

The hidden treasures of FAIR

Barend Mons KRECon 2021



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The FAIR Guiding Principles for scientific data management and stewardship

Mark D. Wilkinson, Michel Dumontier, [...] [Barend Mons](#) [Scientific Data](#) **3**, Article number: 160018 (2016) | [Cite this article](#)**130k** Accesses | **1680** Citations | **1571** Altmetric | [Metrics](#) An [Addendum](#) to this article was published on 19 March 2019

Abstract

The machine knows what I mean

There is an urgent need to improve the infrastructure supporting the reuse of scholarly data. A diverse set of stakeholders—representing academia, industry, funding agencies, and scholarly publishers—have come together to design and jointly endorse a concise and measureable set of principles that we refer to as the FAIR Data Principles. The intent is that these may act as a guideline for those wishing to enhance the reusability of their data holdings. Distinct from peer initiatives that focus on the human scholar, the FAIR Principles put specific emphasis on enhancing the ability of machines to automatically find and use the data, in addition to supporting its reuse by individuals. This Comment is the first formal publication of the FAIR Principles, and includes the rationale behind them, and some exemplar implementations in the community.

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 PRINCIPLES – TECHNOLOGY-RELATED

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 PRINCIPLES – SOCIAL CONTRACT—RELATED

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:

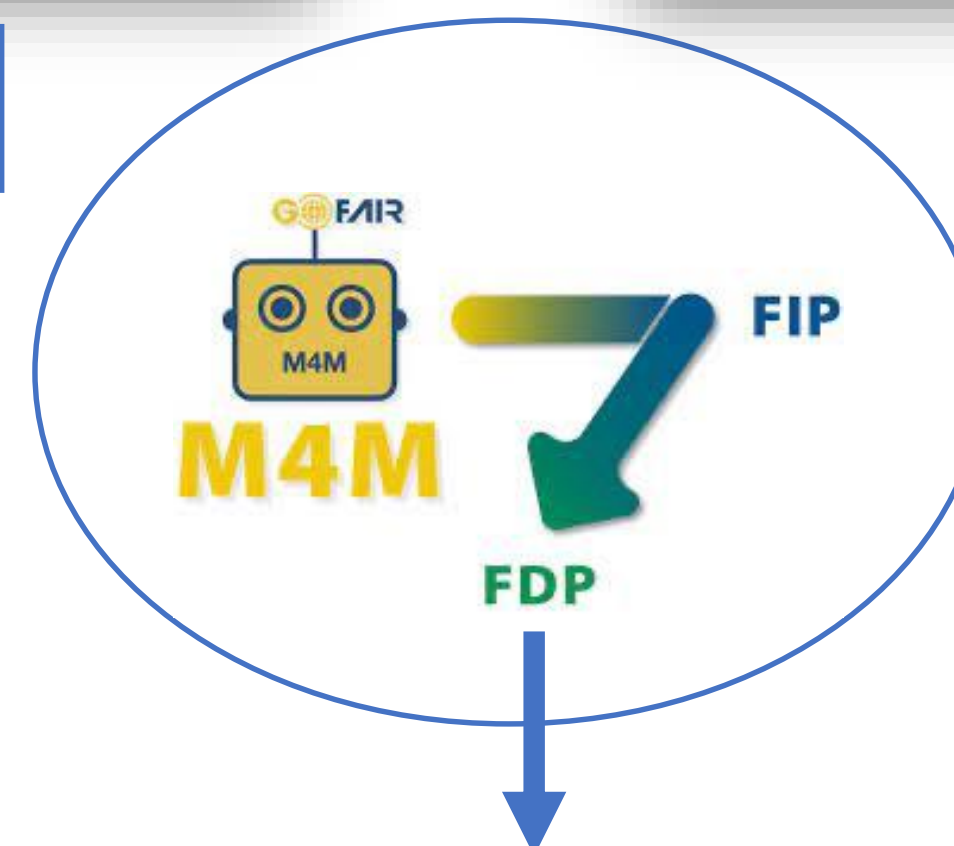
- A1. (meta)data are retrievable by their identifier using a standardized communications protocol;
 - A1.1 the protocol is open, free, and universally implementable;
 - A1.2. the protocol allows for an authentication and authorization procedure, where necessary;
- A2. metadata are accessible, even when 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;

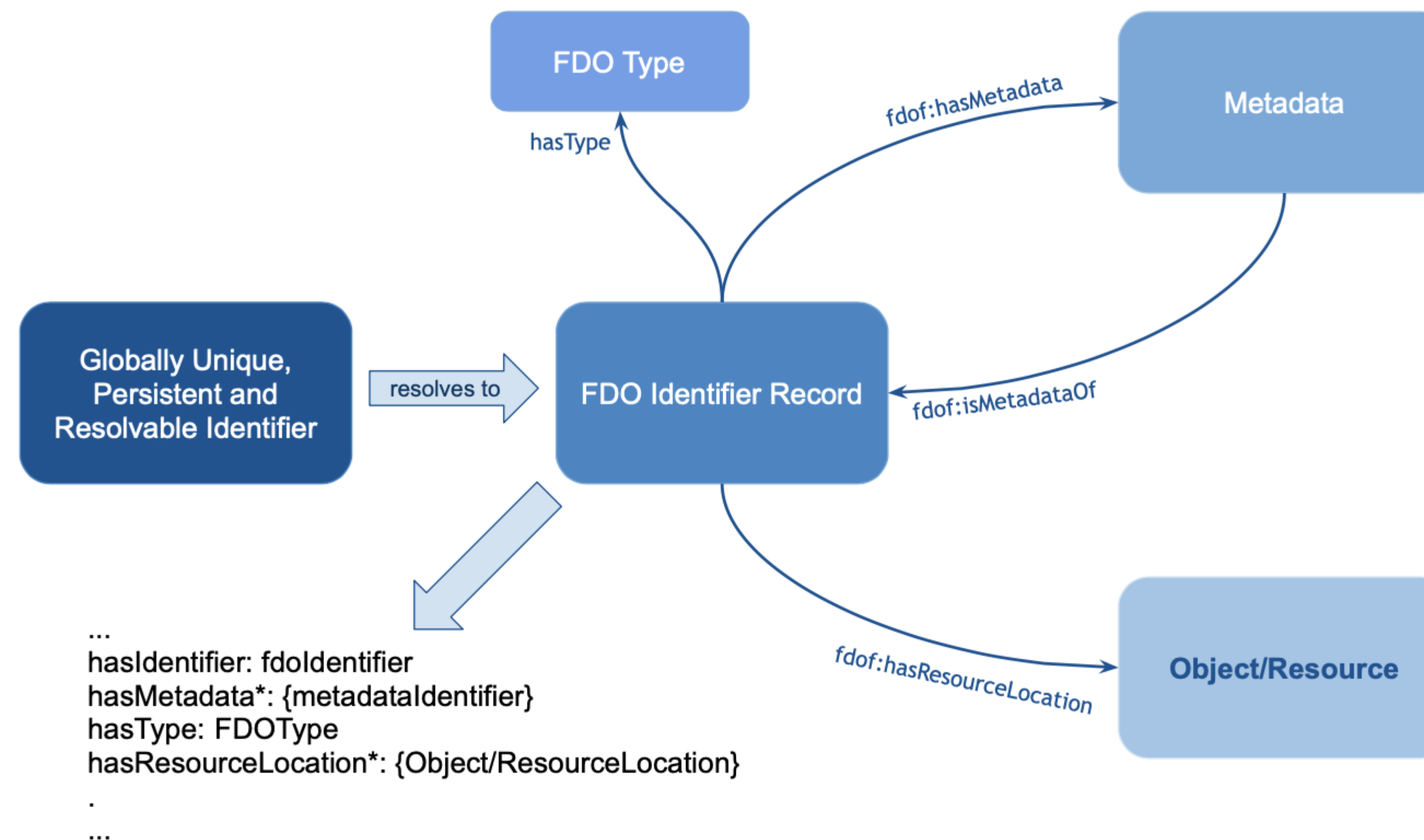
Community: Choose or Develop

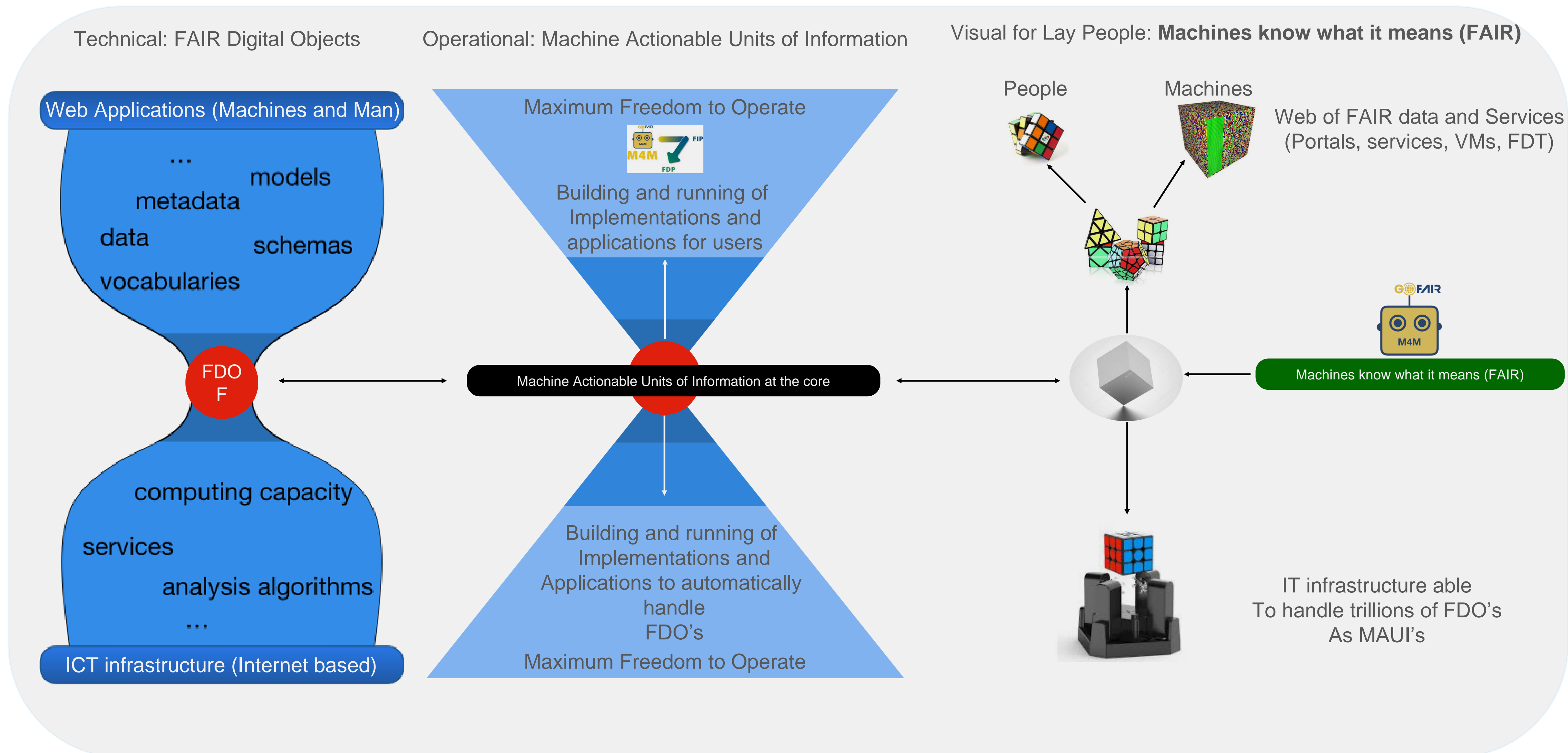
Community: agree on social contracts



Qualification Wizard

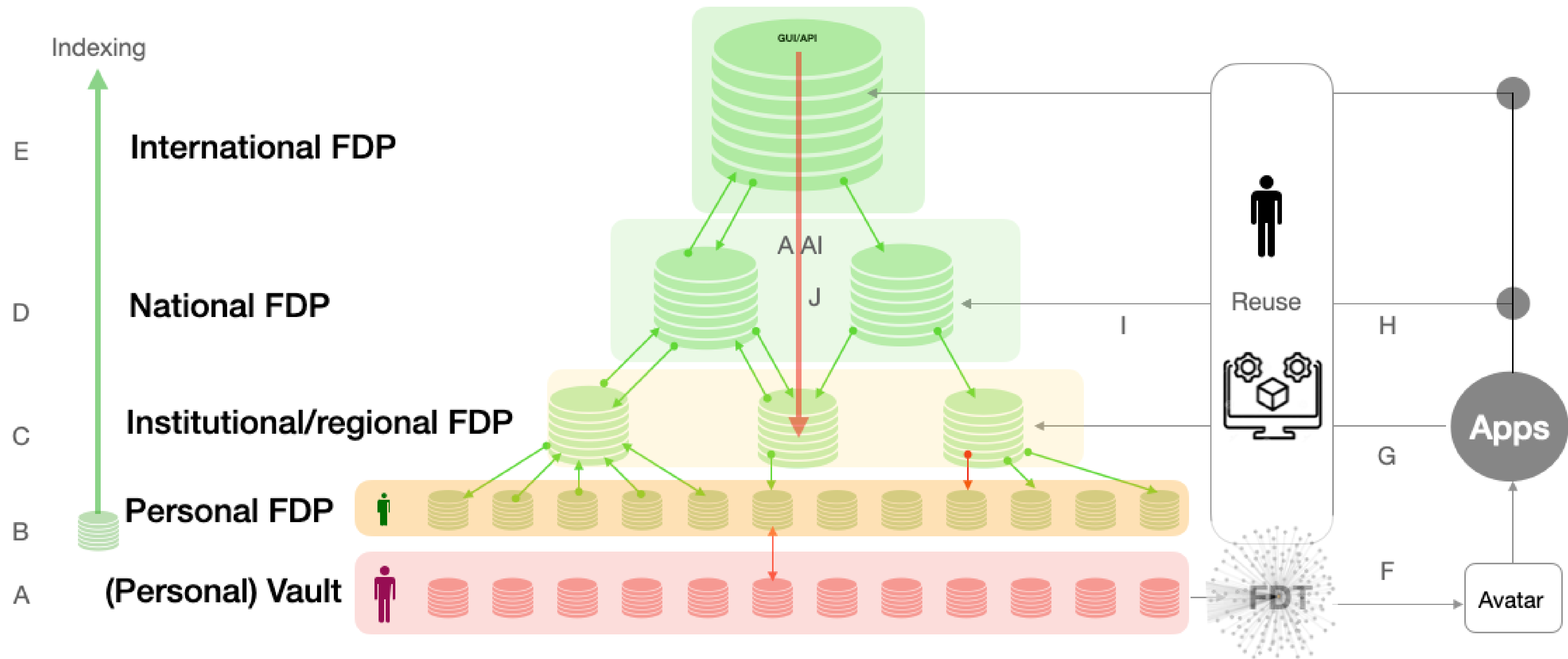
- The Semantic Medline knowledge base is an experimental example of **nanopublications**
- **A nanopublication is only a FAIR Digital Object in case:**

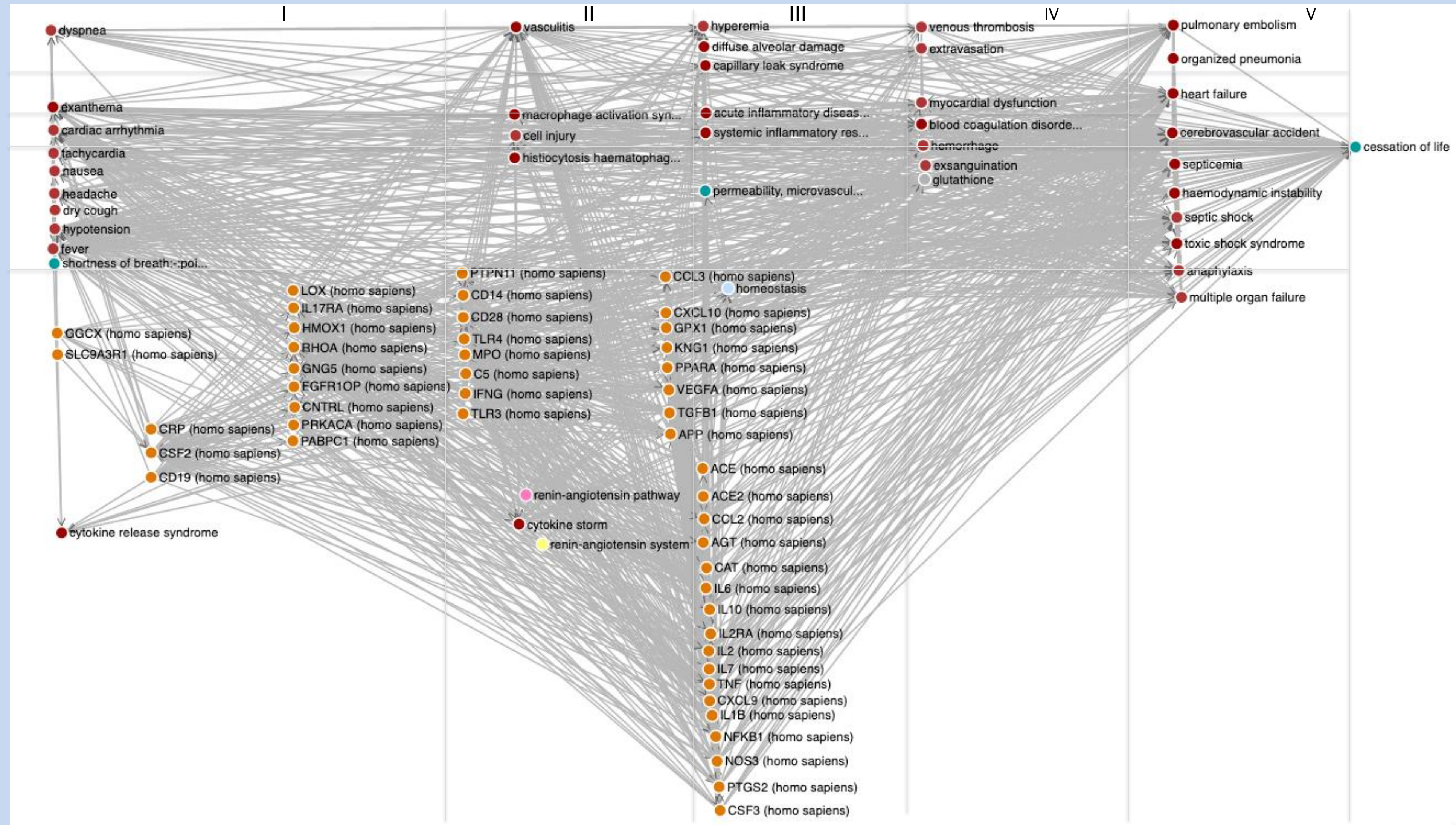
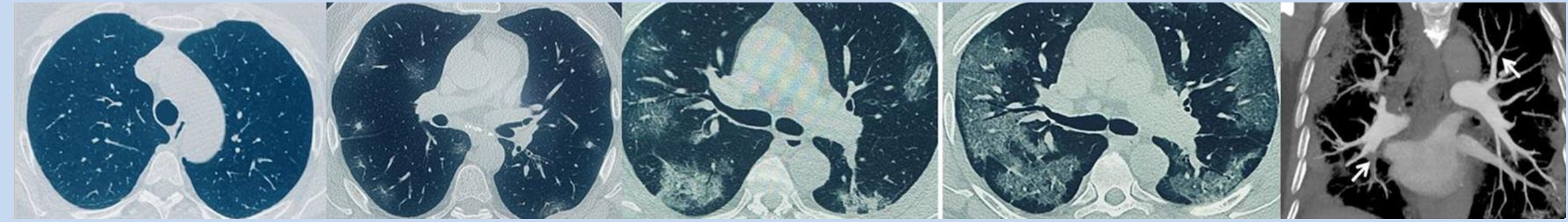


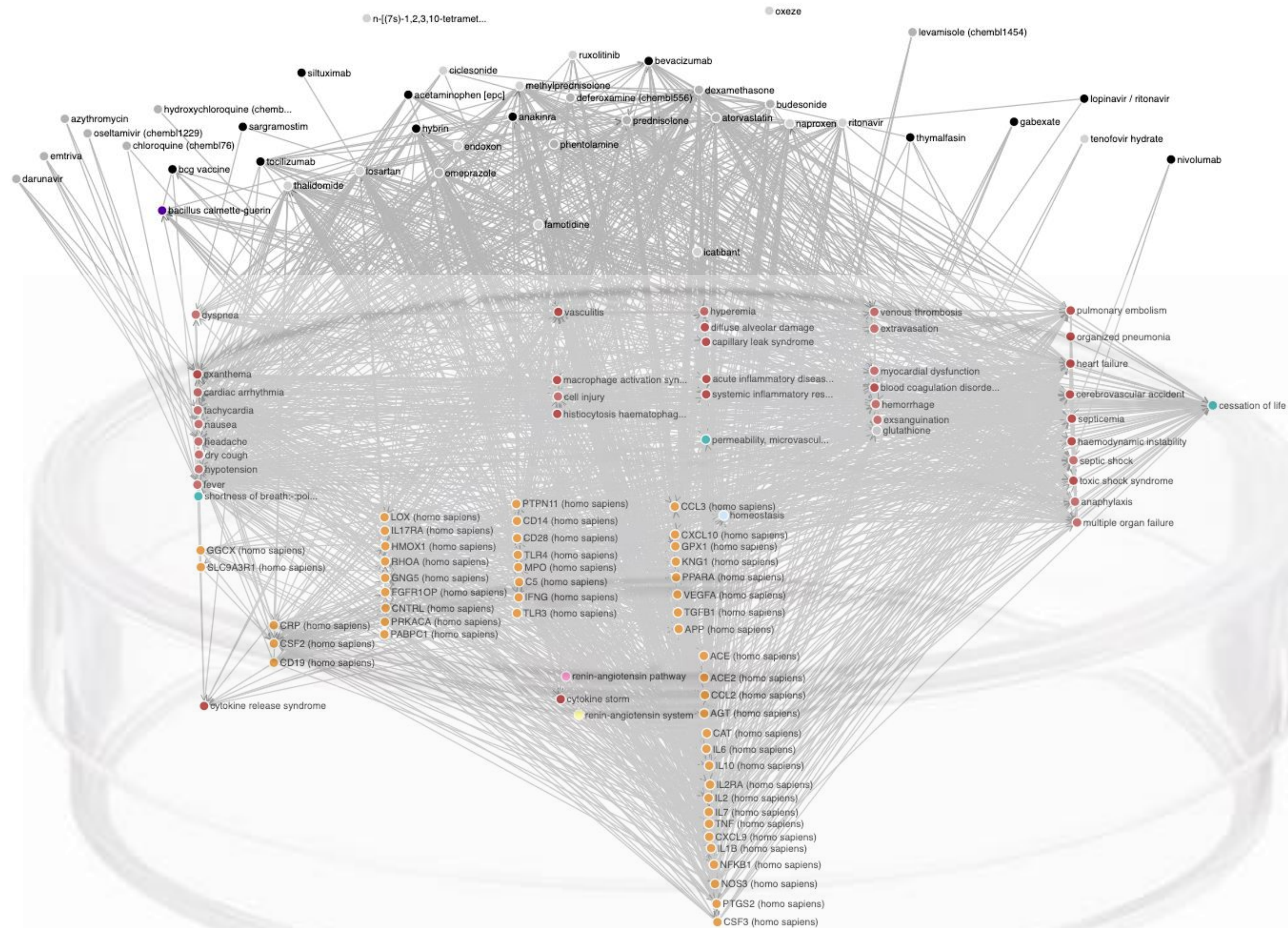


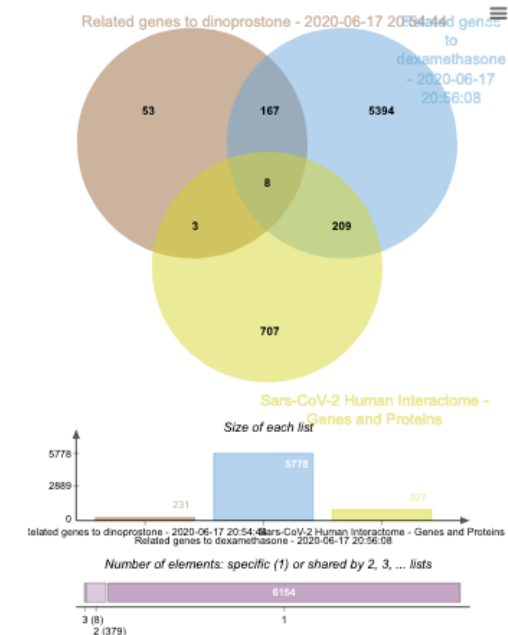
Towards PRIVACY-RESPECTING DATA VISITING

Generic Pyramid stack for FAIR and GDPR compliant reuse of personal data
(all green FAIR data points contain FDO's)







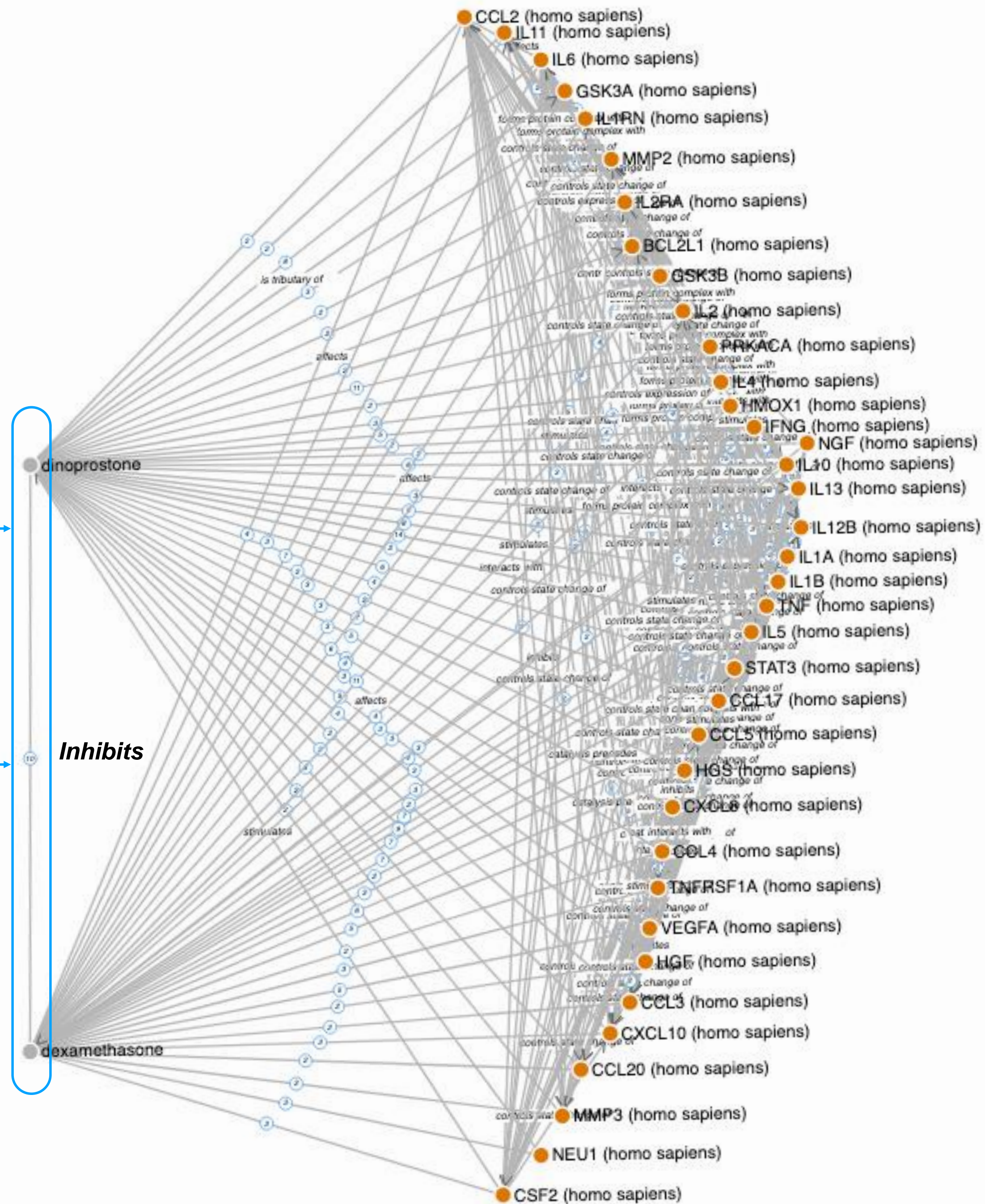
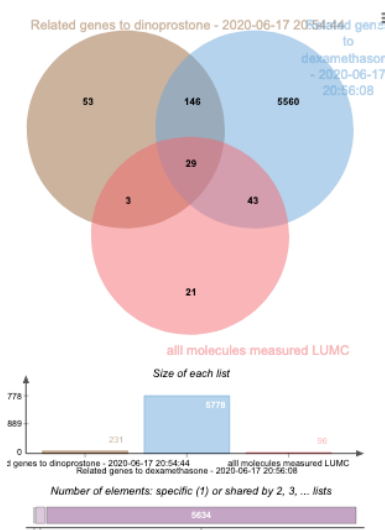


Cardinal assertion

EURETOS
AI PLATFORM

Provenance

Supporting or contesting
Evidence





An Academic Publishers' GO FAIR Implementation Network (APIN)

Cite

Issue title: APE 2020 Driving the Change – Together! Selected papers from the 15th International Conference “Academic Publishing in Europe” Berlin Brandenburg Academy of Sciences and Humanities, 14–15 January 2020

Guest editors: Arnoud de Kemp

Article type: Research Article

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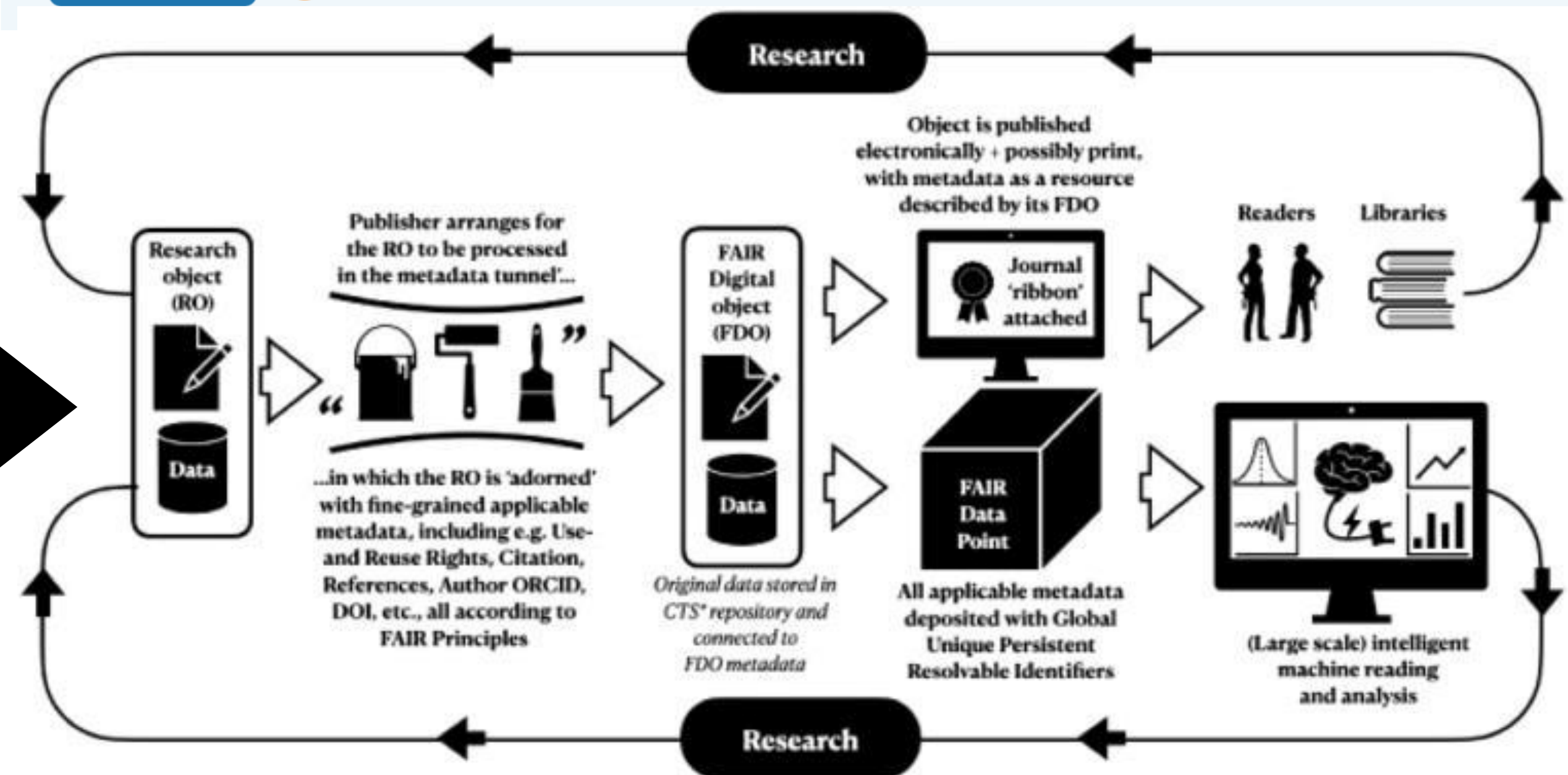
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DOI: 10.3233/ISU-200102

Journal: [Information Services & Use](#), vol. 40, no. 4, pp. 333-341, 2020

Published: 06 January 2021

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Invest 5% of research funds in ensuring data are reusable



It is irresponsible to support research but not data stewardship, Mons.