

# National Research Data Infrastructure (NFDI)

## NFDI4Agri – NFDI for Agricultural Sciences

Spokesperson: Uwe Heinrich

Photo: Petair / Fotolia

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Xenia Specka



Matthias Lange



Jan-Henrik Haunert



Claus Weiland



Ulrike Stahl



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## Consortium & Community

*Xenia Specka*

## Research Data Management

*Jan-Henrik Haunert*

## Scientific Data & Infrastructure Services

*Ulrike Stahl*

## ENCYCLOPÆDIA BRITANNICA

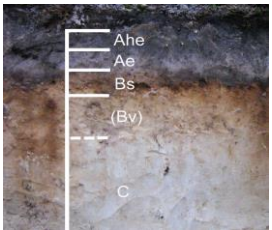
“Agricultural sciences, sciences dealing with food and fibre production and processing. They include the technologies of soil cultivation, crop cultivation and harvesting, animal production, and the processing of plant and animal products for human consumption and use”



## Agricultural research disciplines



- Plant production
- Livestock farming
- Applied genetics & physiology
- Ecology of agricultural landscapes
- Soil sciences
- Forestry
- Agricultural economics & sociology



## Agricultural research data domains



Geodata



Time series



Legacy data



Sensitive data





## 16 (co-)applicant institutions Non-university research institutes and universities



## Examples of continuously funded core infrastructures

22 repositories & information systems  
8 data infrastructures  
3 tools



## Supported by



## Status quo

Heterogeneous landscape of data infrastructures



## User requirements

24 user stories →  
4 consolidated use cases



## Need for action

6 task areas  
25 measures

## 4 consolidated use cases



Use case 1: Findability of agricultural research data  
e.g. site, type, date, content/value specific



Use case 2: Support agricultural research data management  
e.g. planning, compilation, publication

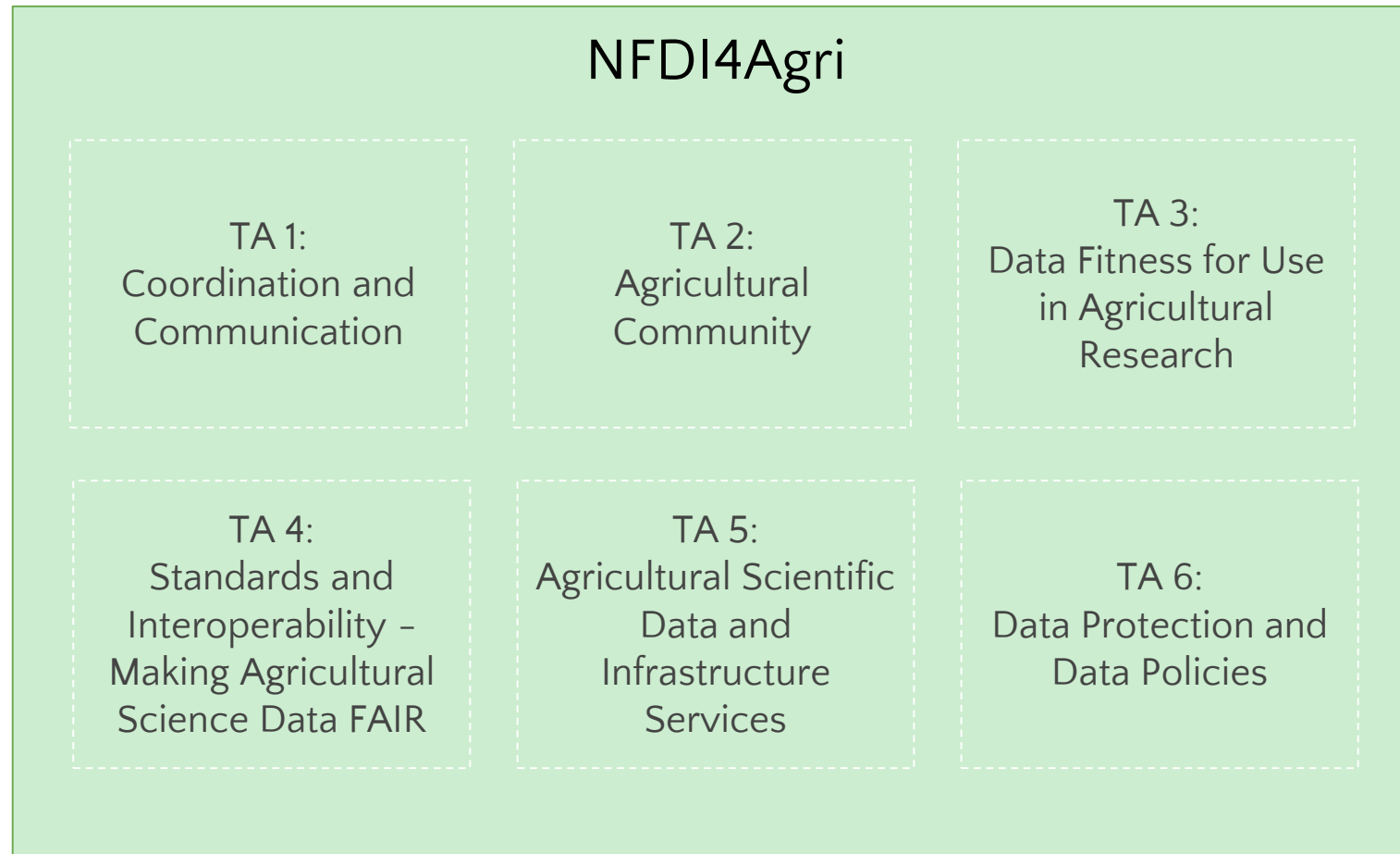


Use case 3: Quality of data, services & infrastructures  
e.g. completeness, plausibility, machine readable

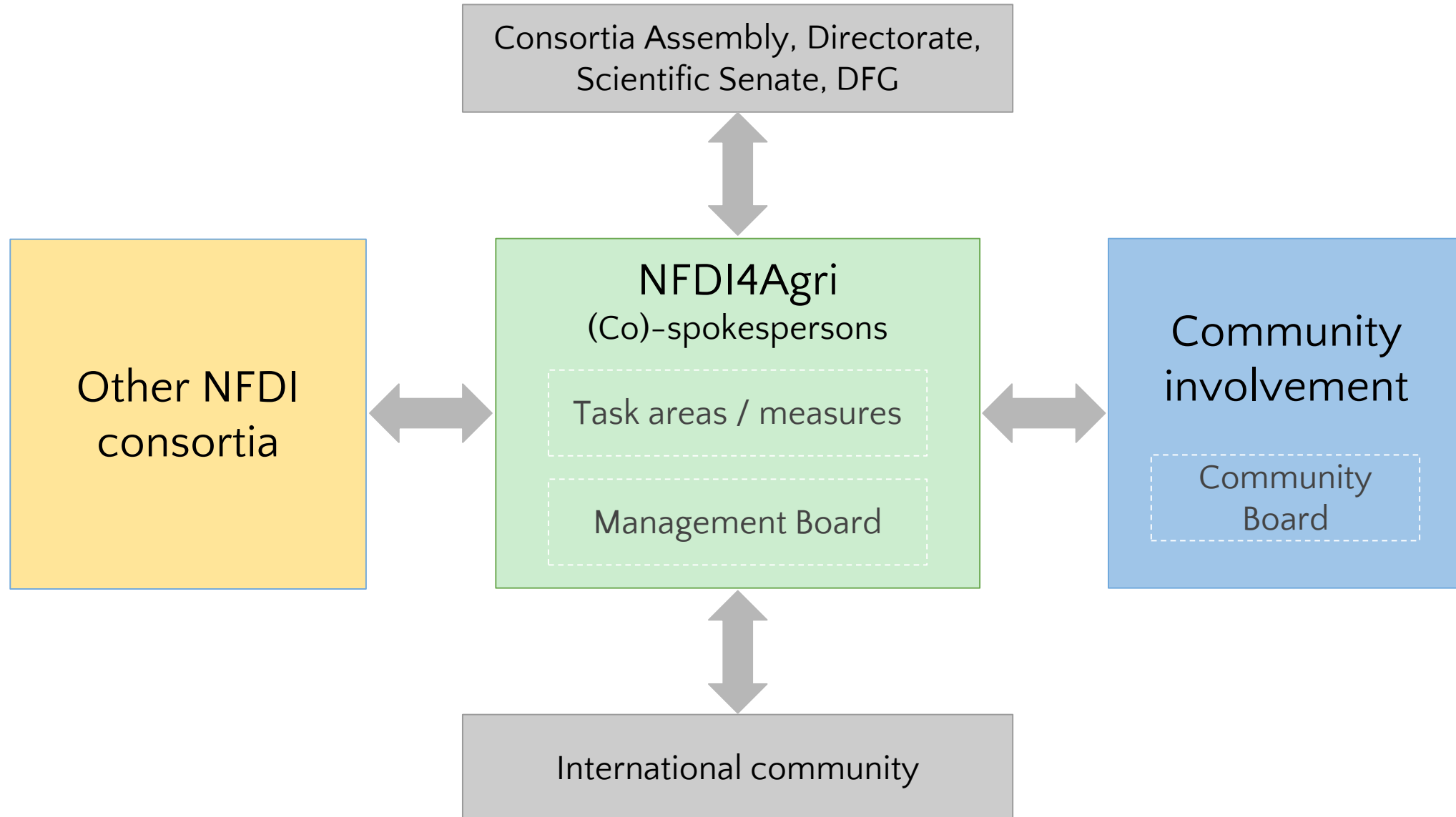


Use case 4: Applications & integrated analysis  
e.g. statistics, machine learning

1. Set up an interoperable and scalable infrastructure by connecting available agricultural disciplinary repositories
2. Implement the NFDI4Agri portal as a central access point for searching agricultural data to enable semantic queries within the federated infrastructures
3. Develop a platform for knowledge exchange and technology transfer to engage in dialogue with the agricultural community

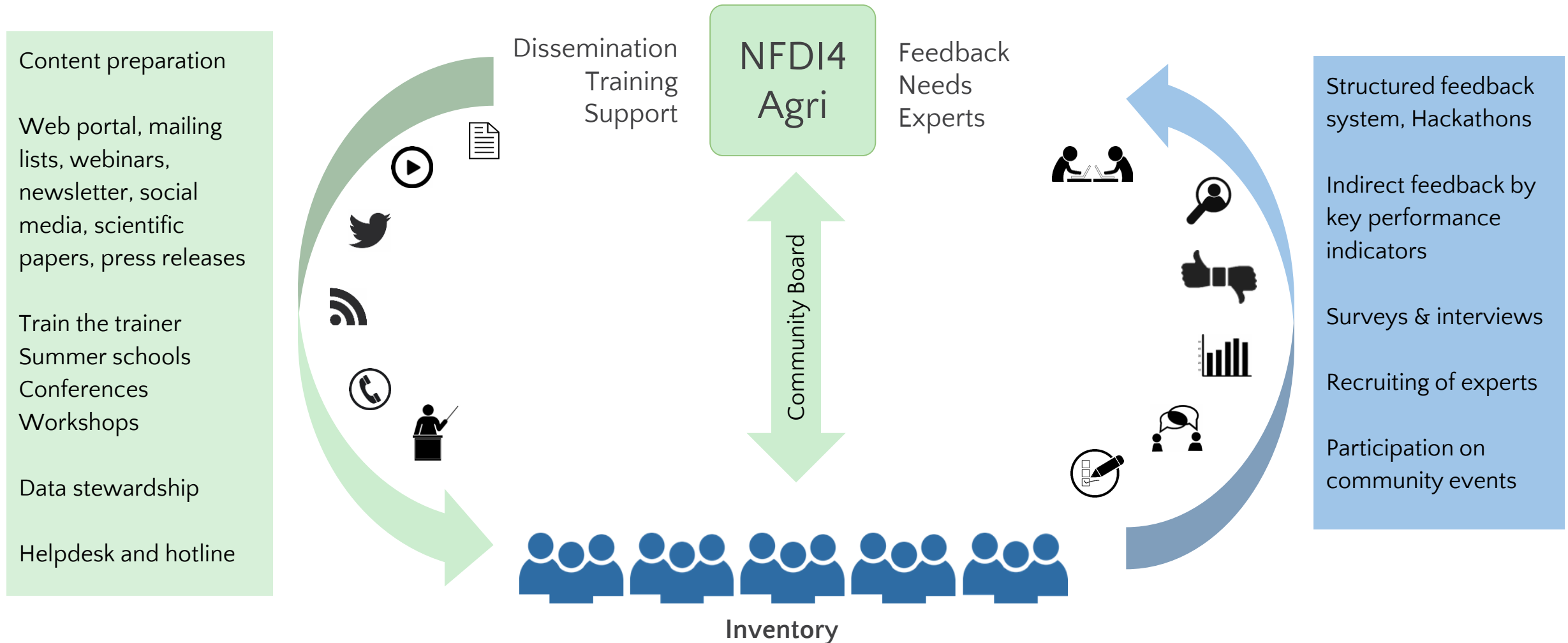




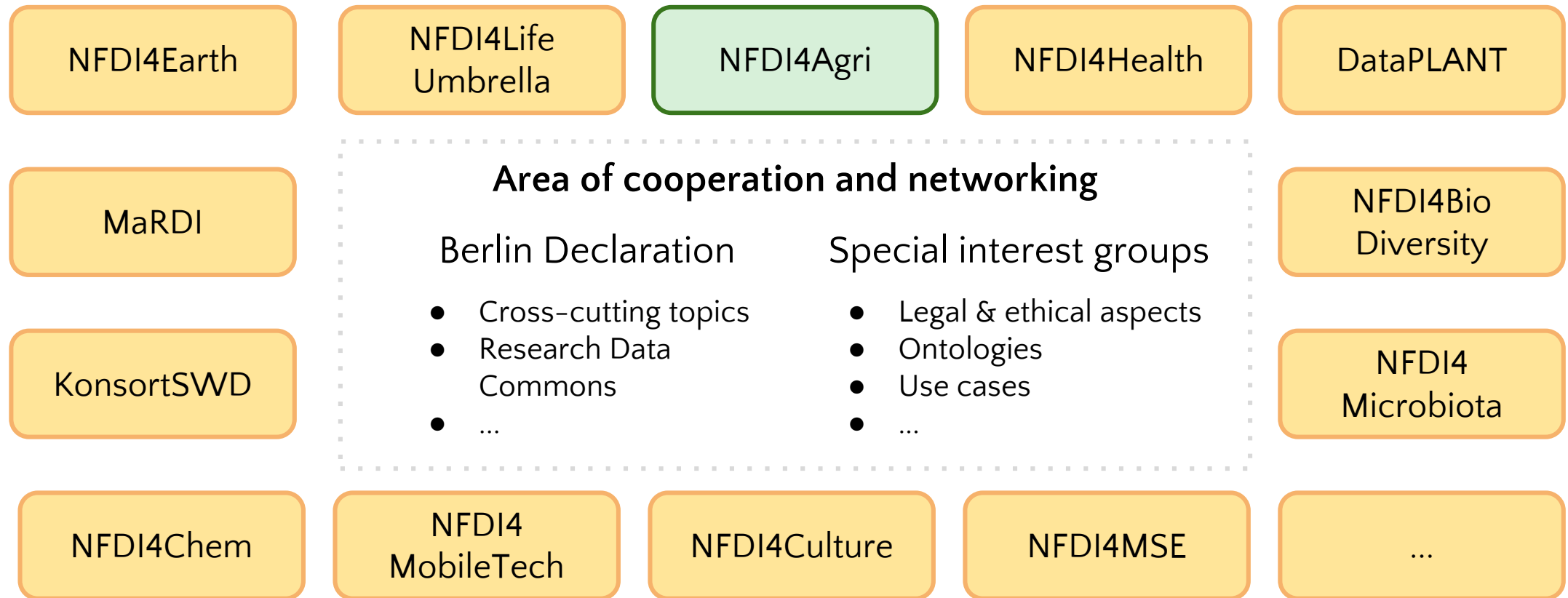


Starting with 17 Participants (13 societies, 3 universities, 1 library network)

	   <p>Deutsche Phytomedizinische Gesellschaft e.V.</p>  <p>Deutsche Botanische Gesellschaft</p>  <p>Gesellschaft für Pflanzenbauwissenschaften e.V.</p>
	  <p>Förderverein Bioökonomieforschung e.V.</p>  <p>C   A   U Kiel University Christian-Albrechts-Universität zu Kiel</p>  <p>Gesellschaft für Ernährungsphysiologie</p>  <p>Hochschule Neubrandenburg University of Applied Sciences</p>
	   <p>Gesellschaft für Informatik in der Land-, Forst- und Ernährungswirtschaft e.V.</p>  <p>Deutsche Agrarforschungsallianz</p>  <p>Deutsche Bodenkundliche Gesellschaft</p>



## National Research Data Infrastructure



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## Scientific Data & Infrastructure Services

*Ulrike Stahl*

**F**indable 

**A**ccessible 

**I**nteroperable 

**R**eusable 



**Q**uality assured 

**L**egally sound 

**S**calable 

**L**ong-term preserved 



Cluster of Excellence PhenoRob of University of Bonn & Forschungszentrum Jülich

- Field experiments at Campus Klein-Altendorf of University of Bonn
- Large variety of sensors and sensor platforms



*4D model of the shoot*

*Hyperspectral images*

*Ground penetration radar*

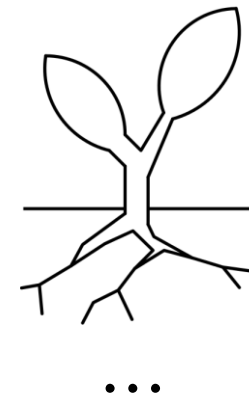
*Earthworm density*

*3D geometry of canopy by  
laser or RGB images*

*Magnetic resonance  
imaging*

*Electromagnetic  
induction*

*Root-tunnel-rhizotron  
observations*



Good documentation of data quality needed, e.g.  
for integrated data analysis

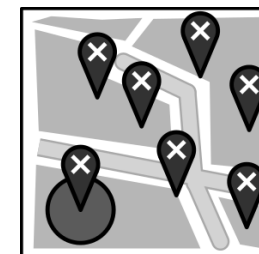
- Even FAIR data may have low quality & thus be of little use  
e.g., see RfII 2019: Herausforderung Datenqualität
- Quality requirements depend on application

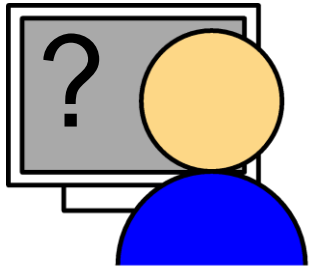


Standards of data quality  
(e.g. ISO 19157)  
practices of data acquisition  
(e.g. KA5 for soil data)

Quality requirements of  
agricultural use cases &  
previous uses of data sets  
(application-data-matrix)

- Implement online platform for discussion & data reviewing
- Develop framework for algorithm-aided data curation





- Plant breeding scientist is looking for a regionally adapted winter barley genotype
- Relevant information:



- Currently, this needs to be collected from different unconnected repositories

- Design and propose fundamental data models
- Review of established metadata & identifier schemas
- Take up key results of initiatives like RDA IGAD and Agrisemantics WG
- Define interfaces to Data Aggregators like the AgroLD
- Enable semantic search across terminologies & services building on FAO's AGROVOC Thesaurus





- Reporting of animal diseases for effective control and scientific assessment
- Data is *highly* sensitive
- Legal & ethical issues and anonymization are important

Targeted actors and measures:

**Data Providers**

Tailored guidance on regulation, data ownership, ethical and practical aspects

**Repository Managers**

Tailored guidance on regulation, data ownership, ethical and practical aspects

Sample materials such as checklists, exemplary consent forms, data policies and terms of use, e.g., in compliance with the Nagoya Protocol

**Data Users**

Good practices in terms of legal, ethical and policy aspects of data and metadata sharing



## Consortium & Community

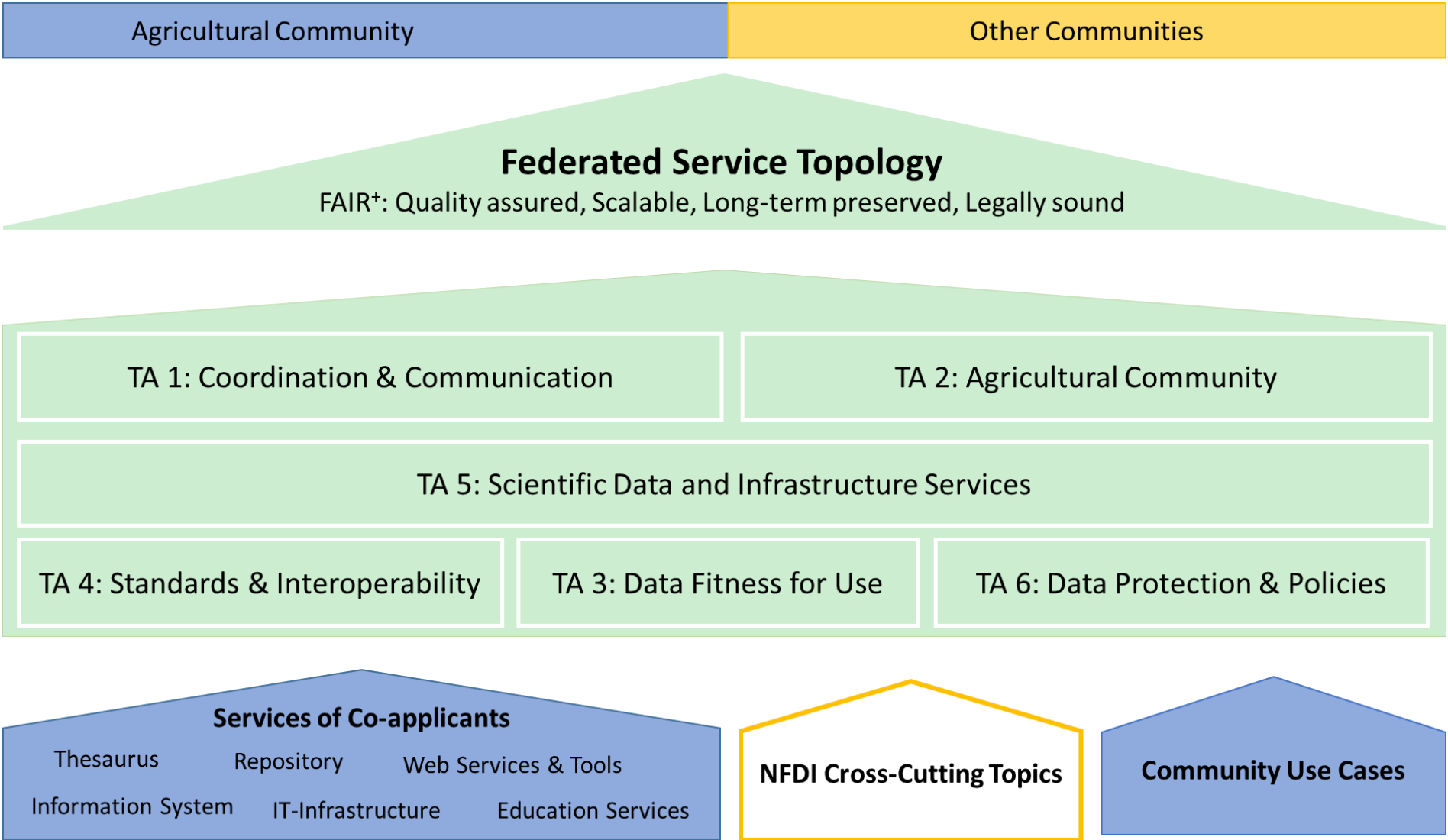
*Xenia Specka*

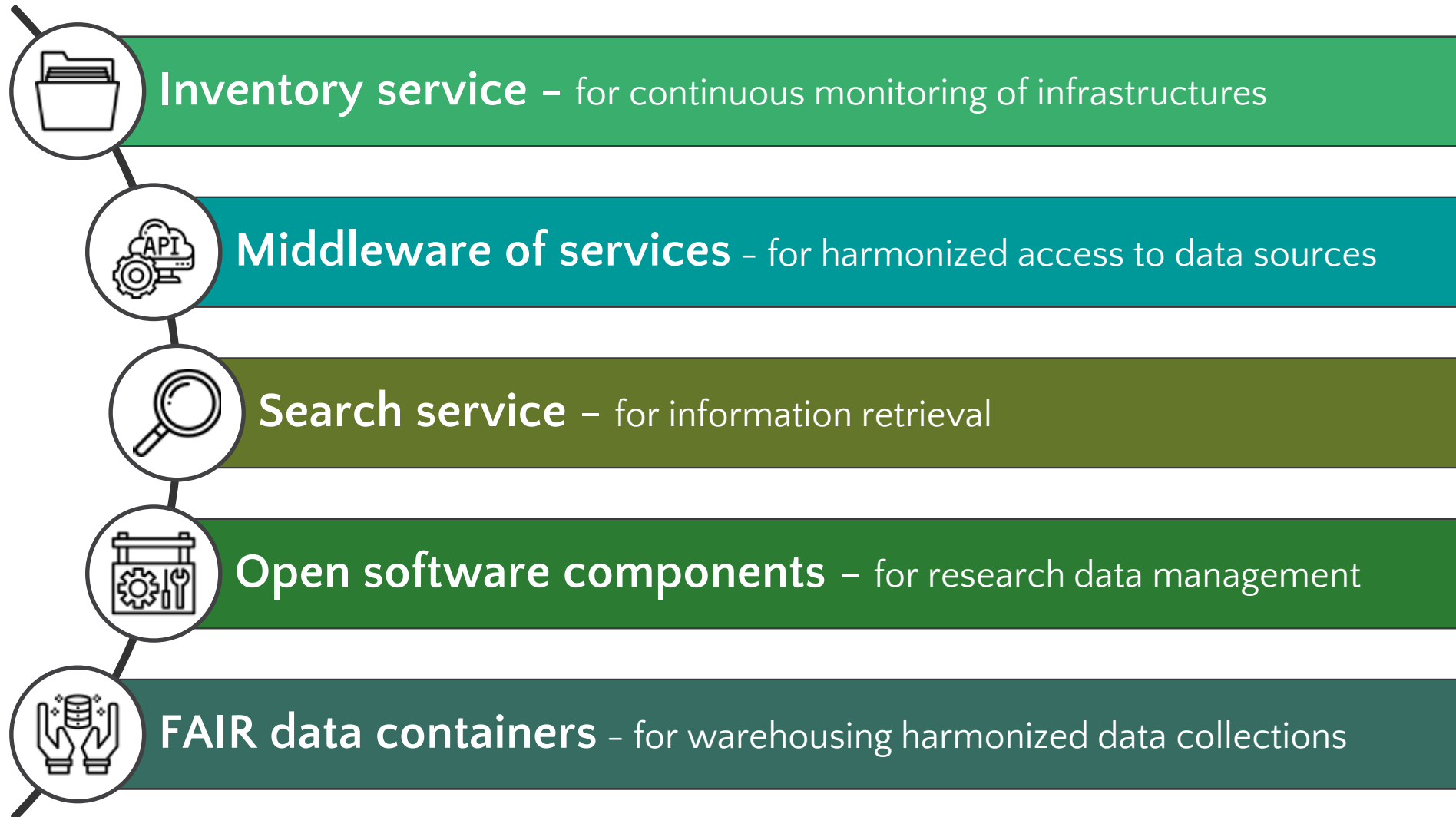
## Research Data Management

*Jan-Henrik Haunert*

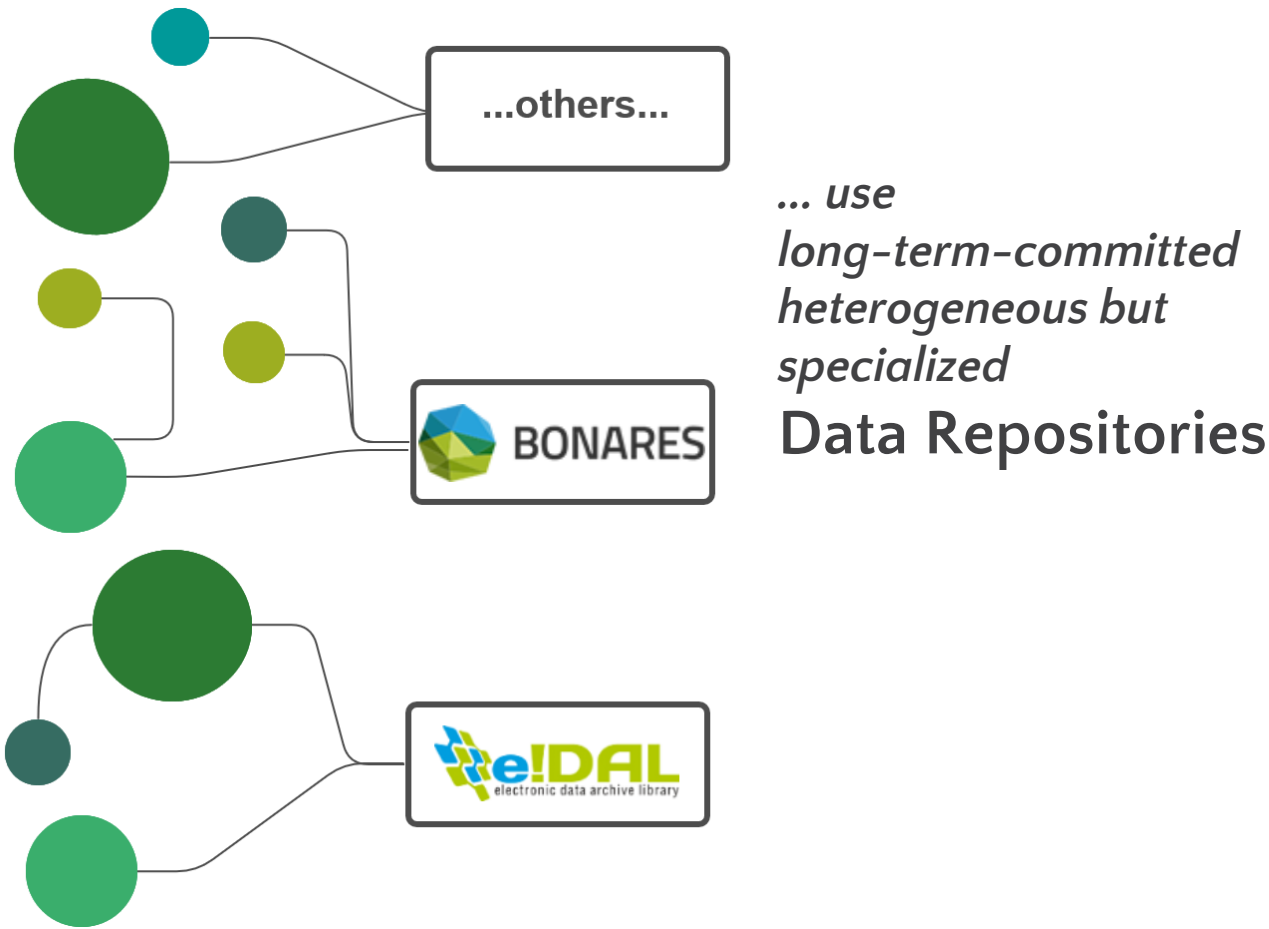
## Scientific Data & Infrastructure Services

*Ulrike Stahl*





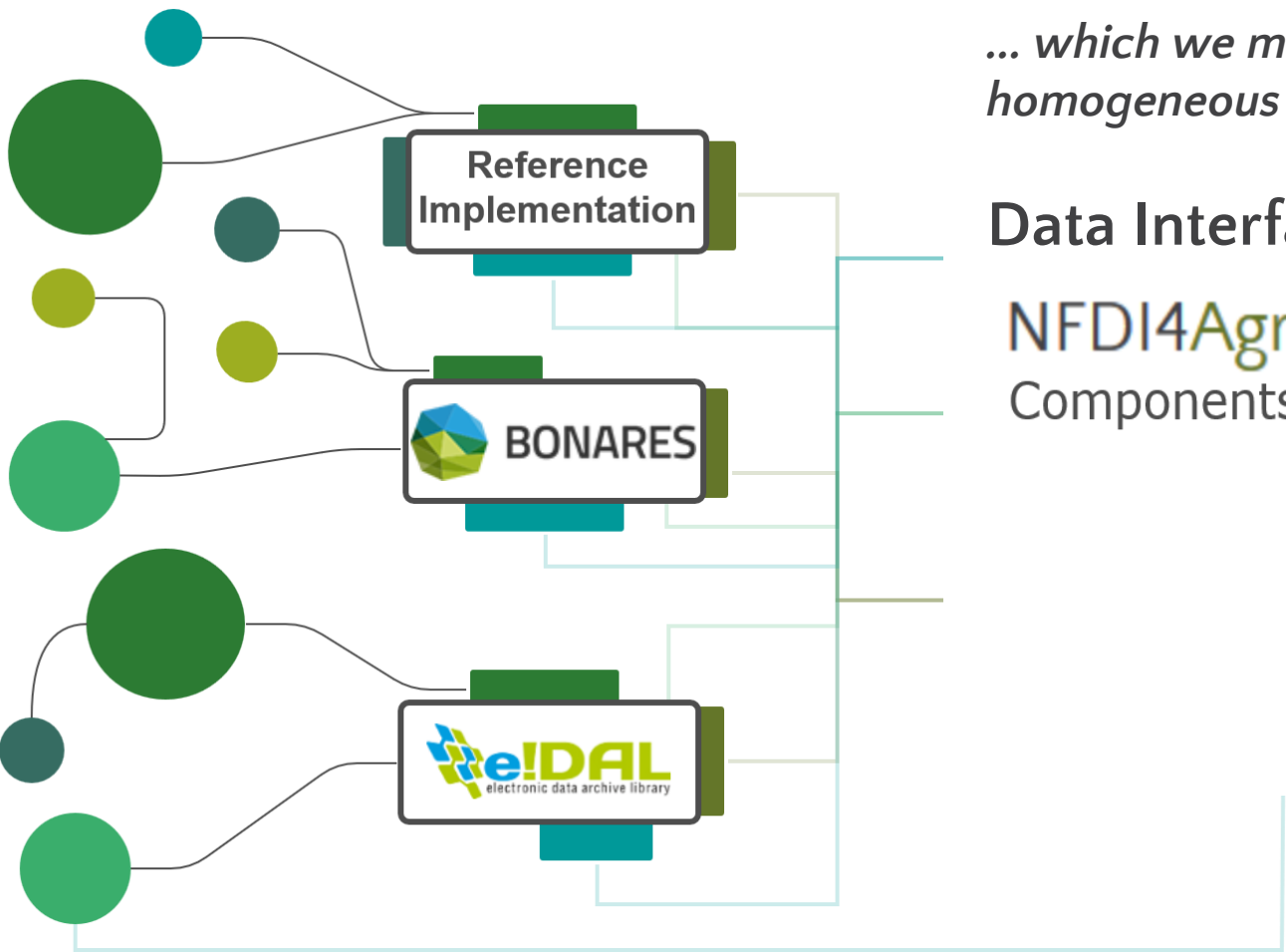
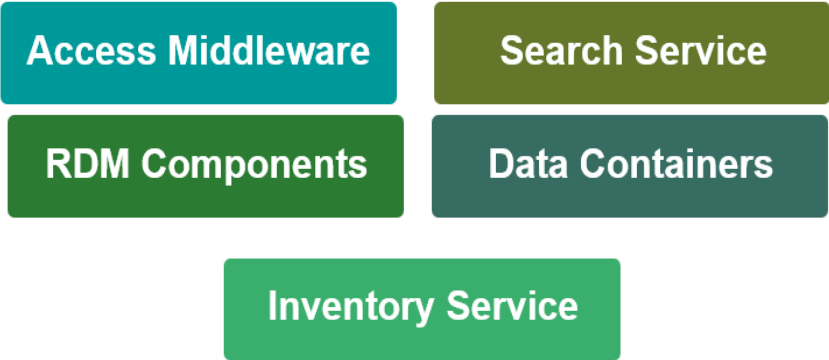




*... which we make interoperable by homogeneous unified*

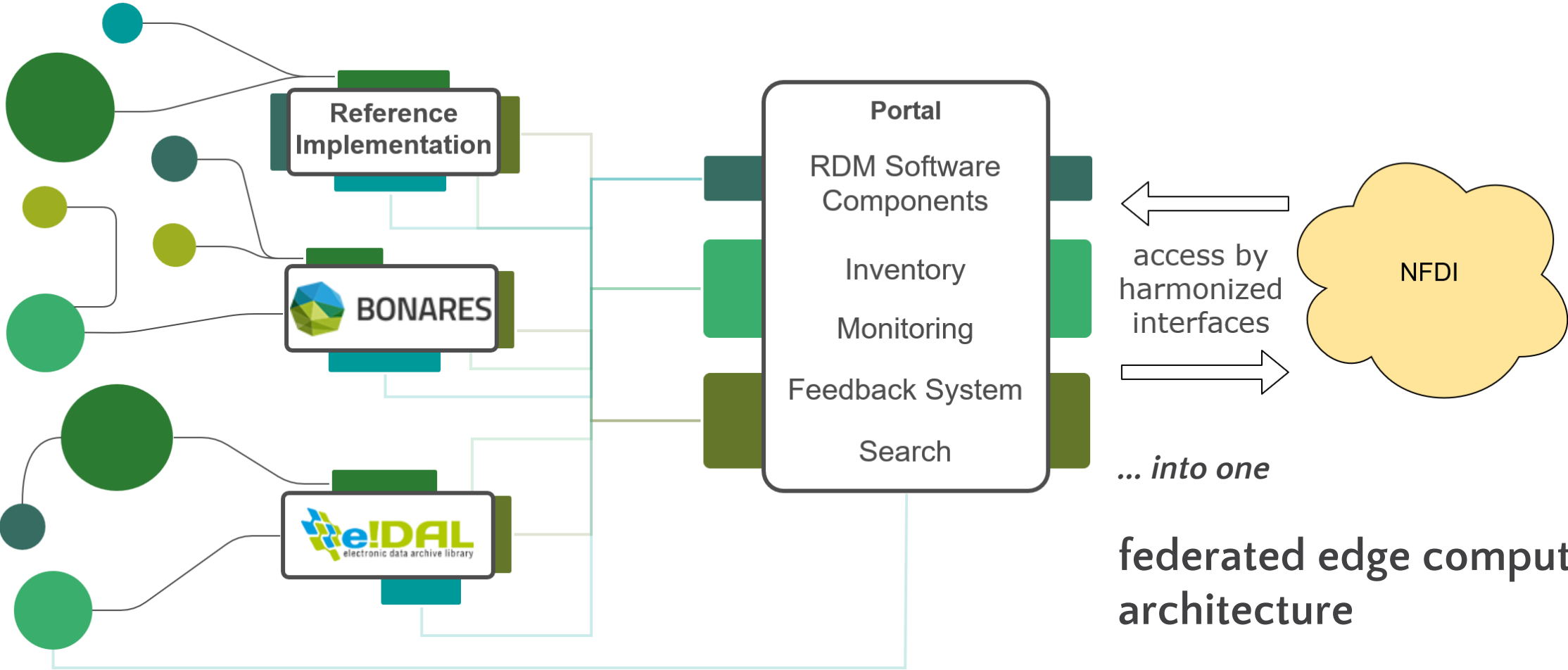
## Data Interfaces & Services

NFDI4Agri  
Components

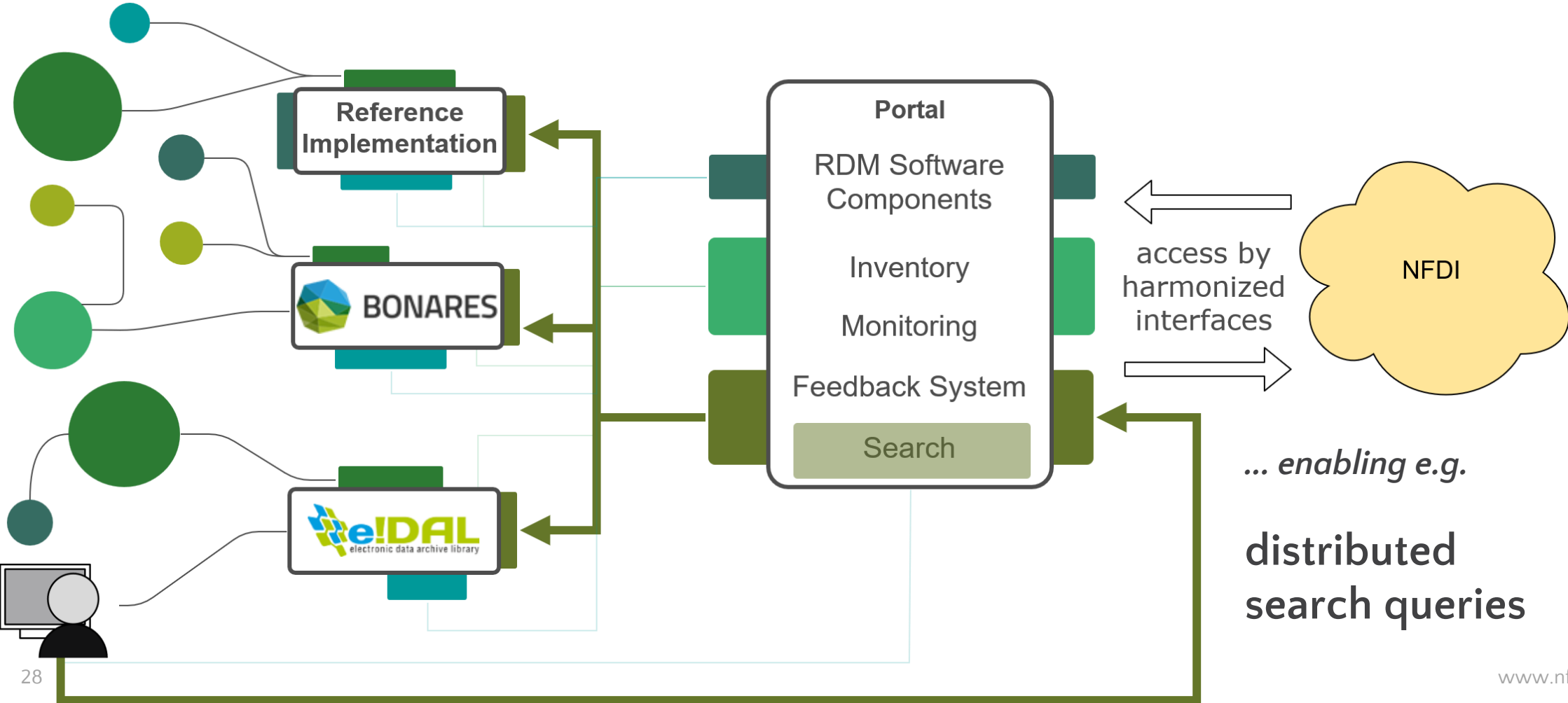




NFDI4Agri  
Components



NFDI4Agri  
Components



- Federated long-term funded and interoperable infrastructures
- Modular components for implementing or upgrading infrastructures
- Structure for actively involving the community (bottom-up-approach)
- FAIR<sup>+</sup> (quality assured, legally sound, scalable, long-term preserved)

# Enabling data owners to become data providers!



Slide 1: Petair | Fotolia (Field)

Slide 3: Nemanja Oticoticki | Fotolia (Tractor), Jarno Müller | ZALF (Glashaus, Cows)

Slide 6: Eva Kufulium (Analytics graph)

Slide 15: Google Earth (greater Bonn, Klein Altendorf region)

Slide 19: Nemanja Oticoticki | Fotolia (Tractor), Jarno Müller | ZALF (Cows)

Slide 23: Freepik from Flaticon (icons)

Slide 29: Haunert (Roboter)

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