

EOSC and data reuse: what's in it for industries and SMEs

Focus on Open Science

Turin

May 7, 2019



Erik Schultes, PhD

International Science Coordinator

GO FAIR International Support and Coordination Office

&

Leiden University Medical Center

Leiden Center for Data Science

Contact:

erik.schultes@go-fair.org

<https://www.go-fair.org>

<http://orcid.org/0000-0001-8888-635X>

February 2019

Happy birthday, Internet

- 50 years old this year!
- First 20 years of R&d supported generously by DARPA produced first NCP then TCP/IP for the ARPAnet (a few hundred nodes)
- Then 10 years of r&D supported generously by NSF produced the NSFnet (thousands of nodes)
- Then the private sector "took over" just as the Internet rocket took off (first millions now billions of nodes)

THE WESTIN
ALEXANDRIA

February 2019

Happy birthday, Internet

- 50 years old this year!
- First 20 years of R&d supported generously by DARPA produced first NCP then TCP/IP for the ARPAnet (a few hundred nodes)
- Then 10 years of r&D supported generously by NSF produced the NSFnet (thousands of nodes)
- Then the private sector "took over" just as the Internet rocket took off (first millions now billions of nodes)

THE WESTIN
ALEXANDRIA

A Framework for Distributed Digital Object Services

Robert Kahn
Corporation for National Research Initiatives

Robert Wilensky
University of California at Berkeley

May 13, 1995 
cnri.dlib/tn95-01

1. Introduction

This document describes fundamental aspects of an **infrastructure** that is **open** in its architecture and which supports a large and extensible class of **distributed digital information services**. Digital libraries are one example of such services; numerous other examples of such services may be found in emerging electronic commerce applications. Here we define basic entities to be found in such a system, in which information in the form of **digital objects** is stored, accessed, disseminated and managed. We provide naming conventions for identifying and locating digital objects, describe a service for using object names to locate and disseminate objects, and provide elements of an access protocol.

We use the term **digital object** here in a technical sense, to be defined precisely below. Files, databases and so forth that one may ordinarily think of as objects with a digital existence are not digital objects in the sense used here, at least not until they are made into an appropriate data structure, etc., as we will describe shortly.

Only the most basic elements of the infrastructure are described herein. These elements are intended to constitute a minimal set of requirements and services that must be in place to effect the infrastructure of a universal, open, wide-area digital information infrastructure system ("the System"). We anticipate that many other services and elaborations will come into existence as the System is further developed, either building upon or otherwise added to these elements.

This paper focuses on the network-based aspects of the infrastructure, namely those for which knowledge of the contents of digital objects is not required. Definition of the content-based aspects of the infrastructure is purposely not addressed in this paper. An important goal in limiting the description of the infrastructure in this way is not to constrain the higher level user and service level choices that, for many reasons, might be inappropriate to fix upon at this point in time. With only the most basic elements of the infrastructure in place, technological evolution would not be overly constrained. Further, the likelihood of achieving widespread interoperability of services at some early point in the future will be preserved. No doubt the resulting capability will have a greater potential for enhancement and evolution through the participation of many others in helping to define it.

2. Overview and Definitions

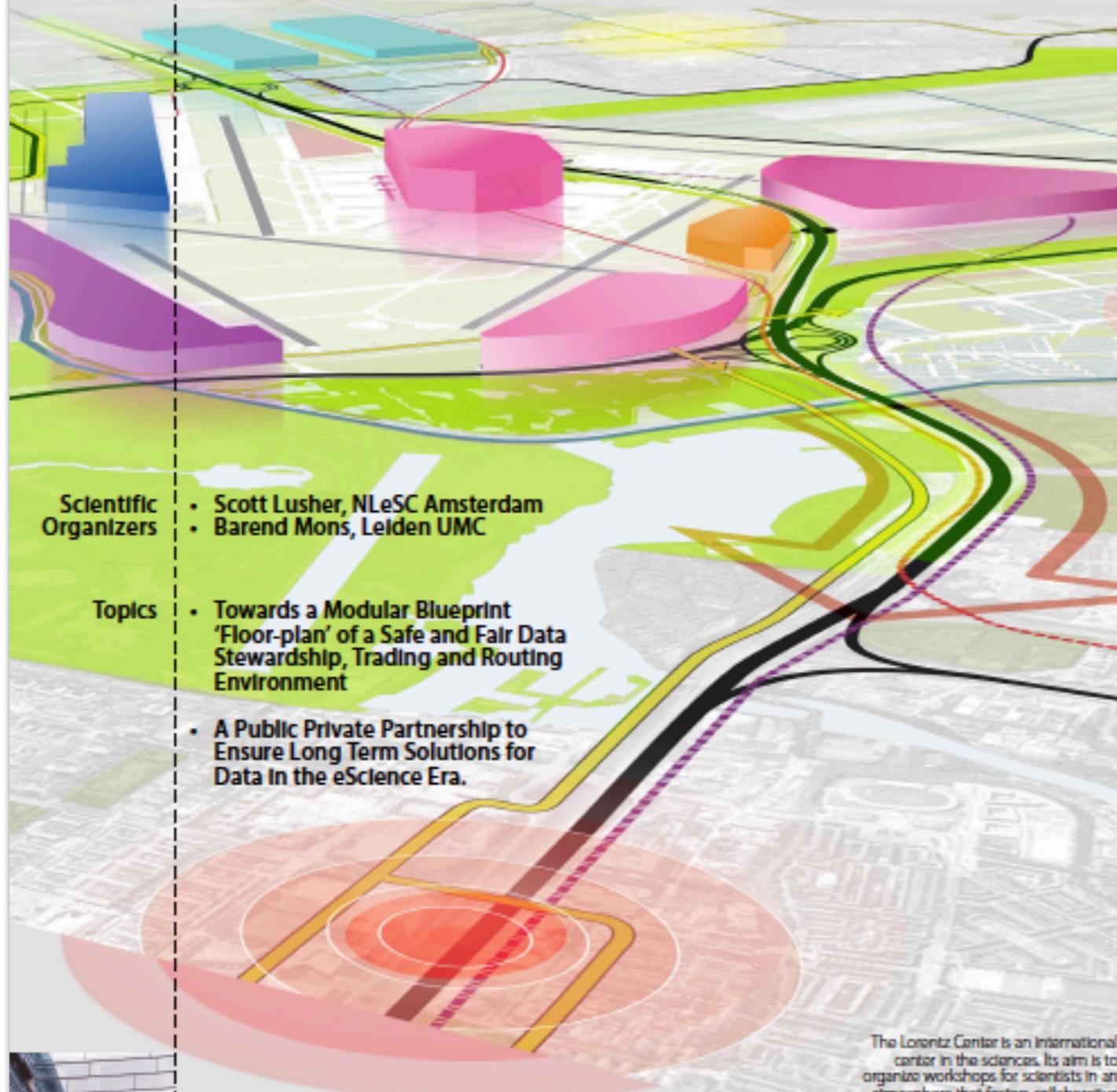
In this section, we first present an informal overview of the elements of the System, sketching its elements and how they are supposed to function together. These elements include the notions of **digital objects**, **handles**, **metadata** and **key metadata**, **repositories**, **handle generators**, **originators**, **users**, **global naming authorities** and **local naming**

2014

Lorentz
center

Jointly Designing a Data FAIRPORT

Workshop: 13 - 16 January 2014, Leiden, the Netherlands



Scientific Organizers

- Scott Lusher, NLeSC Amsterdam
- Barend Mons, Leiden UMC

Topics

- Towards a Modular Blueprint 'Floor-plan' of a Safe and Fair Data Stewardship, Trading and Routing Environment
- A Public Private Partnership to Ensure Long Term Solutions for Data in the eScience Era.

The Lorentz Center is an international center in the sciences. Its aim is to organize workshops for scientists in an atmosphere that fosters collaborative work, discussions and interactions. For registration see: www.lorentzcenter.nl

Image: Structure Plan Schiphol Airport by K&A Architects/Planners. Poster design: SuperNova Studios, NL



www.lorentzcenter.nl

FAIR Guiding Principles

2016

nature > scientific data > comment > article



Comment | [OPEN](#) | Published: 15 March 2016

The FAIR Guiding Principles for scientific data management and stewardship

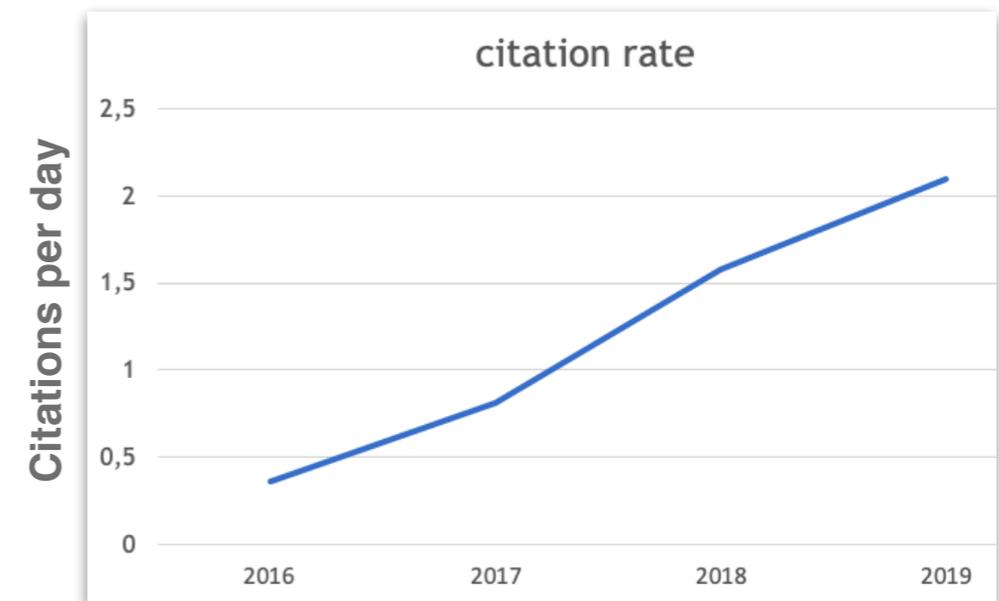
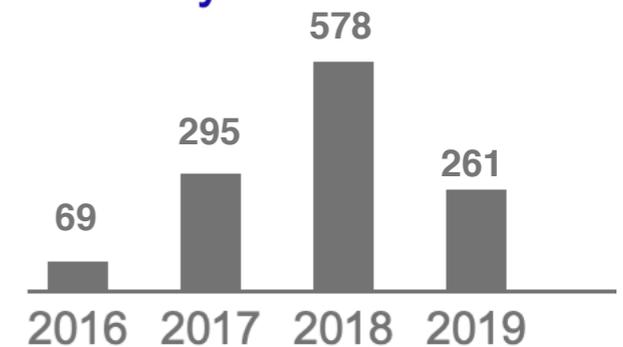
Mark D. Wilkinson, Michel Dumontier, IJsbrand Jan Aalbersberg, Gabrielle Appleton, Myles Axton, Arie Baak, Niklas Blomberg, Jan-Willem Boiten, Luiz Bonino da Silva Santos, Philip E. Bourne, Jildau Bouwman, Anthony J. Brookes, Tim Clark, Mercè Crosas, Ingrid Dillo, Olivier Dumon, Scott Edmunds, Chris T. Evelo, Richard Finkers, Alejandra Gonzalez-Beltran, Alasdair J.G. Gray, Paul Groth, Carole Goble, Jeffrey S. Grethe, Jaap Heringa, Peter A.C 't Hoen, Rob Hooft, Tobias Kuhn, Ruben Kok, Joost Kok, Scott J. Lusher, Maryann E. Martone, Albert Mons, Abel L. Packer, Bengt Persson, Philippe Rocca-Serra, Marco Roos, Rene van Schaik, Susanna-Assunta Sansone, Erik Schultes, Thierry Sengstag, Ted Slater, George Strawn, Morris A. Swertz, Mark Thompson, Johan van der Lei, Erik van Mulligen, Jan Velterop, Andra Waagmeester, Peter Wittenburg, Katherine Wolstencroft, Jun Zhao & Barend Mons  - [Show fewer authors](#)

Scientific Data **3**, Article number: 160018 (2016) | [Download Citation](#) ↓

Google Scholar
Total citations

May 5, 2019

Cited by 1243



FAIR Guiding Principles

2016

nature > scientific data > comment > article

SCIENTIFIC DATA 

Comment | [OPEN](#) | Published: 15 March 2016

The FAIR Guiding Principles for scientific data management and stewardship

Mark D. Wilkinson, Michel Dumontier, IJsbrand Jan Aalbersberg, Gabrielle Appleton, Myles Axton, Arie Baak, Niklas Blomberg, Jan-Willem Boiten, Luiz Bonino da Silva Santos, Philip E. Bourne, Jildau Bouwman, Anthony J. Brookes, Tim Clark, Mercè Crosas, Ingrid Dillo, Olivier Dumon, Scott Edmunds, Chris T. Evelo, Richard Finkers, Alejandra Gonzalez-Beltran, Alasdair J.G. Gray, Paul Groth, Carole Goble, Jeffrey S. Grethe, Jaap Heringa, Peter A.C 't Hoen, Rob Hooft, Tobias Kuhn, Ruben Kok, Joost Kok, Scott J. Lusher, Maryann E. Martone, Albert Mons, Abel L. Packer, Bengt Persson, Philippe Rocca-Serra, Marco Roos, Rene van Schaik, Susanna-Assunta Sansone, Erik Schultes, Thierry Sengstag, Ted Slater, George Strawn, Morris A. Swertz, Mark Thompson, Johan van der Lei, Erik van Mulligen, Jan Velterop, Andra Waagmeester, Peter Wittenburg, Katherine Wolstencroft, Jun Zhao & Barend Mons  - [Show fewer authors](#)

Scientific Data **3**, Article number: 160018 (2016) | [Download Citation](#) ↓

“Data and services that are **findable**, **accessible**, **interoperable**, **re-usable** both for machines and for people.”

FAIR Guiding Principles

2016

nature > scientific data > comment > article

SCIENTIFIC DATA 

Comment | [OPEN](#) | Published: 15 March 2016

The FAIR Guiding Principles for scientific data management and stewardship

Mark D. Wilkinson, Michel Dumontier, IJsbrand Jan Aalbersberg, Gabrielle Appleton, Myles Axton, Arie Baak, Niklas Blomberg, Jan-Willem Boiten, Luiz Bonino da Silva Santos, Philip E. Bourne, Jildau Bouwman, Anthony J. Brookes, Tim Clark, Mercè Crosas, Ingrid Dillo, Olivier Dumon, Scott Edmunds, Chris T. Evelo, Richard Finkers, Alejandra Gonzalez-Beltran, Alasdair J.G. Gray, Paul Groth, Carole Goble, Jeffrey S. Grethe, Jaap Heringa, Peter A.C 't Hoen, Rob Hooft, Tobias Kuhn, Ruben Kok, Joost Kok, Scott J. Lusher, Maryann E. Martone, Albert Mons, Abel L. Packer, Bengt Persson, Philippe Rocca-Serra, Marco Roos, Rene van Schaik, Susanna-Assunta Sansone, Erik Schultes, Thierry Sengstag, Ted Slater, George Strawn, Morris A. Swertz, Mark Thompson, Johan van der Lei, Erik van Mulligen, Jan Velterop, Andra Waagmeester, Peter Wittenburg, Katherine Wolstencroft, Jun Zhao & Barend Mons  - [Show fewer authors](#)

Scientific Data **3**, Article number: 160018 (2016) | [Download Citation](#) ↓

Data and services
that are
findable,
accessible,
interoperable,
re-usable
for machines.

2016

nature > scientific data > comment > article

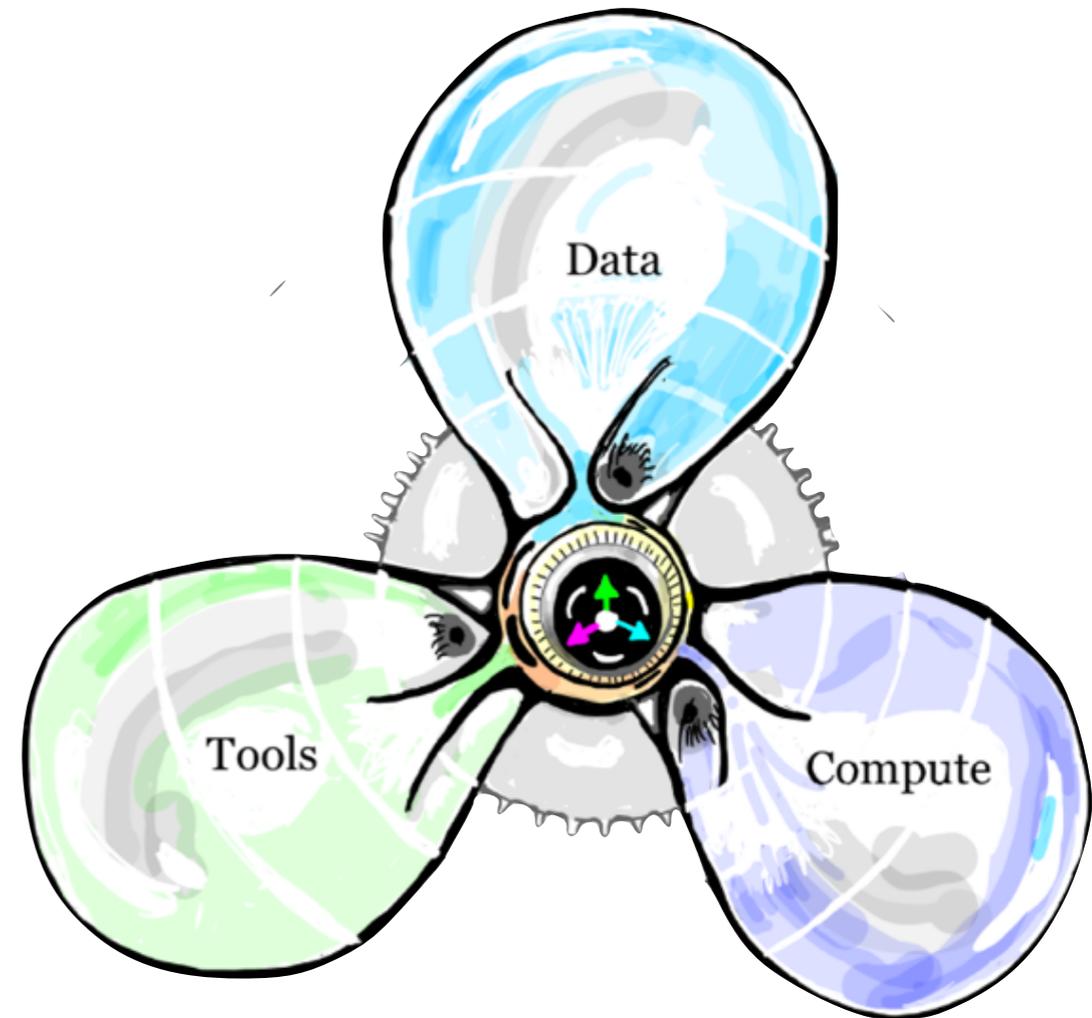
SCIENTIFIC DATA 

Comment | [OPEN](#) | Published: 15 March 2016

The FAIR Guiding Principles for scientific data management and stewardship

Mark D. Wilkinson, Michel Dumontier, IJsbrand Jan Aalbersberg, Gabrielle Appleton, Myles Axton, Arie Baak, Niklas Blomberg, Jan-Willem Boiten, Luiz Bonino da Silva Santos, Philip E. Bourne, Jildau Bouwman, Anthony J. Brookes, Tim Clark, Mercè Crosas, Ingrid Dillo, Olivier Dumon, Scott Edmunds, Chris T. Evelo, Richard Finkers, Alejandra Gonzalez-Beltran, Alasdair J.G. Gray, Paul Groth, Carole Goble, Jeffrey S. Grethe, Jaap Heringa, Peter A.C 't Hoen, Rob Hooft, Tobias Kuhn, Ruben Kok, Joost Kok, Scott J. Lusher, Maryann E. Martone, Albert Mons, Abel L. Packer, Bengt Persson, Philippe Rocca-Serra, Marco Roos, Rene van Schaik, Susanna-Assunta Sansone, Erik Schultes, Thierry Sengstag, Ted Slater, George Strawn, Morris A. Swertz, Mark Thompson, Johan van der Lei, Erik van Mulligen, Jan Velterop, Andra Waagmeester, Peter Wittenburg, Katherine Wolstencroft, Jun Zhao & Barend Mons  - [Show fewer authors](#)

Scientific Data **3**, Article number: 160018 (2016) | [Download Citation](#) ↓



Internet of FAIR Data and Services

FAIR Guiding Principles

2016

nature > scientific data > comment > article

SCIENTIFIC DATA 

Comment | [OPEN](#) | Published: 15 March 2016

The FAIR Guiding Principles for data management and

Mark D. Wilkinson, Michel Dumontier, IJsbrand Jan A. Baak, Niklas Blomberg, Jan-Willem Boiten, Luiz Bonini Bouwman, Anthony J. Brookes, Tim Clark, Mercè Crosas, Chris T. Evelo, Richard Finkers, Alejandra Gonzalez-Baer, Jeffrey S. Grethe, Jaap Heringa, Peter A.C. 't Hoen, Scott J. Lusher, Maryann E. Martone, Albert Morley, Marco Roos, Rene van Schaik, Susanna-Assunta Slater, George Strawn, Morris A. Swertz, Mark Thompson, Velterop, Andra Waagmeester, Peter Wittenburg, Katinka von Kuster, David Waagmeester, Peter Wittenburg, Katinka von Kuster - Show fewer authors

Scientific Data 3, Article number: 160018 (2016) | [DOI](#)

Box 2 | The FAIR Guiding Principles

To be Findable:

- F1. (meta)data are assigned a globally unique and persistent identifier
- F2. data are described with rich metadata (defined by R1 below)
- F3. metadata clearly and explicitly include the identifier of the data it describes
- F4. (meta)data are registered or indexed in a searchable resource

To be Accessible:

- A1. (meta)data are retrievable by their identifier using a standardized communications protocol
 - A1.1 the protocol is open, free, and universally implementable
 - A1.2 the protocol allows for an authentication and authorization procedure, where necessary
- A2. metadata are accessible, even when the data are no longer available

To be Interoperable:

- I1. (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
- I2. (meta)data use vocabularies that follow FAIR principles
- I3. (meta)data include qualified references to other (meta)data

To be Reusable:

- R1. meta(data) are richly described with a plurality of accurate and relevant attributes
 - R1.1. (meta)data are released with a clear and accessible data usage license
 - R1.2. (meta)data are associated with detailed provenance
 - R1.3. (meta)data meet domain-relevant community standards

FAIR Guiding Principles

Sci. Data 3:160018 doi: 10.1038/sdata.2016.18 (2016)

Findable:

F1 (meta)data are assigned a globally unique and persistent identifier;

F2 data are described with rich metadata;

F3 metadata clearly and explicitly include the identifier of the data it describes;

F4 (meta)data are registered or indexed in a searchable resource;

Interoperable:

I1 (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.

I2 (meta)data use vocabularies that follow FAIR principles;

I3 (meta)data include qualified references to other (meta)data;

Accessible:

A1 (meta)data are retrievable by their identifier using a standardized communications protocol;

A1.1 the protocol is open, free, and universally implementable;

A1.2 the protocol allows for an authentication and authorization procedure, where necessary;

A2 metadata are accessible, even when the data are no longer available;

Reusable:

R1 meta(data) are richly described with a plurality of accurate and relevant attributes;

R1.1 (meta)data are released with a clear and accessible data usage license;

R1.2 (meta)data are associated with detailed provenance;

R1.3 (meta)data meet domain-relevant community standards;

FAIR Guiding Principles

Sci. Data 3:160018 doi: 10.1038/sdata.2016.18 (2016)

Findable:

F1 (**meta**)data are assigned a globally unique and persistent identifier;

F2 data are described with rich **metadata**;

F3 **metadata** clearly and explicitly include the identifier of the data it describes;

F4 (**meta**)data are registered or indexed in a searchable resource;

Interoperable:

I1 (**meta**)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.

I2 (**meta**)data use vocabularies that follow FAIR principles;

I3 (**meta**)data include qualified references to other (**meta**)data;

Accessible:

A1 (**meta**)data are retrievable by their identifier using a standardized communications protocol;

A1.1 the protocol is open, free, and universally implementable;

A1.2 the protocol allows for an authentication and authorization procedure, where necessary;

A2 **metadata** are accessible, even when the data are no longer available;

Reusable:

R1 **meta**(data) are richly described with a plurality of accurate and relevant attributes;

R1.1 (**meta**)data are released with a clear and accessible data usage license;

R1.2 (**meta**)data are associated with detailed provenance;

R1.3 (**meta**)data meet domain-relevant community standards;

FAIR Guiding Principles

Sci. Data 3:160018 doi: 10.1038/sdata.2016.18 (2016)

Findable:

 F1 (**meta**)data are assigned a globally unique and persistent identifier;

F2 data are described with rich **metadata**;

F3 **metadata** clearly and explicitly include the identifier of the data it describes;

F4 (**meta**)data are registered or indexed in a searchable resource;

Interoperable:

I1 (**meta**)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.

I2 (**meta**)data use vocabularies that follow FAIR principles;

I3 (**meta**)data include qualified references to other (**meta**)data;

Accessible:

A1 (**meta**)data are retrievable by their identifier using a standardized communications protocol;

A1.1 the protocol is open, free, and universally implementable;

A1.2 the protocol allows for an authentication and authorization procedure, where necessary;

A2 **metadata** are accessible, even when the data are no longer available;

Reusable:

R1 **meta**(data) are richly described with a plurality of accurate and relevant attributes;

R1.1 (**meta**)data are released with a clear and accessible data usage license;

R1.2 (**meta**)data are associated with detailed provenance;

R1.3 (**meta**)data meet domain-relevant community standards;

FAIR Guiding Principles

Sci. Data 3:160018 doi: 10.1038/sdata.2016.18 (2016)

Findable:

F1 (**meta**)data are assigned a globally unique and persistent identifier;

➔ F2 data are described with rich **metadata**;

F3 **metadata** clearly and explicitly include the identifier of the data it describes;

F4 (**meta**)data are registered or indexed in a searchable resource;

Interoperable:

I1 (**meta**)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.

I2 (**meta**)data use vocabularies that follow FAIR principles;

I3 (**meta**)data include qualified references to other (**meta**)data;

Accessible:

A1 (**meta**)data are retrievable by their identifier using a standardized communications protocol;

A1.1 the protocol is open, free, and universally implementable;

A1.2 the protocol allows for an authentication and authorization procedure, where necessary;

A2 **metadata** are accessible, even when the data are no longer available;

Reusable:

R1 **meta**(data) are richly described with a plurality of accurate and relevant attributes;

➔ R1.1 (**meta**)data are released with a clear and accessible data usage license;

➔ R1.2 (**meta**)data are associated with detailed provenance;

➔ R1.3 (**meta**)data meet domain-relevant community standards;

FAIR Guiding Principles

Sci. Data 3:160018 doi: 10.1038/sdata.2016.18 (2016)

Findable:

F1 (**meta**)data are assigned a globally unique and persistent identifier;

F2 data are described with rich **metadata**;

 F3 **metadata** clearly and explicitly include the identifier of the data it describes;

F4 (**meta**)data are registered or indexed in a searchable resource;

Interoperable:

I1 (**meta**)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.

I2 (**meta**)data use vocabularies that follow FAIR principles;

I3 (**meta**)data include qualified references to other (**meta**)data;

Accessible:

A1 (**meta**)data are retrievable by their identifier using a standardized communications protocol;

A1.1 the protocol is open, free, and universally implementable;

A1.2 the protocol allows for an authentication and authorization procedure, where necessary;

A2 **metadata** are accessible, even when the data are no longer available;

Reusable:

R1 **meta**(data) are richly described with a plurality of accurate and relevant attributes;

R1.1 (**meta**)data are released with a clear and accessible data usage license;

R1.2 (**meta**)data are associated with detailed provenance;

R1.3 (**meta**)data meet domain-relevant community standards;

FAIR Guiding Principles

Sci. Data 3:160018 doi: 10.1038/sdata.2016.18 (2016)

Findable:

F1 (**meta**)data are assigned a globally unique and persistent identifier;

F2 data are described with rich **metadata**;

F3 **metadata** clearly and explicitly include the identifier of the data it describes;

 F4 (**meta**)data are registered or indexed in a searchable resource;

Interoperable:

I1 (**meta**)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.

I2 (**meta**)data use vocabularies that follow FAIR principles;

I3 (**meta**)data include qualified references to other (**meta**)data;

Accessible:

A1 (**meta**)data are retrievable by their identifier using a standardized communications protocol;

A1.1 the protocol is open, free, and universally implementable;

A1.2 the protocol allows for an authentication and authorization procedure, where necessary;

A2 **metadata** are accessible, even when the data are no longer available;

Reusable:

R1 **meta**(data) are richly described with a plurality of accurate and relevant attributes;

R1.1 (**meta**)data are released with a clear and accessible data usage license;

R1.2 (**meta**)data are associated with detailed provenance;

R1.3 (**meta**)data meet domain-relevant community standards;

FAIR Guiding Principles

Sci. Data 3:160018 doi: 10.1038/sdata.2016.18 (2016)

Findable:

F1 (**meta**)data are assigned a globally unique and persistent identifier;

F2 data are described with rich **metadata**;

F3 **metadata** clearly and explicitly include the identifier of the data it describes;

F4 (**meta**)data are registered or indexed in a searchable resource;

Interoperable:

I1 (**meta**)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.

I2 (**meta**)data use vocabularies that follow FAIR principles;

I3 (**meta**)data include qualified references to other (**meta**)data;

Accessible:

A1 (**meta**)data are retrievable by their identifier using a standardized communications protocol;

➔ A1.1 the protocol is open, free, and universally implementable;

➔ A1.2 the protocol allows for an authentication and authorization procedure, where necessary;

A2 **metadata** are accessible, even when the data are no longer available;

Reusable:

R1 **meta**(data) are richly described with a plurality of accurate and relevant attributes;

R1.1 (**meta**)data are released with a clear and accessible data usage license;

R1.2 (**meta**)data are associated with detailed provenance;

R1.3 (**meta**)data meet domain-relevant community standards;

FAIR Guiding Principles

Sci. Data 3:160018 doi: 10.1038/sdata.2016.18 (2016)

Findable:

F1 (**meta**)data are assigned a globally unique and persistent identifier;

F2 data are described with rich **metadata**;

F3 **metadata** clearly and explicitly include the identifier of the data it describes;

F4 (**meta**)data are registered or indexed in a searchable resource;

Interoperable:

I1 (**meta**)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.

I2 (**meta**)data use vocabularies that follow FAIR principles;

I3 (**meta**)data include qualified references to other (**meta**)data;

Accessible:

A1 (**meta**)data are retrievable by their identifier using a standardized communications protocol;

A1.1 the protocol is open, free, and universally implementable;

A1.2 the protocol allows for an authentication and authorization procedure, where necessary;

 A2 **metadata** are accessible, even when the data are no longer available;

Reusable:

R1 **meta**(data) are richly described with a plurality of accurate and relevant attributes;

R1.1 (**meta**)data are released with a clear and accessible data usage license;

R1.2 (**meta**)data are associated with detailed provenance;

R1.3 (**meta**)data meet domain-relevant community standards;

FAIR Guiding Principles

Sci. Data 3:160018 doi: 10.1038/sdata.2016.18 (2016)

Findable:

F1 (**meta**)data are assigned a globally unique and persistent identifier;

F2 data are described with rich **metadata**;

F3 **metadata** clearly and explicitly include the identifier of the data it describes;

F4 (**meta**)data are registered or indexed in a searchable resource;

Interoperable:

 I1 (**meta**)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.

 I2 (**meta**)data use vocabularies that follow FAIR principles;

 I3 (**meta**)data include qualified references to other (**meta**)data;

Accessible:

A1 (**meta**)data are retrievable by their identifier using a standardized communications protocol;

A1.1 the protocol is open, free, and universally implementable;

A1.2 the protocol allows for an authentication and authorization procedure, where necessary;

A2 **metadata** are accessible, even when the data are no longer available;

Reusable:

R1 **meta**(data) are richly described with a plurality of accurate and relevant attributes;

R1.1 (**meta**)data are released with a clear and accessible data usage license;

R1.2 (**meta**)data are associated with detailed provenance;

R1.3 (**meta**)data meet domain-relevant community standards;

2017 What FAIR is not...

Cloudy, increasingly FAIR; revisiting the FAIR Data guiding principles for the European Open Science Cloud DOI: 10.3233/ISU-170824

FAIR is **not** a standard

FAIR is **not** a semantic web / LOD

FAIR is **not** equal to 'Open' or 'Free'

*Data are often Open (Access) but **not** FAIR*

*Some data can **never** be Open, yet be perfectly FAIR*

By design, FAIR is **not** explicit about data quality, trustworthiness, responsibility, ethics, etc.

2017

***FAIR
Principles***



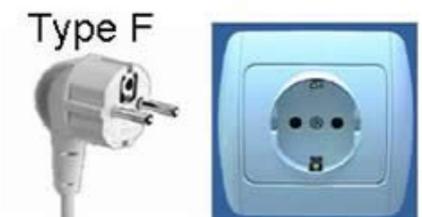
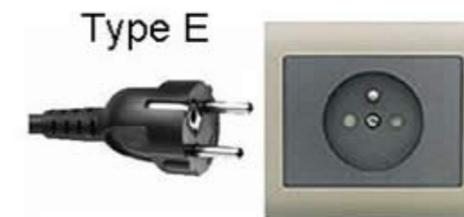
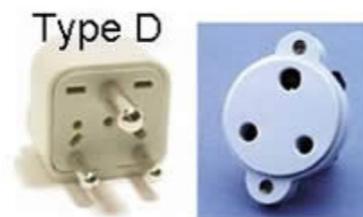
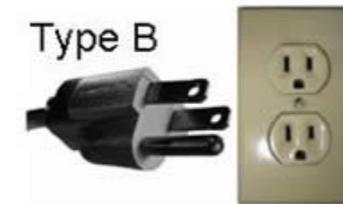
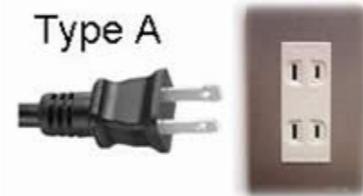
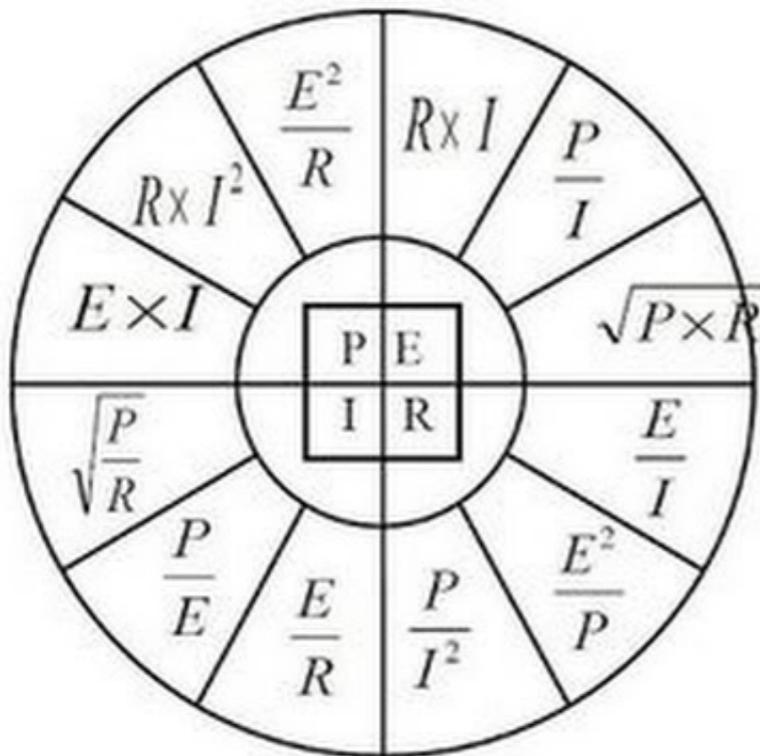
***FAIR
Implementations***

2017

FAIR **Principles**



FAIR **Implementations**



2017



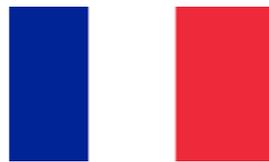
International **Support** and **Coordination** Office



Leiden



Hamburg



Paris



Brazil



San Diego

GO FAIR Modus

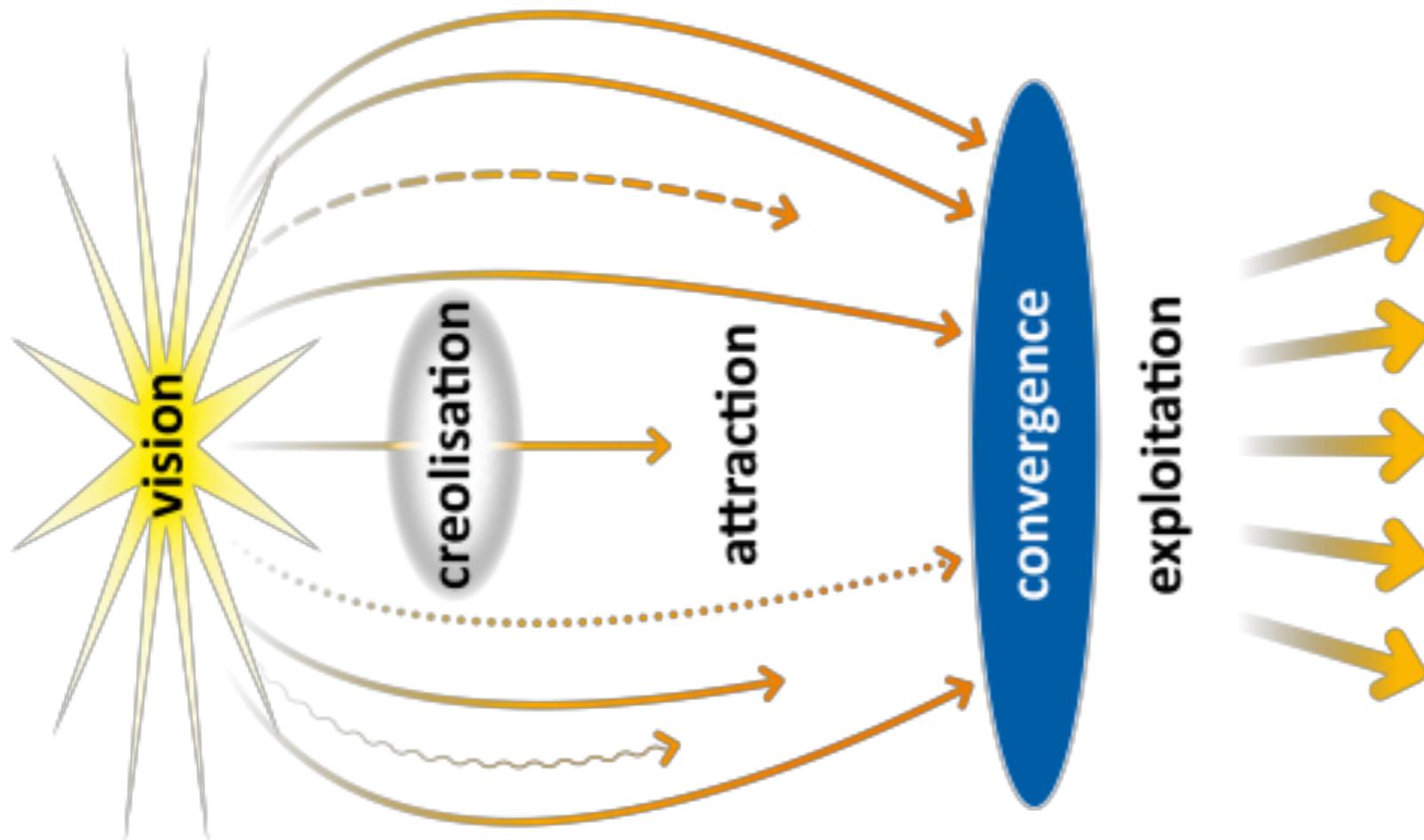
Common Patterns in Revolutionary Infrastructures and Data

Peter Wittenburg, Max Planck Computing and Data Facility

George Strawn, US National Academy of Sciences

February 2018

https://www.rd-alliance.org/sites/default/files/Common_Patterns_in_Revolutionising_Infrastructures-final.pdf



GO FAIR Modus

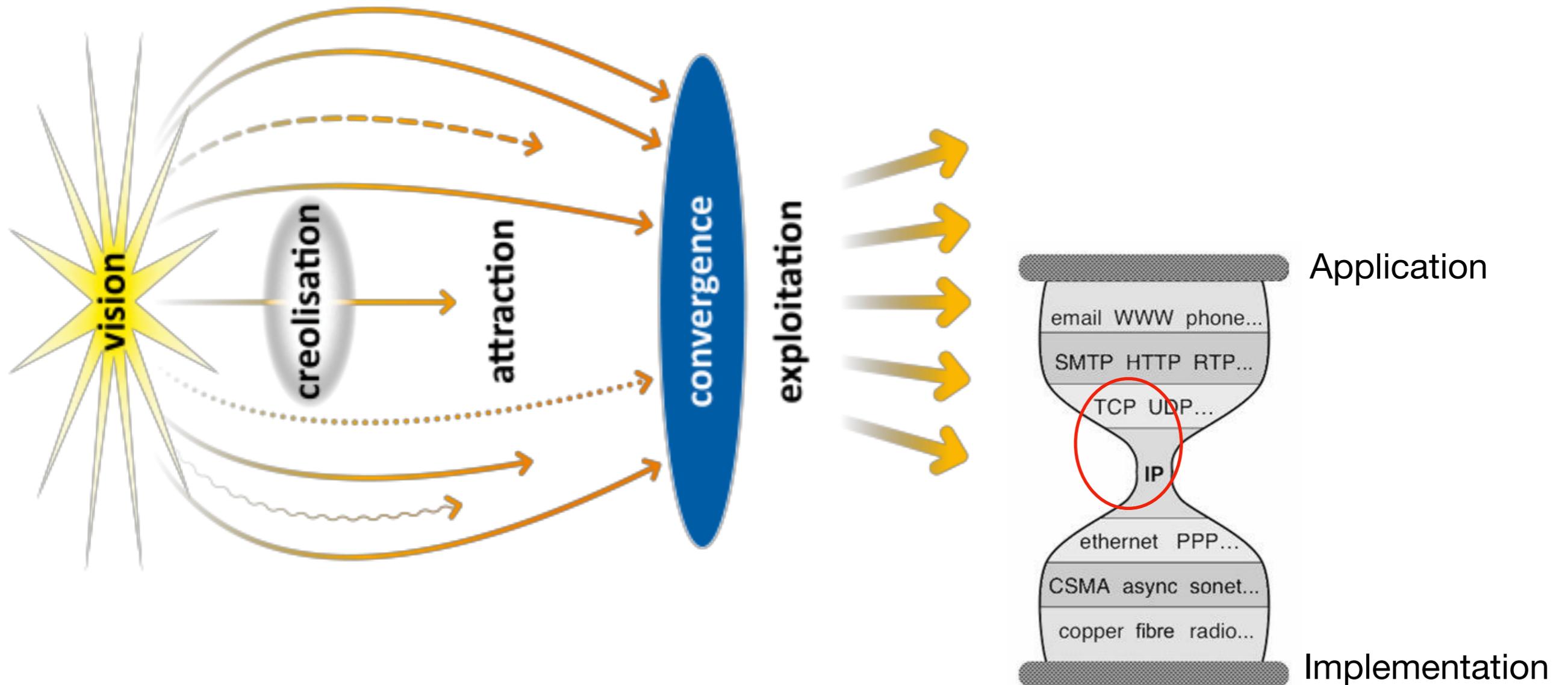
Common Patterns in Revolutionary Infrastructures and Data

Peter Wittenburg, Max Planck Computing and Data Facility

George Strawn, US National Academy of Sciences

February 2018

https://www.rd-alliance.org/sites/default/files/Common_Patterns_in_Revolutionising_Infrastructures-final.pdf



- Rough consensus, running code
- Minimal standard + Freedom to operate
- Voluntary participation
- Critical mass of users

GO FAIR Modus

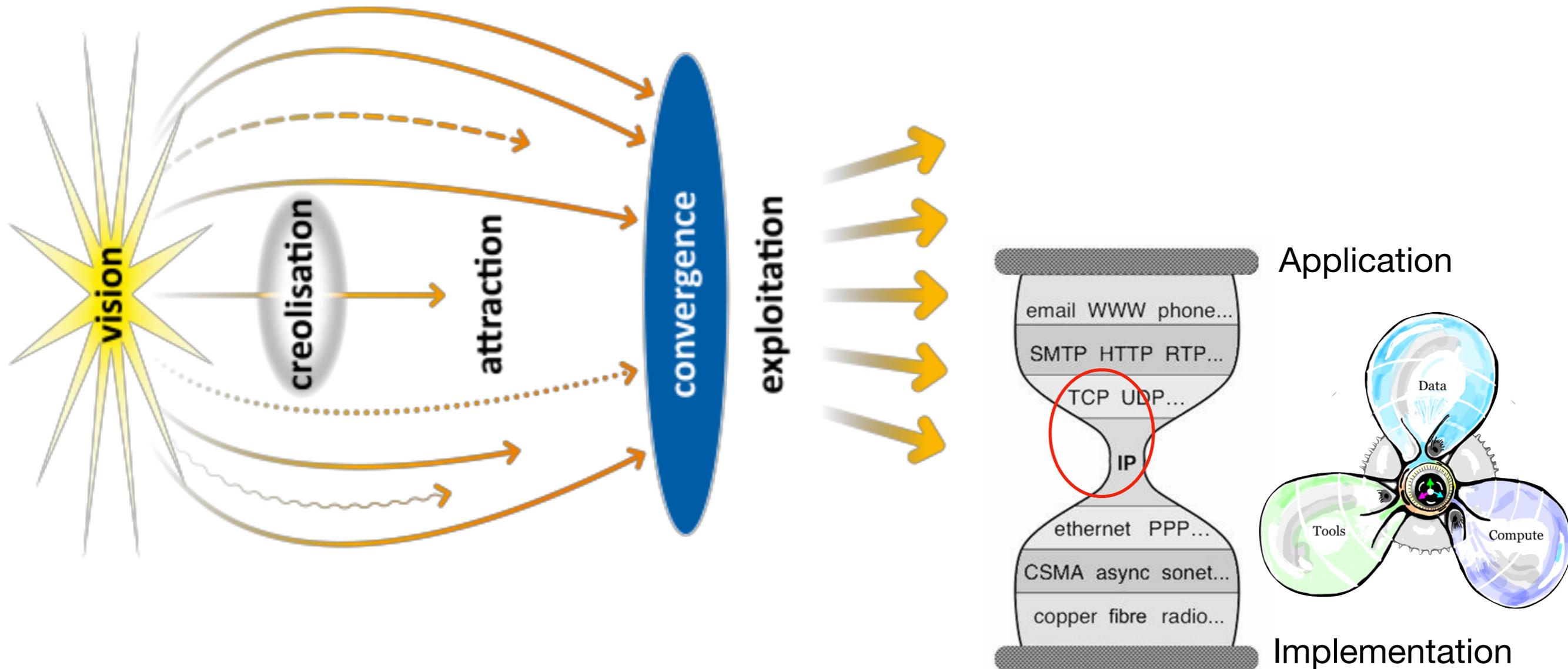
Common Patterns in Revolutionary Infrastructures and Data

Peter Wittenburg, Max Planck Computing and Data Facility

George Strawn, US National Academy of Sciences

February 2018

https://www.rd-alliance.org/sites/default/files/Common_Patterns_in_Revolutionising_Infrastructures-final.pdf



- Rough consensus, running code
- Minimal standard + Freedom to operate
- Voluntary participation
- Critical mass of users

Creolization

Attractors

Convergence

IFDS

- LUMC
- UMC Utrecht
- UMCG
- WUR
- Maastricht University
- BioSemantics Group
- UCSD
- BioCom
- NDS
- ANDS
- NIH
- FAIRdICT
- DTL
- LERU
- CGIAR
- DANS
- RDA
- Metrics Group
- F1000
- Force 11
- Nerdalize
- ODEX
- Lorentz Center
- Personal Health Train
- ReproNIM
- EOSC
- EUDAT
- OpenAIRE
- FOSTER
- CODATA
- EDISON
- BioSB
- HRB
- ZonMW
- Elsevier
- Springer-Nature

GO CHANGE

GO TRAIN

GO BUILD



FAIR Funding
GO FAIR Brazil

CO-OPERAS

FAIR Funders

Neubias

Training Frameworks
Training Curriculum
Seasons Schools

AGU Enabling FAIR Data
System Terre
Sea Data Net

FAIR Pointer

Discovery IN
GERDI
OPEDAS
C2CAMP
Personal Health Train

Annotation

ASTRON

Metrology

Chemistry

Nano Research

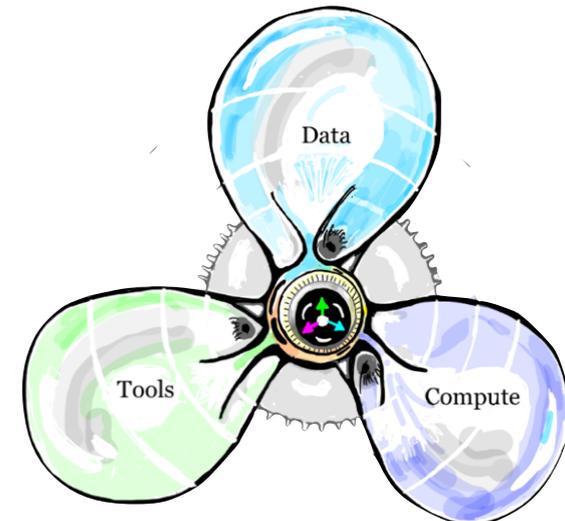
NOMAD

FAIR Journalism (Fake News Monitoring)
Reproducibility and quality assurance of research data

Metabolomics

Vaccine IS

Rare disease



BiodiFAIRse

Agriculture & Food Systems

INOSIE

EcoSoc

PhenoMeNal

CBS (Economics)

Sustainability Research

2017

Q1

Q2

Q3

Q4

2019



**15 FAIR Guiding Principles
Digital Object Framework**

Define metadata functions

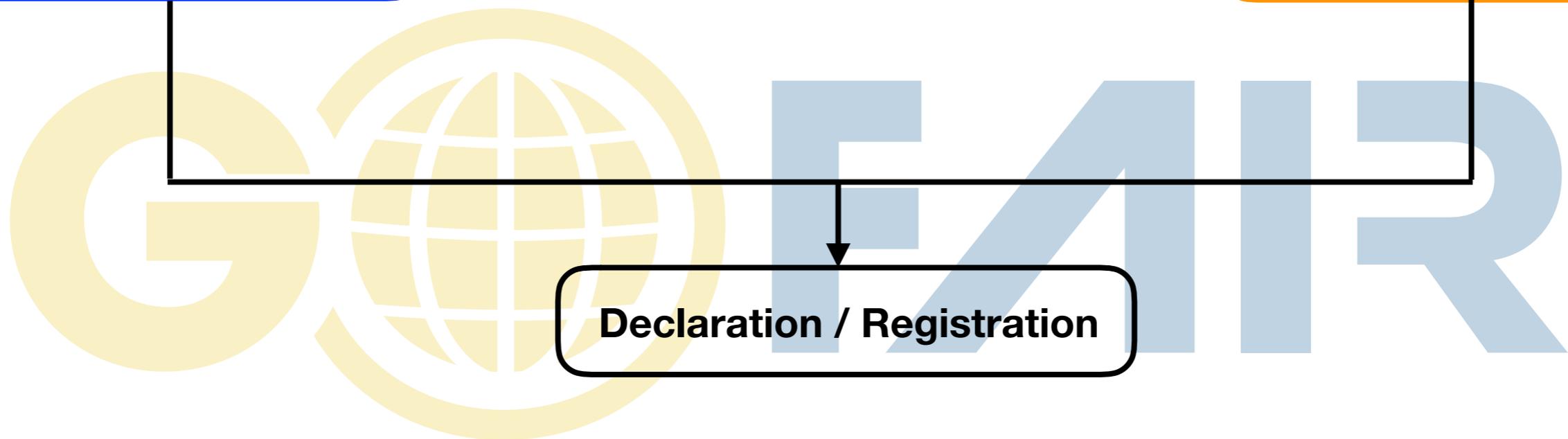
Domain Communities
Self-Identified
aiming to become more FAIR

- *EOSC*
- *NIH Data Commons*
- *Preclinical Trials*
- *Funders*
- *American Geophysical Union*
- *Bayer*
- *Journalists*
- *Financial industry*

Implementation
Choice
Community chooses to re-use existing resources as needed to implement FAIR

Matrix
Communities x Resources

Implementation
Challenge
Community accepts challenge to create new resources as needed to implement FAIR



Declaration / Registration

**15 FAIR Guiding Principles
Digital Object Framework**

Define metadata functions

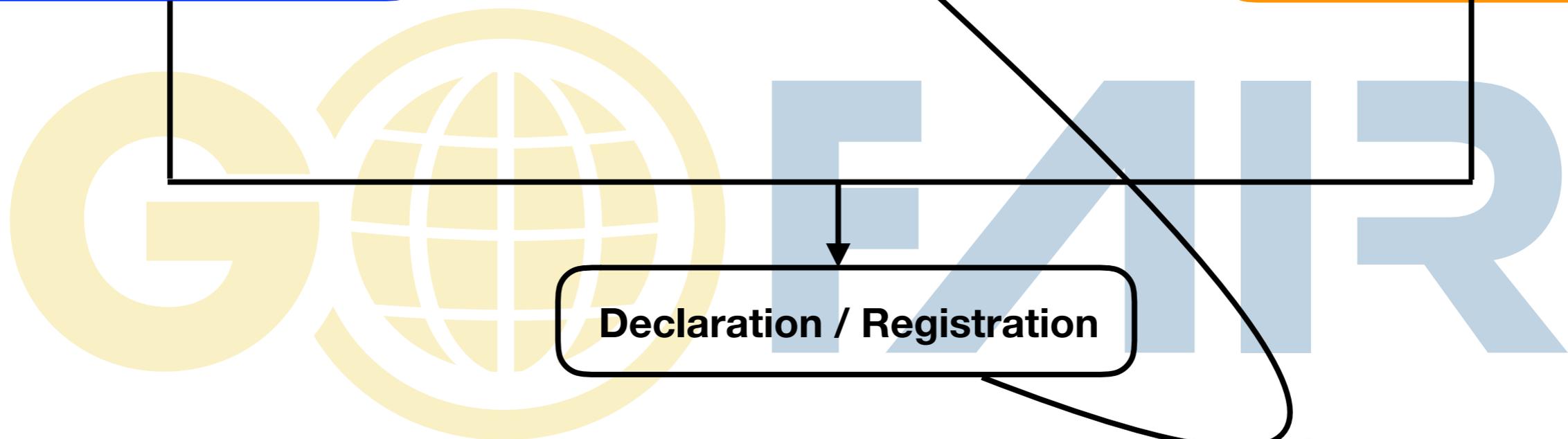
Domain Communities
Self-Identified
aiming to become more FAIR

- *EOSC*
- *NIH Data Commons*
- *Preclinical Trials*
- *Funders*
- *American Geophysical Union*
- *Bayer*
- *Journalists*
- *Financial industry*

Implementation
Choice
Community chooses to re-use
existing resources as needed
to implement FAIR

Matrix
Communities x Resources

Implementation
Challenge
Community accepts challenge to
create new resources as needed to
implement FAIR



Declaration / Registration

**Optimal
Reuse**

← GO FAIR 'IN Profile' Survey      **SEND**  

GO FAIR

QUESTIONS RESPONSES **19**

Section 1 of 14

Implementation Network (IN) Profile

We ask each IN Coordinator to complete this survey as a way for GO FAIR to begin profiling the FAIR-related resources found among more than 30 INs.

The survey contains 14 questions, and will take 30-45 minutes to complete. The entire form can be downloaded here as a PDF: <http://bit.ly/2BvxAH8>.

This survey serves two functions:

- (1) cursory inventory of FAIR-related resources of the IN (this will enable GO FAIR to better search for and to exploit synergies maximising re-use of FAIR solutions).
- (2) A first step in helping INs to frame their own consortia and objectives in the context of the GO FAIR community.

Many of the questions below relate directly to the FAIR Principles (<https://www.go-fair.org/fair-principles/>) and are noted as such in the question. We hope this helps to guide the IN Coordinator to better understand the question.

1. Name of the Implementation Network *

Short answer text

.....

2. IN Coordinator name *

SUBJECT	PREDICATE	OBJECT
name of IN (UPRI)	has-coordinator	ORCID
name of IN (UPRI)	has-participant	ORCID
name of IN (UPRI)	has-member-organisation	VIVO / CrossRef
name of IN (UPRI)	uses-repository	CTS?
name of IN (UPRI)	uses-registry-service	PW ?
name of IN (UPRI)	provides-registry-service	
name of IN (UPRI)	uses-data-format	format-PID
name of IN (UPRI)	provides-data-format	format-PID
name of IN (UPRI)	provides-access-protocol	format-PID
name of IN (UPRI)	uses-access-protocol	protocol-PID
name of IN (UPRI)	has-persistence-policy	policy
name of IN (UPRI)	is found by	Search engine
name of IN (UPRI)	uses-term-system	Term System-PID
name of IN (UPRI)	provides-term-system	Term System-PID
name of IN (UPRI)	uses-license	MR-license ID
name of IN (UPRI)	uses-metadata-format	format-PID
name of IN (UPRI)	provides-meta-data-format	Format-PID
name of IN (UPRI)	provides-training-material	Resource-ID
name of IN (UPRI)	uses-uses-training-material	Resource-ID
name of IN (UPRI)	provides-DS-tools	Resource-ID
name of IN (UPRI)	uses-DS-tools	Resource-ID
name of IN (UPRI)	uses-workspace-tool	Resource-ID
name of IN (UPRI)	Provides-workspace-tool	Resource-ID

FAIR Principles

F1
F1
F2
F2
A1
A1
F1 / A2
F4
I
I
R1.1
R1.2
R1.2

FAIR IN Profile Matrix

January 15-16, Leiden

Survey https://docs.google.com/forms/d/1Oug6GowuG1jNZNsjkIXOeEvPbUrhyuS_F-d185SOy6A/edit

Matrix <https://docs.google.com/spreadsheets/d/1MUZn7uh4x5YLPjqxi-V8XubsSEEonQWvx2jBlcyyNdU/edit#gid=0>



IN Profile Matrix

File Edit View Insert Format Data Tools Add-ons Help All changes saved in Drive

100% \$ % .0 .00 123 Helvetica ... 10 B I U A

FAIR Implementation Matrix

On the OSF <https://osf.io/n7uwp/>

Red indicates waist of hourglass

Blue is an Implementation Choice

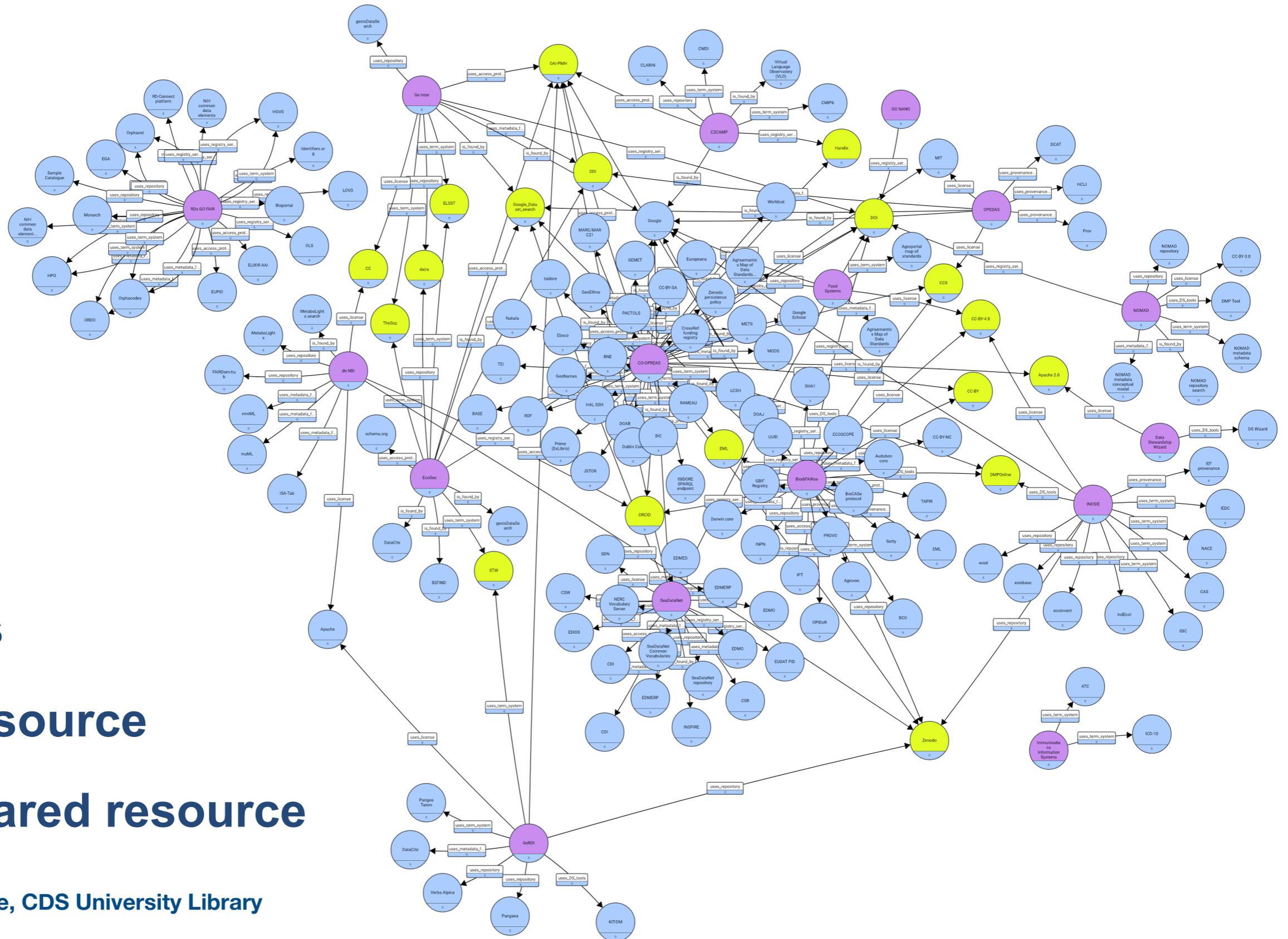
Orange is Implementation Challenge

Green highlight indicates a service provided by the IN or spin-off

Blank cell is not relevant for IN

FAIR Principle	Services	Component	Most used	C2CAMP	OPEDAS	PHT	Rare-Diseases	GERI
	central to all	DOIP	DOIP	DOIP	DOIP	DOIP	DOIP	
	central to all	Metadata format	RDF		RDF	RDF	RDF	
	central to all	Metadata access protocol			LDP/FDP	LDP/FDP	LDP/FDP	
	central to all	Metadata core elements	TBD on M4M		TBD on M4M	TBD on M4M	TBD on M4M	
	Technology	Data Format			RDF for interop.	RDF for interop.	RDF for interop.	
	Technology	Data Access Protocols (MR/A)			LDP/FDP	PHT-standard	PHT-standard	
	Technology	Computer-actionable license description language			RDF	RDF	RDF	
	Tooling	Repository (Data/Metadata)		DONA	IFDS Data Station	IFDS Data Station	ERN?	GERI
	Tooling(Repository)	https://www.dataone.org						
	Tooling	Registry Service		DONA	IFDS Station Registry	IFDS Station Registry	ERN?	
	tooling	Metadata forms/creators			CEDAR/CASTOR			
	Tooling	Search capability		DOIP	IFDS Station Registry	IFDS Station Registry	IFDS Station Registry	
	Policy	Persistence Policy			TBD	TBD	TBD	
	Technology	Computer-actionable policy description language			RDF	RDF	RDF	
	Tooling	License protocols			TBD	TBD	TBD	
	Tooling	Training Materials			Training-IN	Training-IN	EJP	

Community Implementation Choices & Challenges



INs

Resource

Shared resource

FAIR IN Profile Matrix

January 15-16, Leiden

Survey https://docs.google.com/forms/d/1Oug6GowuG1jNZNsjkIXOeEvPbUrhyuS_F-d185SOy6A/edit

Matrix <https://docs.google.com/spreadsheets/d/1MUZn7uh4x5YLPjqxi-V8XubsSEEonQWvx2jBlcyyNdU/edit#gid=0>



IN Profile Matrix

File Edit View Insert Format Data Tools Add-ons Help All changes saved in Drive

100% \$ % .0 .00 123 Helvetica 10 B I U A

Private sector builds to Column 1

FAIR Implementation Matrix

- On the OSF <https://osf.io/n7uwp/>
- Red indicates waist of hourglass
- Blue is an Implementation Choice
- Orange is Implementation Challenge
- Green highlight indicates a service provided by the IN or spin-off
- Blank cell is not relevant for IN

FAIR Principle	Services	Component	Most used	C2CAMP	OPEDAS	PHT	Rare-Diseases	GERI
	central to all	DOIP	DOIP	DOIP	DOIP	DOIP	DOIP	
	central to all	Metadata format	RDF		RDF	RDF	RDF	
	central to all	Metadata access protocol			LDP/FDP	LDP/FDP	LDP/FDP	
	central to all	Metadata core elements	TBD on M4M		TBD on M4M	TBD on M4M	TBD on M4M	
	Technology	Data Format			RDF for interop.	RDF for interop.	RDF for interop.	
	Technology	Data Access Protocols (MR/A)			LDP/FDP	PHT-standard	PHT-standard	
	Technology	Computer-actionable license description language			RDF	RDF	RDF	
	Tooling	Repository (Data/Metadata)		DONA	IFDS Data Station	IFDS Data Station	ERN?	GERI
	Tooling(Repository)	https://www.dataone.org						
	Tooling	Registry Service		DONA	IFDS Station Registry	IFDS Station Registry	ERN?	
	tooling	Metadata forms/creators			CEDAR/CASTOR			
	Tooling	Search capability		DOIP	IFDS Station Registry	IFDS Station Registry	IFDS Station Registry	
	Policy	Persistence Policy			TBD	TBD	TBD	
	Technology	Computer-actionable policy description language			RDF	RDF	RDF	
	Tooling	License protocols			TBD	TBD	TBD	
	Tooling	Training Materials			Training-IN	Training-IN	EJP	

Growing interest from private sector

GO FAIR Service Providers Consortium

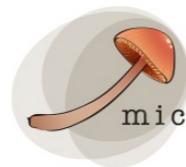
<https://osf.io/9h8uf/>

<https://www.go-fair.org/resources/rules-of-engagement/>



Purple Polar Bears

Software development



micelio

DTL partner

Data Quality

mobiquity

Digital Engagement



PHORTOS

CONSULTANTS DTL partner

Consulting and training



FAIR project management

accenture

Professional Services



Certification and Coordination



DTL partner

Software development
and consulting

EURETOS

DTL partner

FAIRification and Analysis

castor

DTL partner

FAIR data at the source



Semantic Web
&
Linked Data



ELSEVIER

FAIR data publishing



arXiv.org > cs > arXiv:1902.11162
<https://osf.io/b9fz4/>

Search or Article ID

All fields



(Help | [Advanced search](#))

Computer Science > Digital Libraries

The FAIR Funder pilot programme to make it easy for funders to require and for grantees to produce FAIR Data

P. Wittenburg, H. Pergl Sustkova, A. Montesanti, S. M. Bloemers, S. H. de Waard, M. A. Musen, J. B. Graybeal, K. M. Hettne, A. Jacobsen, R. Pergl, R. W. W. Hooft, C. Staiger, C. W. G. van Gelder, S. L. Knijnenburg, A.C. van Arkel, B. Meerman, M. D. Wilkinson, S-A Sansone, P. Rocca-Serra, P. McQuilton, A. N. Gonzalez-Beltran, G. J. C. Aben, P. Henning, S. Alencar, C. Ribeiro, C. R. L. Silva, L. Sayao, L. Sales, V. Veiga, J. Lima, S. Dib, P. Xavier, R. Murtinho, J. Tendel, B. F. Schaap, P. M. Brouwer, A. K. Gavai, Y. Bouzembrak, H. J. P. Marvin, A. Mons, T. Kuhn, A. A. Gambardella, R. de Miranda Azevedo, V. Muhonen, M. van der Naald, N. W. Smit, M. J. Buys, T. F. de Bruin, F. Schoots, H. J. E. Goodson, H. S. Rzepa, K. G. Jeffery, H. P. Shanahan, M. Axton, V. Tkachenko, A. D. Maya, N. K. Meyers, M. Conlon, L. L. Haak, E. A. Schultes

(Submitted on 26 Feb 2019 (v1), last revised 6 Mar 2019 (this version, v2))

Download:

- [PDF only](#)



Current browse context:

cs.DL

[< prev](#) | [next >](#)

[new](#) | [recent](#) | [1902](#)

Change to browse by:

[cs](#)

References & Citations

- [NASA ADS](#)

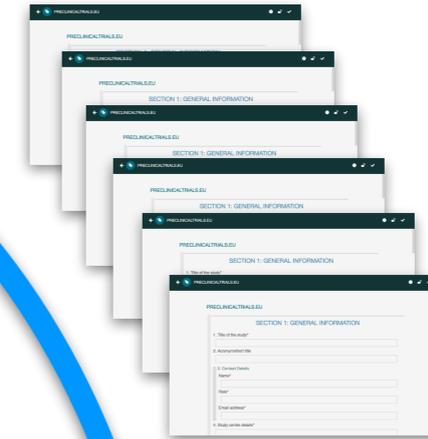
Google Scholar

Bookmark [\(what is this?\)](#)

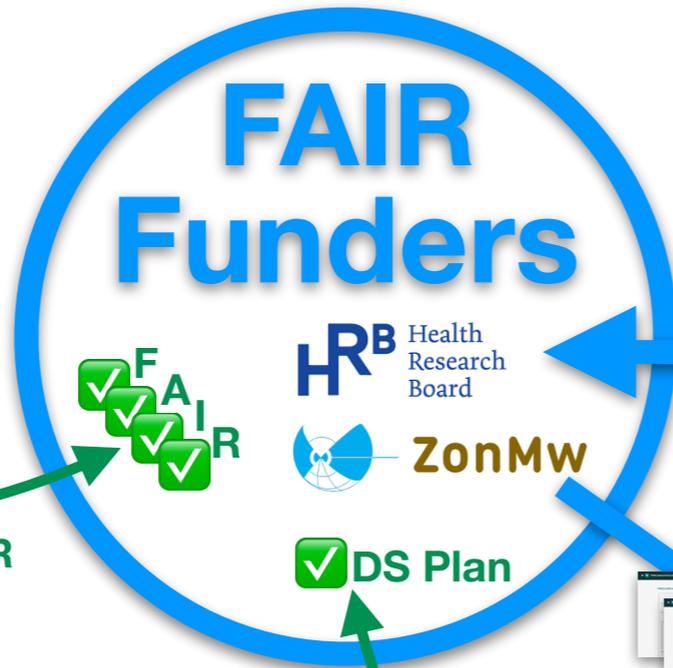




(1)



(7)



(3)



(2)

Funders receive FAIR Matu evaluation certificates.

Funders receive approval of FAIR DS Plan from research institution data stewards.



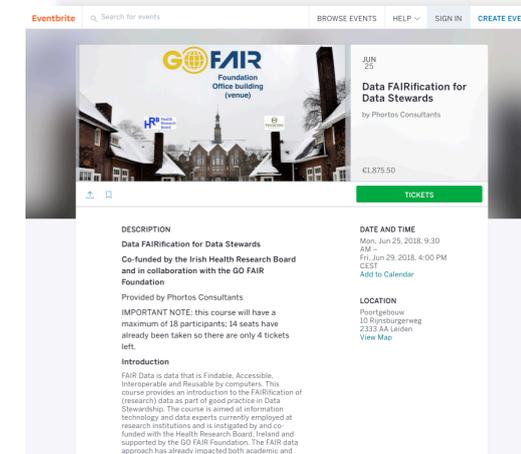
(4)



(6)



(5)



Next Steps...



FAIR Funder Conference

September 30 - October 1, 2019

Leiden

Erik Schultes, PhD

International Science Coordinator

GO FAIR International Support and Coordination Office

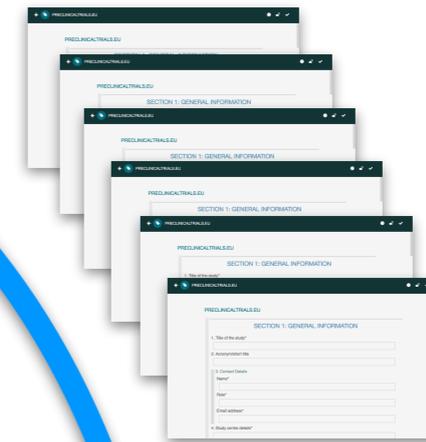
erik.schultes@go-fair.org

go-fair.org





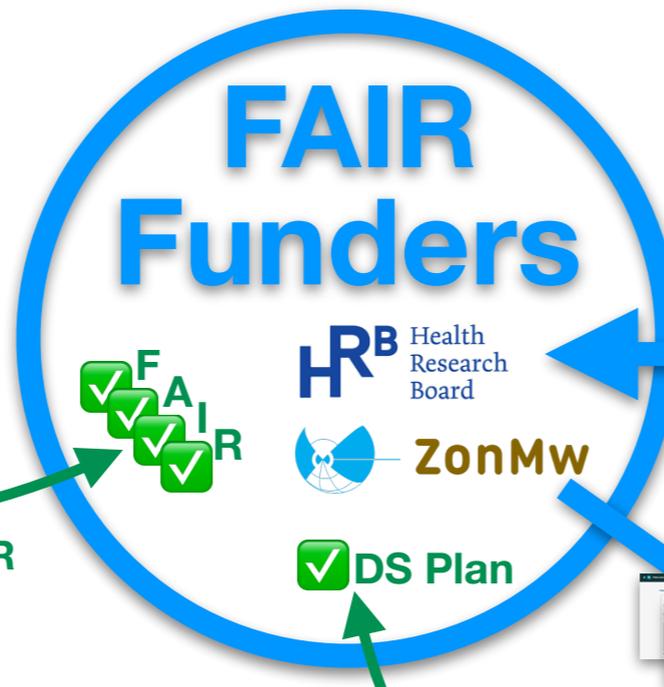
(1) Metadata for Machines Workshops brings domain specialists together with metadata experts, tools and resources to reuse or define novel metadata definitions, templates, and FAIR metrics.



(7) Trusted 3rd-party FAIR metrics evaluations services (Purple Polar Bear) validate the FAIRness of the research data and metadata, sending certificates directly to funder (green check boxes). FAIR metrics are defined by the community (steps 1 & 2) with certification schemas held by GO FAIR Foundation.



Funders receive FAIR metric evaluation certificates.



(3) Funders compose new calls with metadata requirements by reusing the community defined metadata templates



(2) Community-defined machine-actionable metadata templates and FAIR Metrics are made available for reuse in FAIR resource repositories (e.g. CEDAR) and registered in FAIR reference repositories (e.g. FAIRsharing.org). These repositories inform 3rd-party FAIR metrics evaluation services about community-relevant FAIR standards (step 7).

Funders receive approval of FAIR DS Plan from research institution data stewards.



(4) Prompted automatically by CEDAR forms linked in the DS Wizard, researchers and data stewards apply for funding and create machine-actionable DS plans, supplying the required community-defined, FAIR metadata. The Funder receives assurance from local data stewards attesting to the quality of the FAIR DS Plan (green check box).

(6) Machine-actionable data and metadata are deposited in FAIR repositories running automated FAIR metrics evaluations.



(5) Funded researchers and data stewards execute the project, collect FAIR data (using FAIR tooling, e.g., Castor EDC).





The FAIR Funder pilot programme to make it easy for funders to require and for grantees to produce FAIR Data

P. Wittenburg, H. Pergl Sustkova, A. Montesanti, S. M. Bloemers, S. H. de Waard, M. A. Musen, J. B. Graybeal, K. M. Hettne, A. Jacobsen, R. Pergl, R. W. W. Hooft, C. Staiger, C. W. G. van Gelder, S. L. Knijnenburg, A.C. van Arkel, B. Meerman, M. D. Wilkinson, S-A Sansone, P. Rocca-Serra, P. McQuilton, A. N. Gonzalez-Beltran, G. J. C. Aben, P. Henning, S. Alencar, C. Ribeiro, C. R. L. Silva, L. Sayao, L. Sales, V. Veiga, J. Lima, S. Dib, P. Xavier, R. Murtinho, J. Tendel, B. F. Schaap, P. M. Brouwer, A. K. Gavai, Y. Bouzembrak, H. J. P. Marvin, A. Mons, T. Kuhn, A. A. Gambardella, R. de Miranda Azevedo, V. Muhonen, M. van der Naald, N. W. Smit, M. J. Buys, T. F. de Bruin, F. Schoots, H. J. E. Goodson, H. S. Rzepa, K. G. Jeffery, H. P. Shanahan, M. Axton, V. Tkachenko, A. D. Maya, N. K. Meyers, M. Conlon, L. L. Haak, E. A. Schultes

(Submitted on 26 Feb 2019 (v1), last revised 6 Mar 2019 (this version, v2))

Download:

- [PDF only](#)



Current browse context:

cs.DL

[< prev](#) | [next >](#)

[new](#) | [recent](#) | [1902](#)

Change to browse by:

cs

References & Citations

- [NASA ADS](#)

Google Scholar

Bookmark [\(what is this?\)](#)



The FAIR Funder Components: <https://www.hrb.ie>

The FAIR Funder Components: <https://www.zonmw.nl/nl/>

Mijn ZonMw/ProjectNet Vacatures Over ZonMw Veelgestelde vragen Contact English website

ZonMw

Zoeken door de website

Subsidies Onderzoek & resultaten Actueel

ZonMw stimuleert gezondheidsonderzoek en zorginnovatie

Lees verder

Search

HRB Health Research Board

Funding Data collections & evidence Publications Success stories News About

Research. Evidence. Action.

See latest news

I want to

Find a grant Find a publication Find data Visit drugs library

- Long history of DMP/ DSP
- Moving toward FAIR maturity indicators

- History of Open Science
- FAIR DS Training
- Moving toward 5% project funding, eligible for FAIR DS

The FAIR Funder Components: <https://www.hrb.ie>

The FAIR Funder Components: <https://www.zonmw.nl/nl/>

The screenshot shows an Eventbrite event page. At the top, there is a navigation bar with the Eventbrite logo, a search bar, and links for 'BROWSE EVENTS', 'HELP', 'SIGN IN', and 'CREATE EVENT'. The main event card features a background image of a brick building with snow on the roof. The event title is 'Data FAIRification for Data Stewards' by Phortos Consultants, scheduled for June 25th with a price of €1,875.50. A green 'TICKETS' button is visible. Below the card, the event details are organized into sections: 'DESCRIPTION', 'DATE AND TIME', and 'LOCATION'. The description includes information about funding from the Irish Health Research Board and the GO FAIR Foundation, and notes that only 4 tickets are left. The date and time section lists two sessions: one on Monday, June 25, 2018, from 9:30 AM to 4:00 PM CEST, and another on Friday, June 29, 2018, at 4:00 PM CEST. The location is identified as Poortgebouw, 10 Rijnsburgerweg, 2333 AA Leiden.

Eventbrite Search for events BROWSE EVENTS HELP SIGN IN CREATE EVENT

GO FAIR Foundation Office building (venue)

JUN 25

Data FAIRification for Data Stewards

by Phortos Consultants

€1,875.50

TICKETS

DESCRIPTION

Data FAIRification for Data Stewards

Co-funded by the Irish Health Research Board and in collaboration with the GO FAIR Foundation

Provided by Phortos Consultants

IMPORTANT NOTE: this course will have a maximum of 18 participants; 14 seats have already been taken so there are only 4 tickets left.

Introduction

FAIR Data is data that is Findable, Accessible, Interoperable and Reusable by computers. This course provides an introduction to the FAIRification of

DATE AND TIME

Mon, Jun 25, 2018, 9:30 AM –
Fri, Jun 29, 2018, 4:00 PM CEST
[Add to Calendar](#)

LOCATION

Poortgebouw
10 Rijnsburgerweg
2333 AA Leiden
[View Map](#)



Metadata for Machines Workshops

There is no FAIR Data without machine-actionable metadata

[Home](#) › [Resources](#) › [GO FAIR Workshop Series](#) › [Metadata for Machines Workshops](#)

Resources

- › [RDM Starter Kit](#)
- › [GO FAIR Materials](#)
- › [GO FAIR Workshop Series](#)
 - › [Metadata for Machines Workshops](#)
- › [Germany goes FAIR Workshops](#)
- › [Papers & Publications](#)
- › [Videos](#)
- › [Certification](#)
- › [Glossary](#)
- › [FAQ](#)

Making it easy for humans to make metadata for machines



Machine-actionable metadata are core to the FAIR Principles. GO FAIR and RDA members have launched the “Metadata for Machines” workshop series (M4M) to assess the state of metadata practices in data-related communities and stimulate the creation and re-use of FAIR metadata standards and machine-ready metadata templates (definitions of metadata categories).

The M4M workshops are agile, hackathon-style events that bring together domain experts with metadata and technical specialists to accomplish 5 objectives:

1. Assess the state of metadata practices in the various scientific communities, look for improvements of the current fragmentation and promote good FAIR compliant practices.
2. Using the FAIR principles as a guide, define essential metadata elements and standards to support F, A, I, and R by machines, drawing on the deep domain knowledge of existing communities.
3. Formulate these decisions as machine-actionable templates in a unified way;

Metadata for Machines Workshops

The FAIR Funder Components: <https://preclinicaltrials.eu>

PRECLINICALTRIALS.EU

International register of preclinical trial protocols



Not logged in



Home



About



Help with registration



Login



Contact



News



Twitter



Join

to create a user account

Preclinicaltrials aims to provide a comprehensive listing of preclinical animal study protocols.

Preferably registered at inception in order to **increase transparency**, help **avoid duplication**, and **reduce the risk of reporting bias** by enabling comparison of the completed study with what was planned in the protocol.

Registration of your study requires you to create an account that is

- Anonymous
- Free of charge
- Has an optional embargo period

This register is web-based, open to all types of animal studies and freely accessible and searchable to all with a preclinicaltrials.eu account.

The **[registration form](#)** is designed by experts on preclinical animal studies and preclinical evidence synthesis.

Please **[join](#)** us and create an user account, this will provide access to the database and enables you to register your preclinical trial.

Contact us at info@preclinicaltrials.eu.

Metadata for Machines Workshops

The FAIR Funder Components: <https://preclinicaltrials.eu>

PRECLINICALTRIALS.EU

International register of preclinical trial protocols



Not logged in



Home



About



Help with registration



Login



Contact



News



Twitter



Join

to create a user account

Preclinicaltrials aims to provide a comprehensive listing of preclinical animal study protocols.

Preferably registered at inception in order to **increase transparency**, help **avoid duplication**, and **reduce the risk of reporting bias** by enabling comparison of the completed study with what was planned in the protocol.

Registration of your study requires you to create an account that is

- Anonymous
- Free of charge
- Has an optional embargo period

This register is web-based, open to all types of animal studies and freely accessible and searchable to all with a preclinicaltrials.eu account.

The **registration form** is designed by experts on preclinical animal studies and preclinical evidence synthesis.

Please **join** us and create an user account, this will provide access to the database and enables you to register your preclinical trial.

Contact us at info@preclinicaltrials.eu.

Section 1. General information

1. * Title of the study

Enter the full title of the study

2. Acronym/short title

Enter optional acronym/short title for the study

3. * Contact details

Give the name of the main administrative contact for the study

Name

Role

What is the role the main contact in the study (e.g. executive researcher, research group supervisor)?

Email address

Provide the email address of the main contact

4. * Study centre details

Give the details of the institutions where the experiments will be undertaken. Add additional lines if there is more

Metadata for Machines Workshops

The FAIR Funder Components: <https://metadatacenter.org/#about>



CEDAR

Better metadata means better science

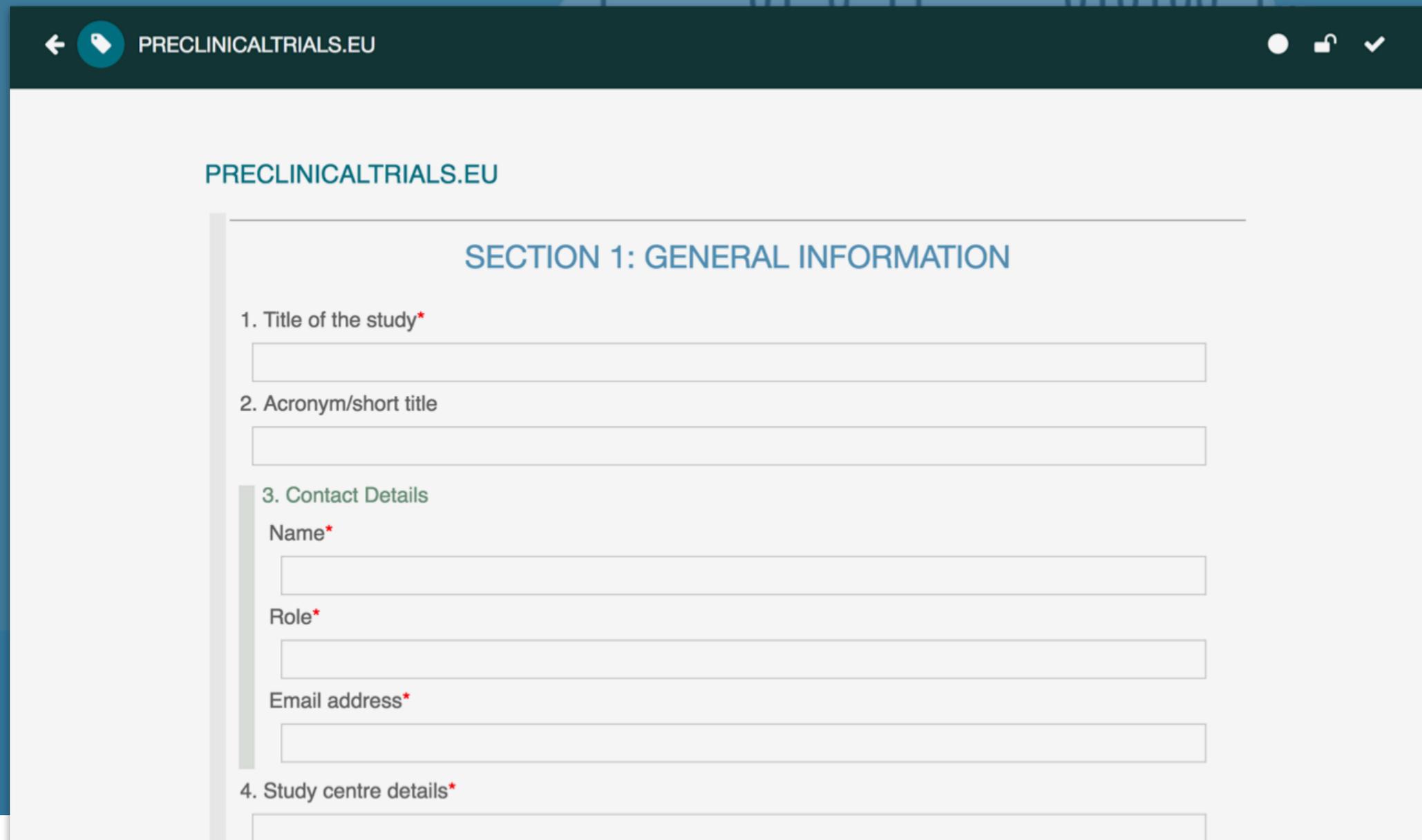
WATCH VIDEO

LEARN MORE



Metadata for Machines Workshops

The FAIR Funder Components: <https://metadatacenter.org/#about>



PRECLINICALTRIALS.EU

SECTION 1: GENERAL INFORMATION

1. Title of the study*

2. Acronym/short title

3. Contact Details

Name*

Role*

Email address*

4. Study centre details*

CEDAR

means better science

WATCH VIDEO

LEARN MORE

Metadata for Machines Workshops

The FAIR Funder Components: <https://fairsharing.org>

FAIRsharing.org
standards, databases, policies

 Search all of FAIRsharing

Standards

Databases

Policies

Collections

Add/Claim Content

Stats

Log in or Register

A curated, informative and educational resource on data and metadata *standards*, inter-related to *databases* and data *policies*.

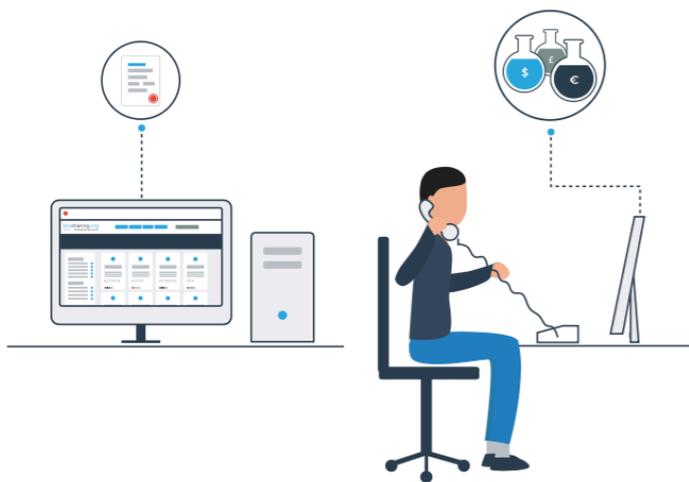
HOW CAN WE HELP?

We guide consumers to discover, select and use these resources with confidence, and producers to make their resource more discoverable, more widely adopted and cited.

Journal editors & publishers

Create and maintain an interrelated list of citable standards, databases and repositories to recommend to your authors, users or their community, and revise this recommendation over time...

[\[read more\]](#)



The FAIR Funder Components: <https://www.go-fair.org/resources/go-fair-workshop-series/metadata-for-machines-workshops/>



+



=

Metadata templates

- community standards
- machine-actionable
- registered/reusable

[Go to App](#)



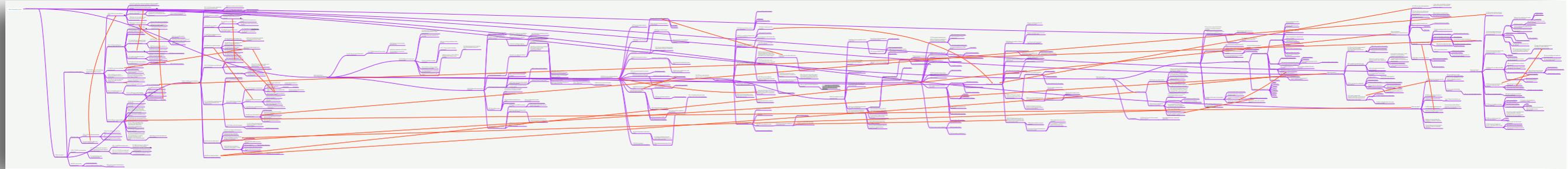
Smart Data Management Plans for FAIR Open Science
For Serious Researchers and Data Stewards

Robert Pergl



ELIXIR Data Stewardship Knowledge Model

<https://github.com/DataStewardshipWizard/ds-km>

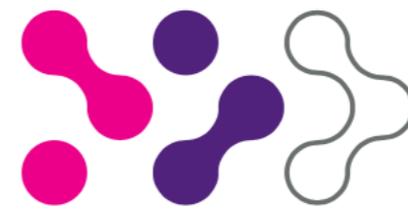


4 m



Rob Hooft

DTL



DUTCH TECHCENTRE FOR LIFE SCIENCES

Data cycle step 1:
Design of experiments

1/33. (1.13) Will you be storing samples?

Reference data

1/29. (1.12) Will reference data be created?

For use of reference data, see branch in existing data

1/30. (1.12.1) What will the IP be like?

1/31. (1.12.2) How will you maintain it?

1/32. (1.12.3) How will the release schedule be?

34. (1.13.1) Where will information about samples be stored? Biobank information system.

For questionnaires see "experimental data"

A34-1. (del) Will you start a new collection?

A34-2. (1.13.2) Will your data and samples be added to an existing collection?

35. (del) How will you make sure your biobank will be properly represented in relevant Catalogues =

36. (del) Do you consult the owners of the biobank?

37. (del) Does the biobank adhere to the FAIR principles?

(del) Will you be using questionnaires?

Use building blocks?

Are you collecting nutrition data?

Will you be using a food frequency questionnaire?

LS1/42. Will you couple existing (biobanks) data sets?

LS1/43. Will you use deterministic couplings?

LS1/49 Will you use probabilistic couplings?

LS1/44. Will you be using a ttp? What is the procedure followed? Where will what data be sent? Did a legal advisor look at these?

LS1/45. Is consent available for the coupling?

LS1/46. How will you check whether coupled data are representative of your goal population?

LS1/47. What is the goal of the coupling: more data about the same subjects (intersection, enrichment) or getting more subjects (Union)?

LS1/48. What variable(s) will you use for coupling?

Will the coupling potentially create new privacy issues (e.g. Potential for re-identification or making personal information more sensitive, such as adding location data)?

Verify that you have permission for such coupling.

20. (1.11) What/how/who will integrate existing data

23. (1.11.2) Do you need integrate or to link to a different type of data?

24. (del) Does that need a project plan?

25. What will you do if the coupled data is updated?

26. What will you do if the format is changed?

27. Are conversions needed?

28. Link or Join? Allowed?

1/81. Will you use any data that needs to be made computer readable first?

Any such data needs to be made available to others too.

21. (1.11.1) Will you need to add data from literature?

22. (1.11.2) Text mining?

existing data

and/or align formats?



Current Phase

Before Submitting the Proposal

- Design of experiment ✓
- Data design and planning ✓
- Data Capture/Measurement ✓
- Data processing and curation ✓
- Data integration ✓
- Data interpretation ✓
- Information and insight ✓

- Summary Report

Design of experiment

Before you decide to embark on any new study, it is nowadays good practice to consider all options to keep the data generation part of your study as limited as possible. It is not because we can generate massive amounts of data that we always need to do so. Creating data with public money is bringing with it the responsibility to treat those data well and (if potentially useful) make them available for re-use by others.

Is there any pre-existing data? !

Are there any data sets available in the world that are relevant to your planned research?

- Desirable: *Before Submitting the DMP*
- Data Stewardship for Open Science: [atq](#)

- No
- Yes ☰

Will reference data be created? !

Will any of the data that you will be creating form a reference data set for future research (by others)?

- Desirable: *Before Submitting the DMP*
- Data Stewardship for Open Science: [rbz](#)

- No
- Yes ☰

Will you be storing samples? !

- Desirable: *Before Submitting the DMP*
- Data Stewardship for Open Science: [kuz](#)

The FAIR Funder Components: <https://ds-wizard.org>



- **Open Source**
- **Machine-readable**
- **Customizable knowledge model & DM templates**
- **Customizable output formats for humans**
- **Links & tooling can be embedded**

Can be localized by:

- Research Community
- Organization
- Policy / Legal Requirements
- Funding Requirements

A screenshot of a web application interface. The browser address bar shows 'PRECLINICALTRIALS.EU'. The page title is 'PRECLINICALTRIALS.EU'. The main content area is titled 'SECTION 1: GENERAL INFORMATION'. It contains a form with four numbered sections: 1. Title of the study* (with a text input field), 2. Acronym/short title (with a text input field), 3. Contact Details (with sub-fields for Name*, Role*, and Email address*), and 4. Study centre details* (with a text input field). The form fields are white with gray borders and red asterisks indicating required fields.

DS Wizard + FAIR Metrics Hackathon July 2-4 2018



Data Stewardship Wizard

common ELIXIR (Common ELIXIR Knowledge Model, 1.0.0)

Save

KM Editor

KM Packages

DS Planner

Data design and planning

Answered: 54/54



Metric	Measure	
Findability	0.33	
Accessibility	0.25	
Interoperability	0.63	
Reusability	0.86	
Good DMP Practice	0.40	
Openness	0.00	



Events

[Home](#) › [Events](#) › The FAIR Wizard of Science Europe

The FAIR Wizard of Science Europe

Jan 17 2019

The Data Stewardship Plan – those manifold decisions required to achieve FAIR data – has been identified as a fulcrum enabling the adaption of FAIR best practices among data producers. It is this “Data Stewardship Moment” where technology and standards, the researcher, the publisher, and the funder come together, driving infrastructure developments leading to an Internet of FAIR Data and Services. In this workshop / hackathon, the development team of the Data Stewardship Wizard (<https://ds-wizard.org>) and representatives of the Science Europe **Initiative for the Alignment of Research Data Management Policies** will work together to help align the DS Wizard knowledge model with the Science Europe template. The goal for the workshop is an Open Source, machine-actionable data stewardship planning tool exploiting the consensus recommendations of Science Europe.



We're Hiring

User login

Solutions for ▾

Features

Pricing

More ▾

Start free

Request demo

Developed for Medical Device

Faster, smarter medical research.

Castor EDC is a cloud-based Electronic Data Capture platform that enables every researcher worldwide to easily capture high quality, reusable data. Through revolutionizing data capture, we aim to improve medical research and help find cures for disease faster.

Start free

Request demo



Watch video



The FAIR Funder Components: <https://github.com/DTL-FAIRData/FAIRDataPoint/wiki/FAIR-Data-Point-Specification>



Search or jump to...

Pull requests Issues Marketplace Explore



DTL-FAIRData / FAIRDataPoint

Watch 14 Star 14 Fork 7

Code Issues 4 Pull requests 1 Projects 0 Wiki Insights

FAIR Data Point Specification

kburger edited this page on Oct 22, 2018 · 22 revisions

The specification moved to a separate repository at <https://github.com/DTL-FAIRData/FAIRDataPoint-Spec/>. This page is considered an archived version.

Introduction

Purpose

The purpose of this document is to specify the FAIR Data Point (FDP) software. This document includes requirements, architecture and design of the FDP software. This specification is primarily intended to be a reference for developing the first version of the FDP software by the DTL FAIR engineering team.

Pages 4

Find a Page...

- Home
- Active FAIRDataPoints
- Configuration
- FAIR Data Point Specification

Clone this wiki locally

<https://github.com/DTL-FA>



FAIR Evaluation Services

Resources and guidelines to assess the FAIRness of digital resources.

Fork Star 52 Watch 30



Import Maturity Indicators

Import Maturity Indicators as YAML [smartAPI](#) interface annotation

Get started



Create collections

Assemble Maturity Indicators into community centered collections

Get started



Evaluate resources

Evaluate resources FAIRness against Maturity Indicator Collections

Get started

RDA / GEDE Webinar on Maturity Indicators for FAIRness and Certification of Repositories
22 March 2019

<https://www.rd-alliance.org/gede-webinar-maturity-indicators-fairness-and-certification-repositories>

The FAIR Funder Components: <https://gofairfoundation.org>

The FAIR Funder Components: <https://fairbearservices.com>



GO FAIR FOUNDATION supports Internet of FAIR Data & Services

About



Purple Polar Bears

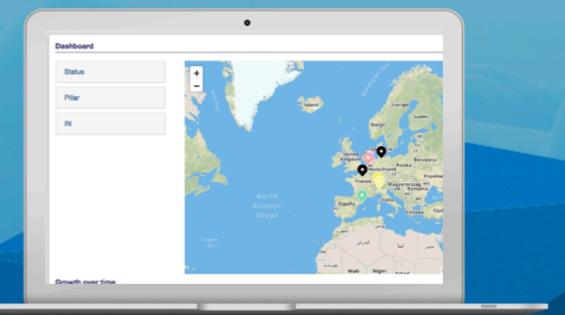
The Software partner for the FAIR Community.

- Empowered by Purple Polar Bear

Looking to be FAIR? Fair Bear Services can help you with
custom, open source and off the shelf data management solutions.

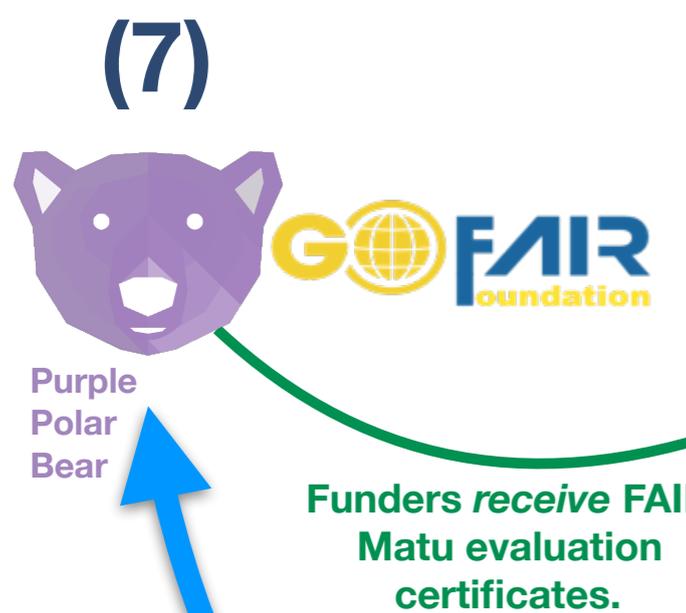
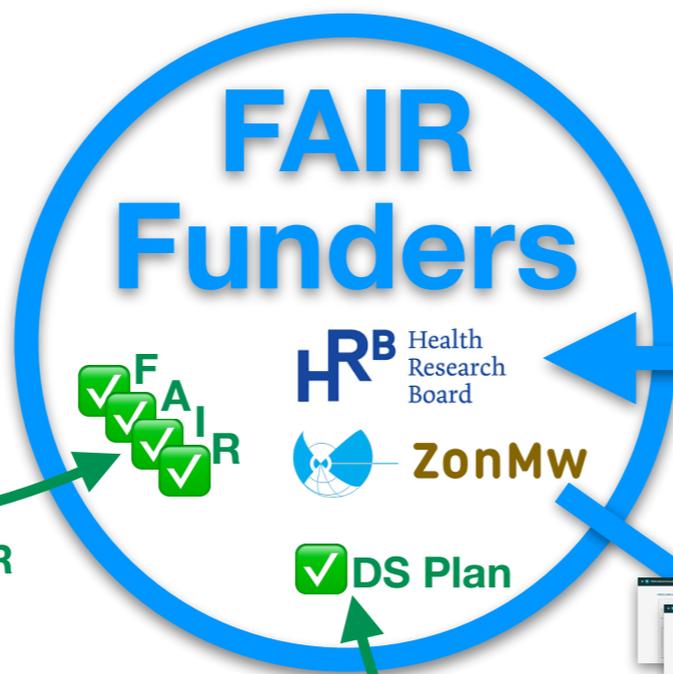
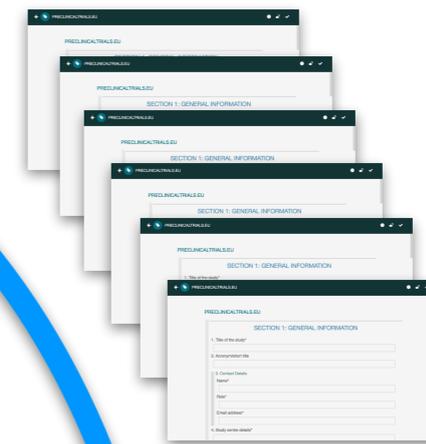
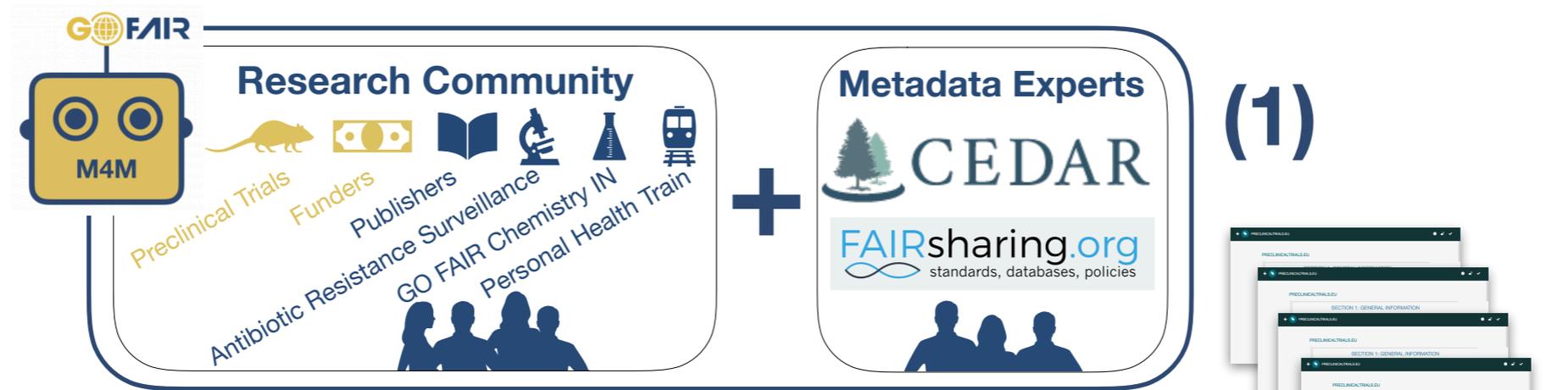
About us

Home Services Custom Web Open Events FAQ Contact



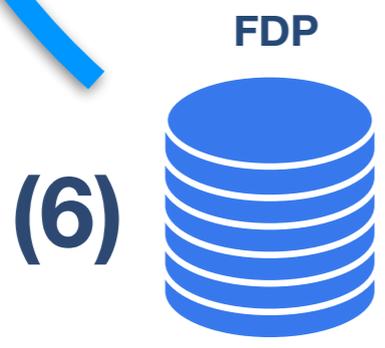
← →





Funders receive FAIR Matu evaluation certificates.

Funders receive approval of FAIR DS Plan from research institution data stewards.



(7)

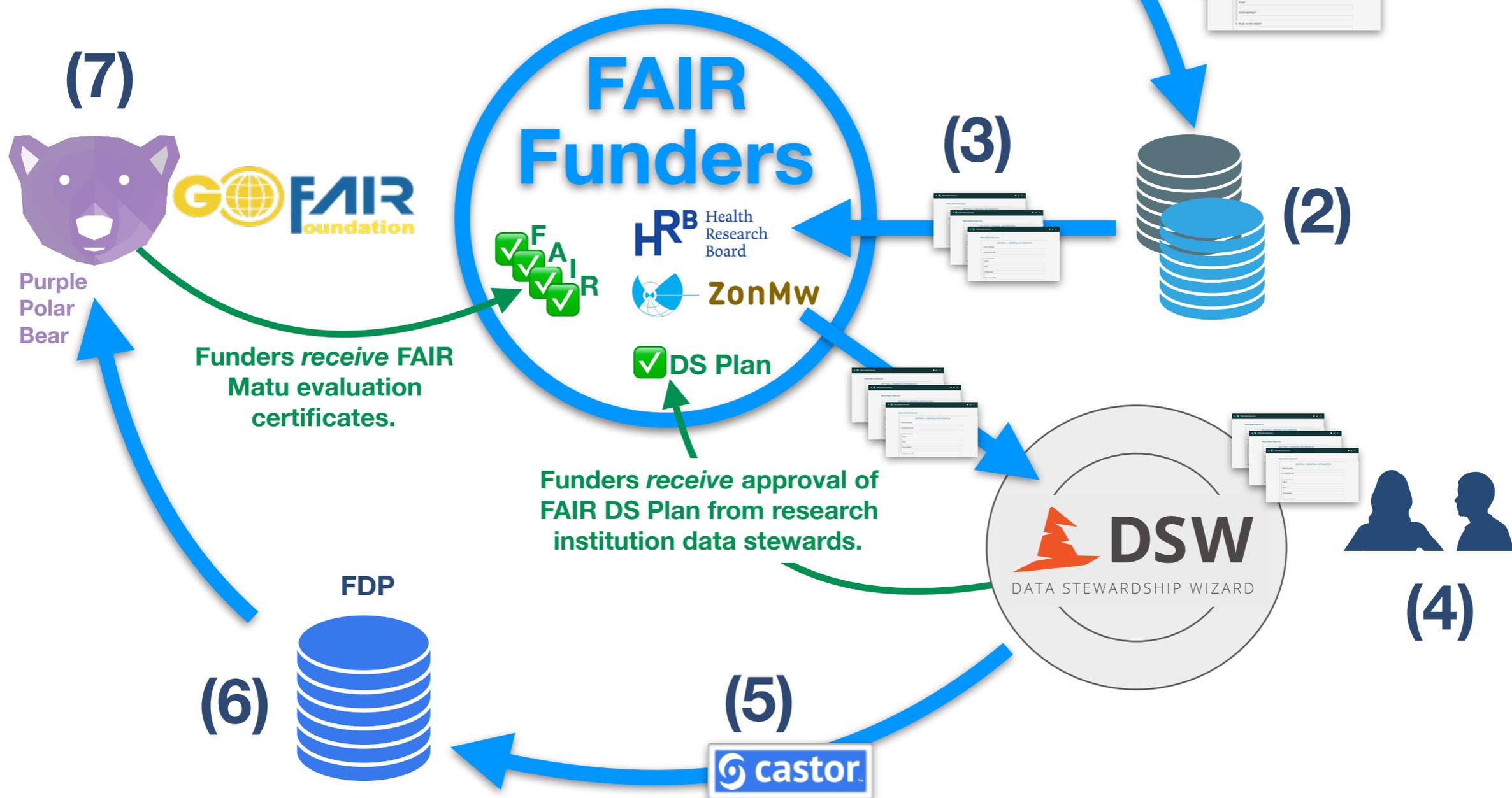
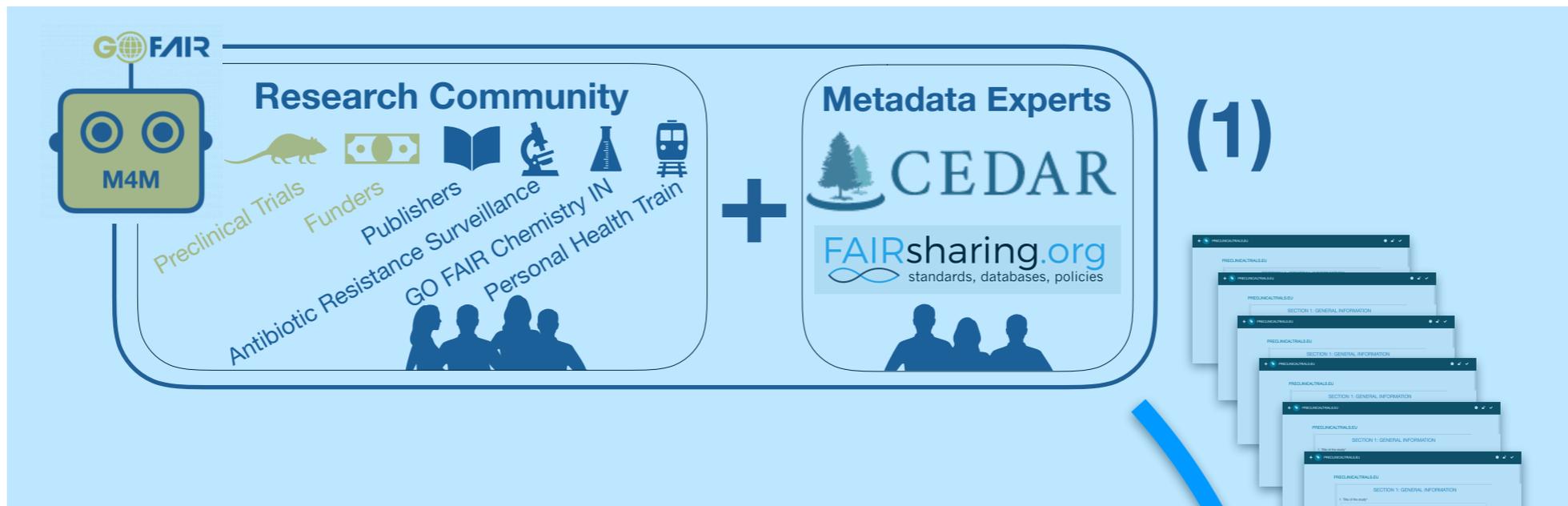
(3)

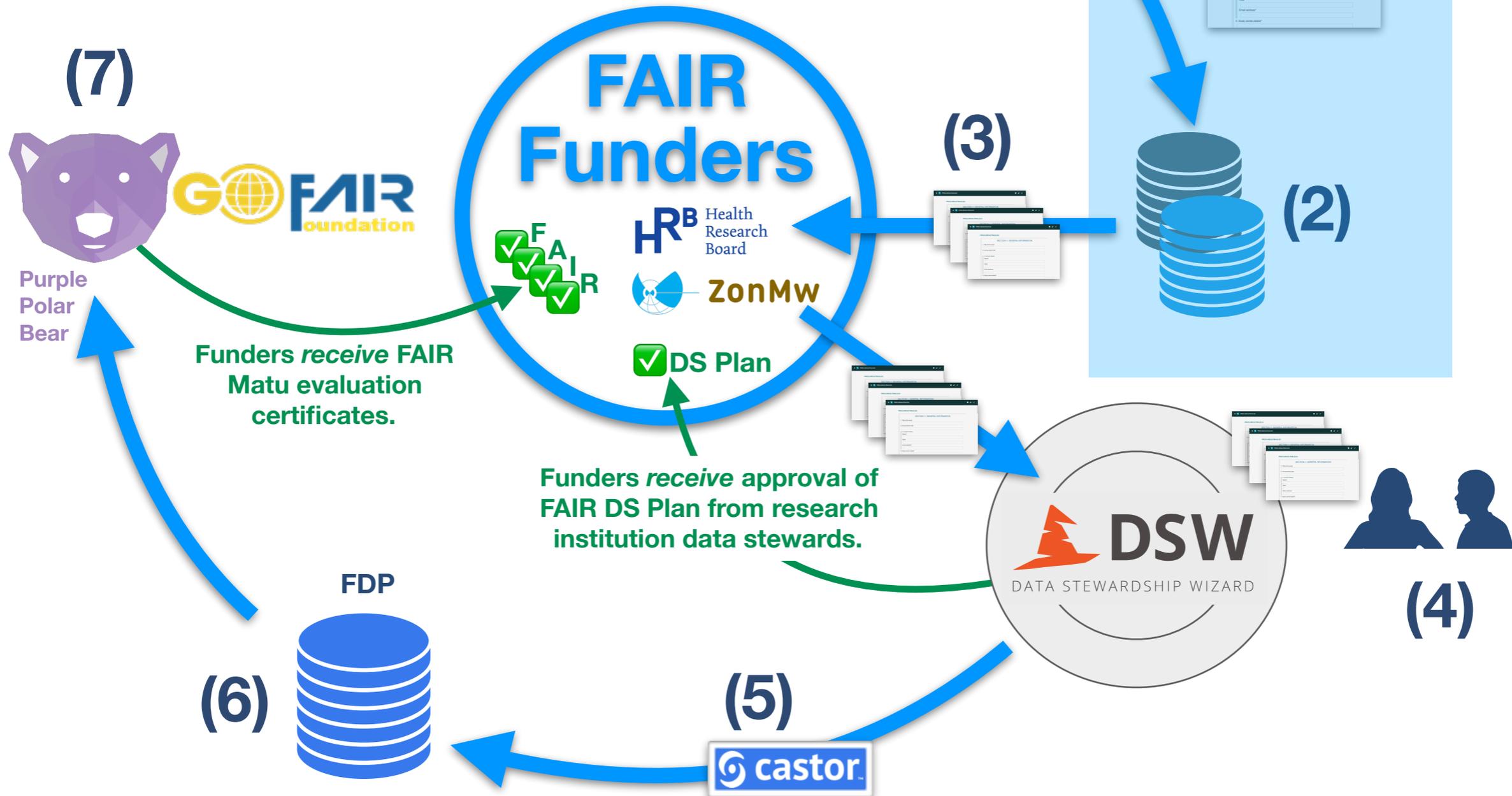
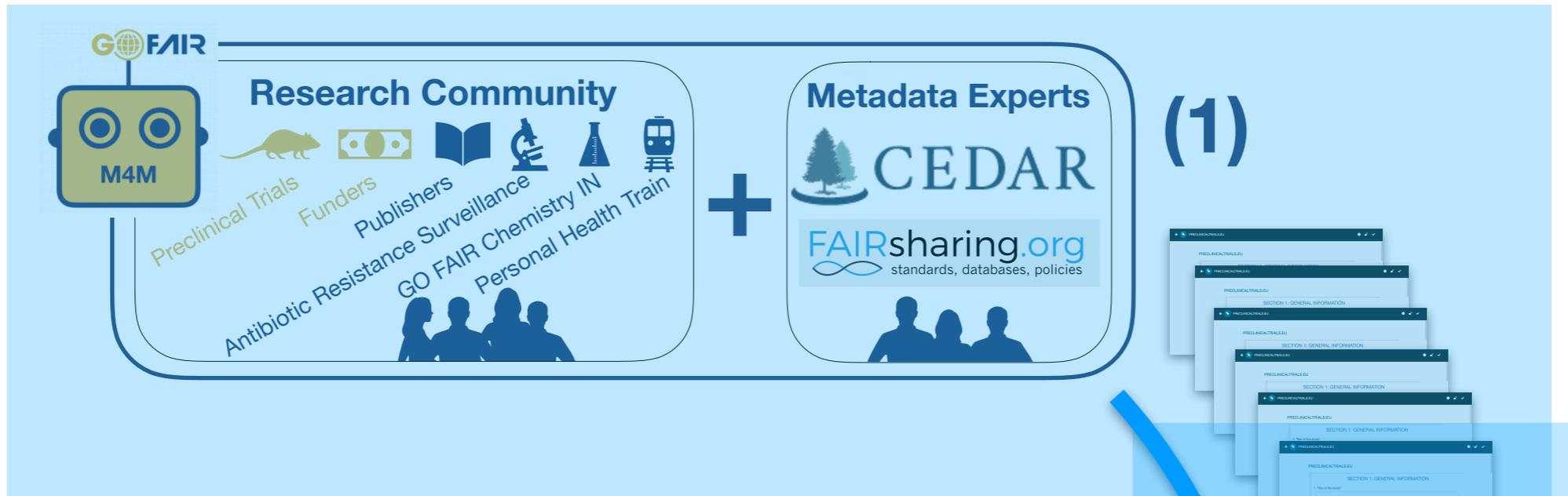
(2)

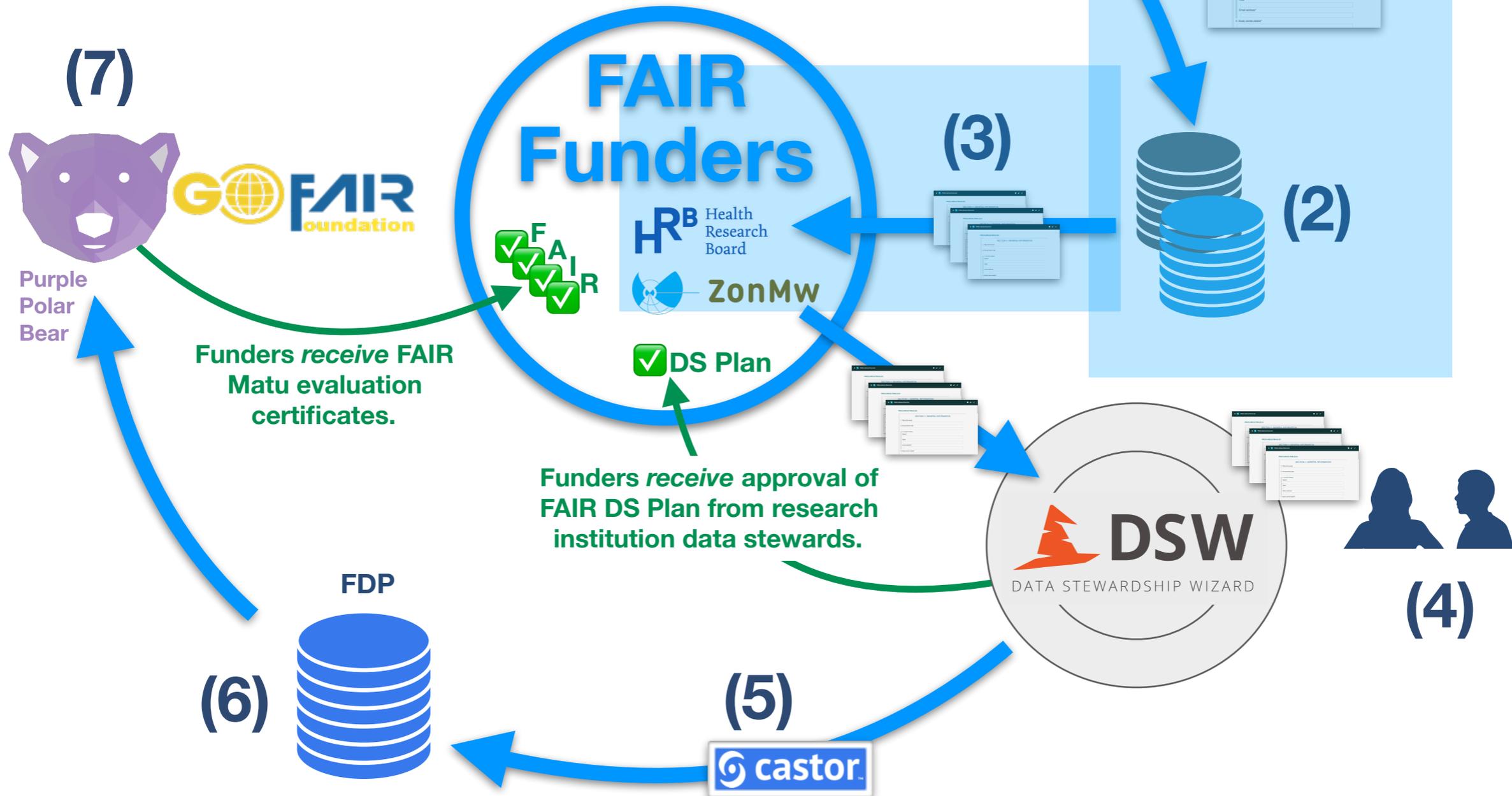
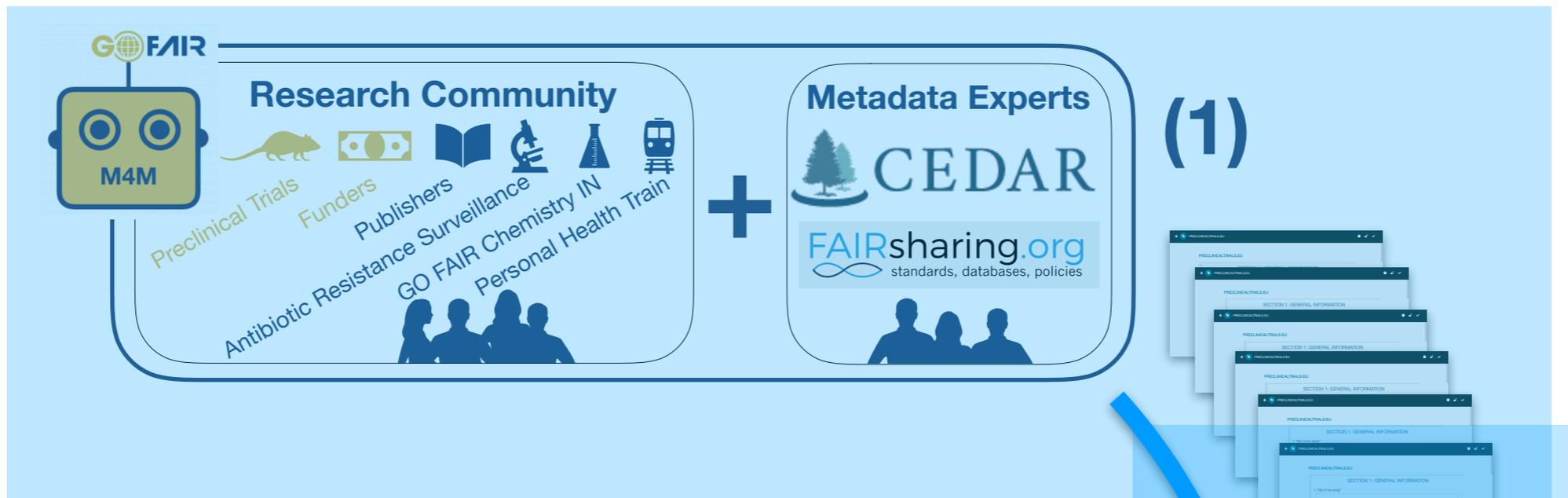
(4)

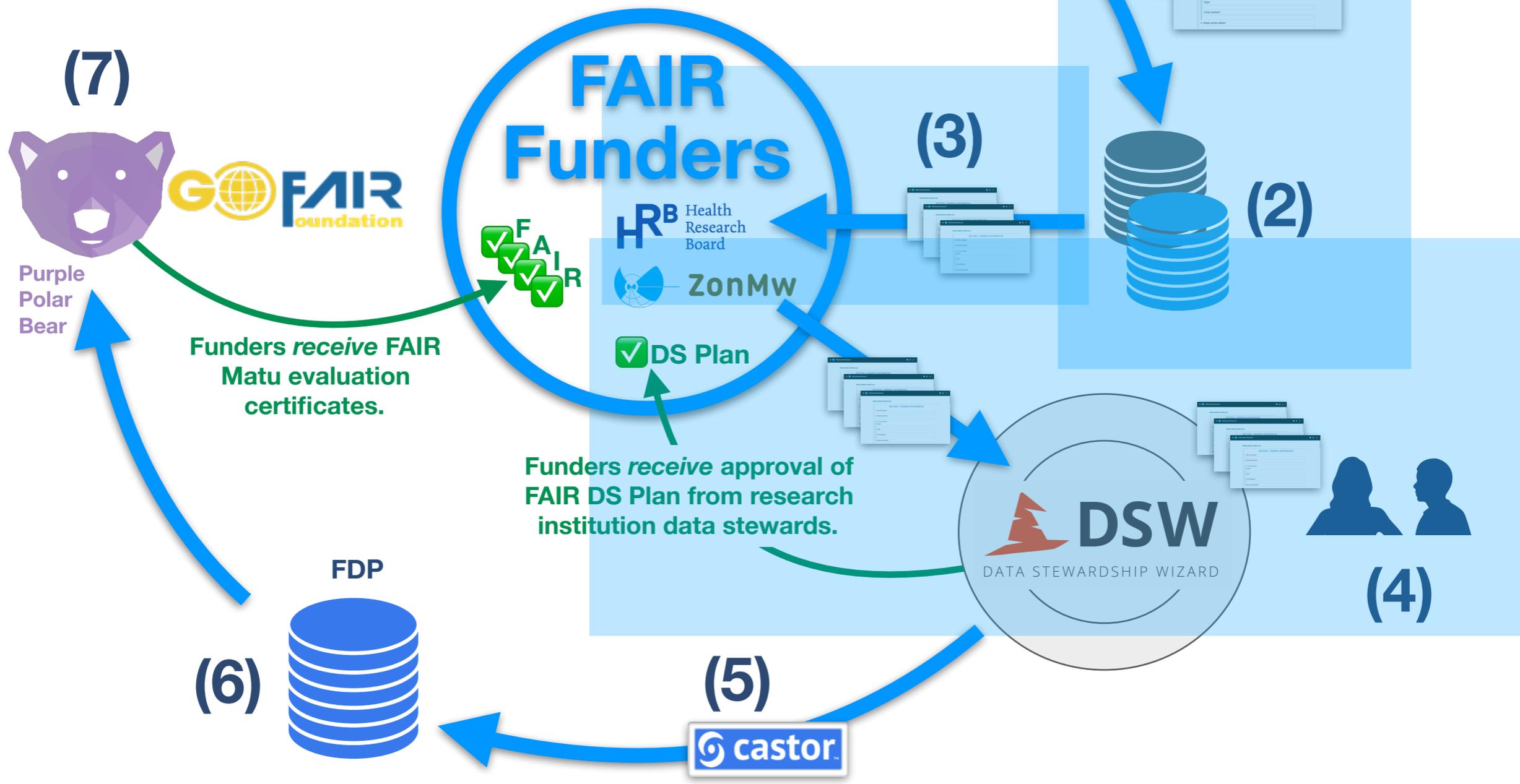
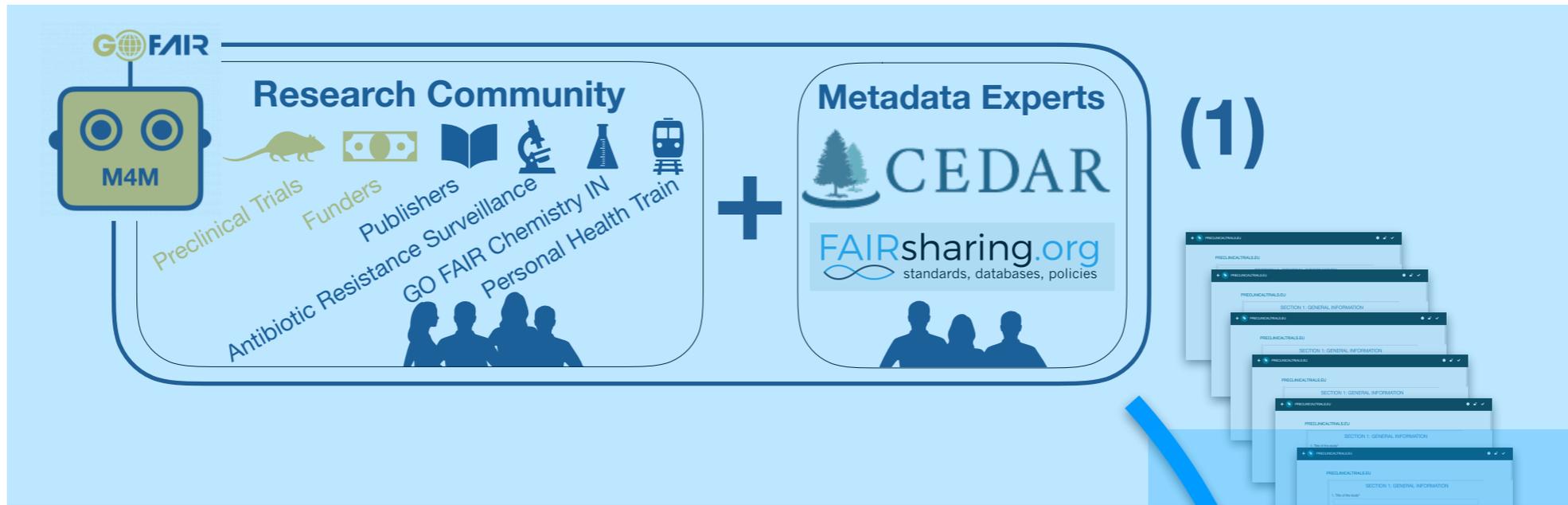
(6)

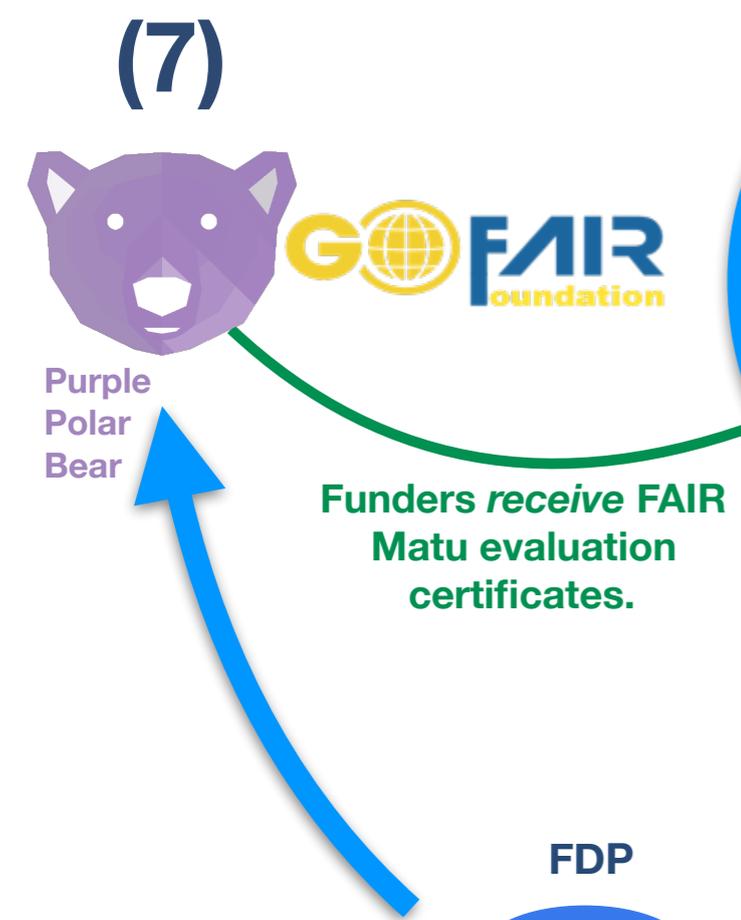
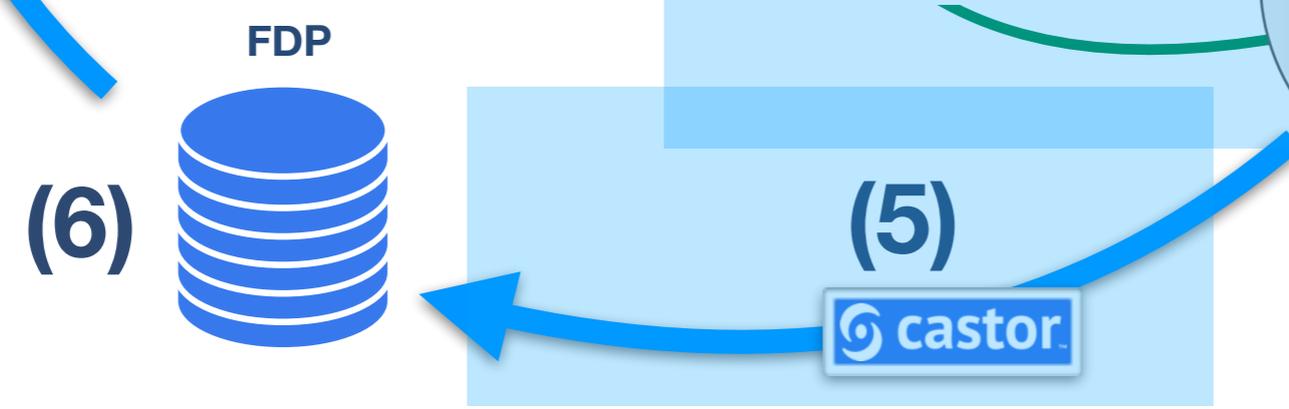
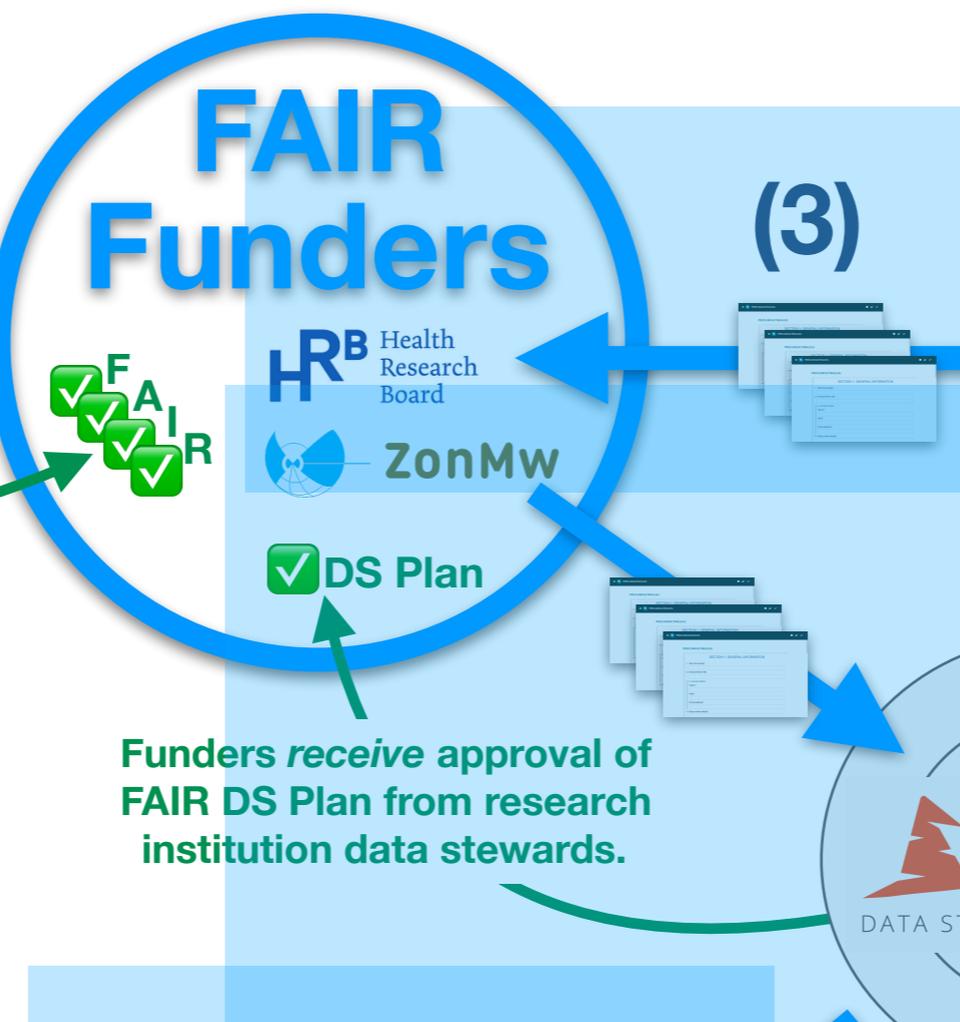
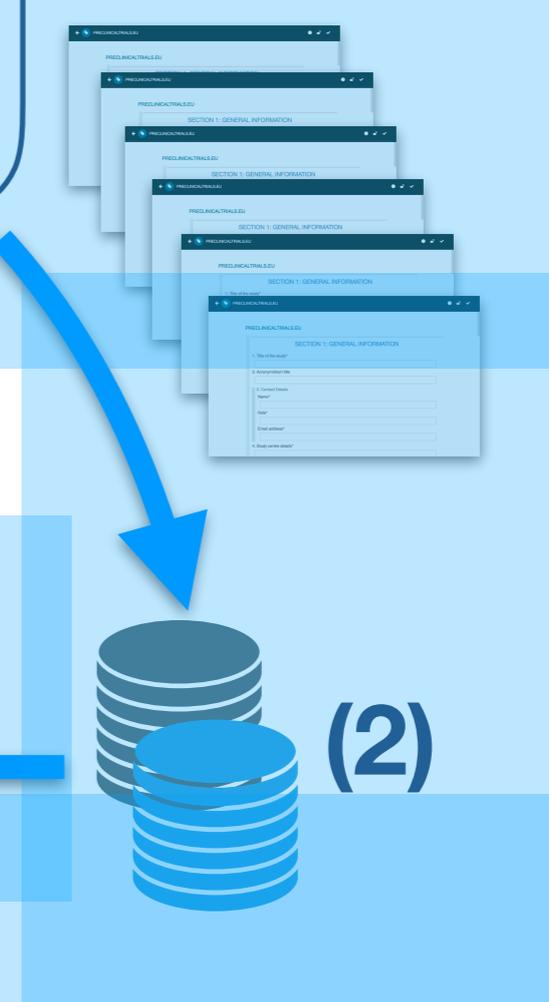
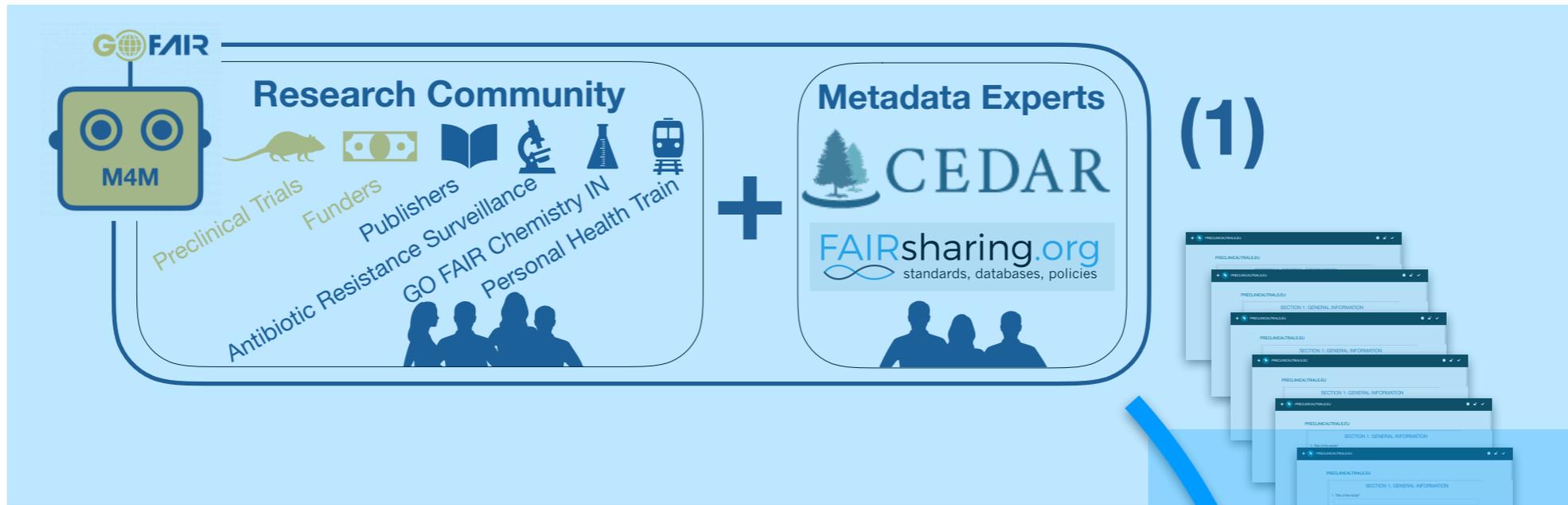
(5)





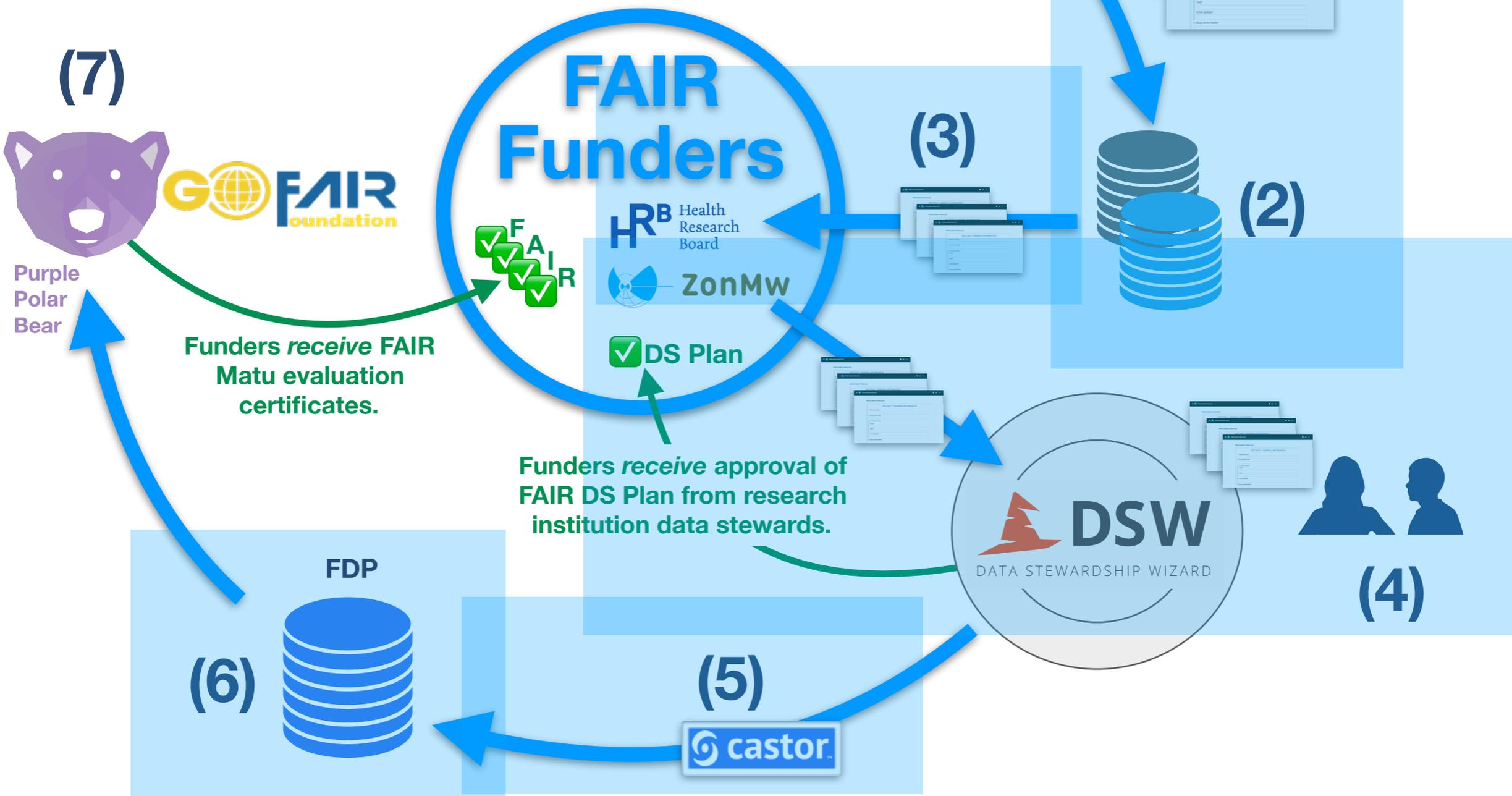
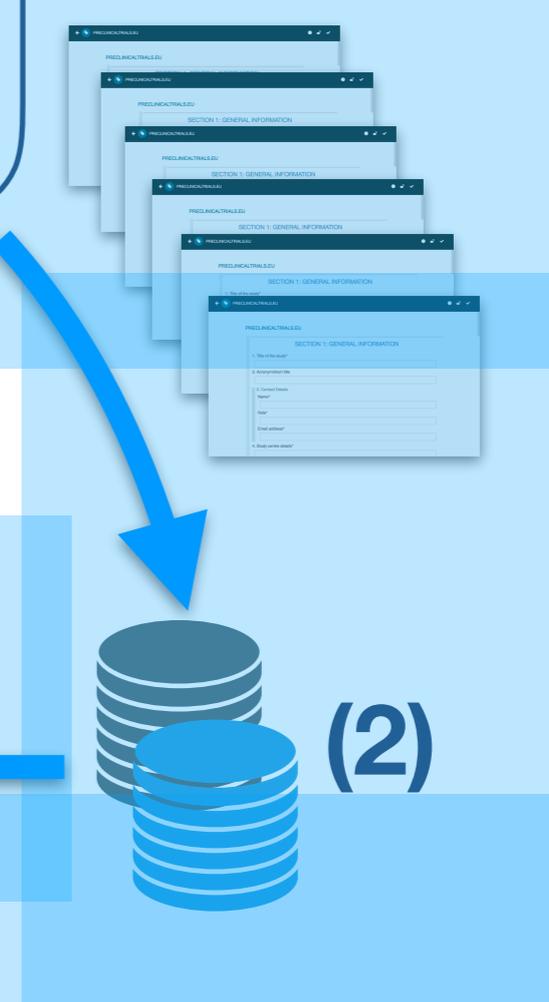
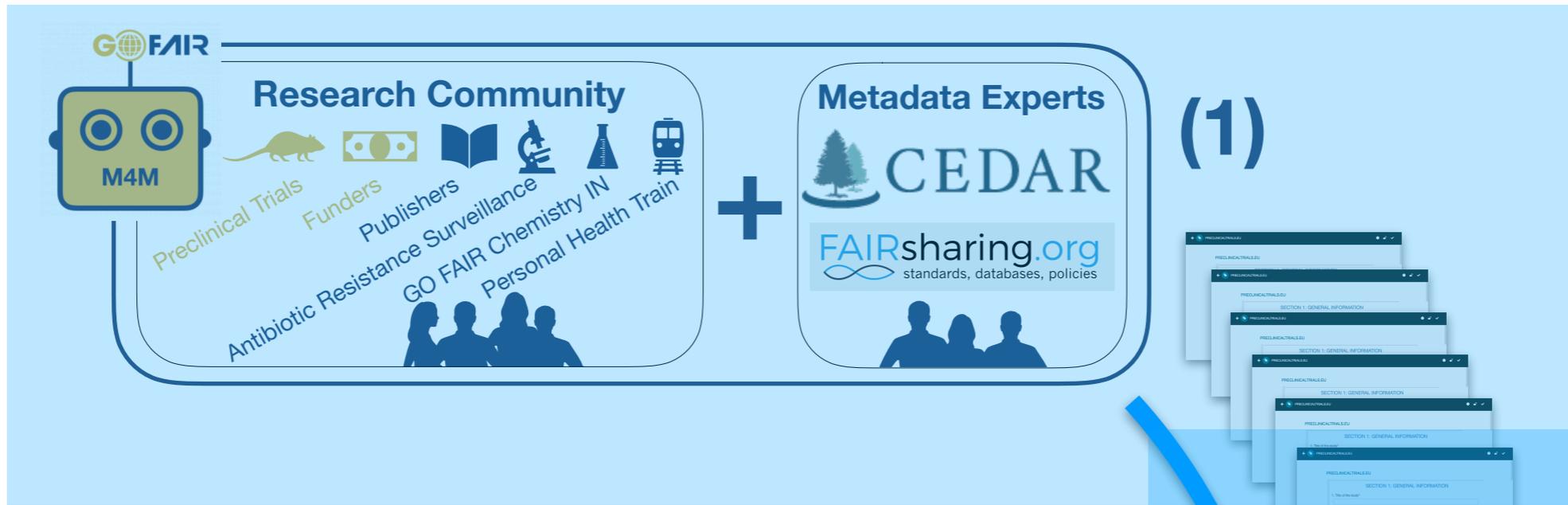


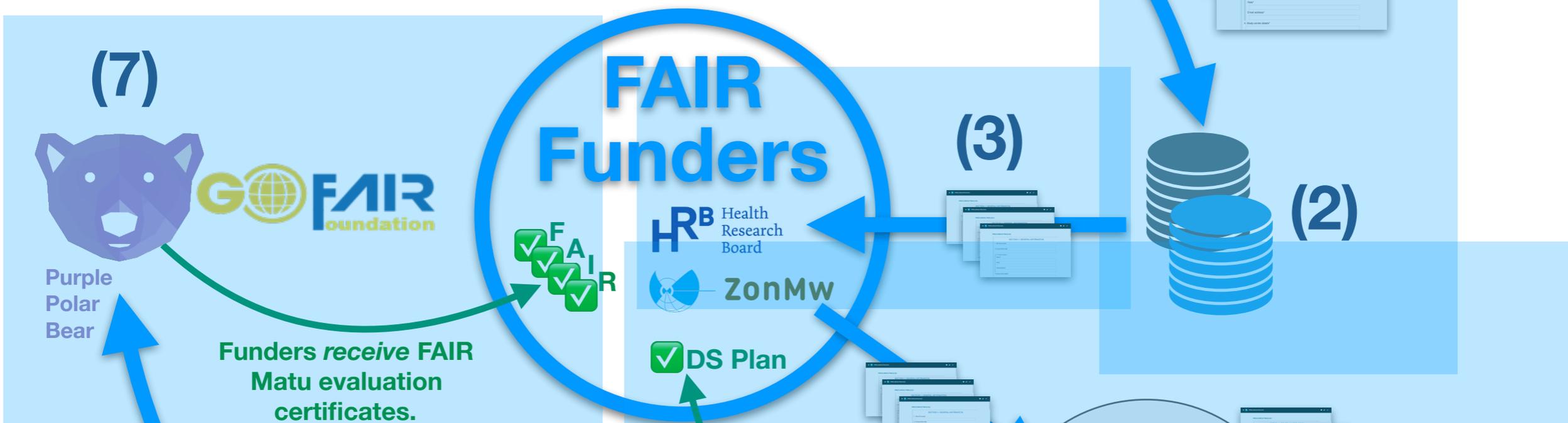
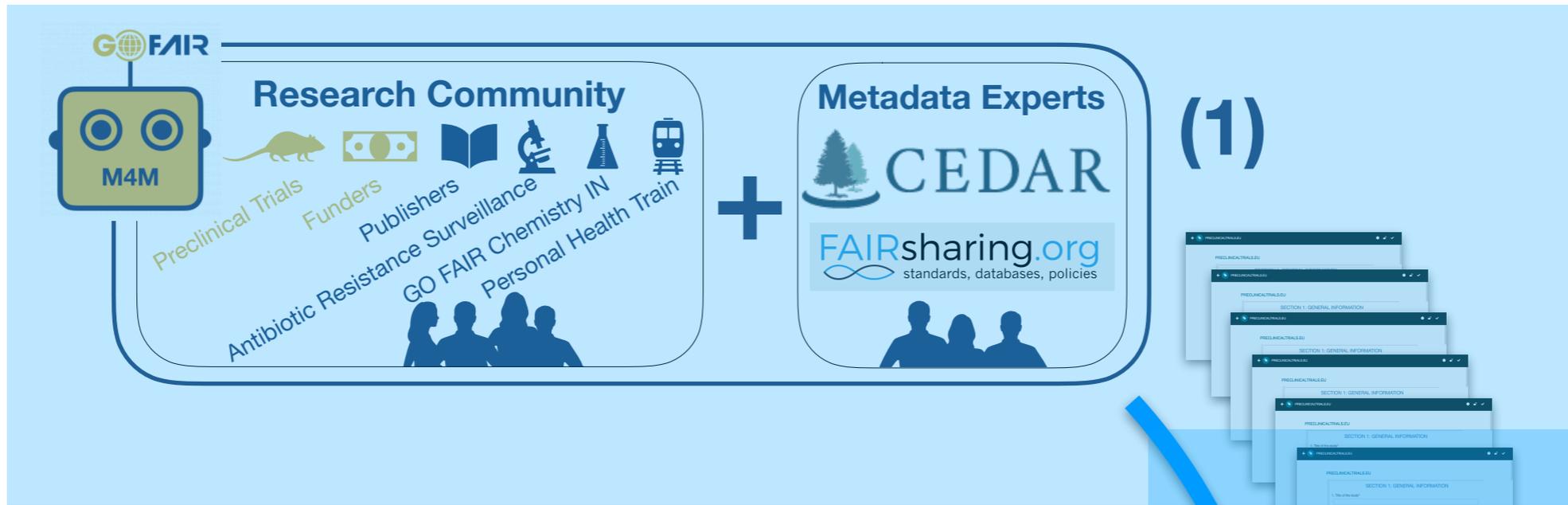




Funders receive FAIR Matu evaluation certificates.

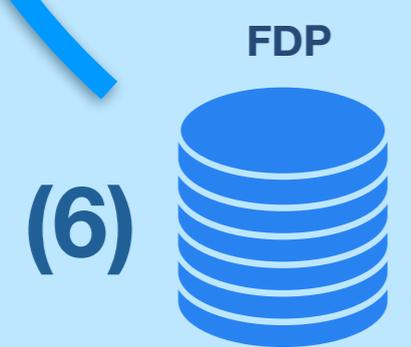
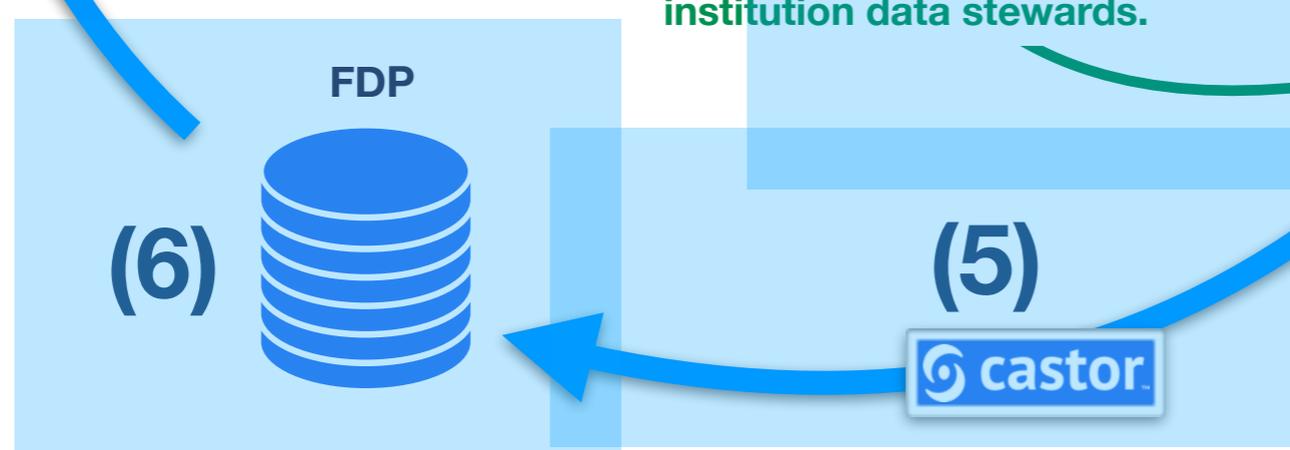
Funders receive approval of FAIR DS Plan from research institution data stewards.





Funders receive FAIR Matu evaluation certificates.

Funders receive approval of FAIR DS Plan from research institution data stewards.



(6)