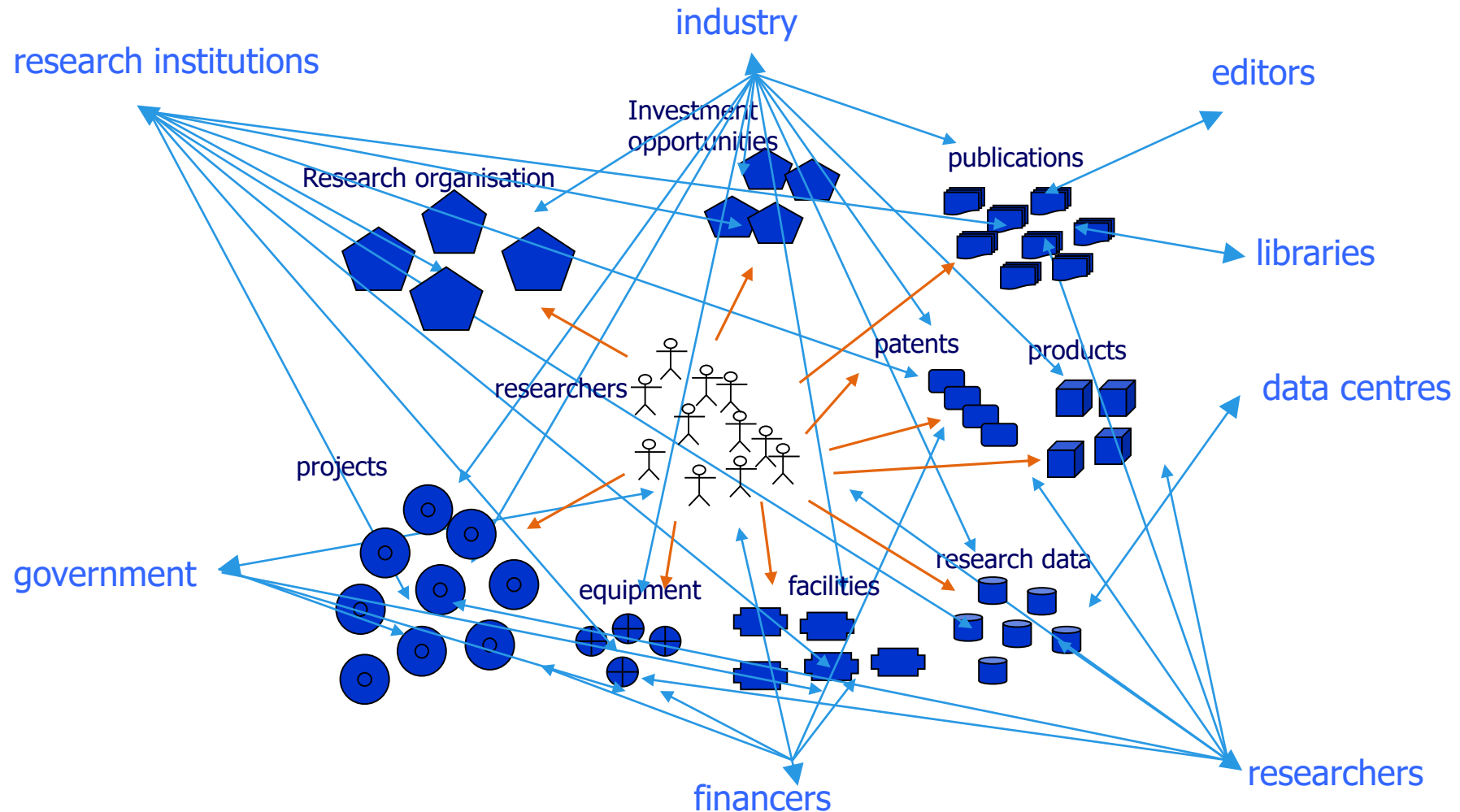# Research Information Systems as Leverage for Open Science

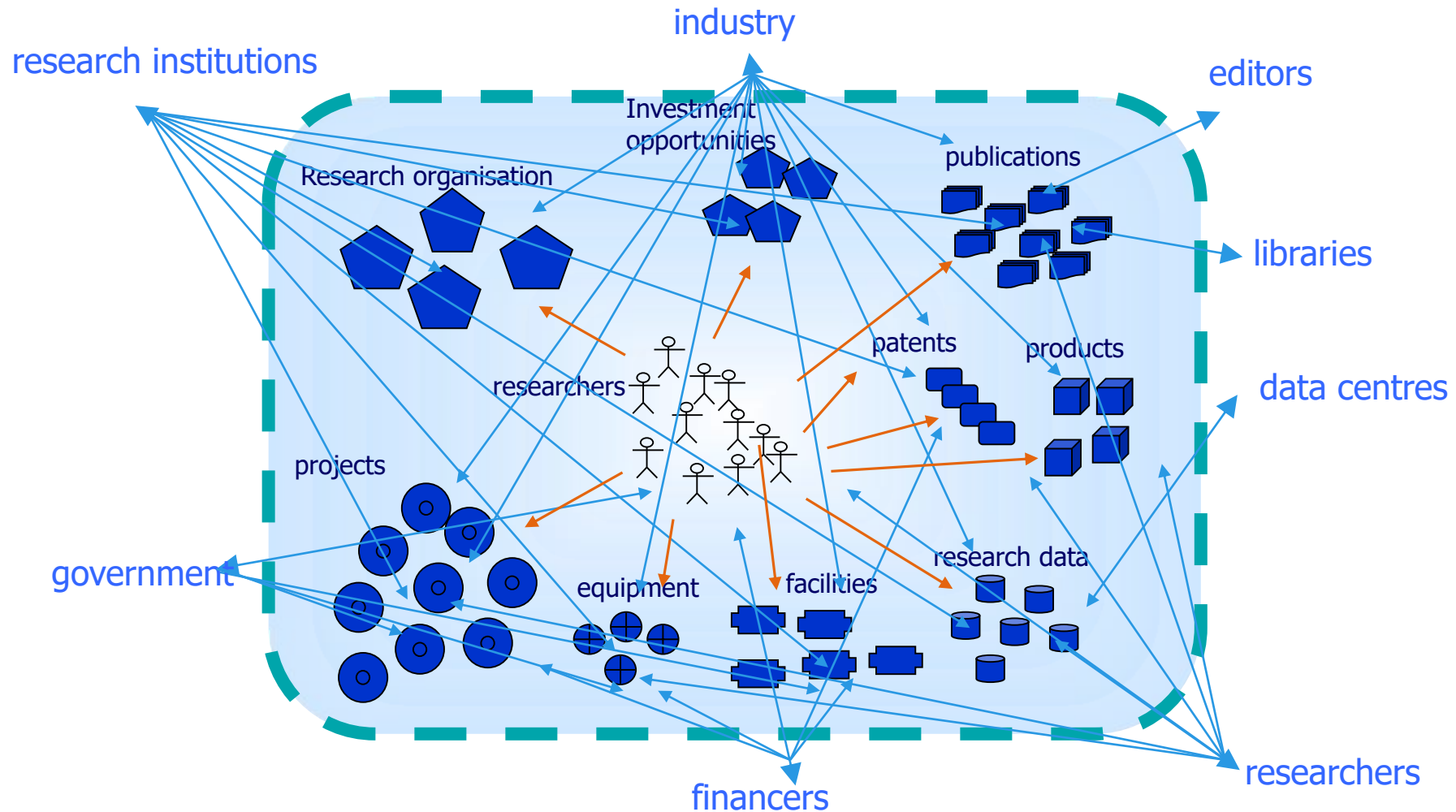Sadia Vancauwenbergh
Hasselt University, ECOOM, BE
President of euroCRIS

eurocris@eurocris.org
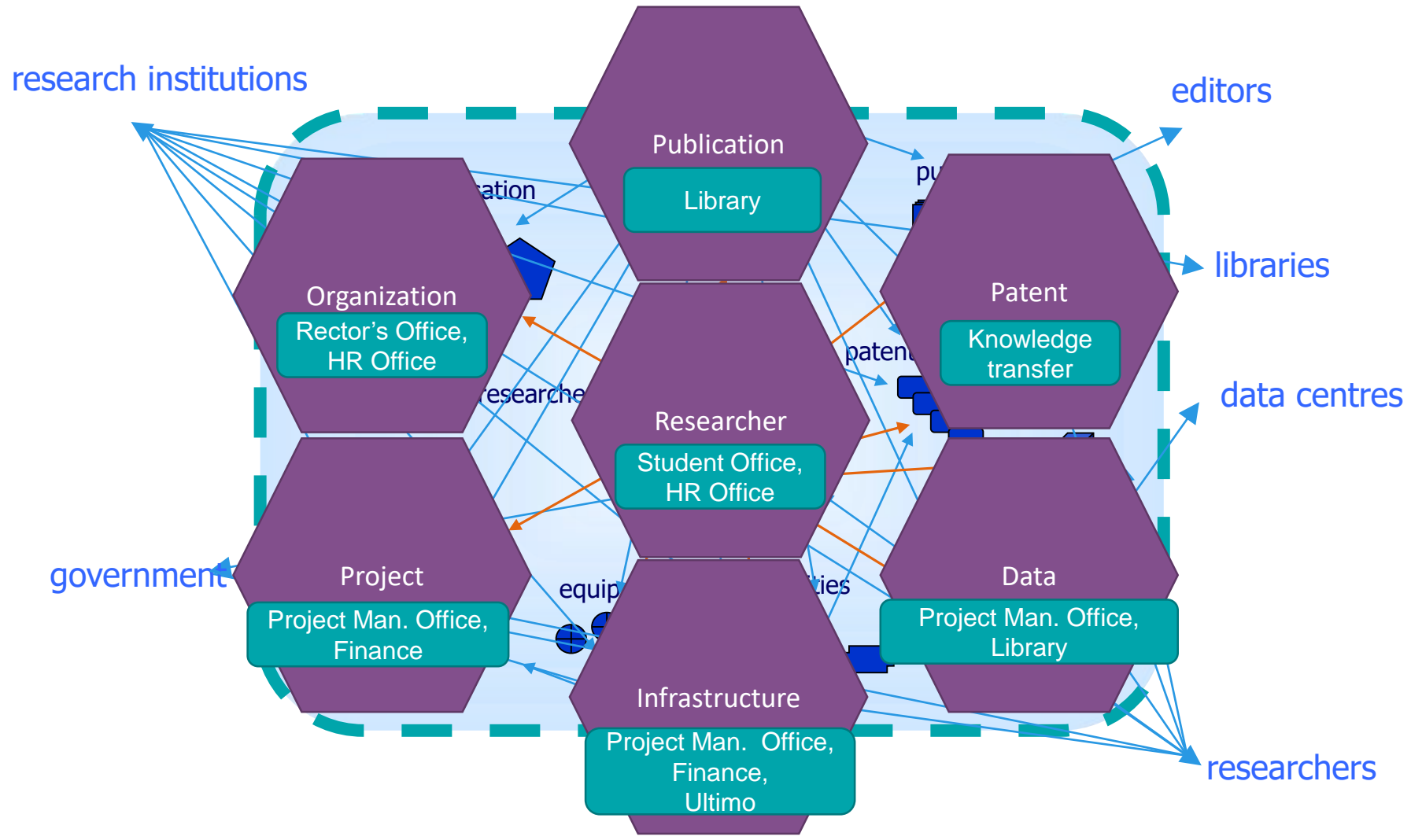
EARMA 21 Conference

15.04.2021

Research information
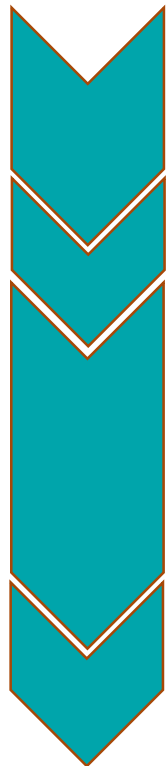
Research information space
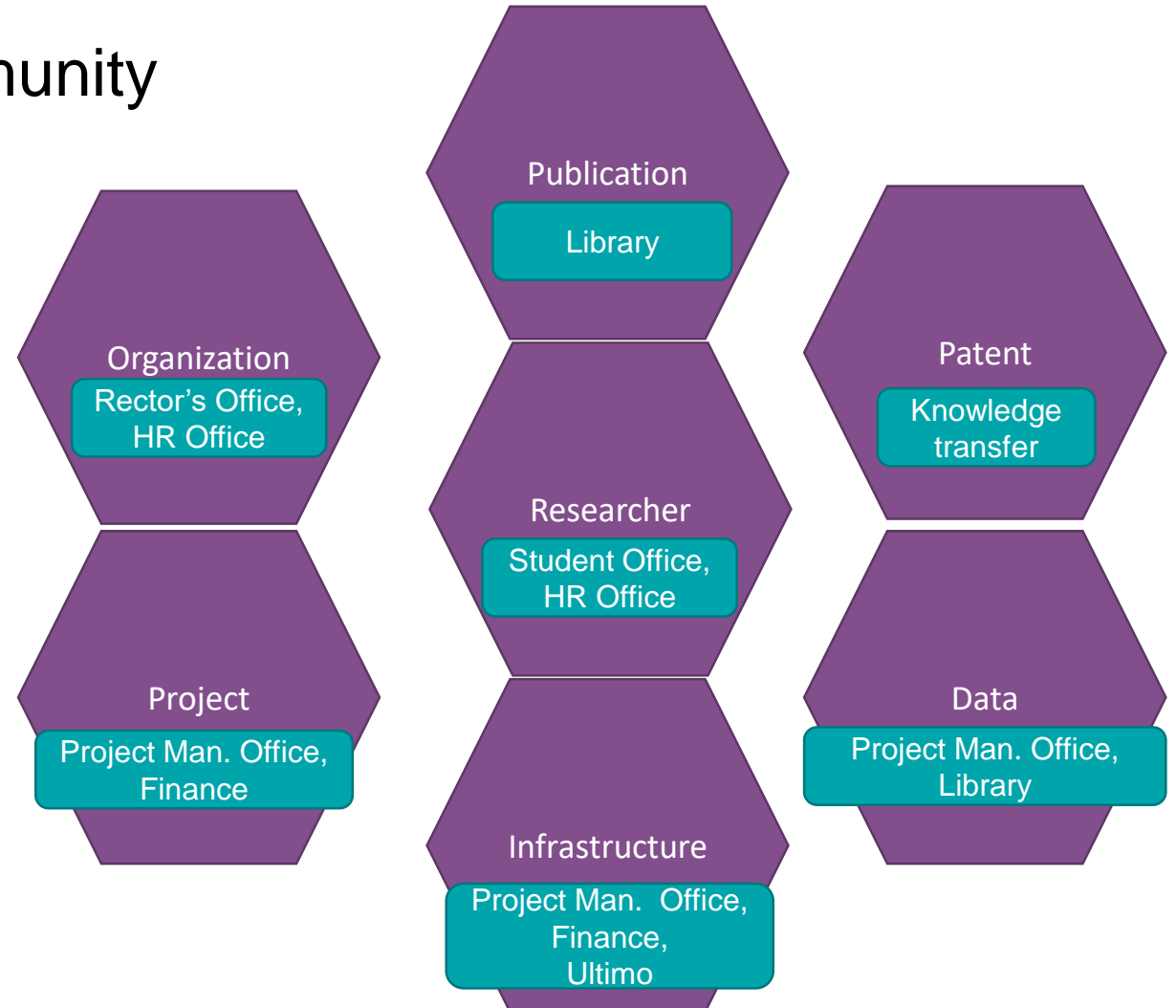
Research information space

Research information systems

- Research management community
  - Processes (ex. Project)
    - Pre-project
    - Funding award
    - Post-award research project
    - Post project

Research information systems

- Correct, actual, complete research information
- Connect data silo's
- Maximum reuse of data
- Reduce system costs

- Reduce administrative burden
- Once-only principle
- Policy monitoring & reporting
- Increase strategic intelligence
- More information services

- Researchers, Institutions, Governments, Funders, Industry, Public

Publication

Organization

Patent

Researcher

Project

Data

Infrastructure
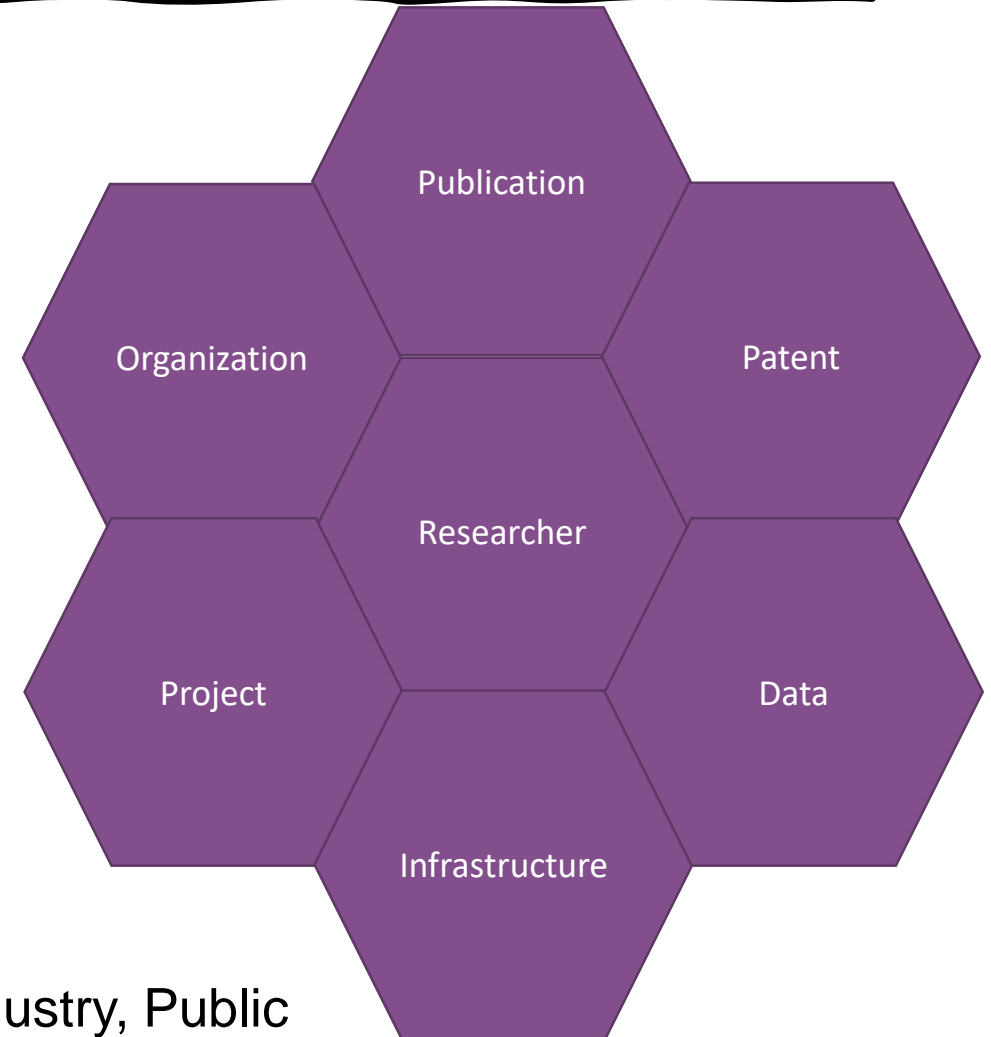
euroCRIS community (eurocris.org)

Mission

Promote **cooperation** within and **share knowledge** among the research information community

and interoperability of research information through **CERIF**, the Common European Research Information Format

CERIF

Projects

DRIS

Publication Repository

Conferences
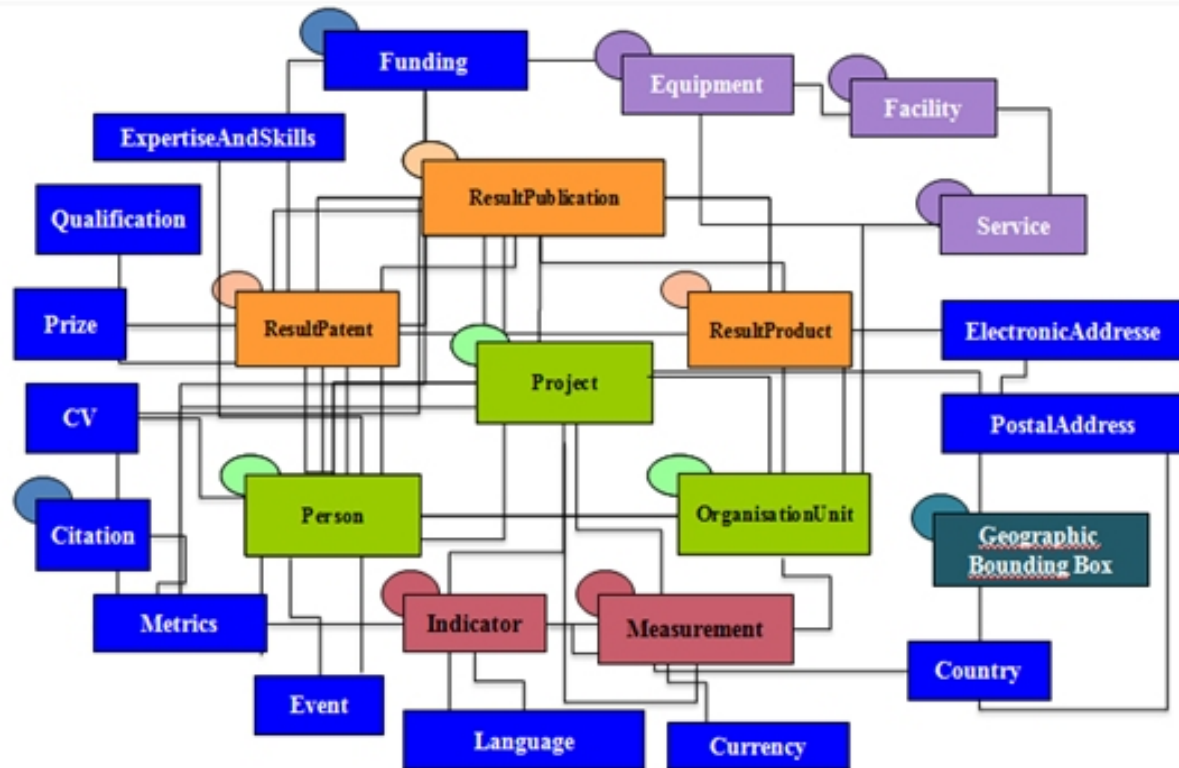
Membership meetings

Webinars

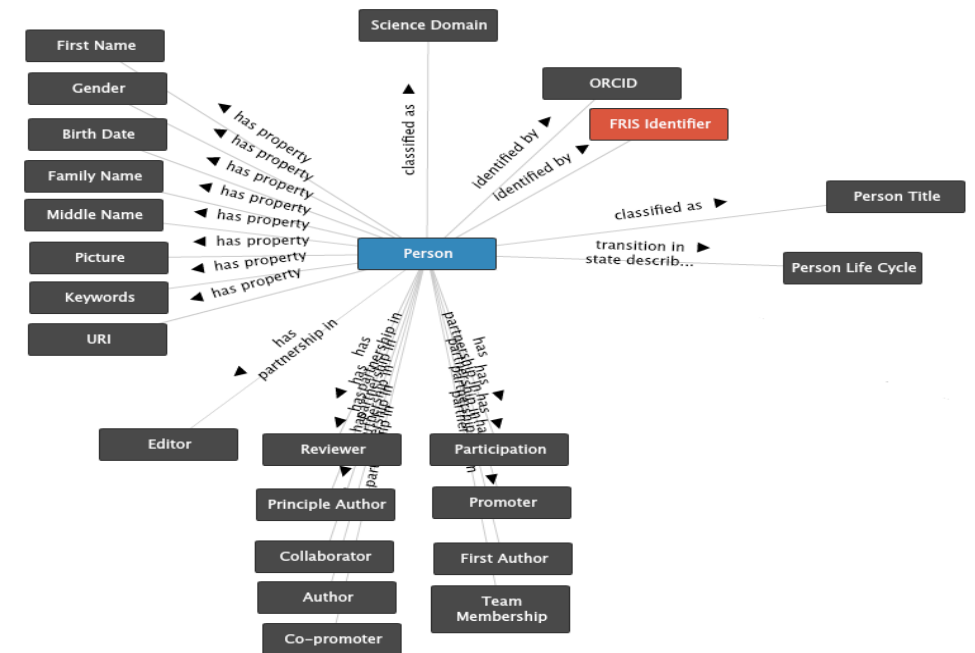# CERIF (https://www.eurocris.org/services/main-features-cerif)

Specification (conceptual level), Model (logical level), Database scripts (physical level)

CERIF model

Metadata for a Person

Projects (https://www.eurocris.org/ongoing-projects)
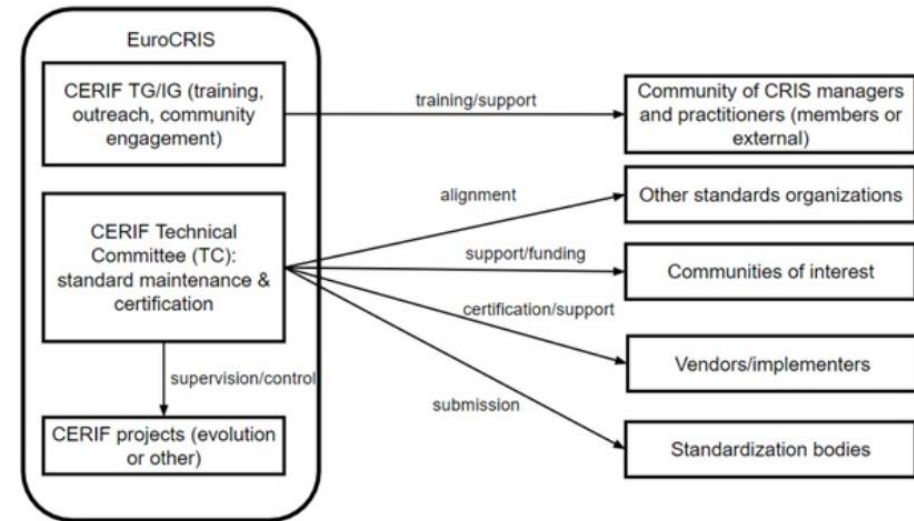
- Ongoing projects:

  - CERIF refactoring project
    - Refactor the CERIF structure in terms of
      - Modularity
      - Extensibility
    - In line with current research practices

- Finished projects:

  - DRIS+, METIS2OpenAire, Pasteur4OA, VRE4EIC, Jisc Research Data Shared Service, ENGAGE, HOLACLOUD

DRIS (https://www.eurocris.org/services/dris)

- Directory of Research Information Systems (DRIS)
  - (Minimally sufficient) information on > 850 systems worldwide
    - https://eurocris.org/dris/dris-form

DRIS (eurocris@eurocris.org RDM+ badge)

EuroCRIS

DRIS record METIS Research Information System

View Statistics | Email Alert | RSS Feed

Information

DRIS Details

Name of the CRIS METIS Research Information System **Acronym** METIS Radboud

Description METIS is the CRIS of Radboud University It was implemented already in 1994 and as such is one of the oldest fully fledged CRIS's in Europe.

Status Operational   **Scope** Institutional   **Date of establishment** 01-04-1993

URI https://www.ru.nl/research-information-services/manuals/ris-explained/ **Number of users** 750   **Institution/organization** Radboud University Nijmegen

Department Central Management   **Contact person** Simons, Eduard   **CRIS data supply** Faculties   **CRIS data validation** Central Administration

CRIS data output Central Management   **Country** Netherlands   **Coverage** Dataset   **Software** Metis

OpenAIRE

RDM+

Repository (https://dspacecris.eurocris.org/)

Source: © istock.com/zorazhuang

Research Information Systems as Leverage for Open Science

Open Science

Source: Science Business Conference, December 3th 2019, Brussels
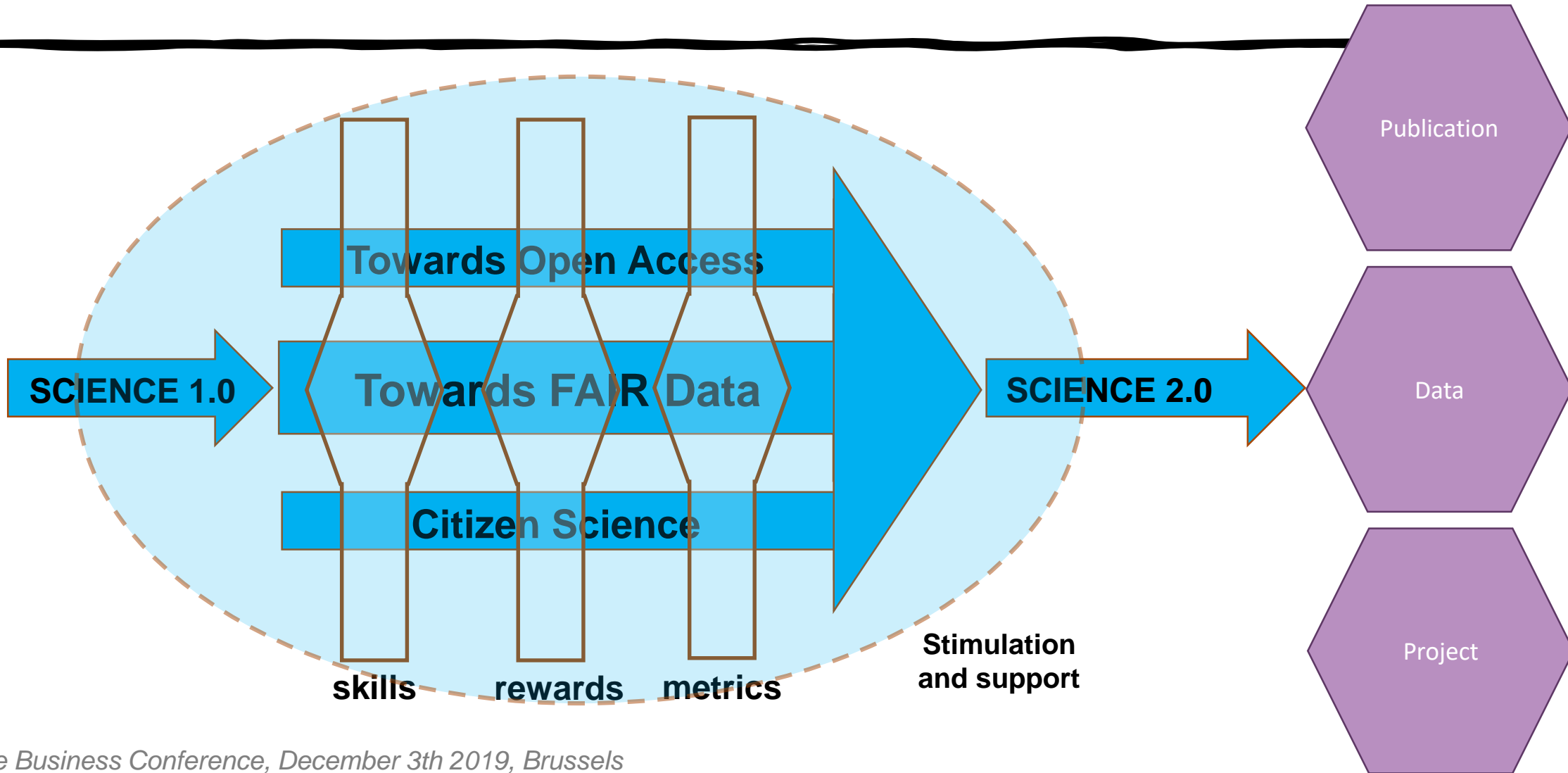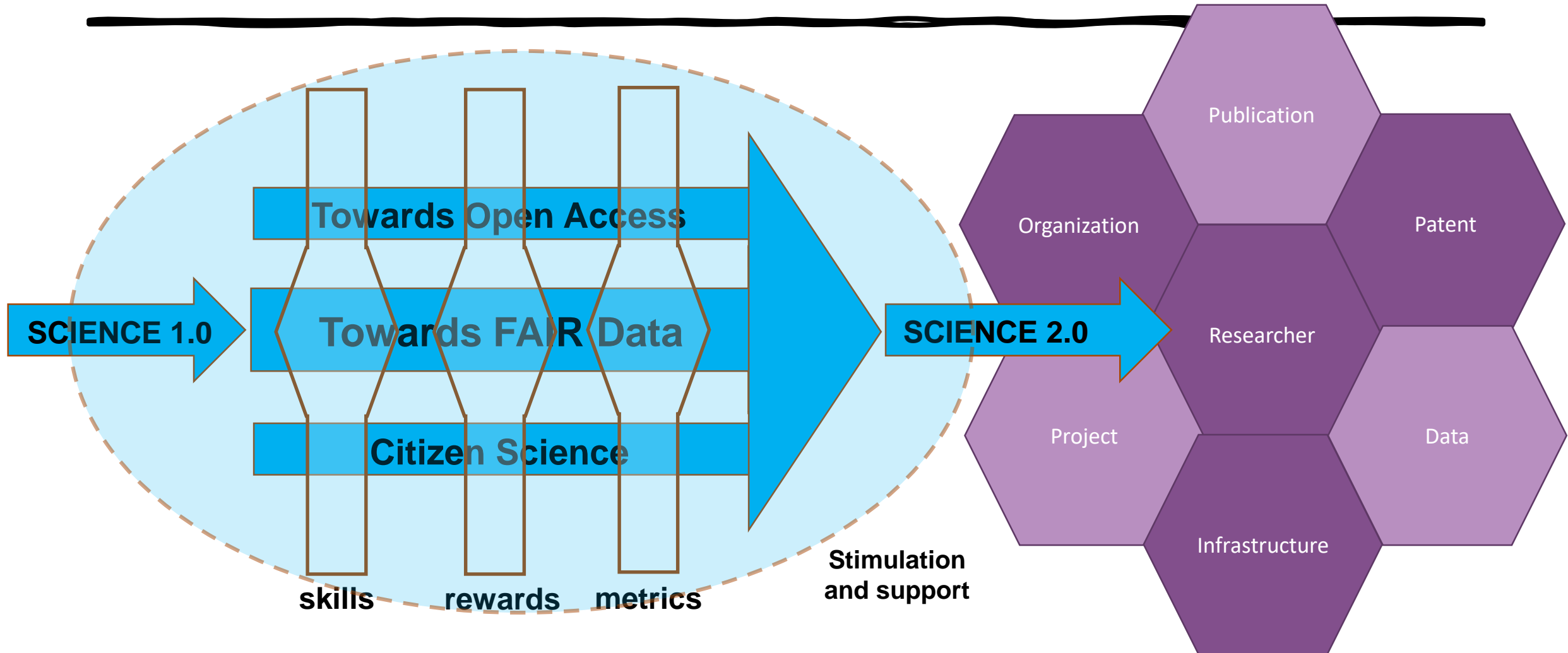
Open Science & CRIS
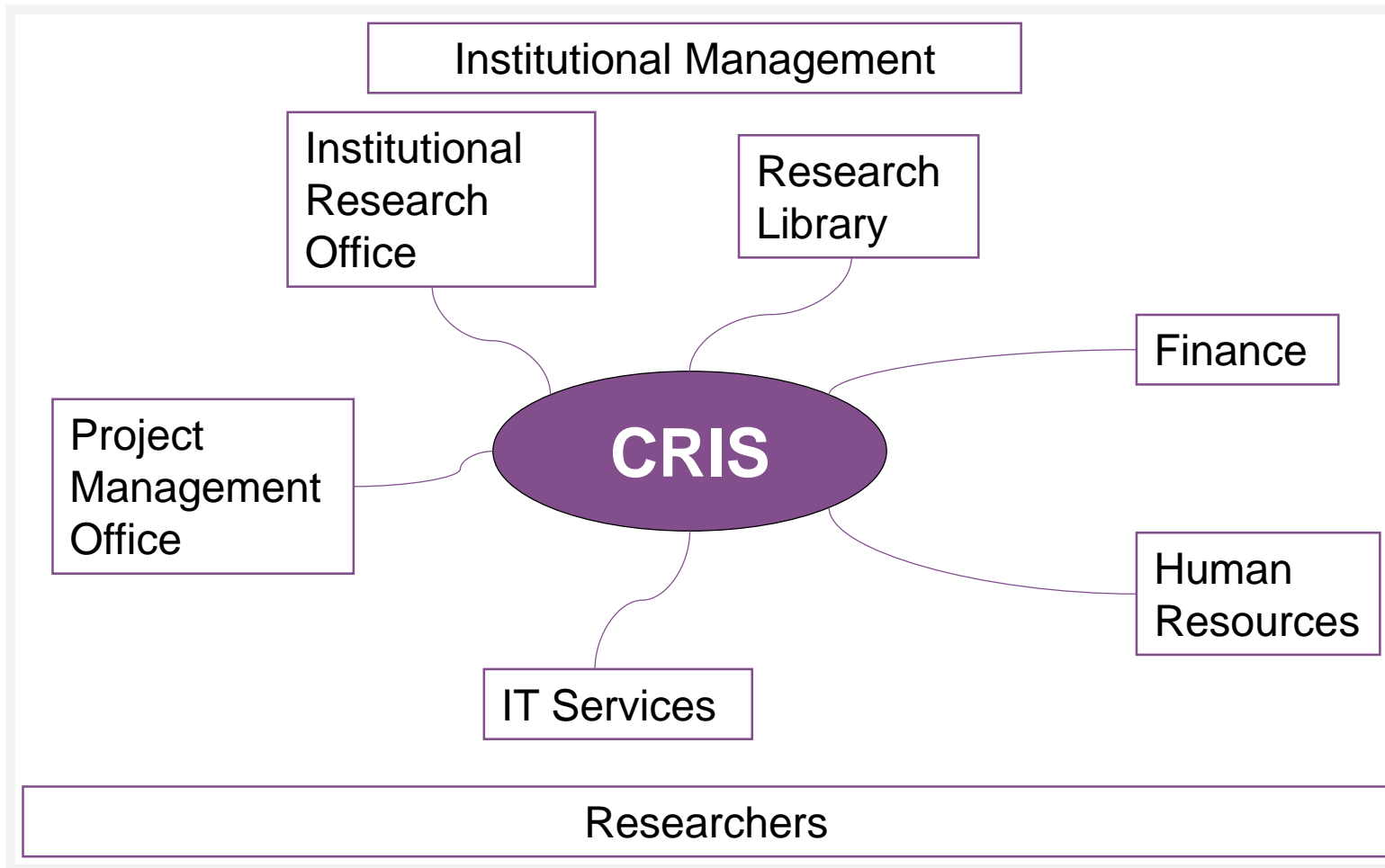
Open Science & CRIS

Open Science - Publication

- Institutional CRIS
  - Input:
    - Web of Science, Scopus, arXiv, Pubmed
    - Bibtex, Refman
    - Manual input

  - Enrichment of information in CRIS
    - Researcher, organisation, project, …

  - Linked
    - Full text repository Open Access
    - Enrichment with data from Unpaywall (https://unpaywall.org/)
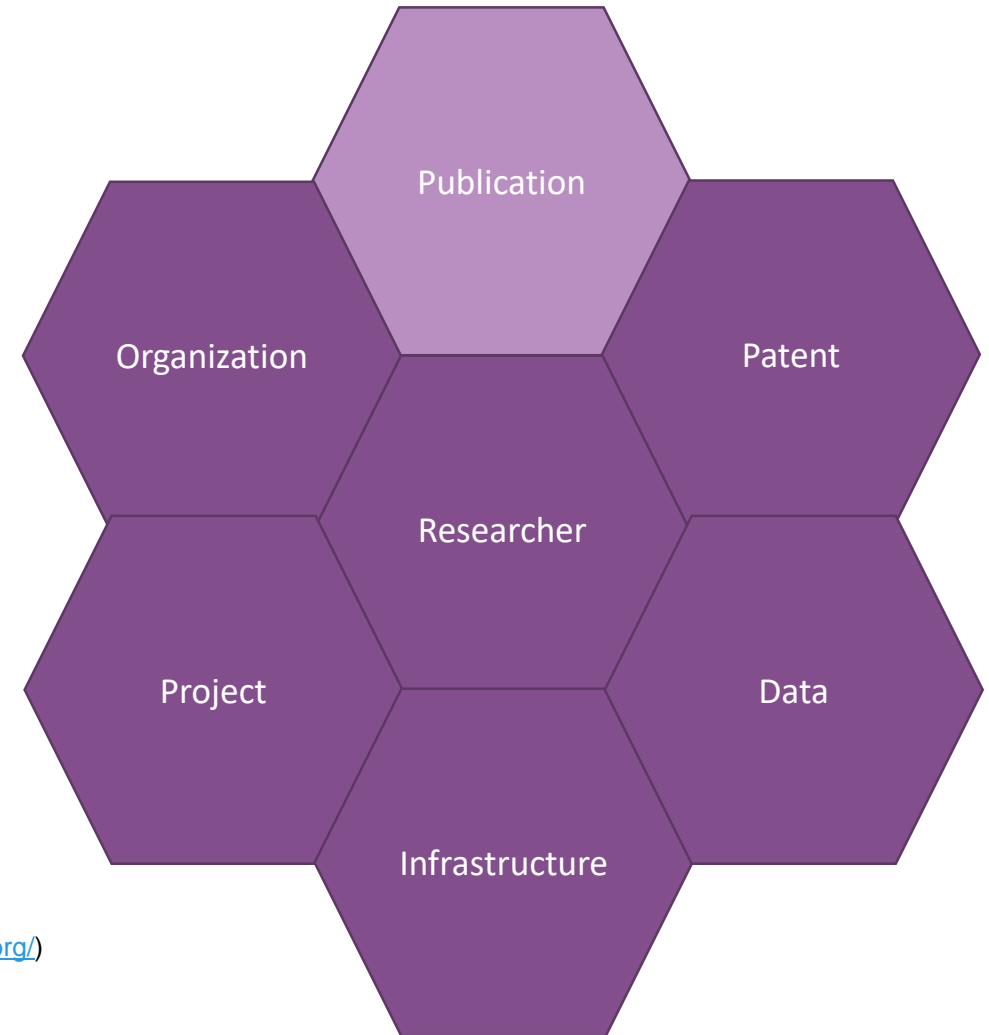
Example: Research Information workflows
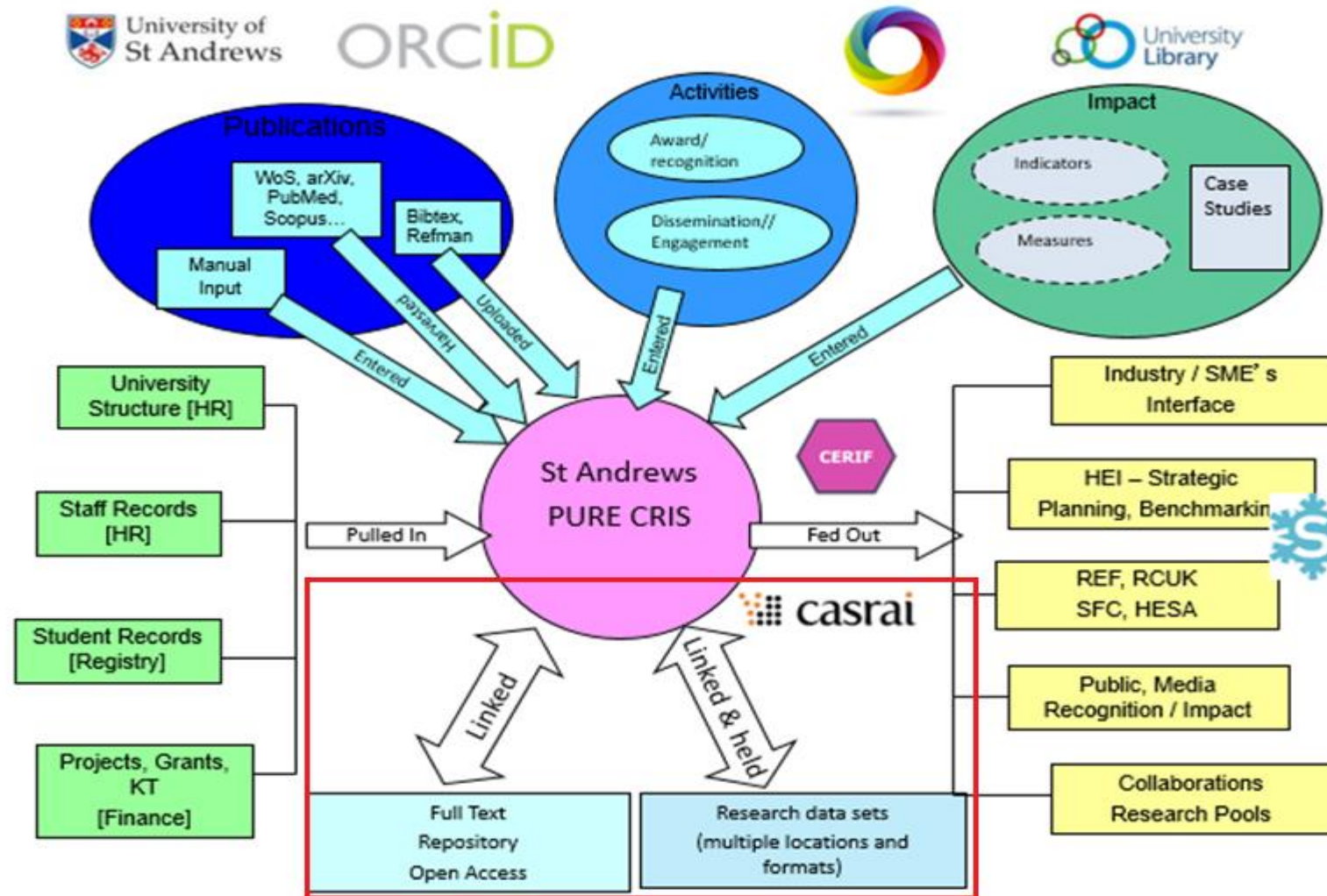
Open Science - Publication

- Open Science KPIs
  - ORCID
  - DMP
  - **Open Access label**
  - Open Data label
  - FAIR Data label

- Interface for OA articles

Open Science - Data

Towards "as FAIR as possible" and "as open as possible"
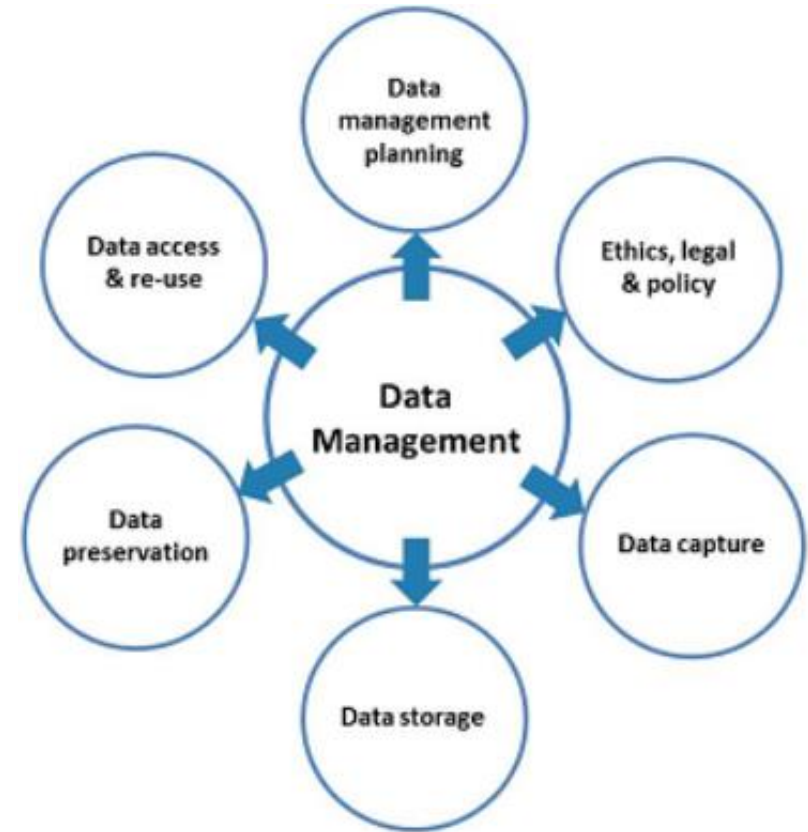
Research data management

Research data information

- Stakeholders:
  - Researchers
  - Research managers
    - Funding application, grant, …
  - Research data stewards
  - Data librarians
  - Data curators
  - Knowledge transfer office
  - Legal office (GDPR, Nagoya, Dual Use, …)

Processes:
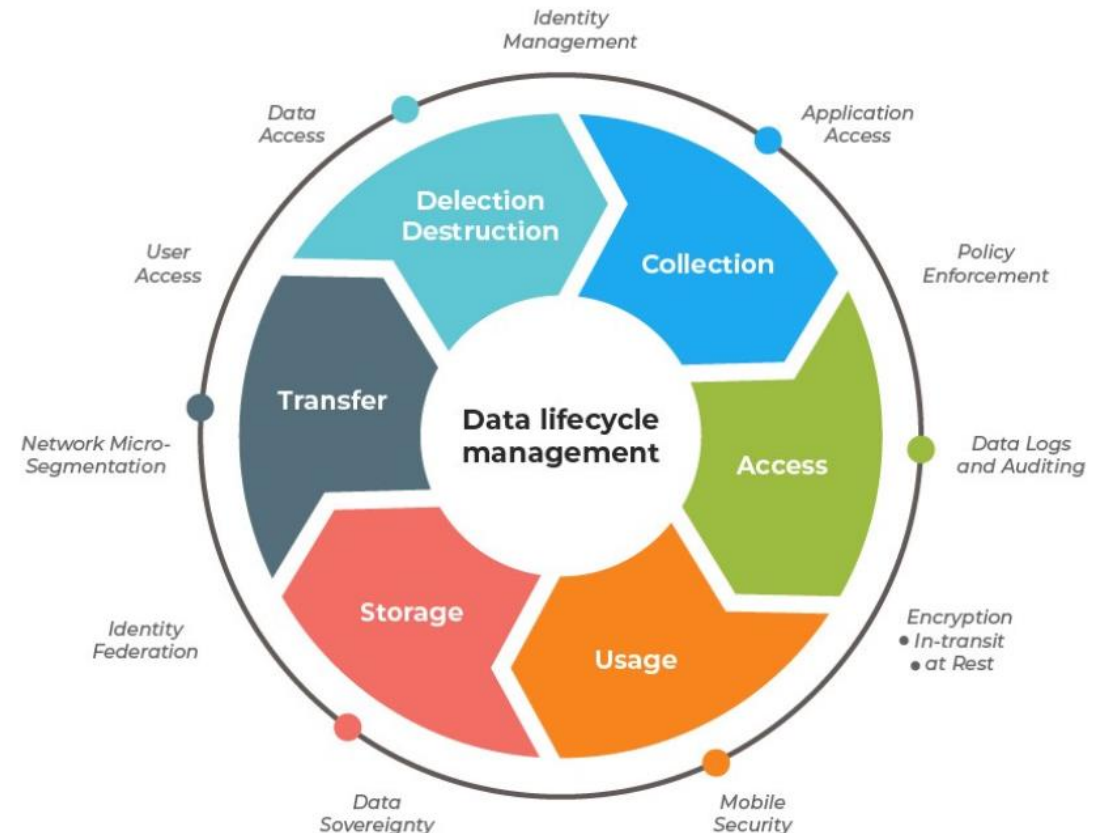
CRIS as leverage for Open Data within institutions
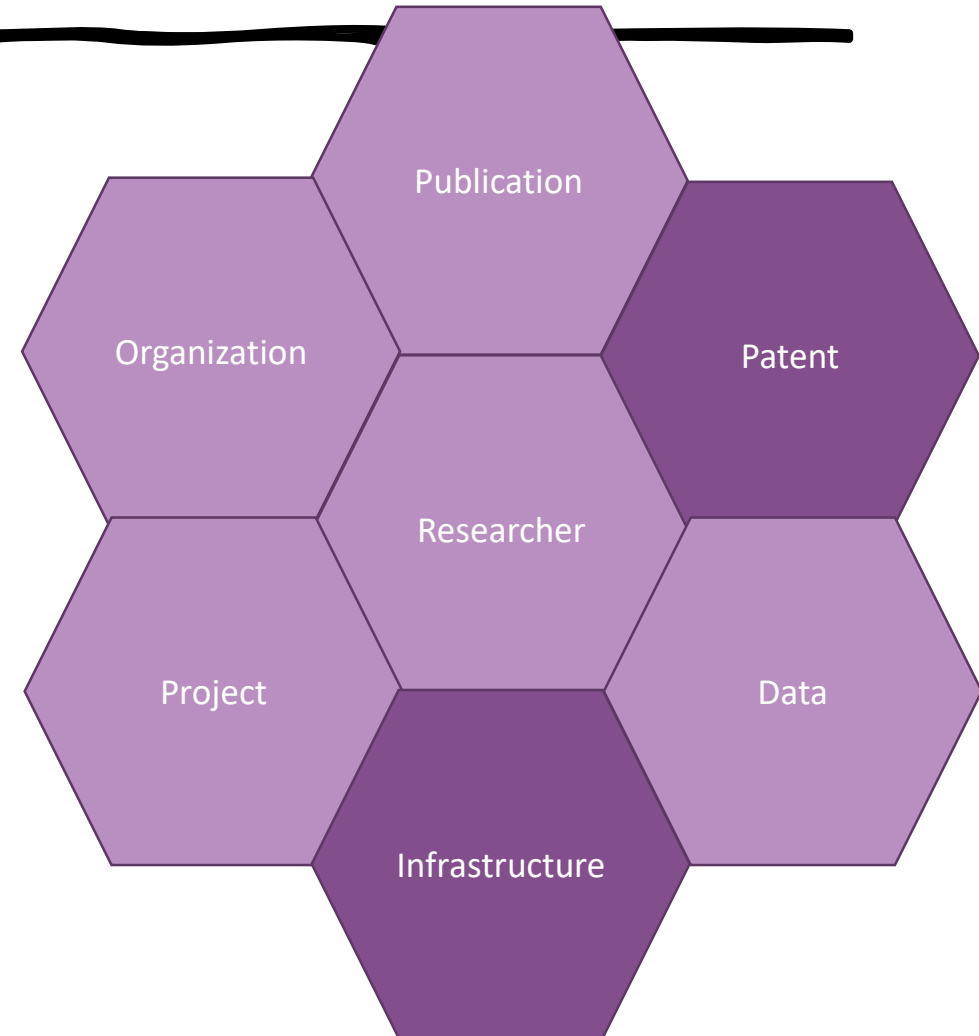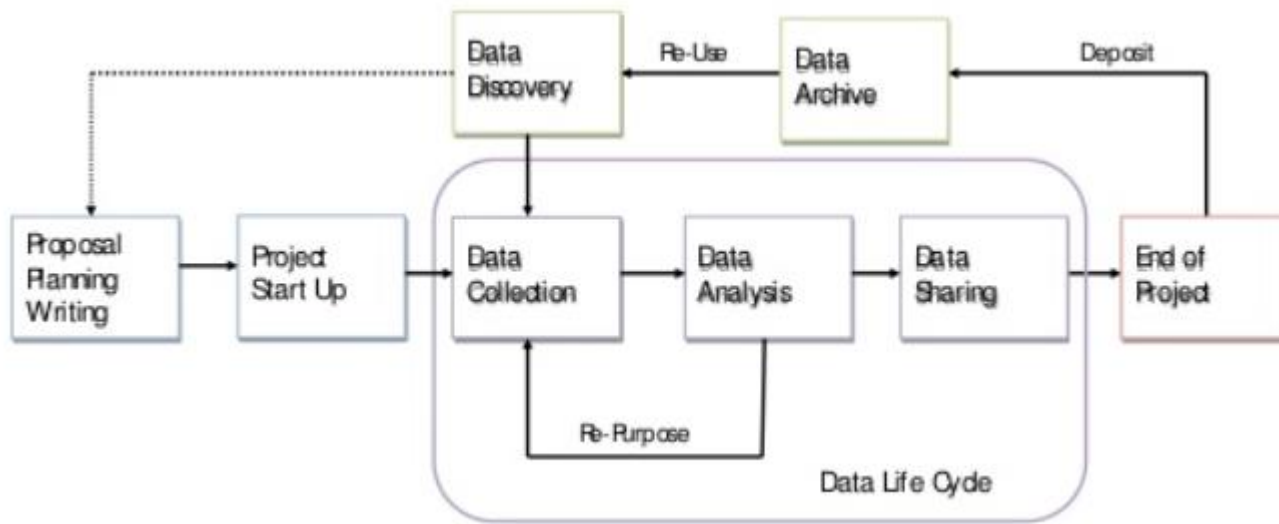
EOSC – Vision of the European Commission

"Europe's final transition must be one from fragmented data sets to an integrated European Open Science Cloud. By 2020, we want all European researchers to be able to deposit, access and analyse European scientific data through a European Open Science Cloud."

Carlos Moedas, Amsterdam, 4 April 2016

EUROPEAN OPEN SCIENCE CLOUD
BRINGING TOGETHER CURRENT AND FUTURE DATA INFRASTRUCTURES

A trusted, open environment for sharing scientific data

Open and seamless services to analyse and reuse research data

Linking data

Connecting across borders and scientific disciplines

Connecting scientists globally

Long term and sustainable

Improving science
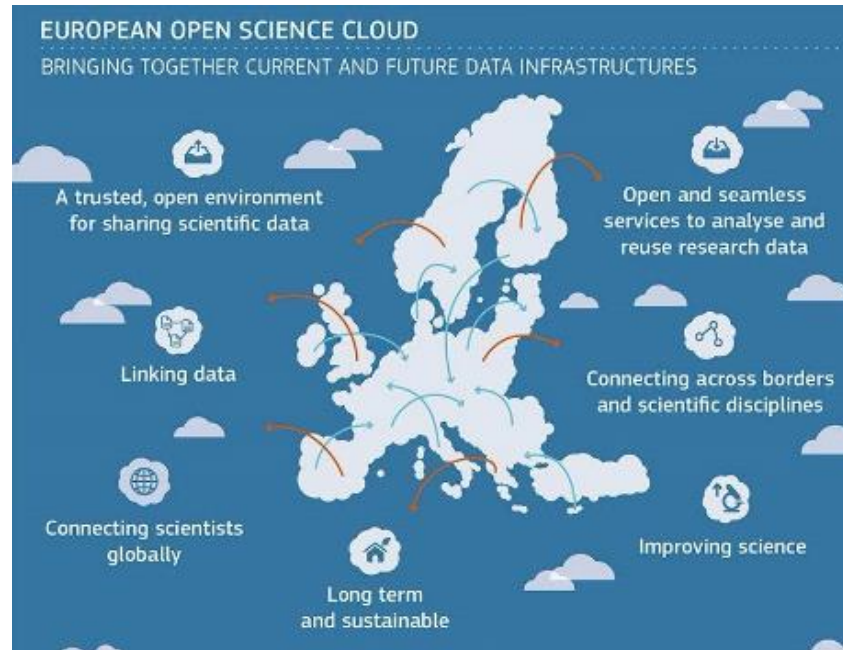
EOSC Declaration, Brussels, 10 July 2017

From the current model of European data infrastructures
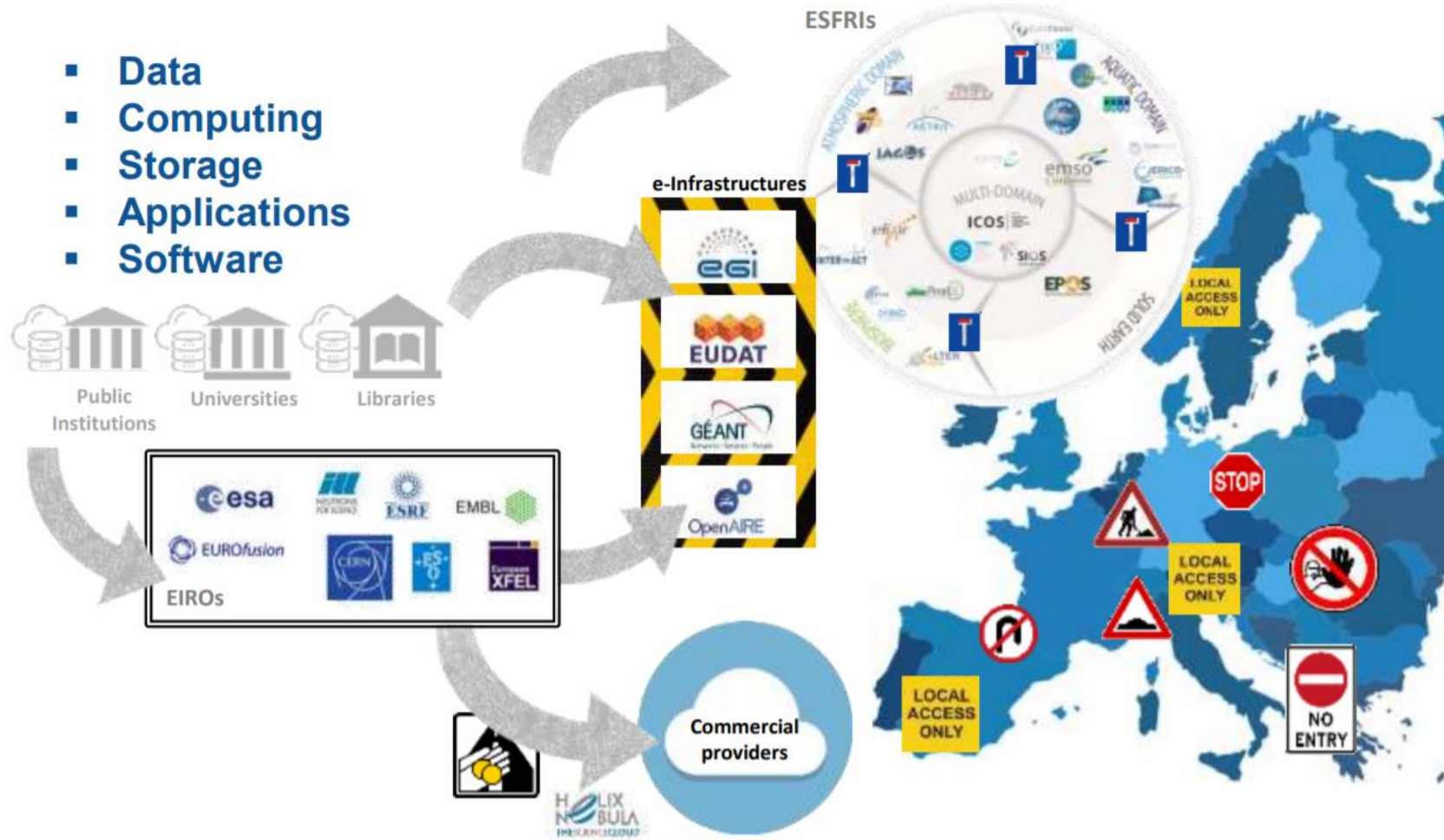
Towards a federated model, with a universal access to data and building on a strong legacy
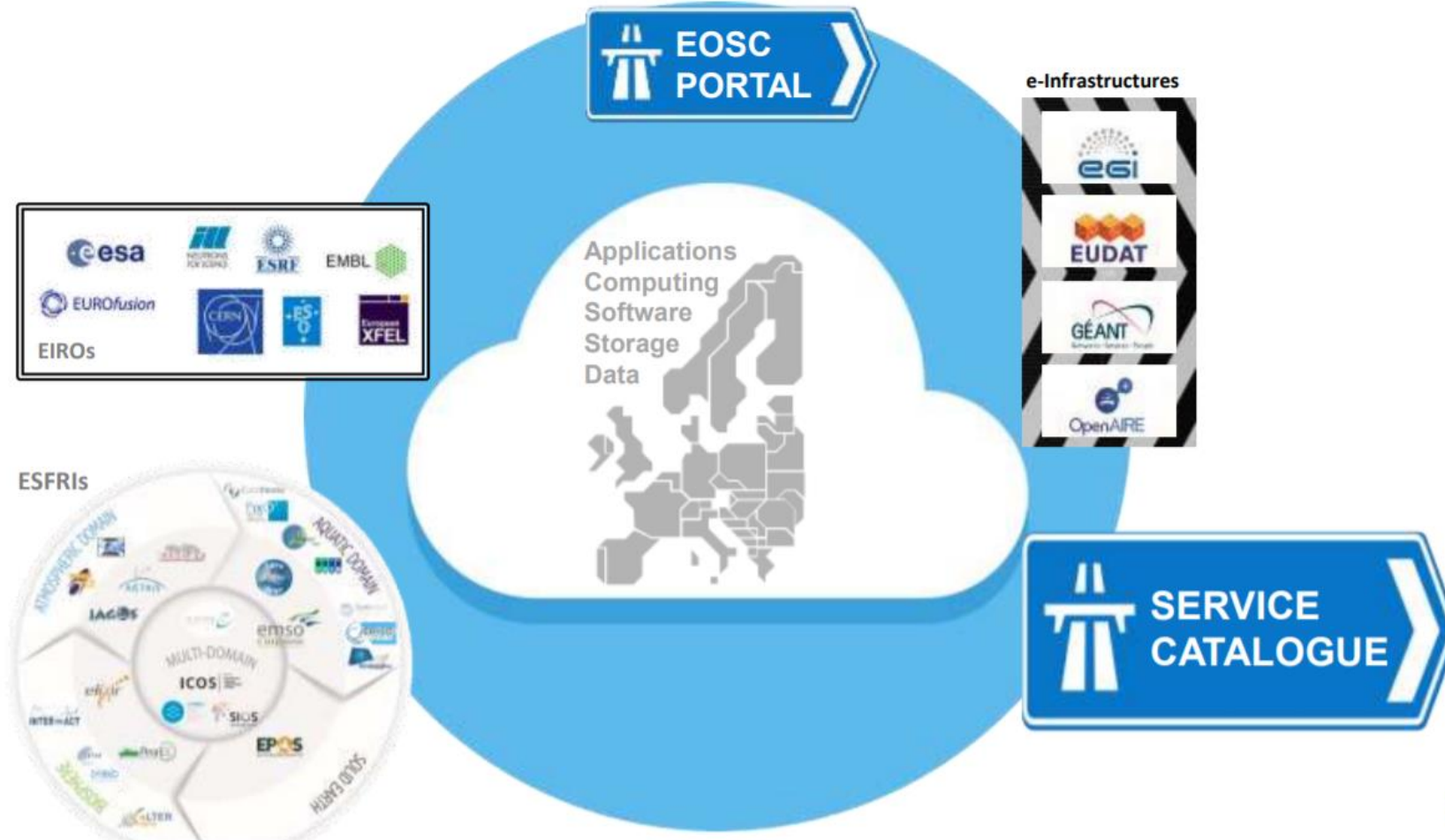
Requirements

	Current model	**Federated**
Resources	Fragmentation of resources and access to them	Integrated access to federated resources for ALL researchers
Services	Varying quality of services currently	Service standards for all federated resources
Interoperability	Varying levels of interoperability standards	Common standards for all federated resources
Governance	Fragmented across 100+ institutions	Layered governance for EOSC participants – balanced stakeholders, MS, EC - with specific rules
Costs & time to implement	Baseline	Marginally higher than baseline
MS and stakeholder acceptance	Low	High

Source: EOSC Strategic Implementation Roadmap 2018-2020, May 2018, European Commission

Source: https://www.eosc.eu/eosc-sria-v10-15-february-2021

Source: https://eoscsecretariat.eu/eosc-governance/eosc-executive-board-outputs

EOSC Interoperability framework

- Technical interoperability
    - Infrastructure and applications

- Semantic interoperability
    - Unambiguous, shared meaning in ontologies & thesauri
    - Minimal set of common metadata formats

- Organisational interoperability
    - Documentation, integration and alignment of processes

- Legal interoperability
    - EOSC, FAIR principles, regulatory and/or policy measures
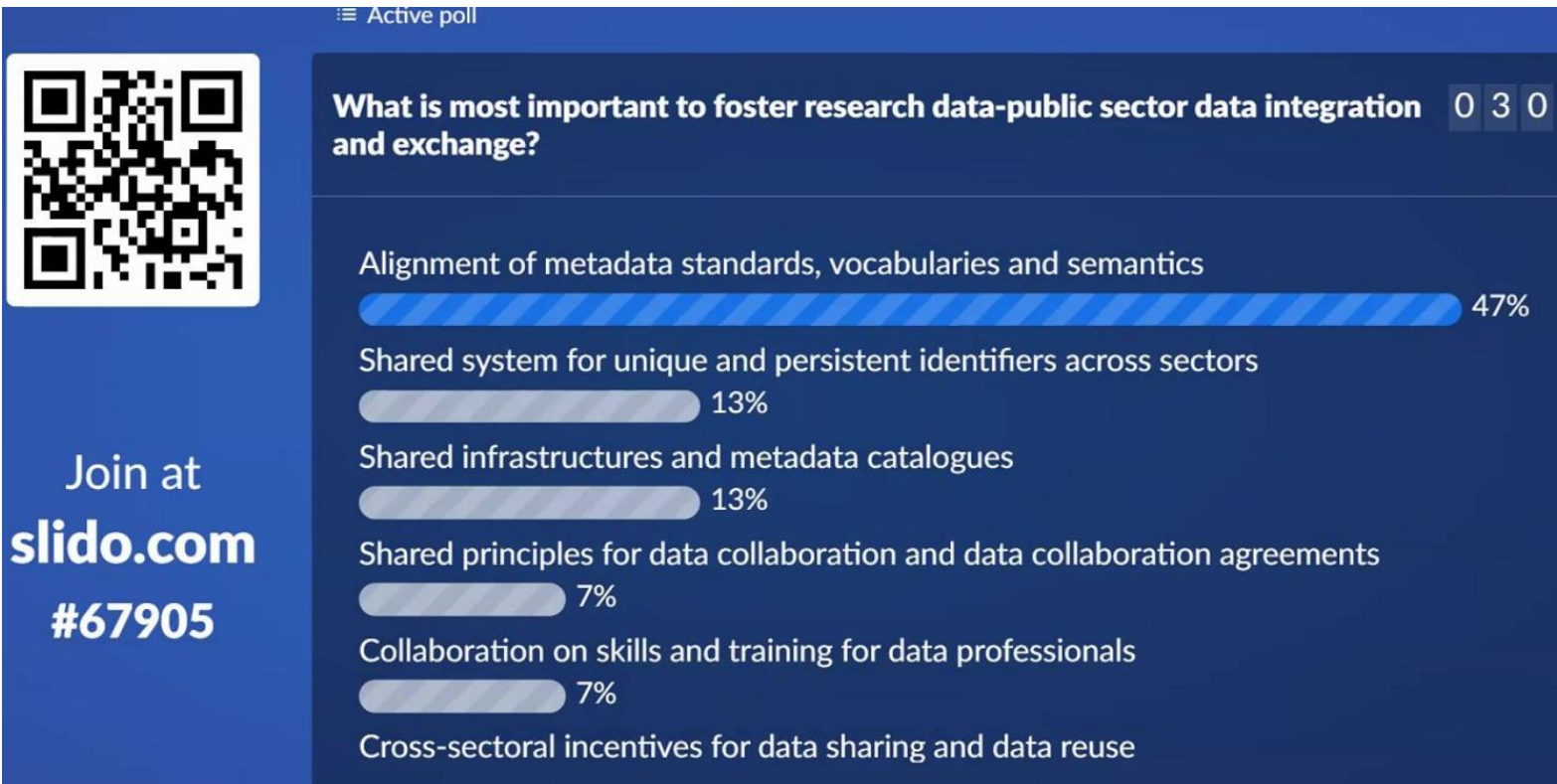
Source: https://op.europa.eu/en/web/endorse/join-us-live

CRIS as leverage for Open Data between institutions

- Case: Flemish Research Information Space (FRIS)

Source: researchportal.be/en
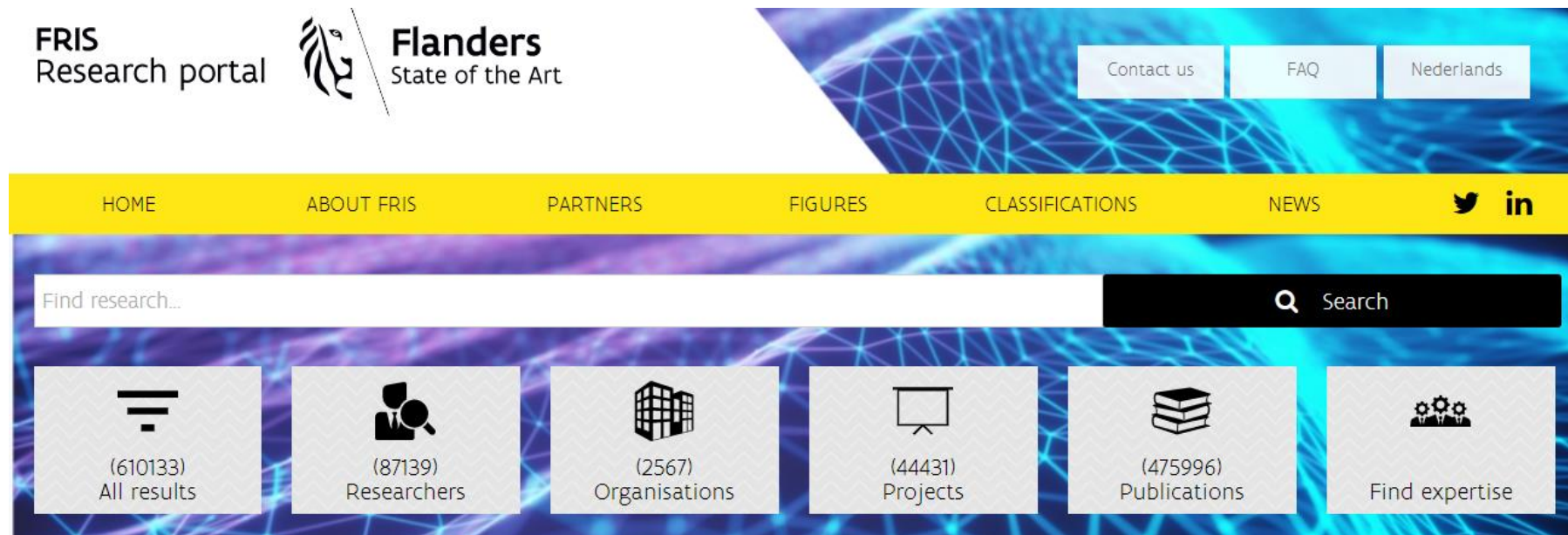
FRIS – data providers landscape

- Universities (5)

- University Colleges (13)

- Strategic Research centres (4)

- Research Institutes (20)

- Funders (2)

- ECOOM
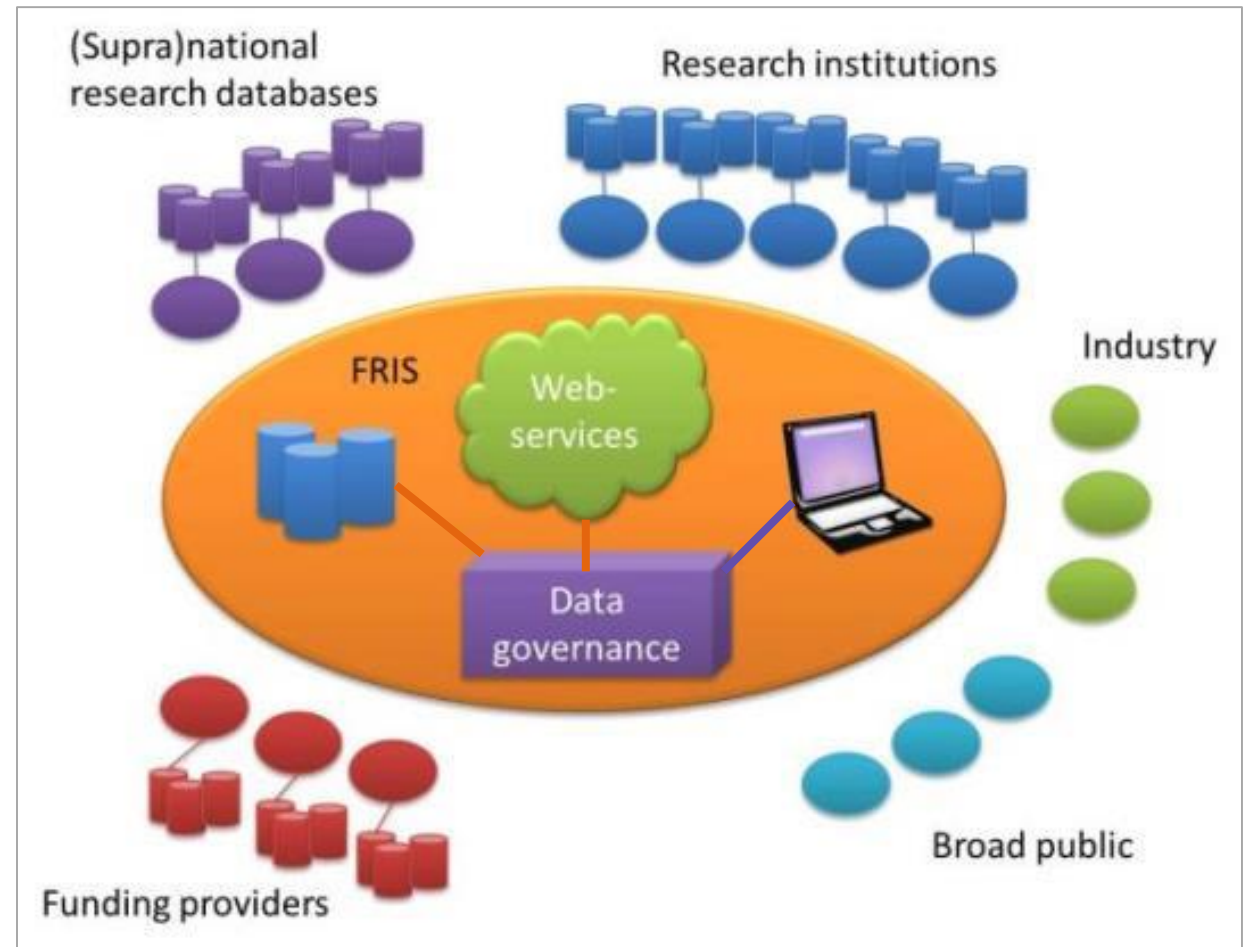
FRIS – CERIF

Specification (conceptual level)

Model (logical level)

Database scripts (physical level)

CERIF model
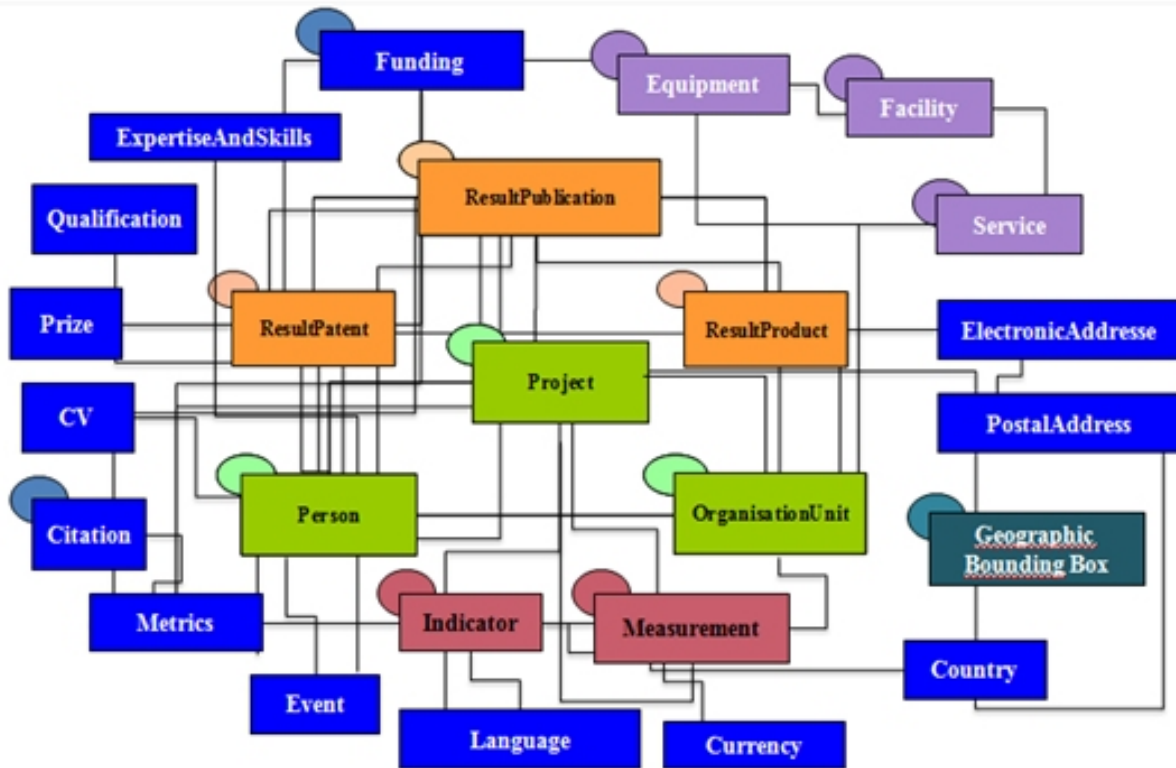
Metadata for a Person
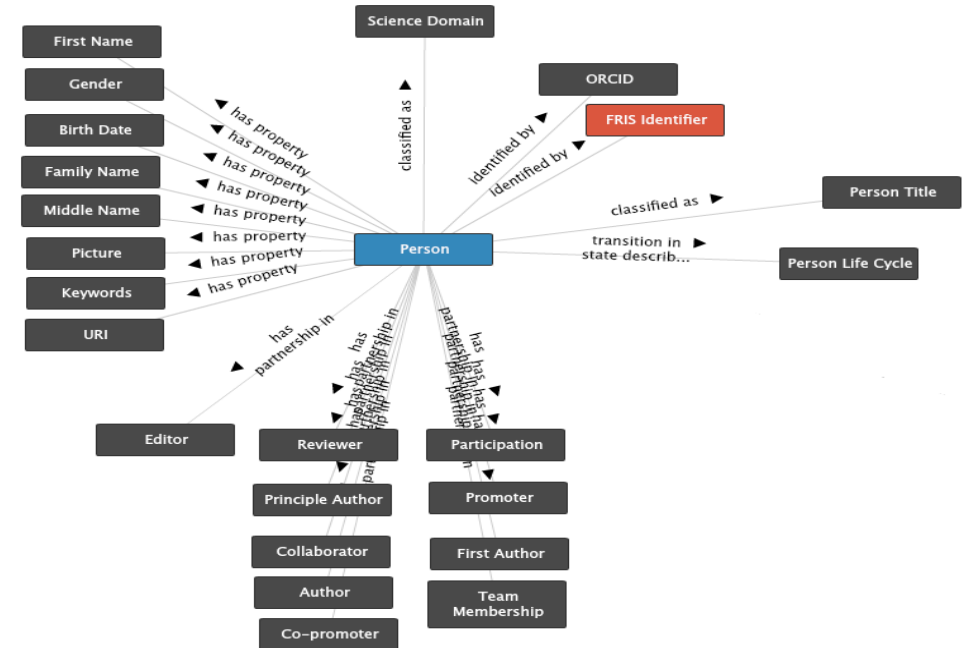
FRIS – core components

CERIF1.6

Organization · Project · Researcher · Publication

Governance structure

Governance Layer	Principles, Guidelines, Governance structures
	Governance model
	FRIS 2.0 meta model
Information Layer	Governance Implementation
	Information models
	Business Rules
Data Layer	Classification Schemes · Code Sets
	Validation Rules
	Data Exchange & Storage Schemes
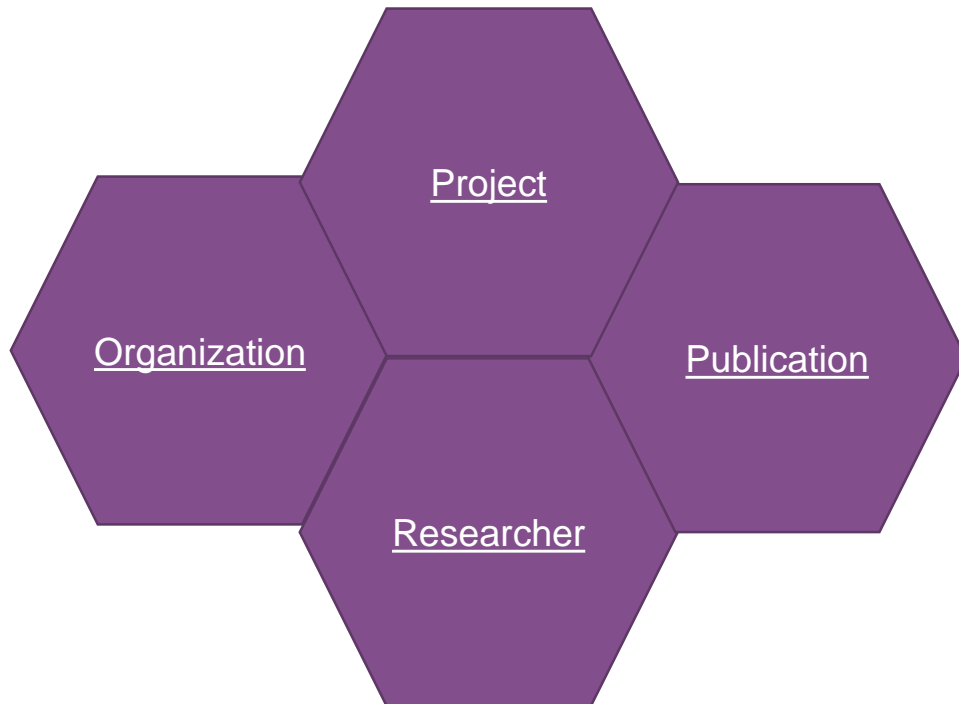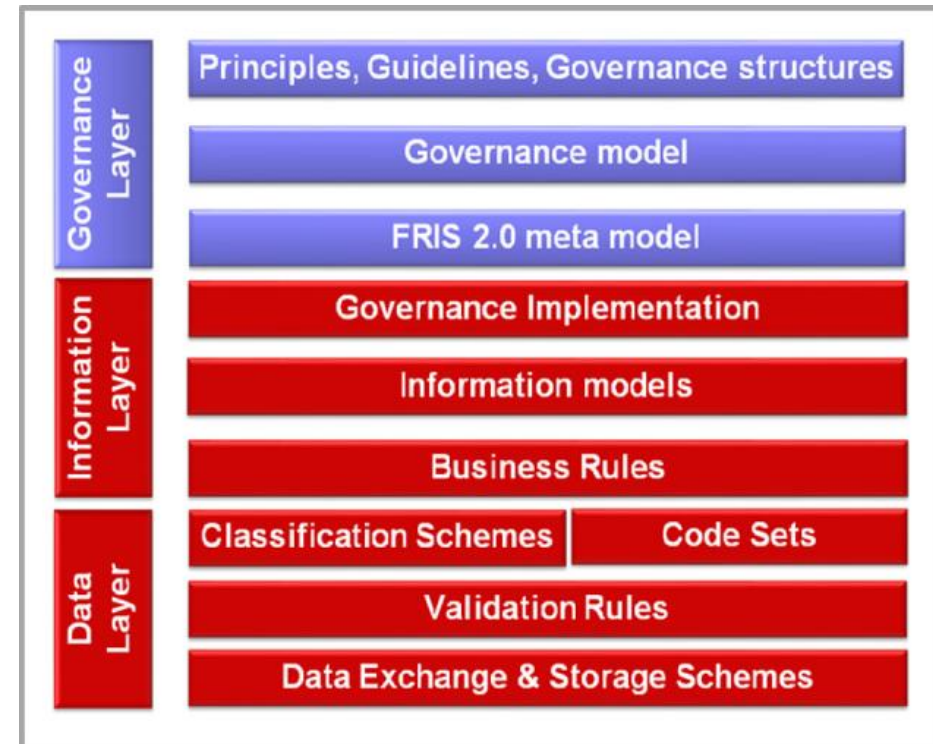
FRIS – inter-organizational semantic alignment

- Definition of required business concepts on the meta-level

- Collaborative, machine-readable manner

- *Full-cycle* business semantics management

FRIS – Development of an Application Profile for research data

- Definition of Research Data:

Data and objects generated by researchers affiliated with a Flemish research institution in the course of their investigations, regardless of their form or method. This includes the whole range of data: raw, unprocessed datasets, proprietary generated and processed data and secondary data obtained from third parties. Examples of research data include, but are not limited to, notes, surveys, images, objects, audiovisual files, spreadsheets, databases, statistical data, geographical data, simulations, software developed for research purposes, samples of any kind including of biological material, personal data, patient data, …
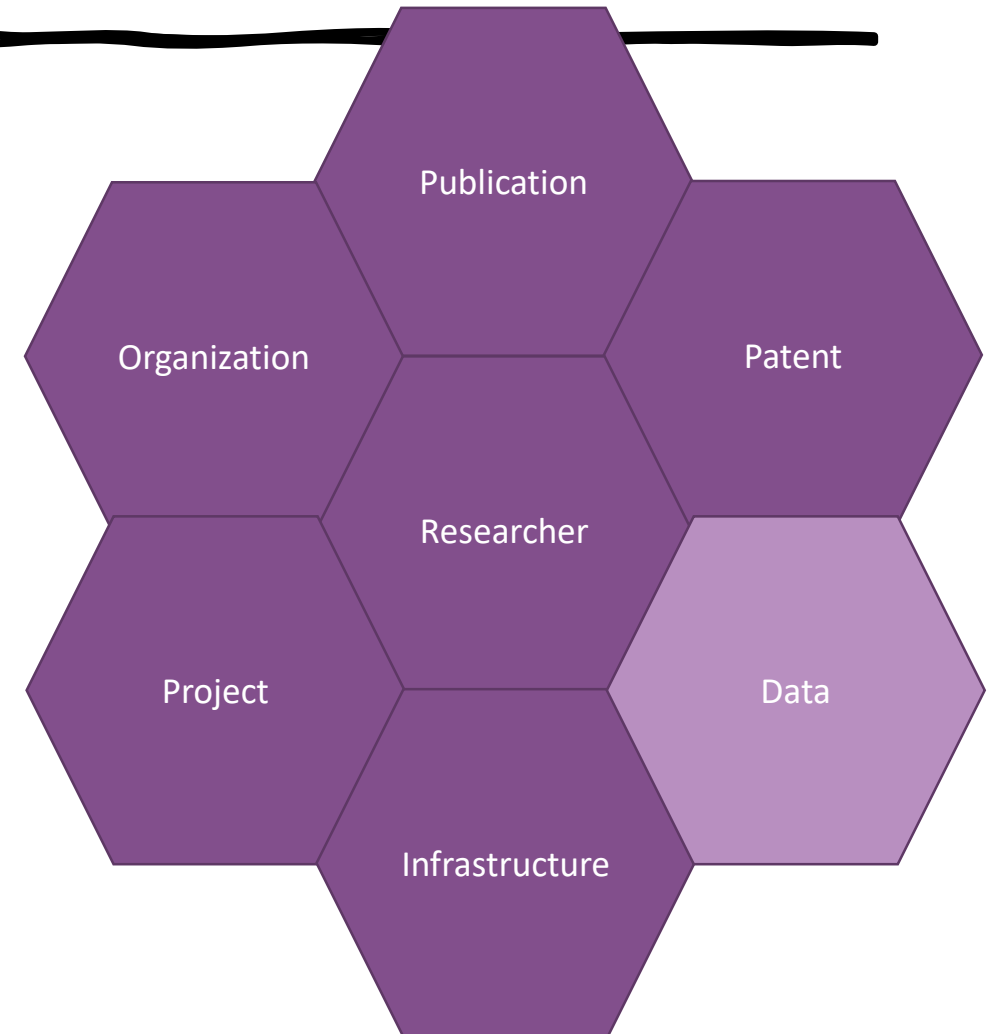
FRIS – Development of an Application Profile for research data

- Interoperability:
  - Means essentially that a user accessing the world through a local / institutional / national portal sees not only local datasets and software but also all datasets and software known to other organisations and members *as if they were local*
  - Required for computer systems to discover, contextualise, select, access, transmit or process datasets

- How?
  - Metadata characterising the objects
    - Description, discovery; contextualisation; coupling users, software and computing resources to data (to provide a Virtual Research Environment)
    - Machine- and human-understandable
    - Management of (meta)data is also relevant (research proposal, funding, project information, research outputs, outcomes, impact…)

  - Techniques to match and map those
    - Convergence to common metadata model
    - Interoperation among many metadata models

FRIS – Development of an Application Profile for research data

- Syntax (metadata standards structures – what they cover)
  - Objects/entities and properties/attributes

- Semantics (terms in metadata standards – what they mean)
  - Relationships between terms including multilinguality

- Temporal information
  - Relationships not base information
  - Provides the temporal interval when the assertion is true

- Integrity
  - Referential (represent dependencies)
  - Functional (all attributes depend uniquely on the unique ID)

- Represented in some form of first order logic
  - Allows induction and deduction – saves input and permits brokering
  - Performance

Development of an Application Profile for research data

1. Installation of a governance layer (WHO): Flemish Open Science Board WG Metadata & Standardisation

   Representation of Flemish research universities, higher education colleges, strategic research centres, research institutions, Flemish research funders

2. Creation of a business layer (WHAT):

   Inventory of generic metadata models

   Recording of business concepts & meanings by terminological theory
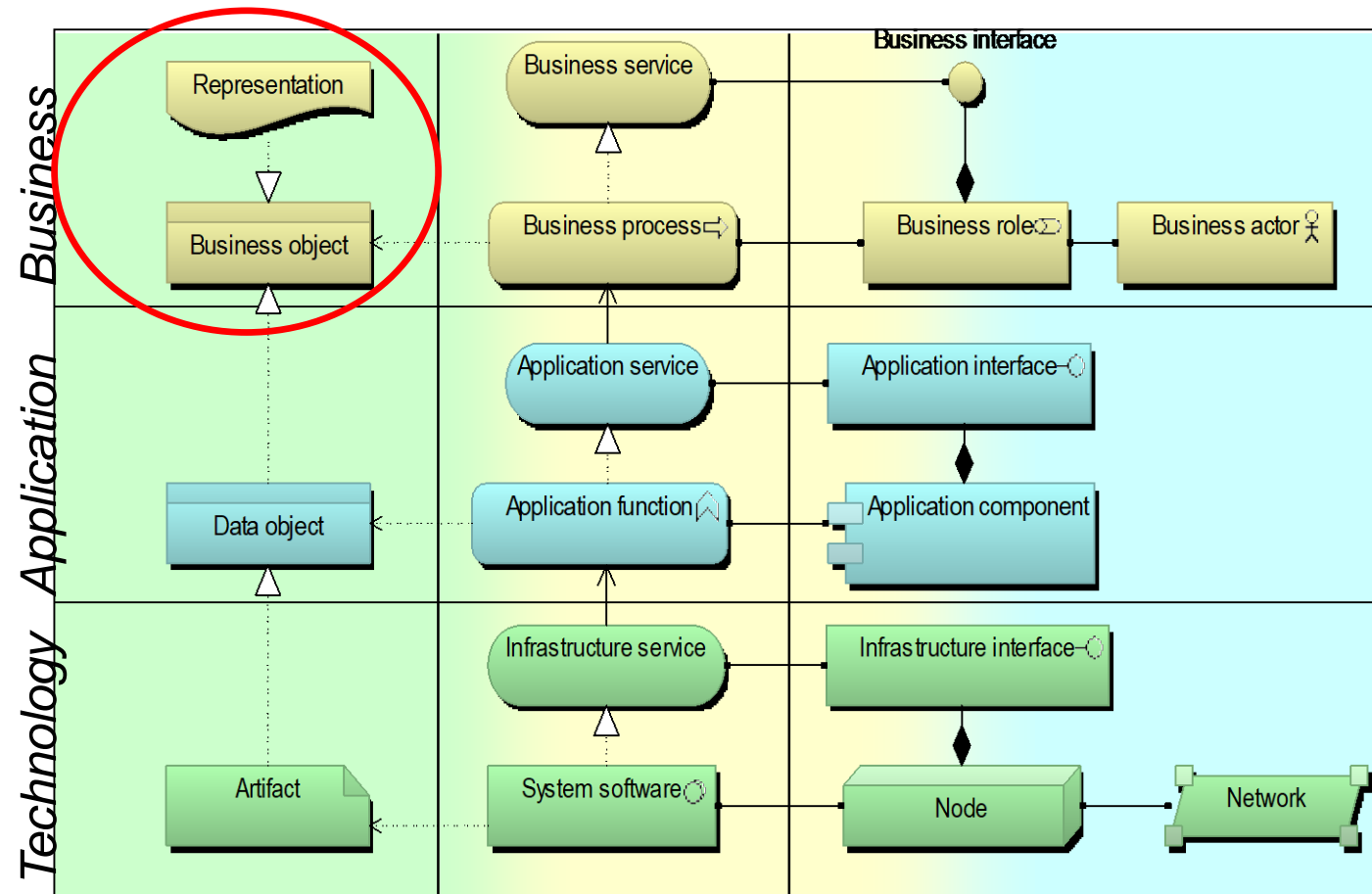
Development of an Application Profile for research data
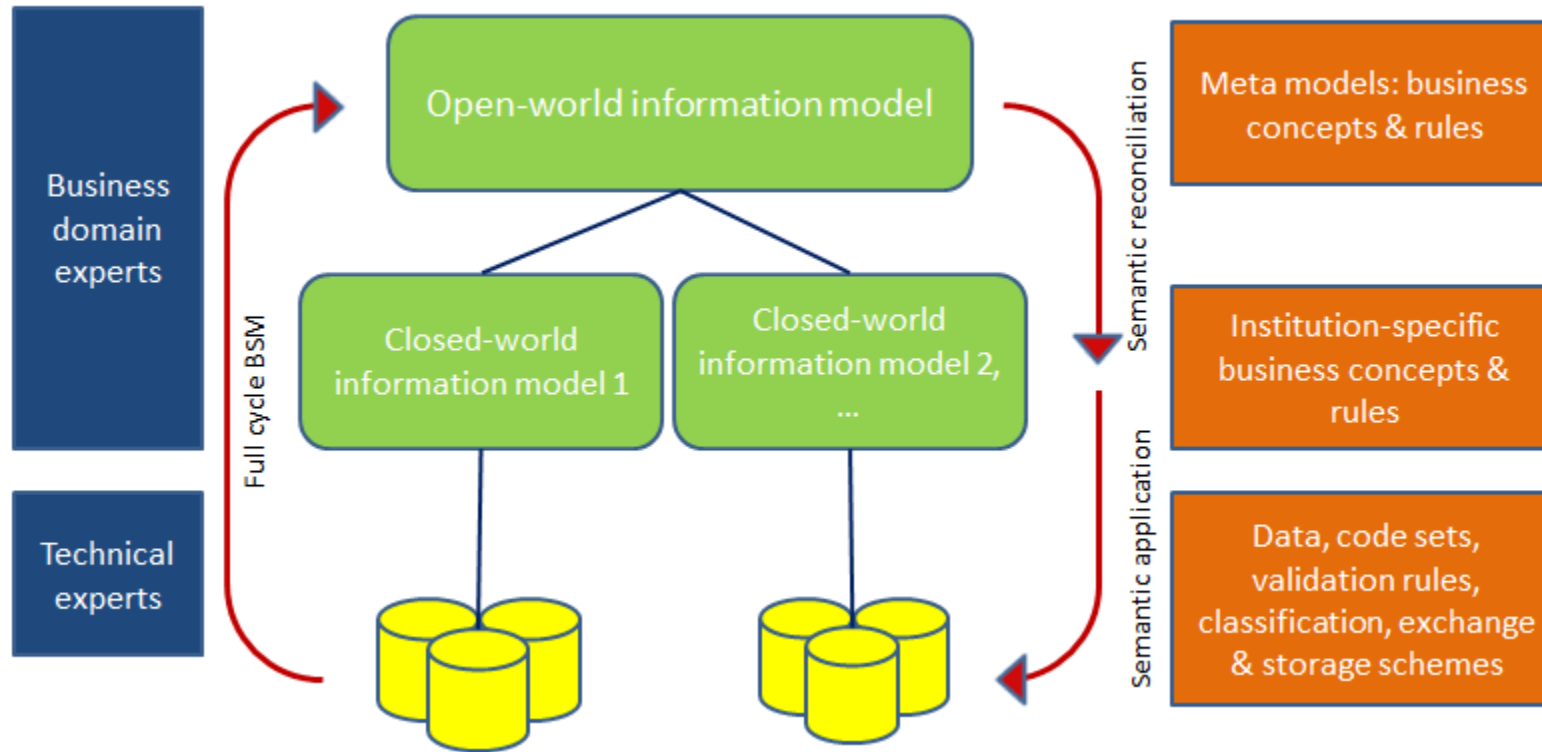
3. Inter-organizational semantic alignment

- Definition of required business concepts on the meta-level
- Collaborative, machine-readable manner
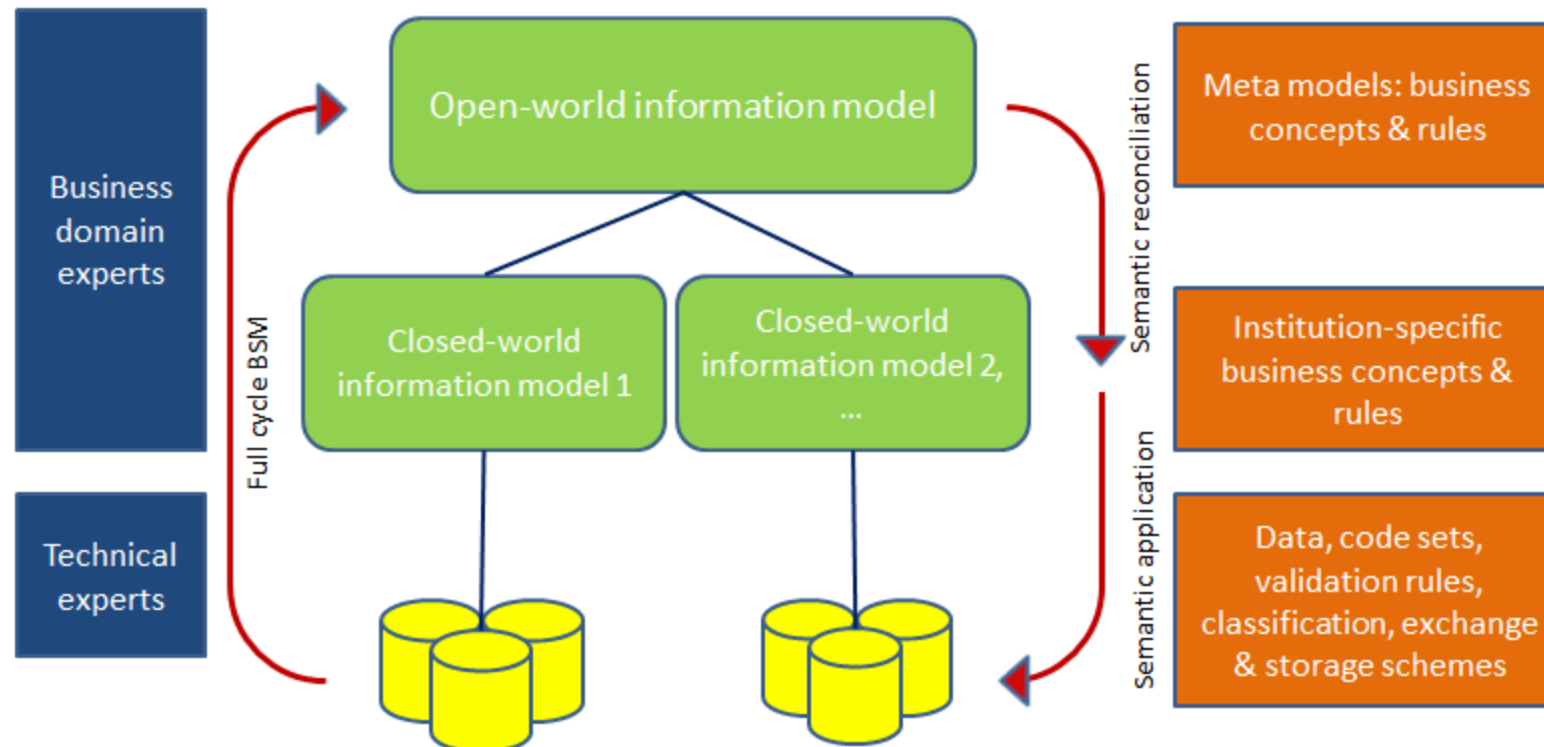
Flemish AP for research data

- Characteristics:
  - 21 properties → 15 originating from DataCite 4.3 model
  - Requirements: M, MA, R, O
  - Values
  - Definitions
  - Examples

Term	DataCite		Mandatory (M), Mandatory if Applicable (MA), Recommended (R), Optional (O)	KPI implications	Value	Definition
Data - Identifier	identifier	https://support.datacite.org/docs/schema-mandatory-properties-v43#1-identifier	M	Mandatory for KPI	value: DOI, handle, ARK, PURL, URN, URL	The Identifier is a persistent a resource, i.e. a concept D record has a minimum of 1 a version DOI.
Data - Identifier type	identifier: identifierType	https://support.datacite.org/docs/schema-mandatory-properties-v43#1-identifier	M		Controlled list: Identifier: DOI, handle, ARK, PURL, URN, URL	The type of the Identifier.
Data - Alternative identifier	alternateIdentifier	https://support.datacite.org/docs/schema-optional-properties-v43#11-alternateidentifier	O		Free text field	The alternative identifier is handle, URL or other (ex. Li repository, a local accession
Data - Identifier type	identifier: alternateIdentifierType	https://support.datacite.org/docs/schema-mandatory-properties-v43#1-identifier	O		Free text field	The type of the Identifier.

Flemish AP for research data

- Deduplication:
  - Description:
    - Abstract
    - Description
  - Subject:
    - Research discipline
    - Keywords
  - Rights:
    - Licenses
    - Access rights

- New:
  - Open Format
  - Legitimate opt-out
  - FAIR data label

Term	DataCite		Mandatory (M), Mandatory if Applicable (MA), Recommended (R), Optional (O)	KPI implications	Value	Definition
Data - Format	format	https://support.datacite.org/docs/schema-optional-properties-v43#14-format	M (universities) / O	Obliged for BOF (universities) from projects starting 01/01/2019, latest by end 2021.	Free text field	Technical format of the dataset.
Data - Open Format			O	Toggle check	Toggle check	Fully open for all parts of the data and it sh... an open format in addition to a non-propri...
Data - Version	version	https://support.datacite.org/docs/schema-optional-properties-v43#15-version	O			The version number of the dataset.
Data - Licenses	rights: rightsIdentifier rightsIdentifierScheme schemeURI rightsList	https://support.datacite.org/docs/schema-optional-properties-v43#16-rights	R, M from 2023	Mandatory for KPI from 2023	example of values : no license, Creative Commons CCZero (CC0) Open Data Commons Public Domain Dedication and Licence (PDDL) Creative Commons Attribution 4.0 (CC-BY-4.0), additional values tbd in TF metrics	Any rights information for this resource, co...
Data - Access Rights	rights: rightsIdentifier rightsIdentifierScheme schemeURI rightsList	https://support.datacite.org/docs/schema-optional-properties-v43#16-rights	M	Mandatory for KPI; datasets underpinning peer-reviewed publications from 2022	values: 'open', 'embargoed' (with indication of expiry date) and 'restricted' or 'closed'	Status on the access possibilities of the dat... Access rights are specified using the OpenA... property you have rightsURI (MA): Use term... Terms vocabulary. The values are: info:eu-repo/semantics/closedAccess info:eu-repo/semantics/embargoedAccess info:eu-repo/semantics/restrictedAccess info:eu-repo/semantics/openAccess

CRIS as leverage for Open Data between institutions

- Metadata availability in CRIS

  - New information object: Data

  - Linking and extending existing objects
    - Project
      - DMP attribute
      - DMP identifier
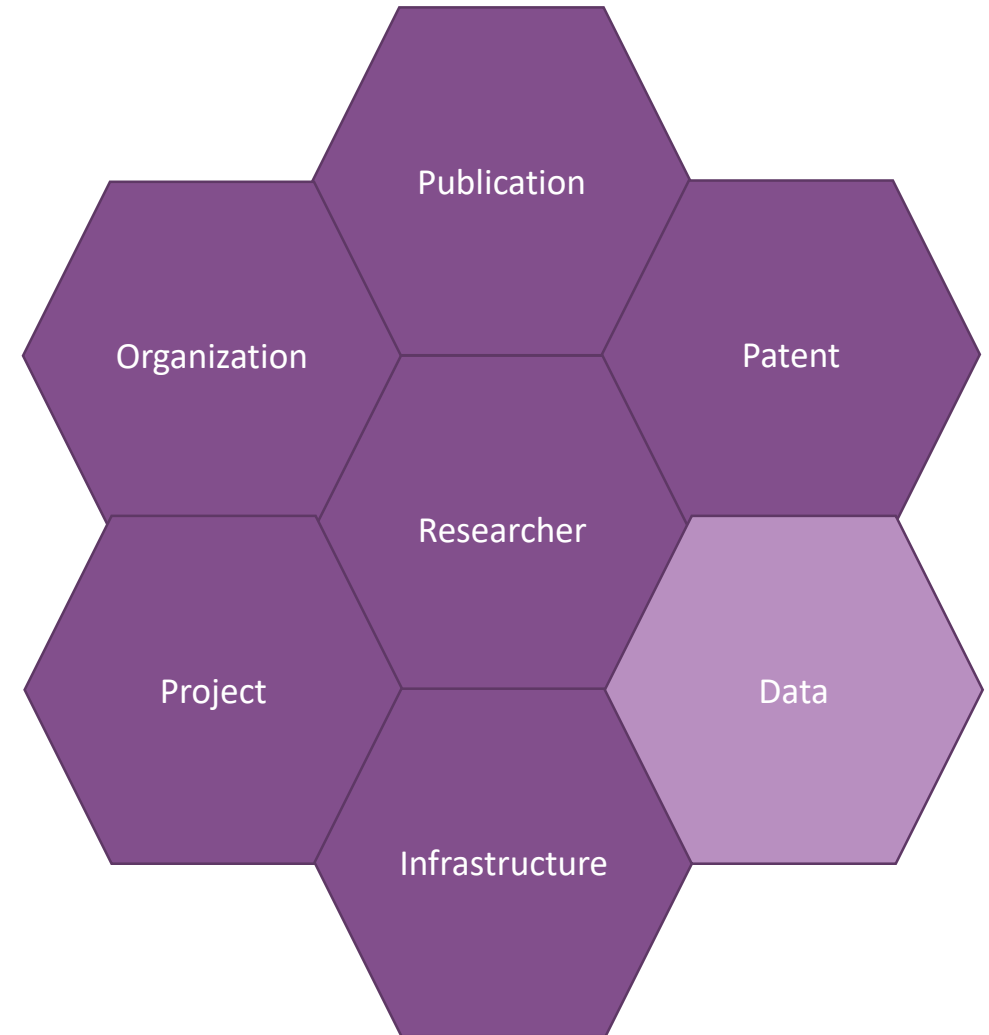
CRIS as leverage for Open Science
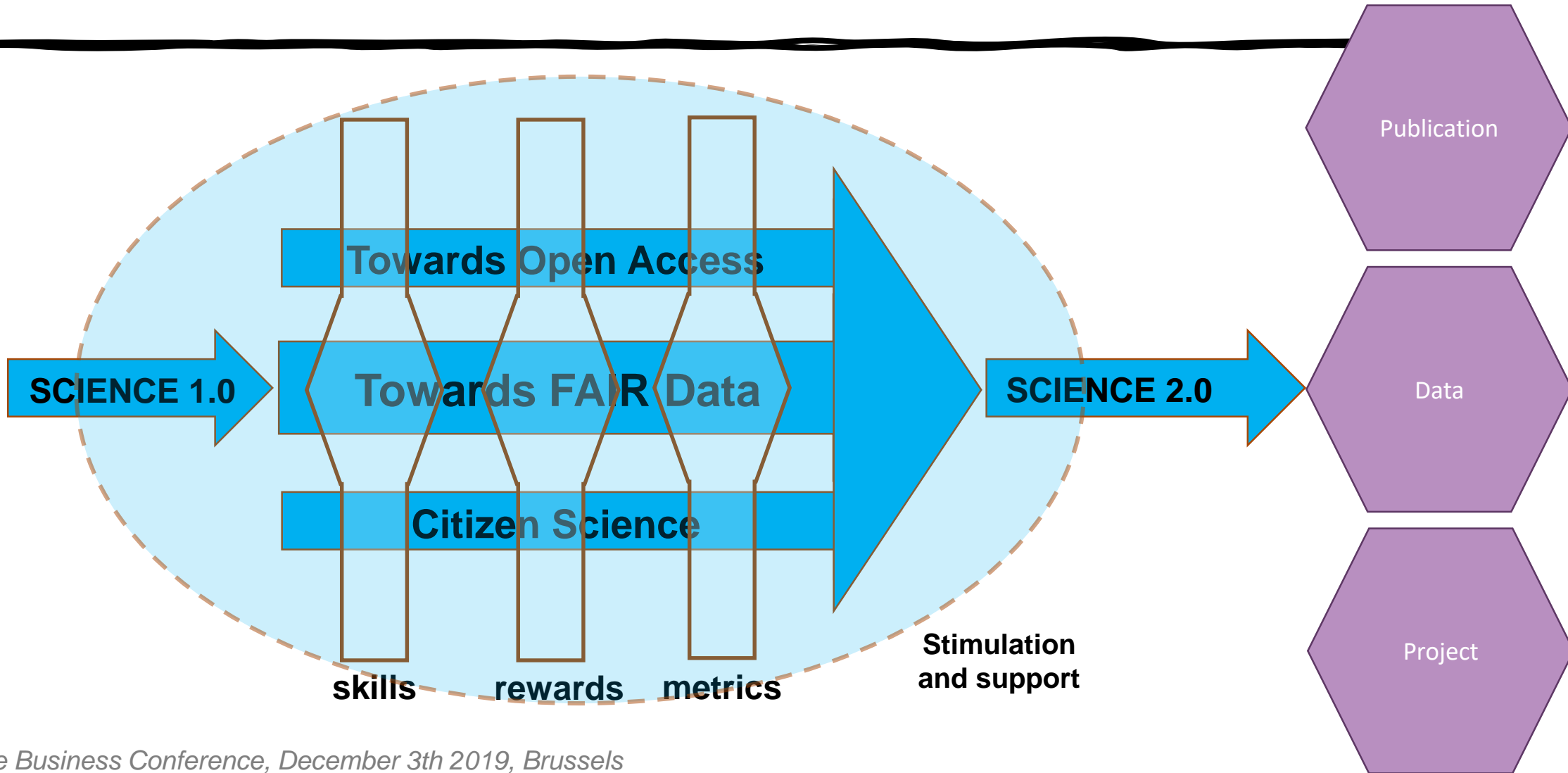
SCIENCE 1.0

Towards Open Access

Towards FAIR Data

Citizen Science

skills   rewards   metrics

SCIENCE 2.0

Stimulation and support

Publication

Data

Project

Research information systems

- Correct, actual, complete Research Information
- Connect data silo's
- Maximum reuse of data
- Reduce system costs

- Reduce administrative burden
- Once-only principle
- Policy monitoring & reporting
- Increase strategic intelligence
- More information services

Publication

Organization

Patent

Researcher

Project

Data

Infrastructure
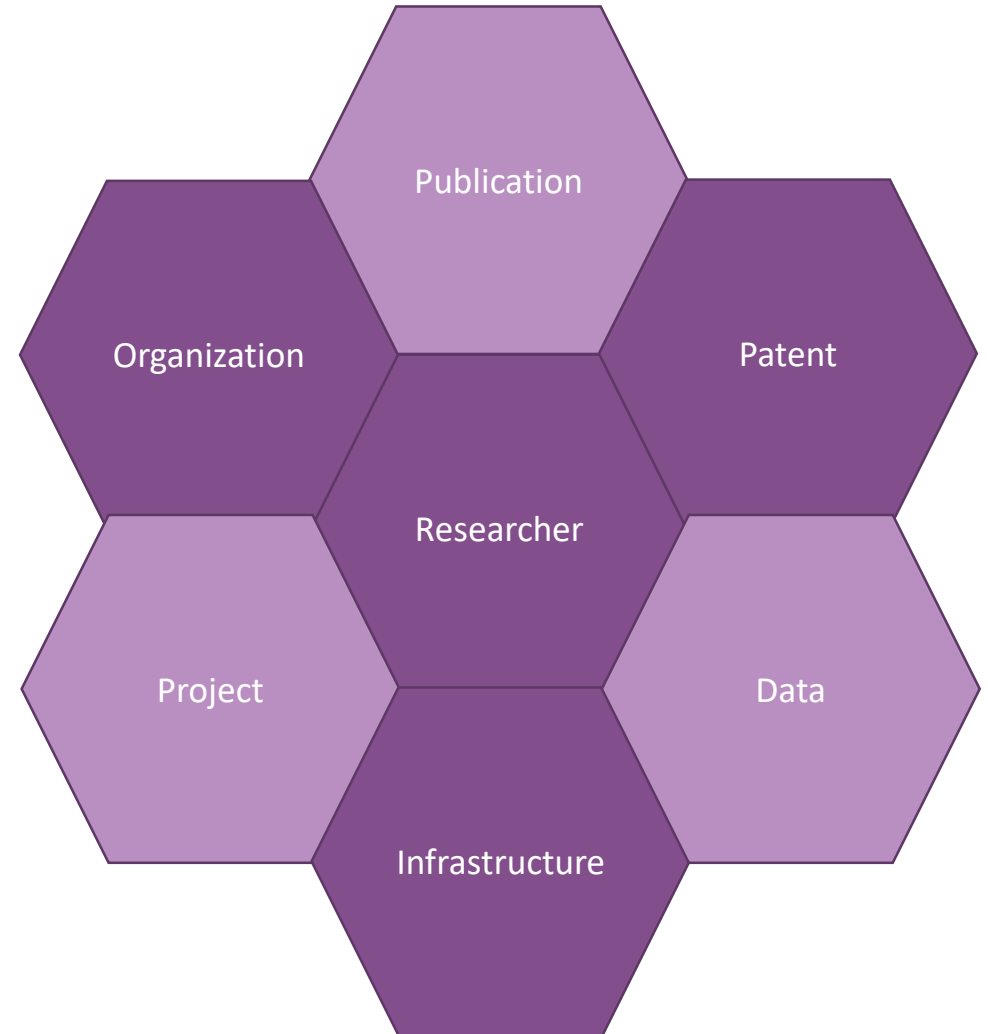
FRIS as leverage for Open Science

- Correct, actual, complete Research Information

- Connect data silo's

- Maximum reuse of data:
  - Researcher (name, identifier, affiliation)
  - Project information
  - Publication information

- Reduce system costs

FRIS as leverage for Open Science

- Only-once principle
  - FRIS ~ EOSC

- Flemish Open Science Policy
  - KPI measurement on Open Science
    - ORCID
    - Open Access label
    - DMP
    - FAIR data label
    - Open data label

FRIS as leverage for Open Science

- Increased strategic intelligence
  - Researchers
  - Research Managers
  - Research Funders
  - Government

- More information services
  - Researchers
  - Industry
  - Public

Publications lifecycle

Open Access publishing (OA)

Workflow for meeting the Open Access / REF policy requirements & for having research papers published Gold Open Access

Research Data Management (RDM)

Workflow for creation & deposit of datasets associated with research publications (supplementary materials)

Create Pure record w/ date of acceptance & full-text accepted author manuscript as soon as possible upon manuscript acceptance

Want Gold OA for article?

Yes / No

Green Open Access option. No further action required (beyond publisher's copyright form)

Send funding request to openaccess@strath.ac.uk (ideally forwarding acceptance notice)

Case-specific funding eligibility confirmation & processing of the Open Access fee (APC) payment

Manuscript preparation

Submission * †

Acceptance with revisions

Final acceptance

Copyright transfer form

Gold Open Access request to publishers

APC payment ‡

First online release!

- Prepare supporting data
- Create basic dataset record in Pure (Title, creator, Data made available)
- Save as "Entry in progress"
- Receive a "place-holder" DOI
- Add "place-holder" DOI to paper's **Data Statement**
- Complete dataset record & data upload

On acceptance:
- Set completed dataset record "for validation"
- Final check for record completeness
- Active DOI minted
- Record validated
- Public KnowledgeBase record created **before** paper is made public

* Make sure the funded project grant number is correctly acknowledged in the manuscript & a data statement is included.
† Email openaccess@strath.ac.uk if you are submitting to a Springer journal. Your article may be eligible for Gold OA at no cost.
‡ Some publishers wait of the APC to be paid before releasing the article.

@StrathRDMS   openaccess@strath.ac.uk
@StrathclydeOA researchdataproject@strath.ac.uk

Source: P De Castro (2018), "The Role of Current Research Information Systems (CRIS) in Supporting Open Science Implementation: the Case of Strathclyde". ITlib Special Issue 2018: pp 21–30, https://doi.org/10.25610/itlib-2018-0003

Potential of CRIS for the RMA community
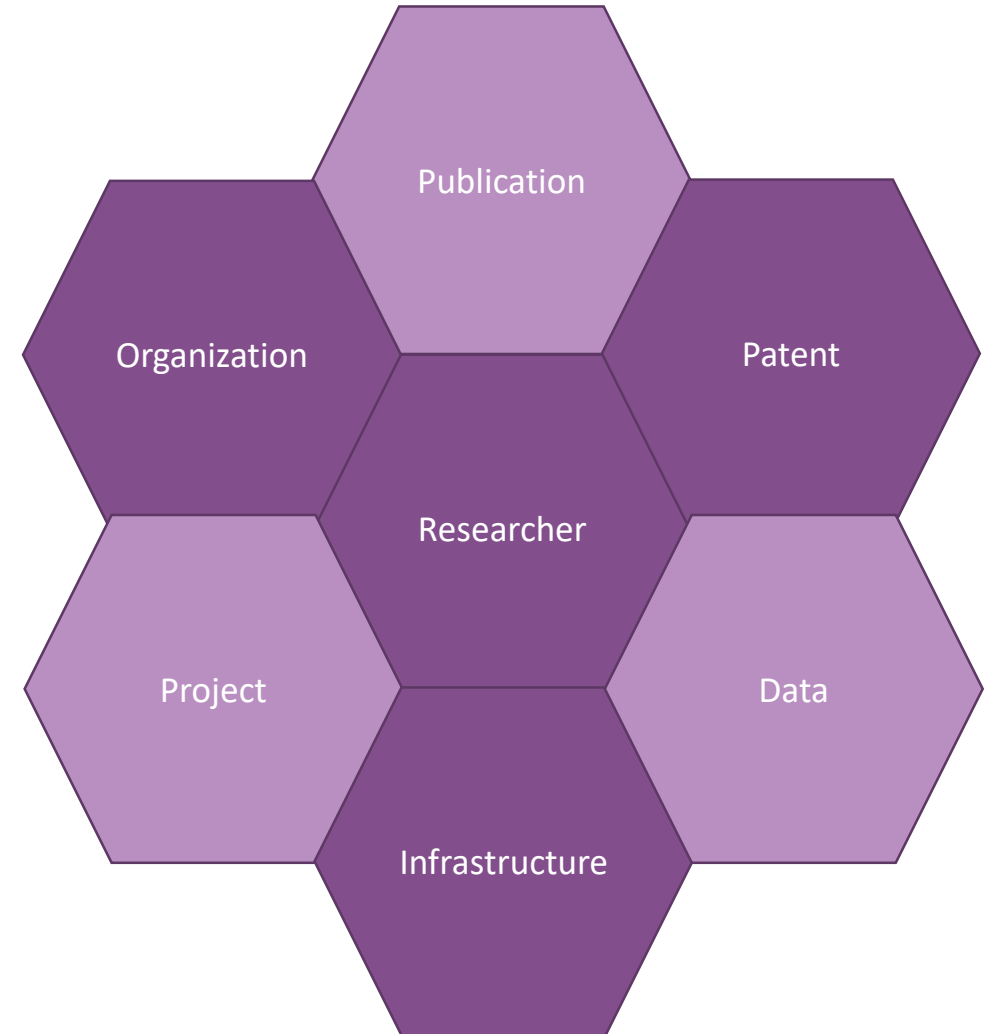
- Correct, actual, complete Research Information

- Connect data silo's

- Maximum reuse of data

- Reduce system costs

- Reduce administrative burden

- Once-only principle

- Policy monitoring & reporting

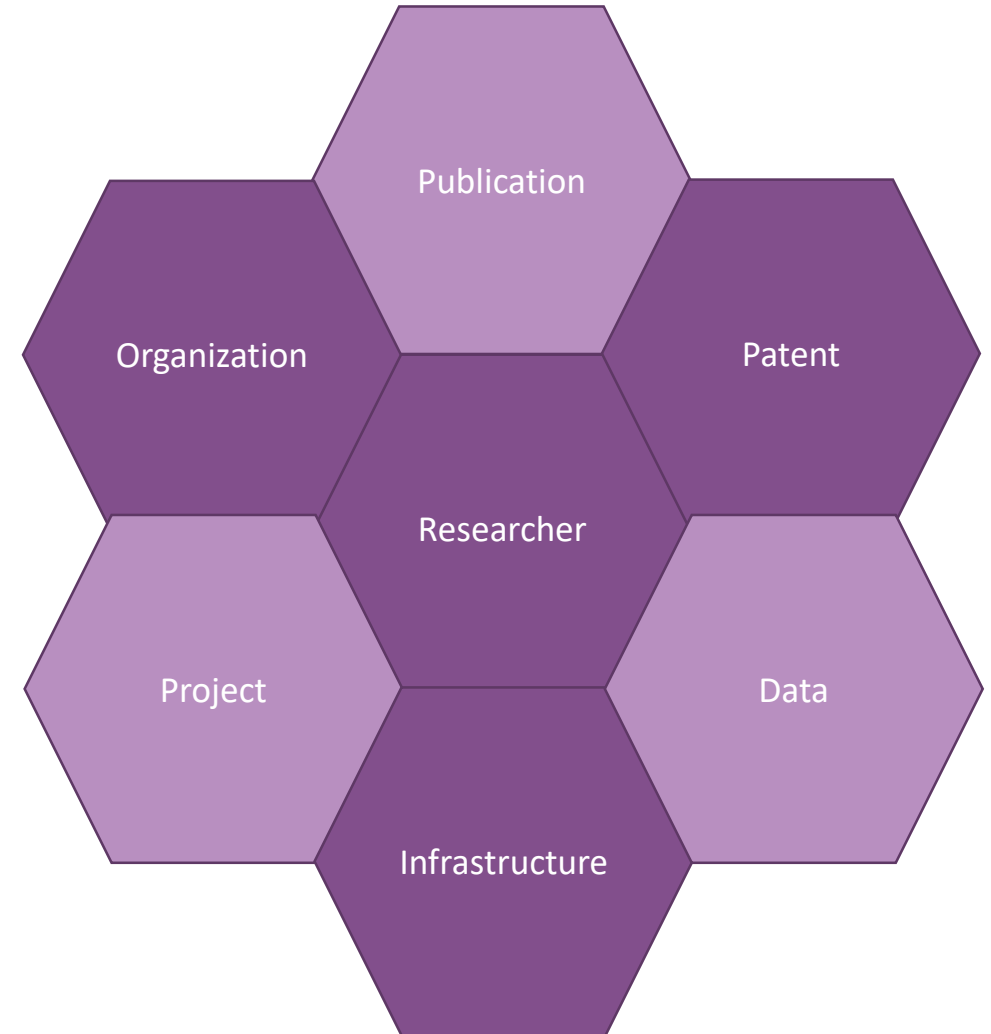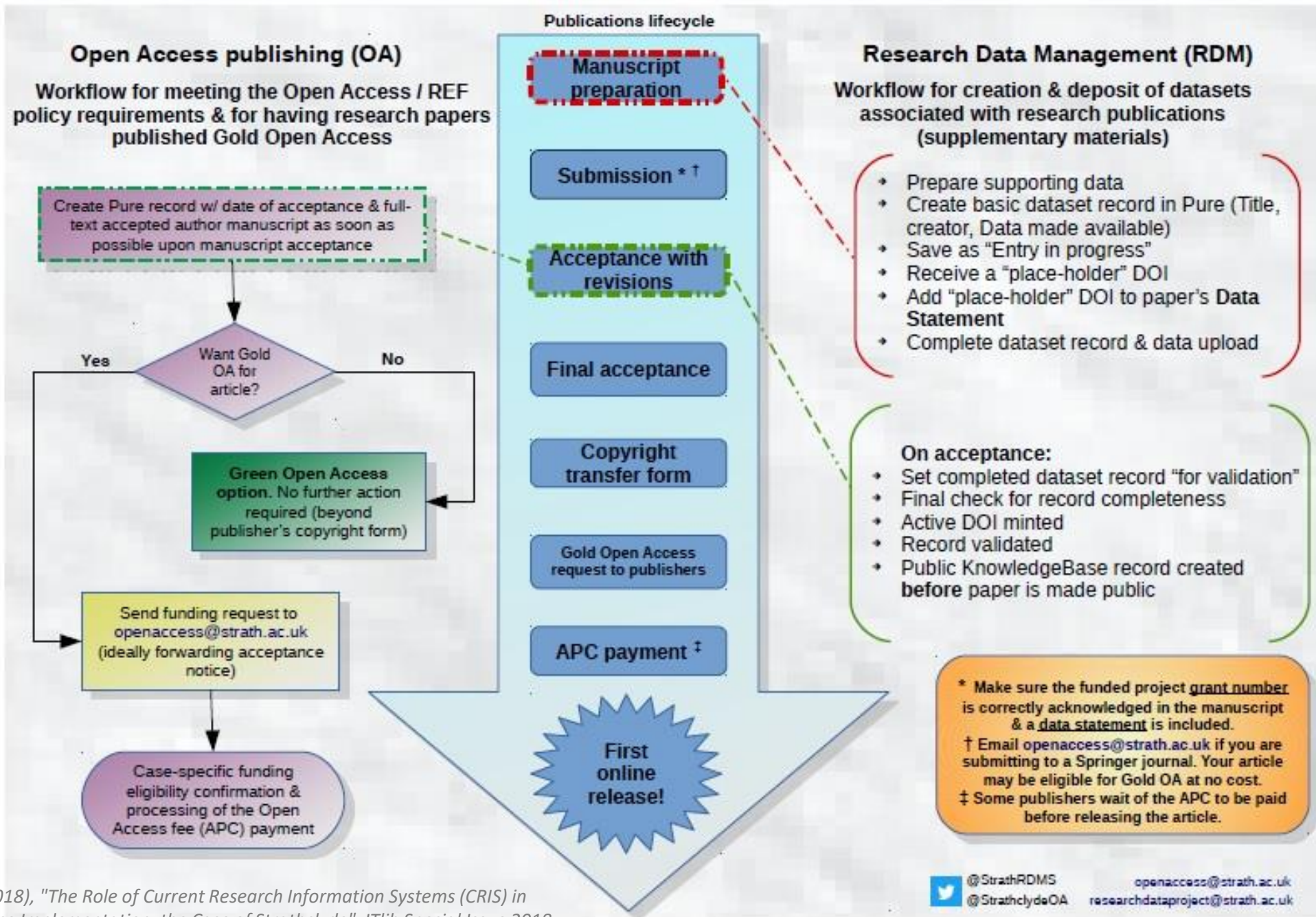- Increase strategic intelligence

- More information services

- Alignment with processes is crucial!

2021.02.11 Joint euroCRIS/EARMA webinar: "RIM v RMA: Mutual areas of interest between Research Information Management (RIM) and Research Management and Administration (RMA) professionals"

Collection's Items (Sorted by Submit Date in Descending order): 1 to 19 of 19

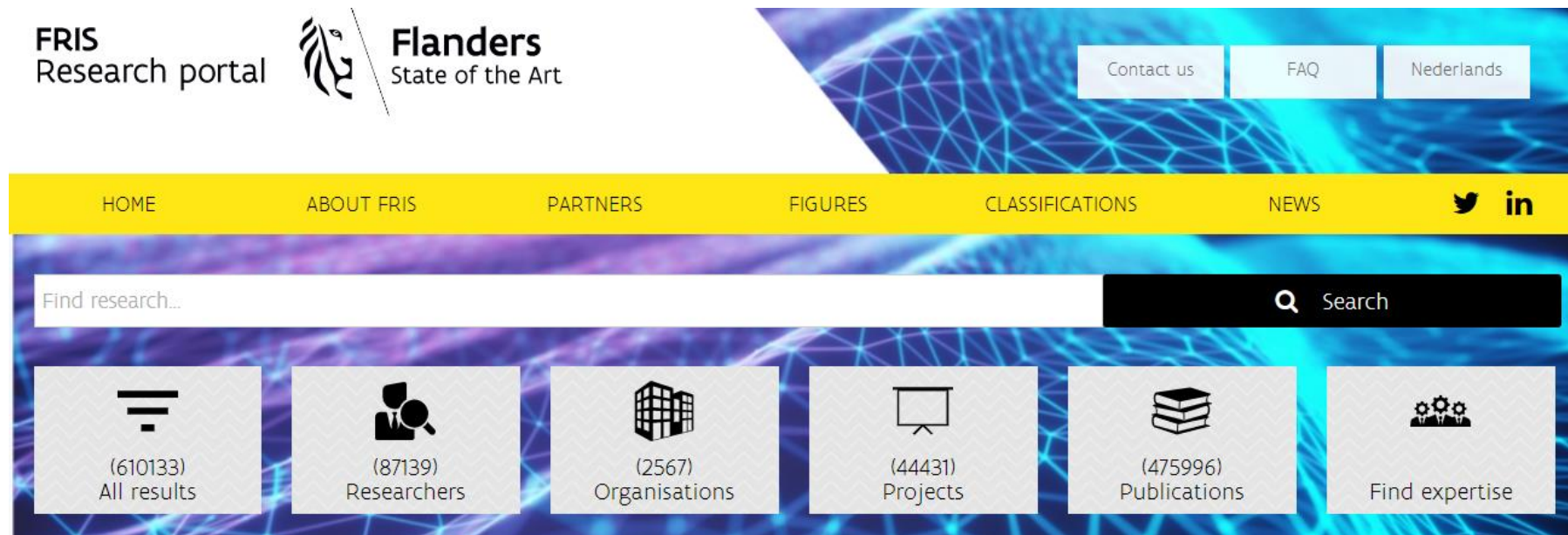| Issue Date	Title	Author(s)
11-Feb-2021	A one platform approach to research management	Hackney, Jon
11-Feb-2021	'Managing' the Research Lifecycle and Research Information at Edinburgh Napier	Ramage, Lindsay
11-Feb-2021	Research Management and Administration (RMA)	Kerridge, Simon
11-Feb-2021	Synergies between RIM and RMA: the Flemish case	Vancauwenbergh, Sadia
11-Feb-2021	Joint euroCRIS/EARMA webinar on RIM v RMA: introduction	De Castro, Pablo

Research Information Systems as Leverage for Open Science

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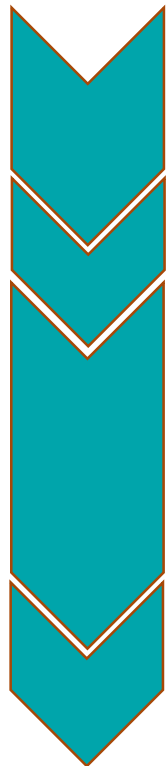# CRIS as leverage for Open Data between institutions

- Case: Flemish Research Information Space (FRIS)

Source: researchportal.be/en

Research information systems

- Research management community
  - Processes (ex. Project)

  - Pre-project

  - Funding award

  - Post-award research project

  - Post project

Organization
Rector's Office, HR Office

Project
Project Man. Office, Finance

Publication
Library

Researcher
Student Office, HR Office

Infrastructure
Project Man. Office, Finance, Ultimo

Patent
Knowledge transfer

Data
Project Man. Office, Library