Task Area 3 '2Interoperate'

1st NFDI4Earth Plenary Meeting, Dresden 9th-10th June 2022

9.6.2022

Stephan Frickenhaus, Claus Weiland, Dominik Hezel, Frederik Tilmann, Florian Ott, Claudia Müller, Thomas Rose, Jonas Grieb

TA3 Overview

NFDI4Earth

NFDI4Earth2Participate
M1.1: Earth System Science Pilots *
M1.2: Incubator Lab
M1.3: Education and Training Materials and Services *
M1.4: NFDI4Earth Academy *

Coordination
H. Gödde
M. Mahecha
M. Sester
C. Keßler

Geo.X
UNIVERSITÄT LEIPZIG
Leibniz Universität Hannover
Hochschule Bochum Bochum University of Applied Sciences

Task Area 1

NFDI4Earth2Facilitate
M2.1: OneStop4All
M2.2: User Support *
M2.3: Governmental Data *
M2.4: Data in Long-Term Storage *
M2.5: Advancing Tools

Coordination
P. Braesicke
M. Reichstein
H. Thiemann

KIT Karlsruher Institut für Technologie
Max Planck Institute for Biogeochemistry
DKRZ DEUTSCHES KLIMARECHENZENTRUM

Task Area 2

Overarching Goal

NFDI4Earth2Interoperate
M3.1: Synthesis of a Sustainable NFDI4Earth Architecture *
M3.2: Common Standards for FAIR ESS Data *
M3.3: NFDI Commons *
M3.4: International Networking & Embedding *

Coordination
F. Tilmann
S. Frickenhaus
H. Marschall
C. Weiland

GFZ Helmholtz-Zentrum Potsdam
AWI
GOETHE UNIVERSITÄT FRANKFURT AM MAIN
SENCKENBERG world of biodiversity

Task Area 3

Infrastructure Perspective:
Improve Interoperability by Convergence & Integration

NFDI4Earth2Coordinate
M4.1: Coordination, Collaborative and Sustainable
       Governance of NFDI4Earth *
M4.2: Towards a Cultural Change in
       ESS Research Data Management *
M4.3: Central Support Services for the federated NFDI4Earth *

Coordination
L. Bernard
W. Nagel

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Task Area 4

NFDI4Earth Infrastructures and Services

NFDI₄Earth

TA3

Co-Design along Pilots and Interest Groups

User Experience and Requirements

Design Features, Architecture & Embedding

Infrastructures along common standards

Development

+

Operation of RDM Services ...

FID GEO

PANGAEA

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and many more ...
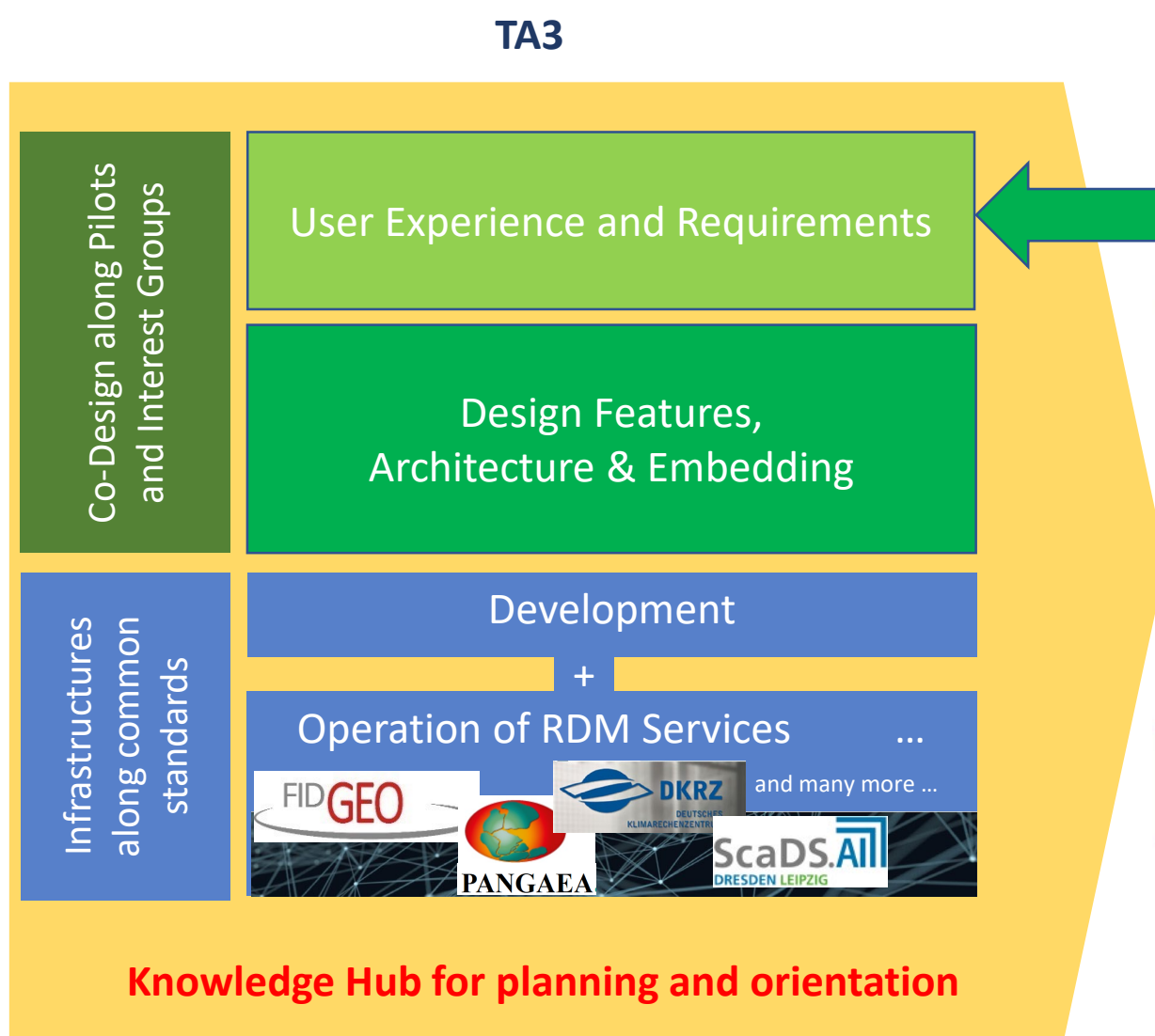
Knowledge Hub for planning and orientation

TA2

www OneStop4All

User Support Network

Accessed via the OneStop4All / USN
Facilitated by 2Interoperate

Data publishing – offer it FAIR

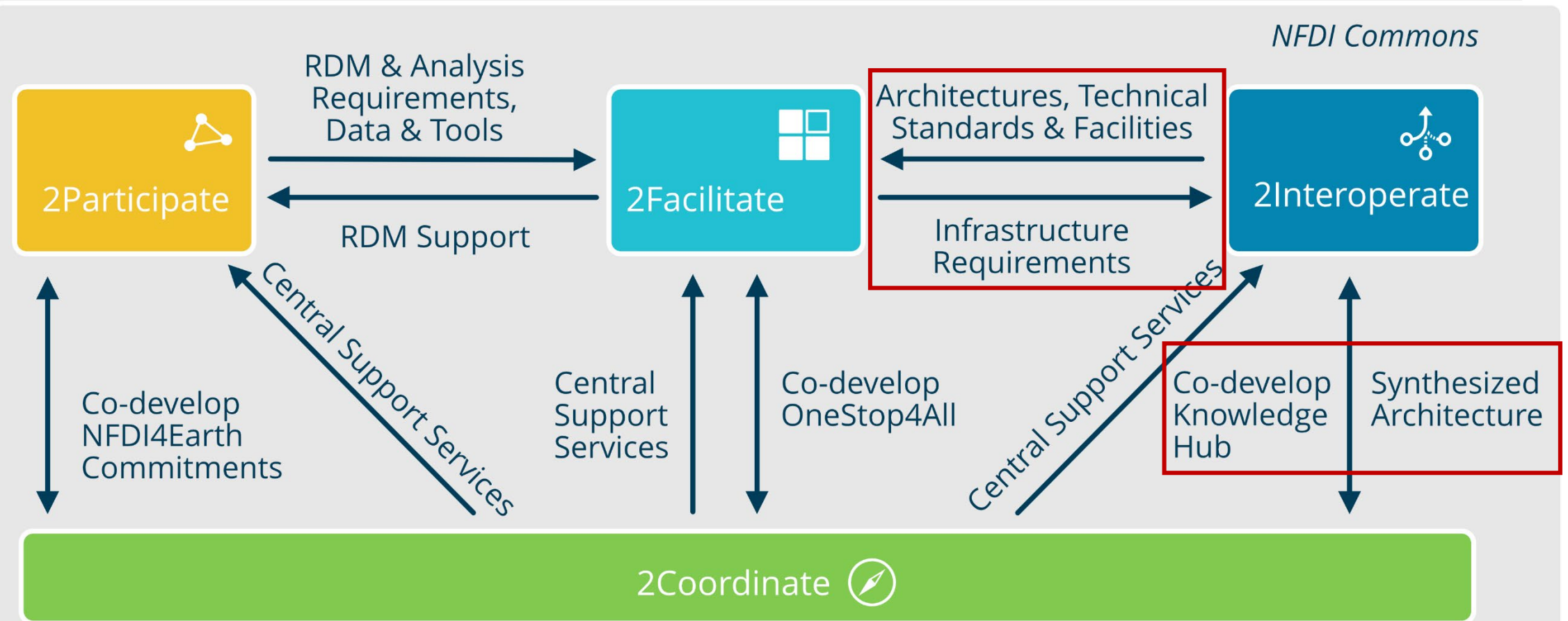**Storage resources** – keep it safe and FAIR

HPC resources – create and analyse data FAIRly

NFDI4Earth will support the development of a **sustainable synthesized architecture** by intensively interacting with the existing ones (some are already associated with NFDI4Earth)

Information regarding infrastructures will be part of the **Knowledge Hub**

Task Area Interactions

TA3 – Interrelations and Teams

NFDI4Earth2Participate
M1.1: Earth System Science Pilots *
M1.2: Incubator Lab
M1.3: Education and Training Materials and Services *
M1.4: NFDI4Earth Academy *

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Hochschule Bochum
Bochum University of Applied Sciences BO

Task Area 1

Community Engagement

NFDI4Earth2Facilitate
M2.1: OneStop4All
M2.2: User Support *
M2.3: Governmental Data *
M2.4: Data in Long-Term Storage *
M2.5: Advancing Tools

Coordination
P. Braesicke
M. Reichstein

KIT Karlsruher Institut für Technologie
Max Planck Institute geochemistry
DKRZ DEUTSCHES KLIMARECHENZENTRUM

Task Area 2

Piloting Innovations

Team TA2-3-4

User Perspective

NFDI4Earth2Interoperate
M3.1: Synthesis of a Sustainable NF
M3.2: Common Standards for FAIR
M3.3: NFDI Commons *
M3.4: International Networking & E

Service Catalogue,
Standards, Tools, Code
snippets, Development-Roadmaps,
Interoperability-Label,
International Embedding
CONVERGENCE & INTEGRATION

Infrastructure Perspective TA3

Knowledge Base and Handbook

NFDI & International Integration

NFDI4Earth2Coordinate
M4.1: Coordination, Collaborative a
Governance of NFDI4Earth *
M4.2: Towards a Cultural Change in
ESS Research Data Management *
M4.3: Central Support Services for the federated NFDI4Earth *

B. Berkara
W. Nagel

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Task Area 4

Community Support

Knowledge Hub Service
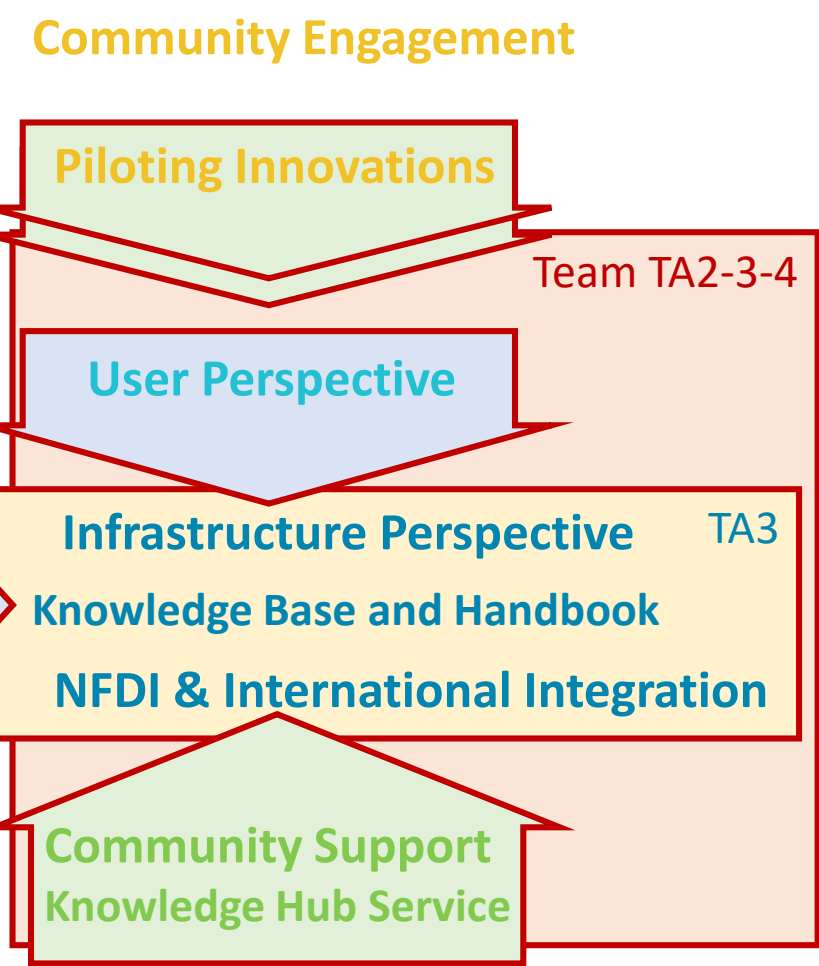
Measure 3.1: Synthesis of a sustainable NFDI4Earth Architecture

Who we are

Stephan Frickenhaus

Claudia Müller

Stephan Hachinger

Johannes Munke

Annika Jahnke-Bornemann
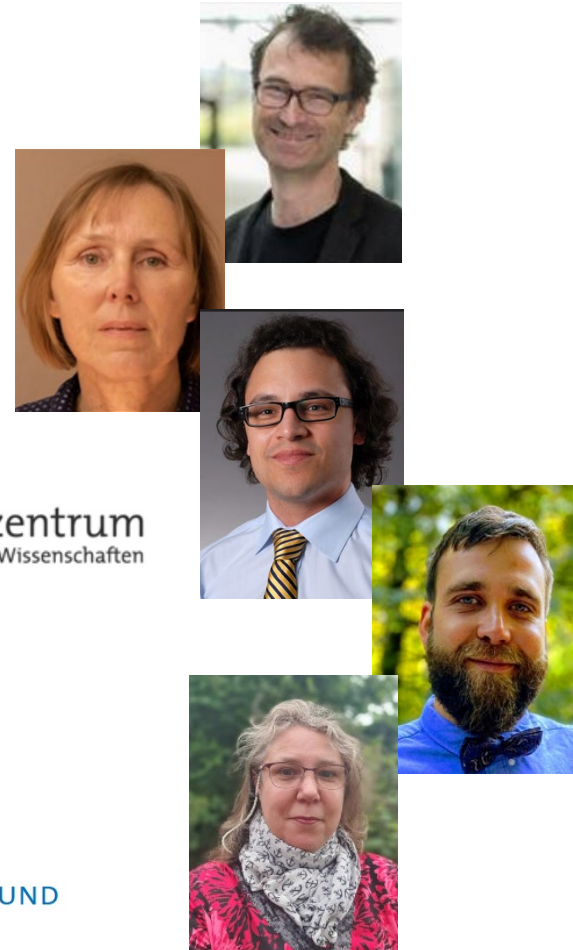
Measure 3.1: Synthesis of a sustainable NFDI4Earth Architecture

NFDI₄Earth

Products

NFDI4Earth service catalogue

- the collection of all existing and new services provided by NFDI4Earth
  ⟹ Knowledge Hub
  - detailed descriptions of the services, and used standards
  - their features, documentation, and FAIRness
  - their usage and relation to user communities
  - relation and interoperability with other services code/libraries to access/use the service

Extensions and Improvements

- based on the NFDI4Earth Architecture
- via Gap analysis of pilots
- description in human-/ machine-readable form
- for data stewards and others

M3.2 objectives:

- An assessment of technical standards and (semantic) information artifacts leveraging on existing community efforts in the ESS

- Design and implementation of a data abstraction layer to normalize currently heterogeneous data structures (intended approach: FAIR Digital Objects)

- Based on this, the development of a self-assessment framework (NFDI4Earth Label) as key driver and indicator for interoperability of services

… Involving the current team: Jan Bumberger (UFZ), Jonas Grieb (SGN*), Thomas Schnicke (UFZ), Markus Stocker (TIB), Claus Weiland (SGN*)

What are interoperability and reusability about?

- Computational agents are increasingly involved in data discovery and integration

- Machine-Actionability as a core objective of FAIR: Enable autonomous and appropriate acting of machines faced with a multitude of types, formats, and protocols (Wilkinson et al. [2016] https://doi.org/10.1038/sdata.2016.18)

- Challenging vision: A global data ecosystem that can be navigated independently by those machines (Lannom [2021] https://www.scidatacon.org/virtual-2021/sessions/330/)

FAIR Digital Objects, shortened

Key components:

- Globally-unique PIDs (preferably handles),

- Specs of valid operations on typed DO (DOIP)

- Metadata enabling highly automated mobilizing and processing of encapsulated data

- Machine-actionable knowledge units in "one virtual data collection" (Wittenburg & Strawn [2021] doi: 10.3390/info12110472)
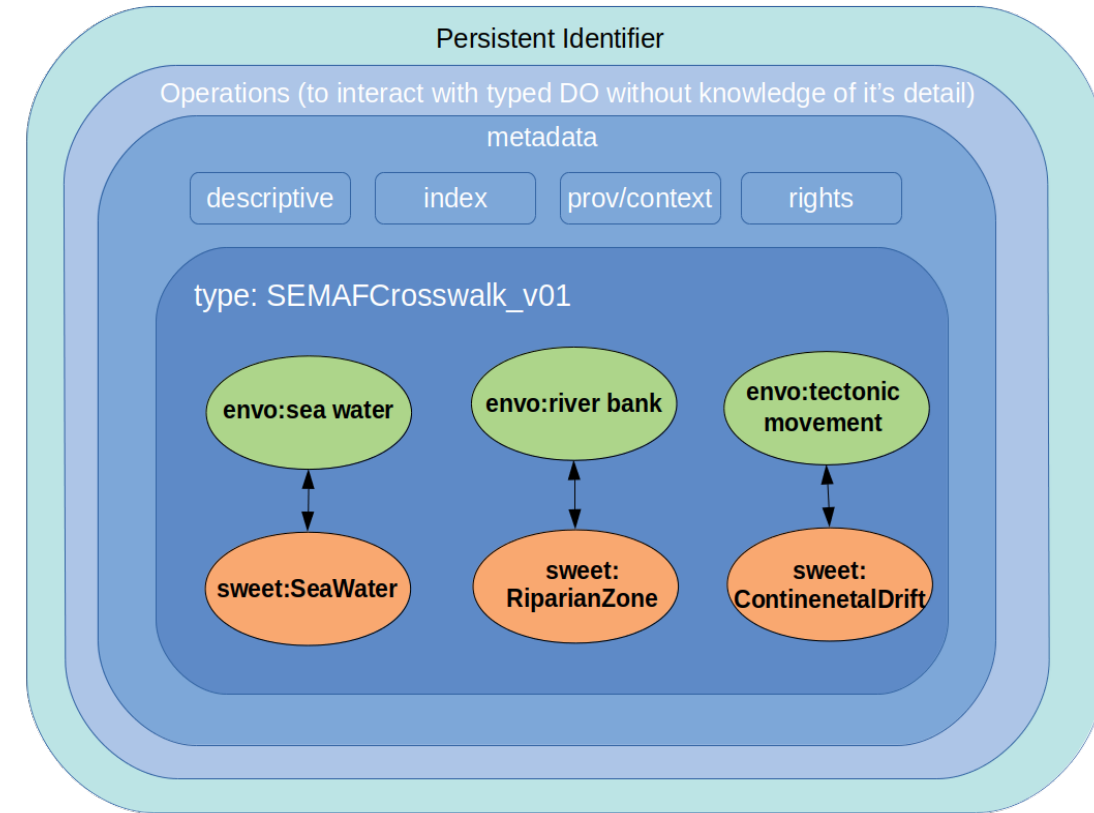
Figure based on P. Wittenburg (2022), changed
Mappings by M. Sattler in Karam et al (2020)
doi: 10.1017/S0269888920000132
SEMAF report (Broeder et. al. 2021)
doi: 10.5281/zenodo.4651421

In practice: development of the data model

- Defining core data types for the Knowledge Hub

  - Eg. repository/ aggregator/ registry, service, tool, ontology/ vocabulary, document

- Objective: FAIR Digital Object types which store their content in a linked data serialisation (e.g. json-ld)

- Close alignment with DCAT vocabulary

Source: https://www.w3.org/TR/vocab-dcat-3/
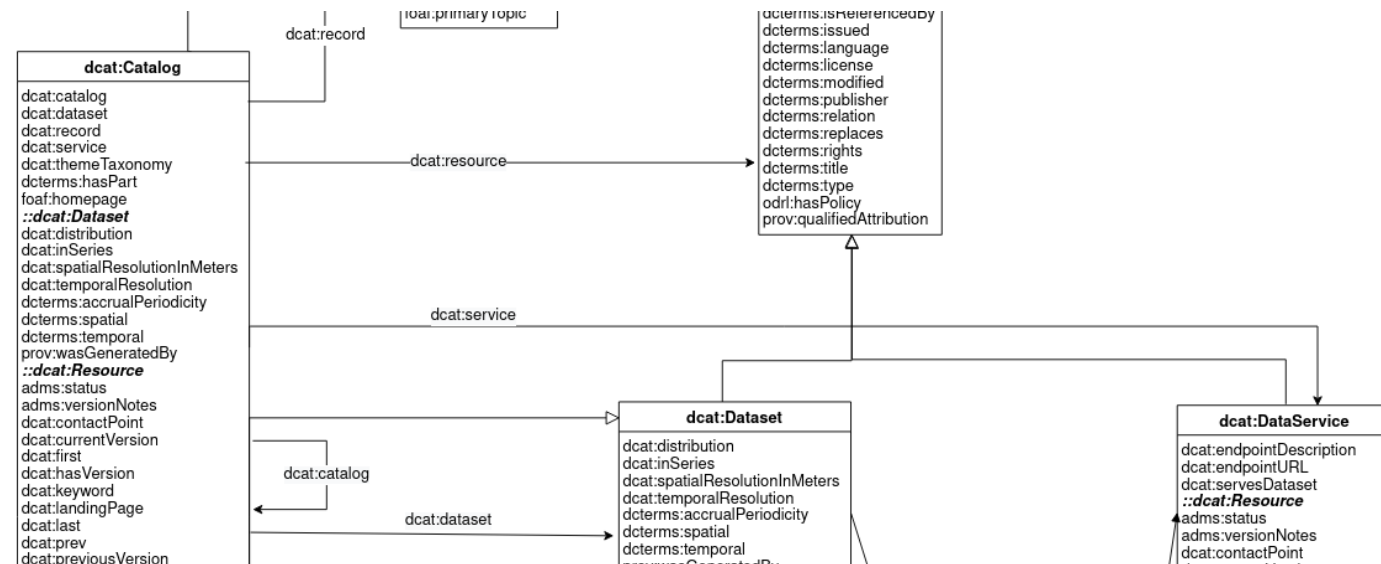
Measure 3.3 NFDI Commons

Compiling, producing & editing the Living Handbook

- Drafting and defining templates & entry types

  Database, Service, Software, Documentation, Best Practices, Architecture, Instructions, Manuals, Tutorials, …)

- Definition of user archetypes & user stories

  User types, level of competence, application types

- Development of technical concept & implementation

  Wiki, Docusaurus, …

Measure 3.3 NFDI Commons

Contact & communicate with related organisations & initiatives within Germany

- Within the NFDI & State-FDIs

    Exchange best practices with other consortia,

    participation in NFDI sections (RDC, Metadata)

- With Authorities, Organisations & Initiatives

    Geological/Weather/… Services, RfII, RDA-de, …

- Within Academia

    Universities, Research Institutes, Meetings

Measure 3.3 NFDI Commons

Team

- PD Dr. Dominik C. Hezel
  Primary responsible for the measure
- Thomas Rose
  Primary responsible for the day-to-day work of the measure
- Prof. Dr. Horst R. Marschall
  Co-Applicant & administration of the measure

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Participants in our Measure

- These are:
  Uni Tübingen: Thomas Walter & Michael Finkel
  → RDM, Metadata

  LIAG, Hannover: Thorsten Agemar
  → Georeferenced object data, 3D-Models

  Uni Göttingen, Gerhard Wörner, Matthias Willbold
  → Geochemical databases

  GFZ, Florian Ott
  → RDM, Repositories

Measure 3.4: International Networking & Embedding

Status quo: Where do we start

- Actively embedded in **international initiatives** and in various **international networks and organisations (**AGU, EGU, IUGG, IPCC, ..)

- ESS-related initiatives on **research data infrastructures** (COPERNICUS, ECMWF, ENVRI-FAIR, EPOS, ICOS ..)

- Engagement in organisations such as the **Open Geospatial Consortium (OGC)** to ensure the establishment of international standards

- Roles in cross-cutting initiatives as the **Research Data Alliance (RDA)**

- Many participants are currently engaging in **EOSC**

NFDI4BioDiversity,
NFDI4Agri,
NFDI4Objects,
KonsortSWD,...

Berlin Declaration on NFDI Cross-Cutting Topics

Berlin/Leipzig Declaration

NFDI4Agri - NFDI for Agricultural Sciences

Measure 3.4: International Networking & Embedding

Goals

- Ensure **international visibility & interoperability** of NFDI$_4$Earth

- Have **one voice** for ESS related RDM on international stage

- **Support novel avenues** for ESS related RDM in international initiatives

Outlook

Deliverables and Milestones

Mile-stone	Delive-rable	Type*	Description	Due end of
-	D3.4.1	S	A comprehensive overview of all ESS relevant RDM networks and initiatives in which NFDI4Earth participants are active will be established and available (Knowledge Hub and OneStop)	Q4 2022
-	D3.4.2	S	Key stake holders and contact persons are included	Q3 2023

Measure 3.4: International Networking & Embedding

NFDI₄Earth

Who we are

GFZ
Helmholtz-Zentrum
Potsdam

TECHNISCHE UNIVERSITÄT DRESDEN
Jörg Seegert

DKRZ
DEUTSCHES KLIMARECHENZENTRUM
Hannes Thiemann

Frederik Tilmann
Co-Applicant & coordination of the measure

Florian Ott
Primary responsible for the measure

Valentina Protopopova-Kakar
Primary responsible for the day-to-day work of the measure

Kirsten Elger
RDA, COPDESS, DOI/PID (Geodesy/IGSN)

TA3 at the Meeting

- Topics for TA3 Breakout
  - How can I participate in TA3?
    - as Service Provider, as Reviewer/ Editor of Information, as data provider (in particular long-tail)
    - as User/ Contributor of/to the Knowledge-Hub
    - as a contributor to standards and interoperability label
  - How do we interconnect to international activities?
  - How does TA3 support Quality Assurance?
  - How do we relate and interconnect to several existing services, e.g. re3data?

- Further Input from first day discussion

- Meeting point at the TA3 Poster
  - Further things to discuss in TA3 Breakout
  - Visit Poster (18:00 and in-between)