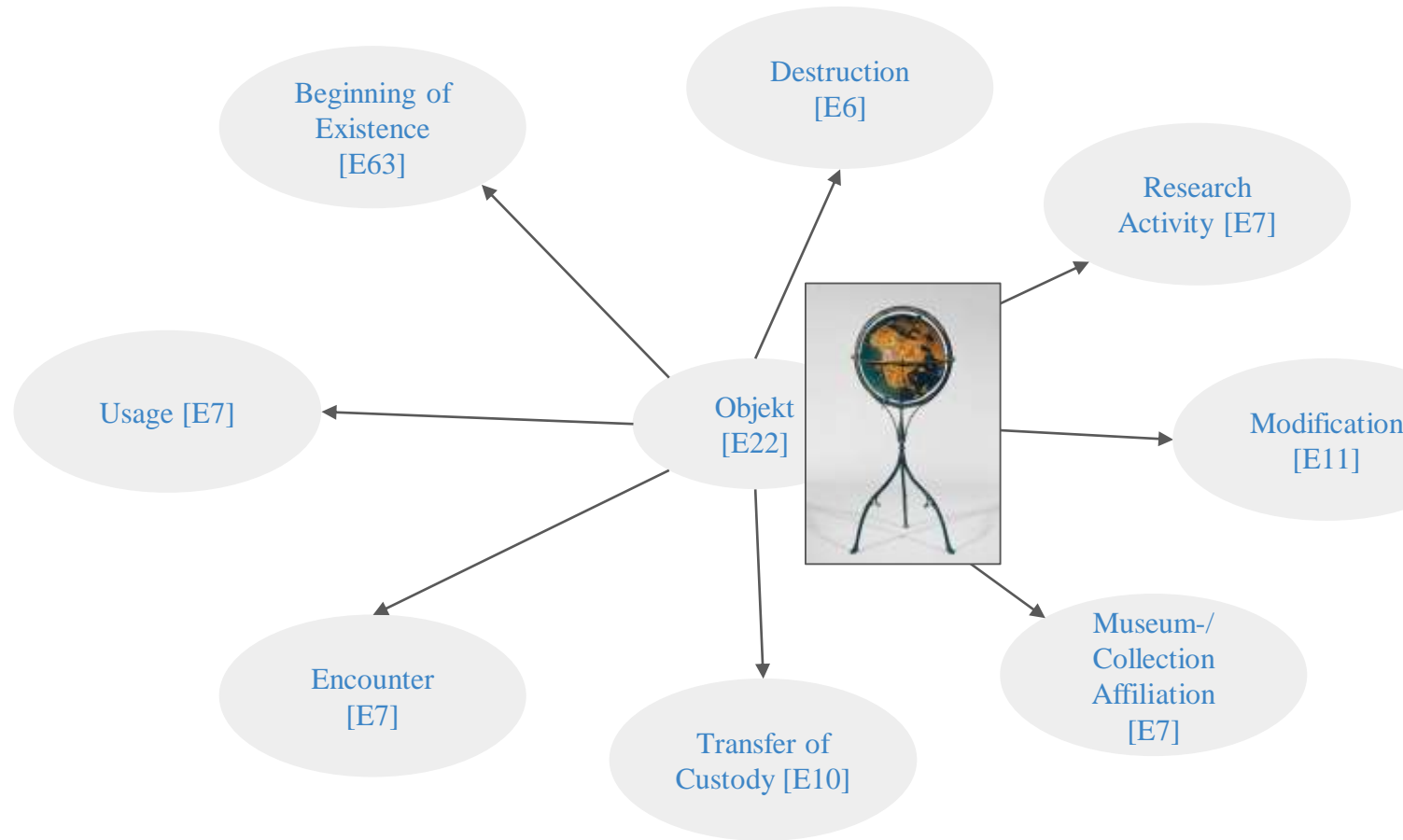
Use Case: The Behaim Globe



E22 Human-Made Object
E63 Beginning of
Existence
E65 Creation
E12 Production
E10 Transfer of Custody
E11 Modification
E5 Event
E7 Activity
E6 Destruction

Main events and contexts in the biography of an object that we defined so far

Use Case: The Behaim Globe



Timeline (excerpt)

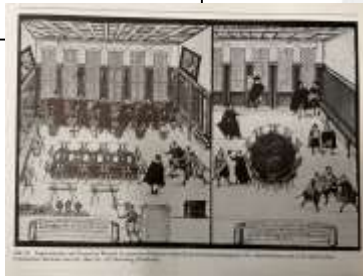
- 1492 commission/initiative
- 1492-94 production
- 1494-1601/1730 installation at Nuremberg town hall
- after 1494 addition to the dedication inscription
- after 1507 addition of Behaim's death notice
- 1510 addition of the horizon ring; replacement of the tripod
- 1730, 1778, 1842, 1853, 1854, planiglobe facsimiles
- latest 1730-1906 custody of the Behaim family
- 1823 restoration of the inscriptions
- 1892 copy for Bibliothèque nationale de France
- 1906 loan from Behaim family to GNM
- ...

Use Case: The Behaim Globe



Many manufactures and sources of ideas; production ca. 1492-94

As object of representation in the Nuremberg Town Hall, ca. 1492/94-latest 1730



Beginning of Existence [E63]

Destruction [E6]

Object of research since its existence; numerous publications, material-scientific analyses, imaging procedures

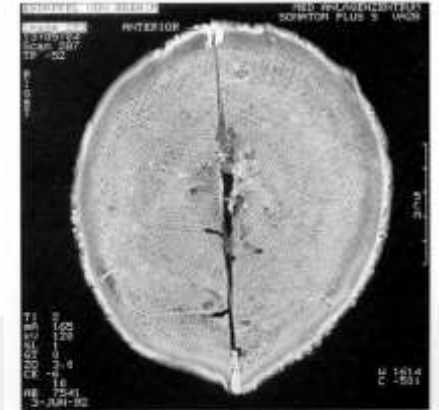


Abb. 15-Scan 287. In der Kugelrundung, Außergewöhnlich gut sind die Gewebestrukturen, die Bindungsart und die Fadenstärken zu erkennen

Many modifications and restorations over the centuries, e.g. already in 1510, when the horizon ring was added



19. Restaurierung im Erdgeschoss des Gebäudes im Jahr 1937. Die Behaim-Kugel ist im Erdgeschoss des Gebäudes im Jahr 1937. Die Behaim-Kugel ist im Erdgeschoss des Gebäudes im Jahr 1937.

Since 1906 object in the collection of scientific objects at GNM; numerous changing exhibition contexts, photo campaigns etc.



Numerous transfers between the actors, e.g. on loan to the GNM since 1906, withdrawn in 1928; officially acquired by the GNM in 1937 with the involvement of the Nazi regime.

Implementation of the data model in WissKI

Edit Pathbuilder: nfdi4objects_objektbiografie ☆

[+ Add Path](#) [+ Add Existing Path](#) [Show row weights](#)

Title	Path	Enabled	Field Type	Cardinality	Operations
Objekt	Group [nfdi4objects:Object]	<input checked="" type="checkbox"/>		Unlimited	Edit
Id	nfdi4objects:Object → crm:P48_has_preferred_identifier → nfdi4objects:Identifier	<input checked="" type="checkbox"/>	Text (plain)	1	Edit
Entstehung	Group [nfdi4objects:Object → crm:P92i_was_brought_into_existence_by → crm:E63_Beginning_of_Existence]	<input checked="" type="checkbox"/>		Unlimited	Edit
Beauftragung	Group [nfdi4objects:Object → crm:P92i_was_brought_into_existence_by → crm:E63_Beginning_of_Existence → crm:P20i_was_purpose_of → nfdi4objects:Commissioning]	<input checked="" type="checkbox"/>		Unlimited	Edit
Akteurzuweisung	nfdi4objects:Object → crm:P92i_was_brought_into_existence_by → crm:E63_Beginning_of_Existence → crm:P20i_was_purpose_of → nfdi4objects:Commissioning → crm:P140i_was_attributed_by → nfdi4objects:Actor_Assignment	<input checked="" type="checkbox"/>	Entity reference	Unlimited	Edit
Ortszuweisung	nfdi4objects:Object → crm:P92i_was_brought_into_existence_by → crm:E63_Beginning_of_Existence → crm:P20i_was_purpose_of → nfdi4objects:Commissioning → crm:P140i_was_attributed_by → nfdi4objects:Place_Assignment	<input checked="" type="checkbox"/>	Entity reference	Unlimited	Edit
Zeitzuweisung	nfdi4objects:Object → crm:P92i_was_brought_into_existence_by → crm:E63_Beginning_of_Existence → crm:P20i_was_purpose_of → nfdi4objects:Commissioning → crm:P140i_was_attributed_by → nfdi4objects:Time_Assignment	<input checked="" type="checkbox"/>	Entity reference	Unlimited	Edit
Kommentar	nfdi4objects:Object → crm:P92i_was_brought_into_existence_by → crm:E63_Beginning_of_Existence → crm:P20i_was_purpose_of → nfdi4objects:Commissioning → crm:P129i_is_subject_of → nfdi4objects:Comment	<input checked="" type="checkbox"/>	Text (formatted, long)	1	Edit
Quellenverweis	nfdi4objects:Object → crm:P92i_was_brought_into_existence_by → crm:E63_Beginning_of_Existence → crm:P20i_was_purpose_of → nfdi4objects:Commissioning → crm:P129i_is_subject_of → nfdi4objects:Source_Content_Section	<input checked="" type="checkbox"/>	Entity reference	Unlimited	Edit

Pathbuilders ☆

[+ Add Pathbuilder](#) [+ Path Usage](#) [+ Export Pathbuilder and Ontologies](#)

name	Operations
NFDI4Objects Minimaldatensatz	Edit
NFDI4Objects Objektbiografie	Edit
WissKI Linkblock (Linkblock)	Edit

Pathbuilders in N4O WissKI

Detail of the WissKI Pathbuilder with the Object Biography data model

Object Biography of the Behaim Globe in WissKI

[illegible][illegible]

View of the Behaim
Globe in WissKI, detail (!)

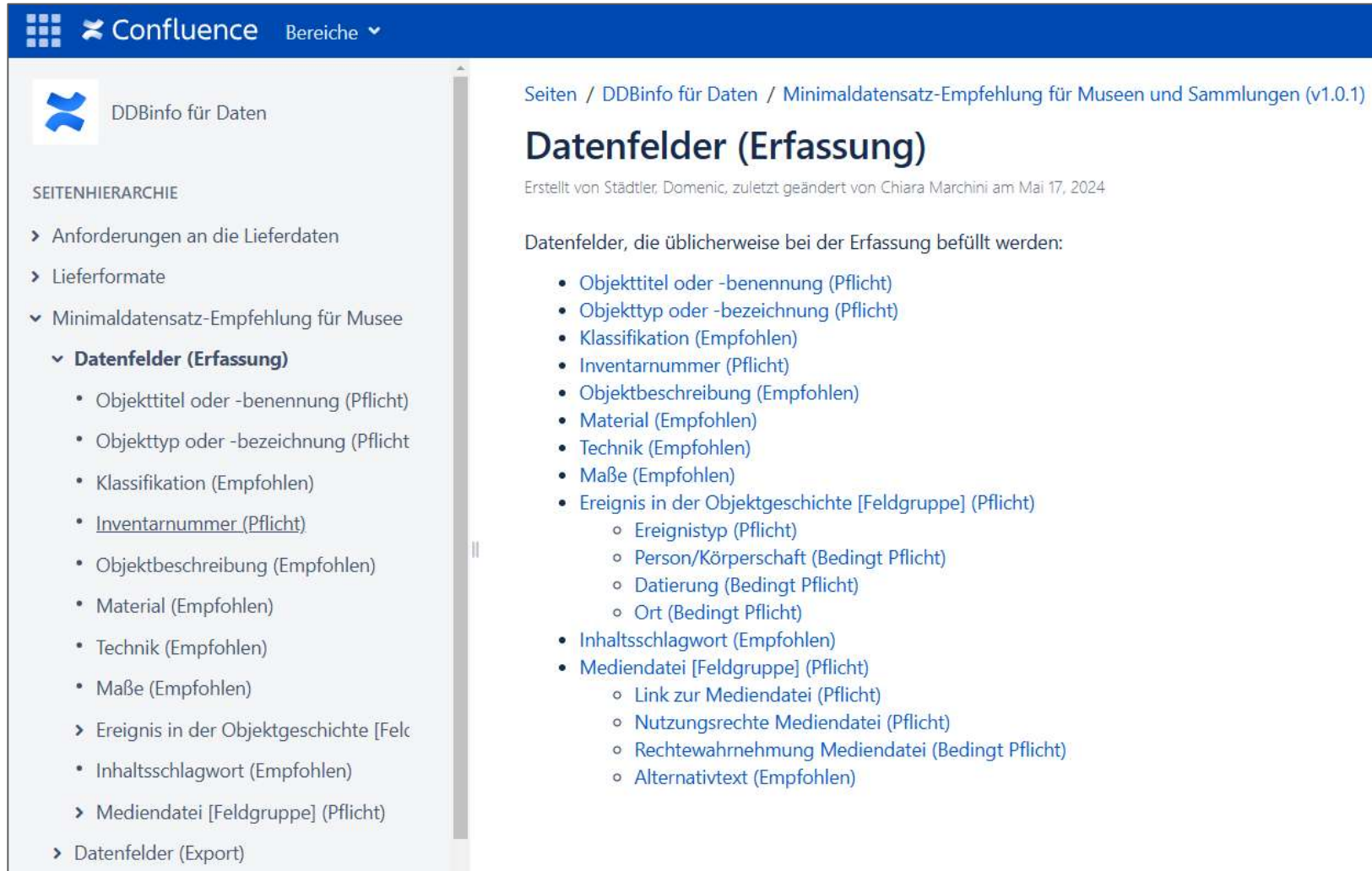
Please note: a new webdesign is currently under development, because the mass of information can no longer be adequately displayed with current themes.

Object Biography – Chances using the concept for object documentation

- Allows the integration of heterogeneous, multidisciplinary and scattered object information (within NFDI4O and beyond).
- Focus on detailed representation of provenance information and
- information provenance.
- Creates a meta-perspective on objects (until now, object documentation is coming from the current collection's perspective).
- Takes equal account of attributions of actors and groups outside the collection, the museum or the scientific context (societies of origin, popular culture, etc.).

Minimal Dataset

Minimal Dataset for Museums and Collections by DDB



The screenshot shows a Confluence page with a blue header bar containing the Confluence logo and the text 'Bereiche ▾'. The left sidebar has a blue header 'DDBinfo für Daten' and a section 'SEITENHIERARCHIE' with a tree view. The main content area has a breadcrumb 'Seiten / DDBinfo für Daten / Minimaldatensatz-Empfehlung für Museen und Sammlungen (v1.0.1)' and a title 'Datenfelder (Erfassung)'. Below the title is the text 'Erstellt von Städtler, Domenic, zuletzt geändert von Chiara Marchini am Mai 17, 2024'. The main content lists 'Datenfelder, die üblicherweise bei der Erfassung befüllt werden:' followed by a bulleted list of fields with their requirements (Pflicht, Empfohlen, Bedingt Pflicht).

Confluence Bereiche ▾

DDBinfo für Daten

SEITENHIERARCHIE

- › Anforderungen an die Lieferdaten
- › Lieferformate
- ▼ Minimaldatensatz-Empfehlung für Museen
 - ▼ **Datenfelder (Erfassung)**
 - Objekttitle oder -benennung (Pflicht)
 - Objekttyp oder -bezeichnung (Pflicht)
 - Klassifikation (Empfohlen)
 - Inventarnummer (Pflicht)
 - Objektbeschreibung (Empfohlen)
 - Material (Empfohlen)
 - Technik (Empfohlen)
 - Maße (Empfohlen)
 - › Ereignis in der Objektgeschichte [Feldgruppe] (Pflicht)
 - Inhaltsschlagwort (Empfohlen)
 - › Mediendatei [Feldgruppe] (Pflicht)
 - › Datenfelder (Export)

Seiten / DDBinfo für Daten / Minimaldatensatz-Empfehlung für Museen und Sammlungen (v1.0.1)

Datenfelder (Erfassung)


Erstellt von Städtler, Domenic, zuletzt geändert von Chiara Marchini am Mai 17, 2024

Datenfelder, die üblicherweise bei der Erfassung befüllt werden:

- Objekttitle oder -benennung (Pflicht)
- Objekttyp oder -bezeichnung (Pflicht)
- Klassifikation (Empfohlen)
- Inventarnummer (Pflicht)
- Objektbeschreibung (Empfohlen)
- Material (Empfohlen)
- Technik (Empfohlen)
- Maße (Empfohlen)
- Ereignis in der Objektgeschichte [Feldgruppe] (Pflicht)
 - Ereignistyp (Pflicht)
 - Person/Körperschaft (Bedingt Pflicht)
 - Datierung (Bedingt Pflicht)
 - Ort (Bedingt Pflicht)
- Inhaltsschlagwort (Empfohlen)
- Mediendatei [Feldgruppe] (Pflicht)
 - Link zur Mediendatei (Pflicht)
 - Nutzungsrechte Mediendatei (Pflicht)
 - Rechtswahrnehmung Mediendatei (Bedingt Pflicht)
 - Alternativtext (Empfohlen)

Minimal Dataset by Deutsche Digitale Bibliothek (German digital library),
<https://zenodo.org/records/13771750>

Minimal Dataset for Museums and Collections by DDB

DDBInfo für Daten

SEITENHIERARCHIE

- › Anforderungen an die Lieferdaten
- › Lieferformate
- ▼ Minimaldatensatz-Empfehlung für Museen
 - › Datenfelder (Erfassung)
 - › Datenfelder (Export)
 - FAQs
 - ▼ Ressourcen und Links
 - Pressemitteilung: Online-Handreichung
 - Change Log
 - › Credits und Zitationshinweis
 - › English Translation: Minimum Record Rec
- › Werkzeuge

Seiten / DDBInfo für Daten / Minimaldatensatz-Empfehlung für Museen und Sammlungen (v1.0.1)

Liste von Softwareanbieter*innen und Verbünden

Die Datenbanken folgender Anbieter*innen und Verbünde unterstützen die Minimaldatensatz-Empfehlung:

	Softwareanbieter*in oder Verbund	Datenbank	Hinweise zur Nutzung der Minimaldatensatz-Empfehlung
1	Axiell	Axiell Collections	
2	CD-Lab Bonn	VINO (=Virtual INternet Objects)	
3	digiCULT-Verbund eG	digiCULT.web	
4	Förderverein des Freilichtmuseums am Kiekeberg e. V.	FirstRumos Museumssoftware	
5	Germanisches Nationalmuseum Friedrich-Alexander-Universität Erlangen-Nürnberg Museum Koenig Bonn Interessengemeinschaft für semantische Datenverarbeitung e. V.	WissKI	CIDOC CRM basiertes Datenmodell für die Minimaldatensatz-Empfehlung (WissKI Pathbuilder)
6	Joanneum Research	imdas pro	
7	museum-digital Deutschland e. V.	museum-digital	museum-digital:handbuch annotiertes PDF
8	Robotron Datenbank-Software GmbH	robotron*Daphne	
9	Verbundzentrale des GBV	kuniweb und naniweb	
10	zetcom	MuseumPlus	

<https://wiki.deutsche-digitale-bibliothek.de/display/DFD/Ressourcen+und+Links>

Minimal Dataset for Museums and Collections by DDB in WissKI



[https://wiki.deutsche-digitale-bibliothek.de/display/DFD/Ressourcen+und+Links?preview=/129008331/186056726/Annotierte+Folien+WissKI+neu%20\(1\).pdf](https://wiki.deutsche-digitale-bibliothek.de/display/DFD/Ressourcen+und+Links?preview=/129008331/186056726/Annotierte+Folien+WissKI+neu%20(1).pdf)

Minimal Dataset for Museums and Collections by DDB in N4O WissKI

Edit Pathbuilder: nfdi4objects_minimaldatensatz ☆

+ Add Path + Add Existing Path

Show row weights

Title	Path	Enabled	Field Type	Cardinality	Operations
Objekt	Group [nfdi4objects:Object]	✓		Unlimited	Edit
Objektinitial oder -benennung	nfdi4objects:Object → crm:P1_is_identified_by → crm:E41_Appellation	✓	Text (plain)	Unlimited	Edit
Objekttyp oder -bezeichnung	nfdi4objects:Object → crm:P2_has_type → nfdi4objects:Object_Type → crm:P1_is_identified_by → crm:E41_Appellation	✓	Text (plain)	Unlimited	Edit
Themenkategorie	nfdi4objects:Object → crm:P2_has_type → nfdi4objects:Keyword → crm:P1_is_identified_by → crm:E41_Appellation	✓	Text (plain)	Unlimited	Edit
Inventarnummer	nfdi4objects:Object → crm:P48_has_preferred_identifier → nfdi4objects:Inventory_Number	✓	Text (plain)	1	Edit
Objektbeschreibung	nfdi4objects:Object → crm:P70I_is_documented_in → nfdi4objects:Description	✓	Text (plain, long)	Unlimited	Edit
Material	nfdi4objects:Object → crm:P45_consists_of → crm:E57_Material → crm:P1_is_identified_by → crm:E41_Appellation	✓	Text (plain)	Unlimited	Edit
Technik	nfdi4objects:Object → crm:P92I_was_brought_into_existence_by → crm:E12_Production → crm:P33_used_specific_technique → crm:E29_Design_or_Procedure → crm:P1_is_identified_by → crm:E41_Appellation	✓	Text (plain)	Unlimited	Edit
Maße	Group [nfdi4objects:Object → crm:P43_has_dimension → crm:E54_Dimension]	✓		Unlimited	Edit

Detail of the WissKI Pathbuilder with the Minimal Dataset implementation using the N4O Objects Ontology

Back to site Administration Configuration WissKI

Pathbuilders ☆

+ Add Pathbuilder + Path usage + Export Pathbuilder and Ontologies

name	Operations
NFDI4Objects Minimaldatensatz	Edit
NFDI4Objects Objektbiografie	Edit
WissKI Linkblock (Linkblock)	Edit

Pathbuilders in N4O WissKI

Minimal Dataset by DDB as starting point for the "Minimal Metadata-Set" for N4O

- Determine the minimum required data fields of N4O Task Areas 1-4 ("Documentation", "Collecting", "Experiments & Analytics" and "Protecting") for integration and connection in the N4O Knowledge Graph (TA5)
- Via a (open) Temporary Working Group (TWG):
<https://www.nfdi4objects.net/portal/twgs/development-of-a-common-nfdi4objects-objects-ontology-n4o-oo-and-a-minimal-metadata-set-n4o-mmds/>
- Stay tuned and subscribe to the TWG mailing list:
https://www.listserv.dfn.de/sympa/info/n4o_twg_objectsontology_mmds
- Want to contribute? Join the TWG Rocket Chat: https://n4o-chat.nfdi.de/channel/TWG_ObjectsOntology_and_MinimalMetadataSet

References and Resources

- Current state of the N4O Objects Ontology and Data Models (Object Biography, Minimal Dataset): <https://github.com/nfdi4objects/n4o-ontology>
- N4O Knowledge Graph: <https://github.com/nfdi4objects/n4o-graph>
- Terminologies in NFDI4Objects: <https://github.com/nfdi4objects/n4o-terminologies>
- AG Minimaldatensatz (2024): Minimaldatensatz-Empfehlung für Museen und Sammlungen (v1.0.1). Zenodo. <https://doi.org/10.5281/zenodo.12759620>
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- Gerber, Anja/von Hagel, Frank, AG Minimaldatensatz. (2024): Die Minimaldatensatz-Empfehlung für Museen und Sammlungen. NFDI4Objects Community Meeting, Mainz. Zenodo. <https://doi.org/10.5281/zenodo.13771750>
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- Wagner, Sarah (2024): Digitale Objektbiografien für NFDI4Objects. 15. Jahrestagung für Universitätssammlungen 2024, Neue Rollen, neue Ziele? Universitätssammlungen im Spannungsfeld von Forschung, Finanzen und Politik, Zürich. Zenodo. <https://doi.org/10.5281/zenodo.11471183>
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- Kopytoff, Igor (1986): The Cultural Biography of Things, in: The Social Life of Things. Hg. v. Arjun Appadurai, Cambridge, S. 64-91.
- Peter Braun (2015): Objektbiographie. Ein Arbeitsbuch. Weimar.
- Wagner, Sarah/Stört, Diana/Knittel, Meike (2024): Die Berliner Kunstkammer als Wissensgraph – Quellengestützte Erschließung von Sammlungs- und Objektinformationen mit Semantic Web Technologien. In: Sammler*innen | Sammlung | Netz: Die Netzimplikationen von Sammlungspraxis und Sammlungsforschung, Hg. v. Jörn Münkner, Joëlle Weis, Maximilian Görmar, Göttingen, S. 63-84, <https://www.wallstein-verlag.de/openaccess/9783835353923-oa.pdf>
- Becker, Marcus/Dolezel, Eva/Knittel, Meike/Stört, Diana/Wagner, Sarah (2023): Die Berliner Kunstkammer. Sammlungsgeschichte in Objekten vom 16. bis 21. Jahrhundert, Petersberg, S. 16-21, <https://books.ub.uni-heidelberg.de/arthistoricum/catalog/book/1461/version/2222>