



OPEN SCIENCE
AND RESEARCH

Digital Research Infrastructures and Open Science in Finland

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Open Science and Research Initiative and CSC

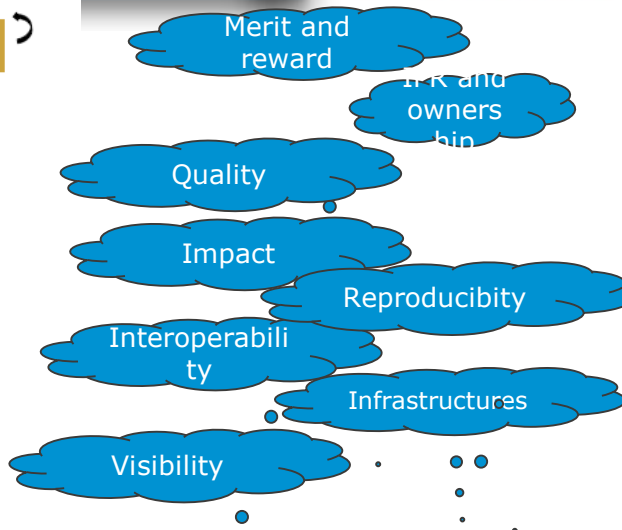
Opening up Science in Finland



Targets of Open Science and Research 2014-2017 initiative (ATT):

- To incorporate open science and research to the whole research process **to improve the visibility and impact of science and research**
- To foster the research system in Finland towards better competitiveness and higher quality, **transparent, collaborative and inspirational research process** should be promoted
- The measures to **promote open publications, open research data, open research methods and tools**, as well as increasing skills and knowledge and support services
- Contributions from all research system actors are welcome to **change the research culture** towards openness
- Finland is engaged in **international collaboration** to promote open science and research

Modern Academic Workflows



What is data infrastructure?



"Data is infrastructure. It underpins transparency, accountability, public services, business innovation and civil society." - Open Data Institute

Data infrastructures help to connect domains, disciplines and sectors.

Data structure: means to manage data efficiently, interface, implementation => search and request

Characteristics: Correctness, dealing with complexity, visibility and access

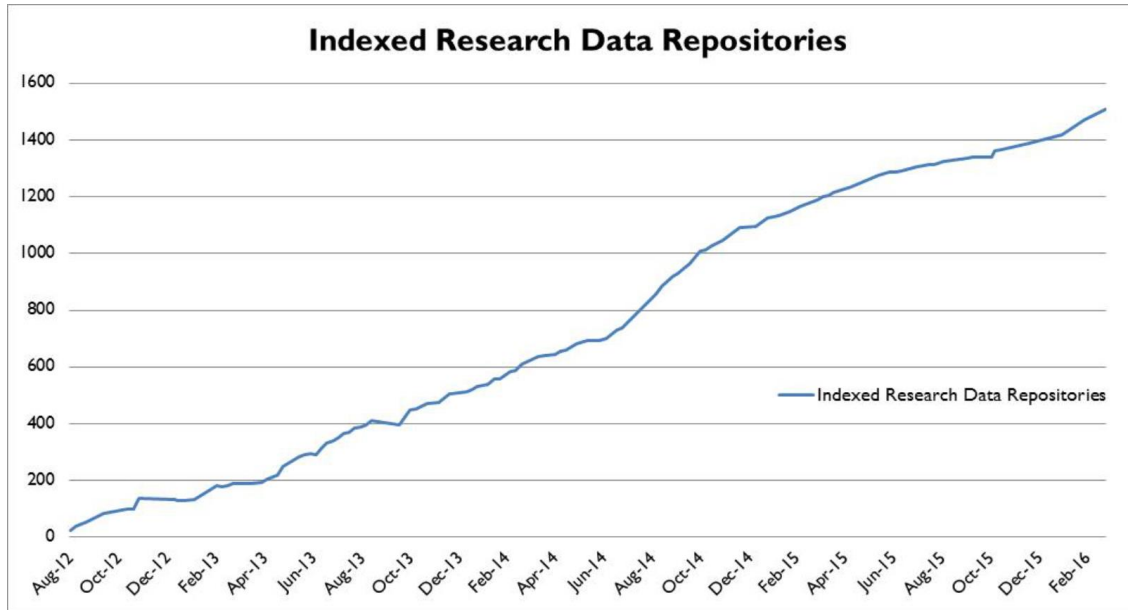
Compatibility: CERIF, METS, PREMIS, DDI, ICAT...

- **Skills and capabilities**
 - Knowledge hubs and knowledge transfer
 - Disruptive innovations
- **Reproducibility and excellent quality of research**
 - Involving all stakeholders
- **Re-usability of results in different and new contexts**
 - Discovery of results as input for new studies and innovation
 - Maximum impact from financial inputs
- **Interoperability**
 - Building interoperability on metadata level => independence from infrastructure
 - Federation of existing resources, infrastructures and data, not new funding-needy infrastructures
 - No waste in building competing services with public funding
 - Understanding that there is no one-size fit all -solution, leave room for diversity and new ideas

Data Infrastructures

International repositories:

-Discipline-specific: <http://www.re3data.org/>



- Data repositories
- Metadata catalogs
- Publication platforms (ArXiv etc)
- Collaborative platforms
- Analysis platforms

FAIR principles

Included in EU Council Conclusions on Open Science



- **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:**

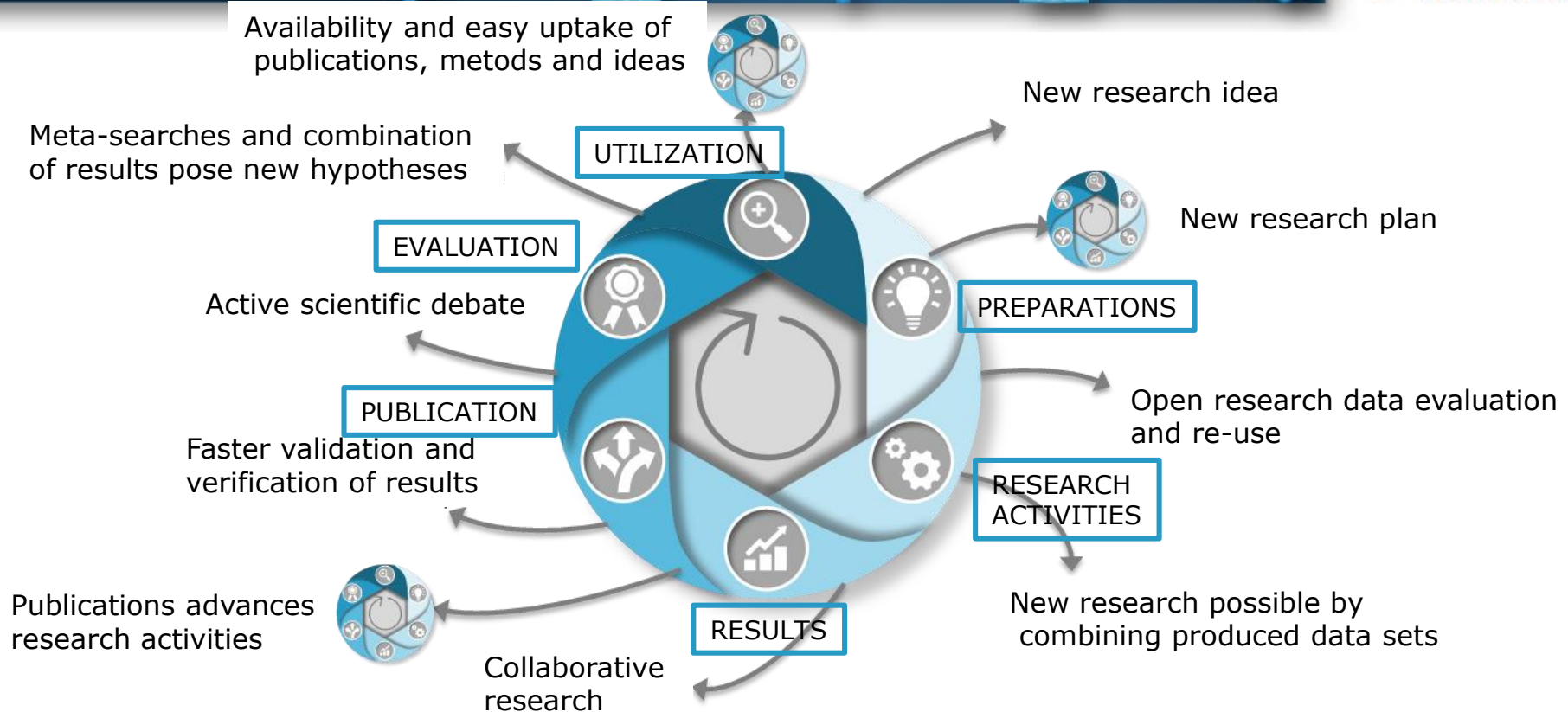
- R1. meta(data) are richly described with a plurality of accurate and relevant attributes
 - R1.1. (meta)data are released with a clear and accessible data usage license
 - R1.2. (meta)data are associated with detailed provenance
 - R1.3. (meta)data meet domain-relevant community standards

Digital infrastructures



- Should support science, not take control
 - *Ownership, licenses, IPR*
- Should help increase quality
 - *Data models, standards, metadata, ...*
- Should help in reproducibility
 - *Sustainable access*
- Should encourage participation and interoperability
 - *Not a silo, open collaboration and development*

Open science and research: science accelerator



Service Map in Finland

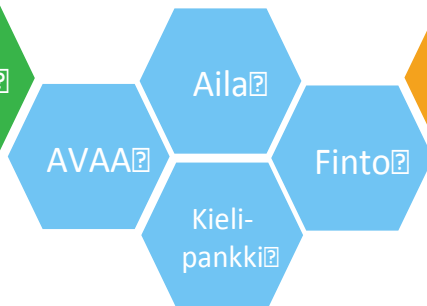
■ Services that support research process

FIND AND USE 



MANAGE AND STORE

OPEN AND
SHARE



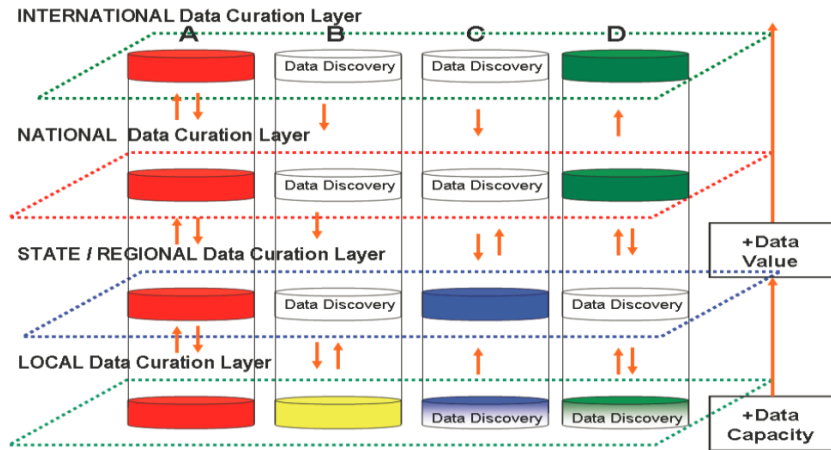
Example: ATT supports FAIR in Finland

- Metadata model: persistent identifiers, metadata standards, usage rights and licenses (working groups), semantic interoperability with iow tools
- Etsin metadata catalogue
 - Harvesting metadata from national sources
 - Exchanging metadata with international sources
 - Organizations views
 - Autentication and authorization possible
- ATTX: persistent interfaces + intelligent metadata complement
- AVAA: service for opening the data
- Availability: Digital preservation



SERVICES BASED ON OPEN SOURCE CODE

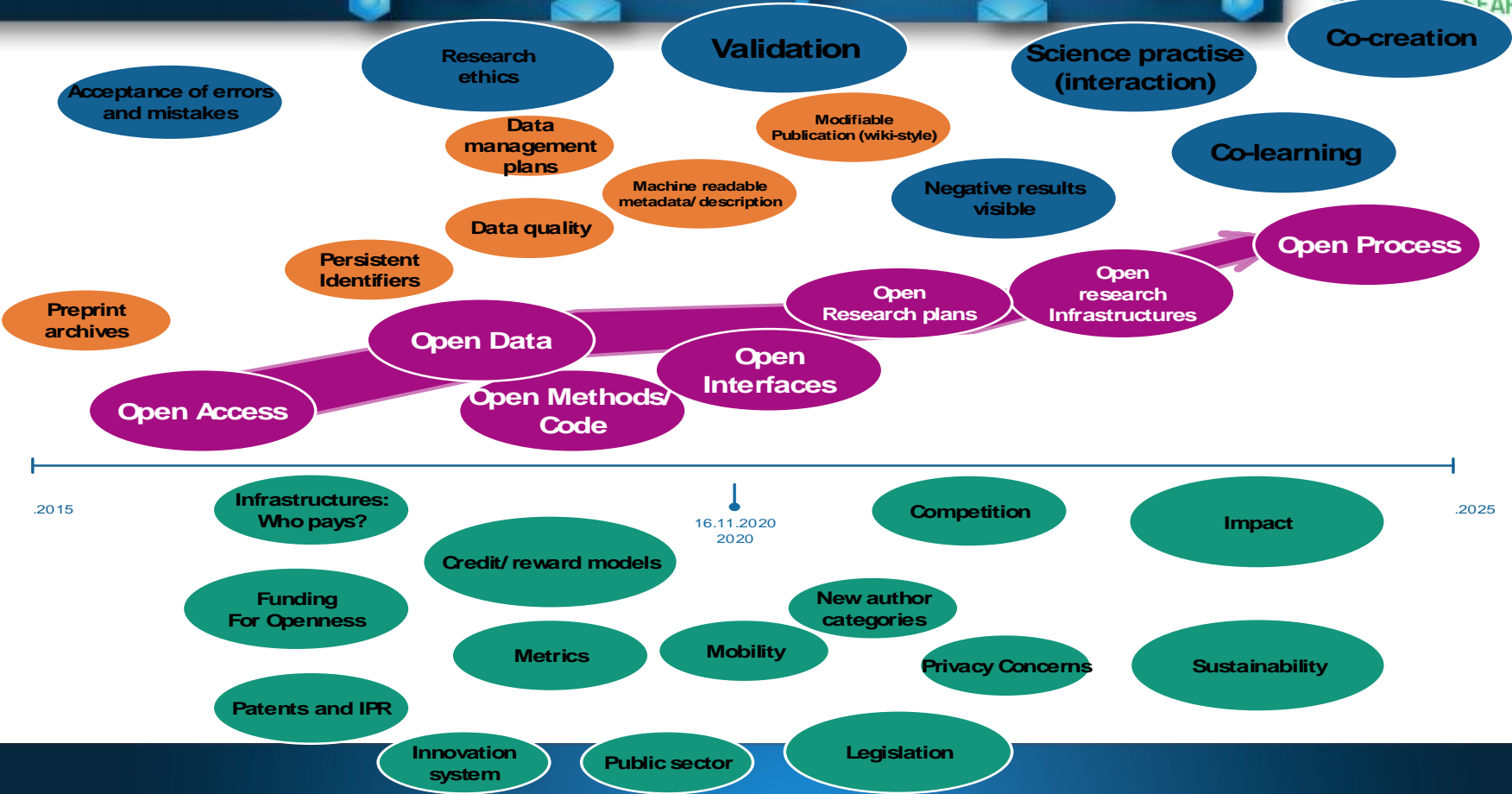
Building reproducibility: Digital preservation



Source: McDonald 2008

- Managing storage
(10 year buffer)
- Managing status
(*data integrity*)
- Managing location
(*where is the object?*)
- Agreements
(*who is responsible for sustainability?*)
- Managing risks
(*what actions are necessary?*)

Open Science: anticipated evolution



Data Infrastructures

- Europeana: <http://www.europeana.eu/>
- Openaire: <https://www.openaire.eu/>, tex. Zenodo
- EUDAT: <https://www.eudat.eu/>
- CODATA, EMBL, EBI, ESA, ESO...

CHECK INSTITUTIONAL DATA POLICIES!



What is important?

The importance of being earnest

- Skills and competences
- Data interoperability
- Analytics
- Reproducibility



INSPIRATION



PERSPIRATION



New INSPIRATION

Want to know more?



Web:

[Openscience.fi/](https://www.openscience.fi/)

Email:

avointiede@postit.csc.fi

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@AvoinTiede

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YOU ARE WELCOME TO JOIN US!