Landscape of policies, funding and interoperability framework for international science

19 October 2022

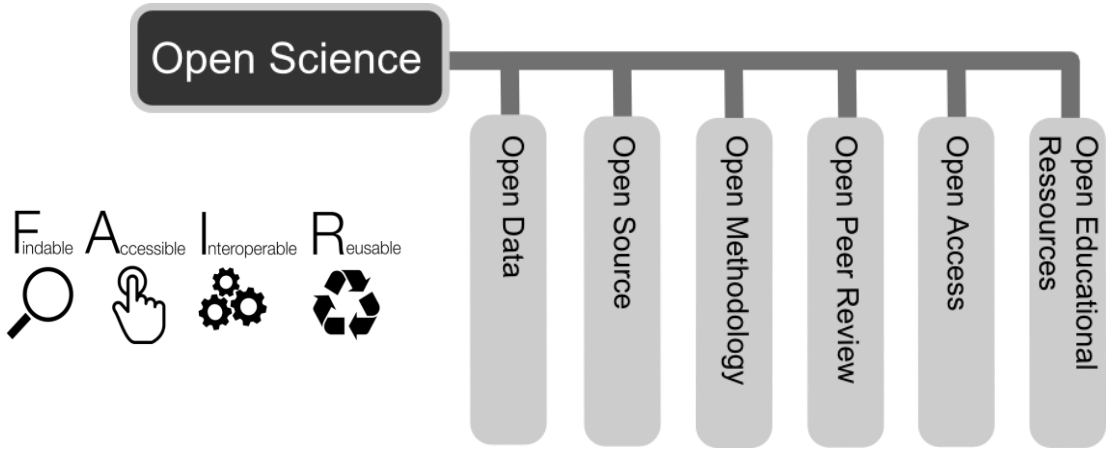
In the next 15 minutes I’d like to introduce you:

* Science in transition - Open Science
* European priorities and EOSC
* Open Science Policies
* Funding models
* Interoperability famework
* Global initiatives

Science in Transition

01 | 01 | 2022 by Author

Science in Transition



https://commons.wikimedia.org/wiki/File:Open_Science_-_Prinzipien.png

The **Open Science** paradigm affects the whole research cycle and all its stakeholders

It implies sharing knowledge and tools:

- "as early as possible" in the research process;
- "as openly as possible";
- "as FAIR as possible";

- ➢ Developing an enabling policy environment for open science
- ➢ Investing in open science infrastructures and services
- ➢ Investing in human resources, training, education, digital literacy and capacity building for open science
- ➢ Provide incentives

not only within a discipline but also between disciplines and society at large.

European Priorities

19 | 10 | 2022 by Marialuisa Lavitrano

Open Science: a Political Priority of the Union

- 2016: Council Conclusions on the 'Transition Towards an Open Science System'
- 2018: EC Recommendation on 'Access to and Preservation of Scientific Information'
- 2020: EC Communication on the 'New ERA'
- 2021: Council Recommendation on a 'Pact for R&I in Europe'
- 2021: Council Conclusions on the 'Future Governance of the ERA' including the 'ERA Policy Agenda
- 2022: Council Conclusions on 'Research Assessment"

Member States' Commitment to 20 ERA Actions

Status: 13/07/2022

Priority area: 1 Open Science including EOSC
4 Research careers
8 Research Infrastructures

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	19	20	Total
Austria (AT)	■		■	■	■	■	■	■	■	■	■	■	■				■		13
Belgium (BE)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	18
Bulgaria (BG)				■				■				■		■	■		■		7
Croatia (HR)	■		■																4
Cyprus (CY)	■			■	■		■	■	■	■	■	■			■		■		9
Czechia (CZ)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	18
Denmark (DK)	■	■	■	■	■		■	■	■	■	■	■					■		13
Estonia (EE)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	18
Finland (FI)	■		■		■	■	■	■	■	■	■	■	■						11
France (FR)	■	■	■	■	■	■	■	■	■	■	■		■	■	■		■	■	16
Germany (DE)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	18
Greece (EL)	■				■			■					■	■					5
Hungary (HU)																			13
Ireland (IE)																			5
Italy (IT)	■	■	■	■	■	■	■	■	■	■	■	■	■	■			■		14
Latvia (LV)	■		■	■	■	■	■	■											7
Lithuania (LT)	■		■	■	■	■	■	■	■	■	■	■	■	■	■				14
Luxembourg (LU																			0
Malta (MT)	■		■	■					■	■	■	■	■						5
Netherlands (N	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	16
Poland (PL)	■		■	■	■		■	■	■	■	■	■		■	■				11
Portugal (PT)																			18
Romania (RO)	■		■	■				■	■	■	■	■		■				■	8
Slovakia (SK)	■		■	■				■	■	■	■	■	■						9
Slovenia (SI)	■		■		■	■	■	■	■	■	■	■				■			10
Spain (ES)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	16
Sweden (SE)	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	10
Total	23	12	22	24	18	15	16	23	19	23	17	18	13	16	15	8	15	9	

What is EOSC?

- Virtual space where science producers and consumers come together
- Environment in which data can be brought together with services to perform analyses and address societal challenges

A Web of scientific insight

- Web of FAIR Data and related Services
- Federation of relevant existing and future data sources
- Federation of e-Infra and Research Infrastructures

Image: Martin Reisch https://unsplash.com/photos/6DivtP_WRYs

EOSC implementation: a two-stage approach

EOSC phase 1: preparatory	EOSC phase 2: continuos EOSC roll-out
2018 - 2020	**2021 - 2030**
H2020 calls/grants approach	**Partnership approach in Horizon Europe**
EOSC roadmap 2018-2020 by the European Commission	EOSC Strategic Research and Innovation Agenda (**EOSC SRIA**) 2021-2027 by the EOSC Community
Initial EOSC Governance (Member States and the Commission to steer and oversee initial EOSC development)	**New EOSC Governance** (Increasingly stakeholder-driven, high-level steering role maintained for the European Commission and the Member States)

Activities to deliver the EOSC as a trusted virtual environment supporting Open Science and data and service-driven research is co-designed with MS/ACs and stakeholders in the framework of the **EOSC European partnership**.

EOSC Partnership

EOSC STEERING BOARD

Anna Panagopoulou

European Commission

DG-RTD
DG-CNECT

Volker Beckmann

Member States and Associated Countries

MoU

Partnership Board

MS/AC collective representation

Exchange of information

Tripartite Collaboration

EOSC ASSOCIATION

President
Karel Luyben

Secretary General
Ute Gunsenheimer

BOARD

General Assembly
including organisations performing research, funding research, providing services, organisations mandated by MS/AC and other organisations)

The partnership formed by the EC and the EOSC Association envisages 1 billion euro to roll-out EOSC during phase 2

The EOSC Association Today

27 Mandated Organisation - 133 Members - 78 Observers

EOSC-A Brain-Pool: 13 Task Forces

Over 400 volunteers

Implementation of EOSC

- Rules of Participation compliance monitoring
- PID policy and implementation
- Researcher engagement and adoption

Technical challenges on EOSC

- Technical interoperability of data and services
- Infrastructure for quality research software
- AAI Architecture

Metadata and data quality

- Semantic interoperability
- FAIR metrics and data quality

Research careers and curricula

- Data stewardship curricula and career paths
- Research careers, recognition and credit
- Upskilling countries to engage in EOSC

Sustaining EOSC

- Financial sustainability
- Long-term data preservation

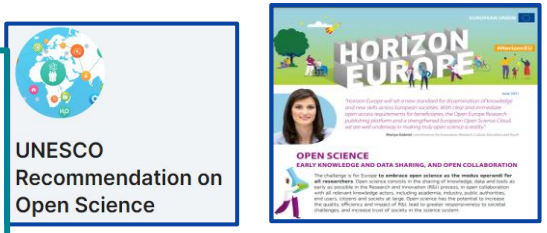
Open Science Policies

eosc

Open Science strategy

- **Open Science policies** and **governance**
- **Services** and **infrastructures**
- **Skills** and **training**
- **Incentives** and **recognition**
- **Alignment** with **global projects and initiatives**

Key to ensure EOSC sustainability



find more at https://zenodo.org/record/4486610#.YlPwkshBw2w

Filipa Pereira: *Open Science Strategy Landscapes*

Status of national Open Science

- different M… …ogressing at different paces on policy on **Open Access to** **…cognition** related to data sharing

Status o…

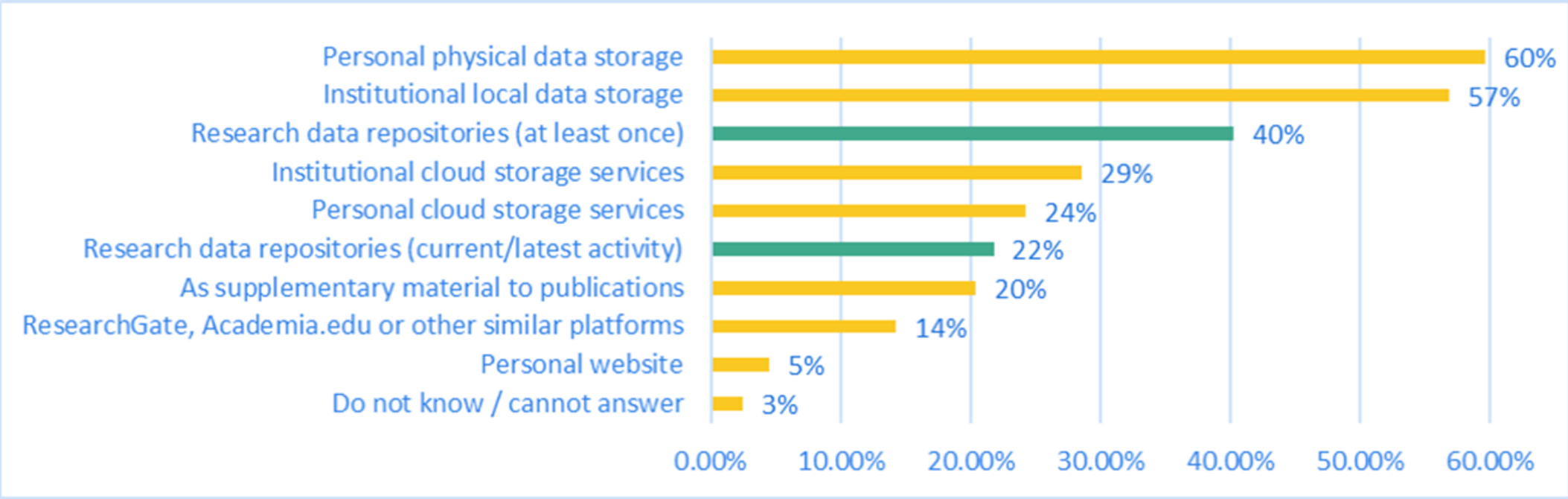
…tructures and services available, Competence centers, Large-scale data preservation and

Status of implementation of FAIR principles:

National service for data management plans, submission of DMP and deposit of data in trustworthy data repositoriesas a requirement,

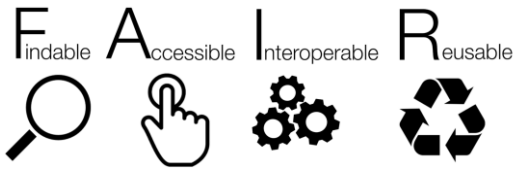
Research data depositing

- **Research data repositories are not the most common destination for storing usable research data**.
- Researchers usually (~**60%**) stored data in **personal** physical data storage or institutional **local** data storage.
- **40%** of researchers occasionally stored data in **research data repositories**.
  22% respondents did that during the current/latest research activity.

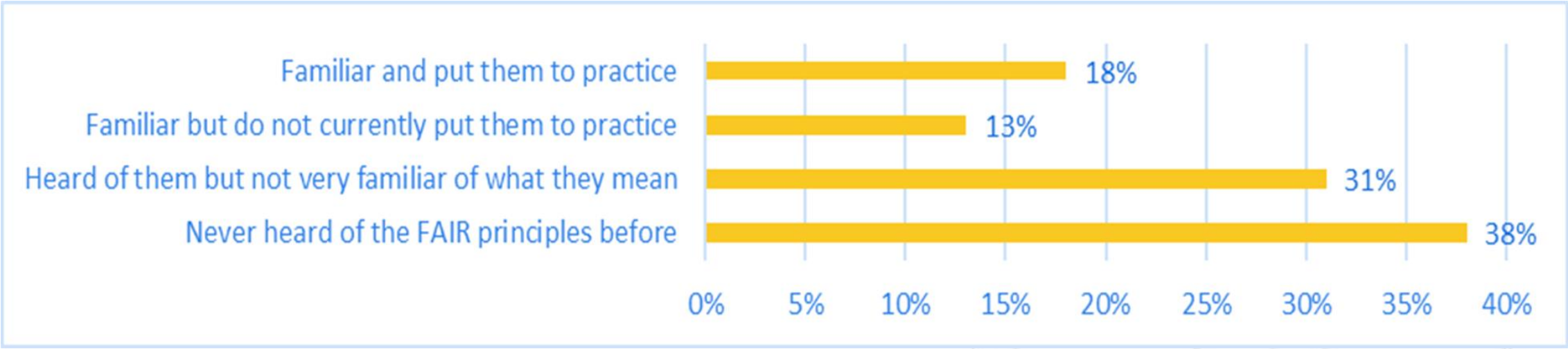


Source: European Research data landscape study 2022 commissioned by the European Commission
Elaboration by the study performers based on unweighted researchers' survey data. Total N=10,914.

Awareness of FAIR



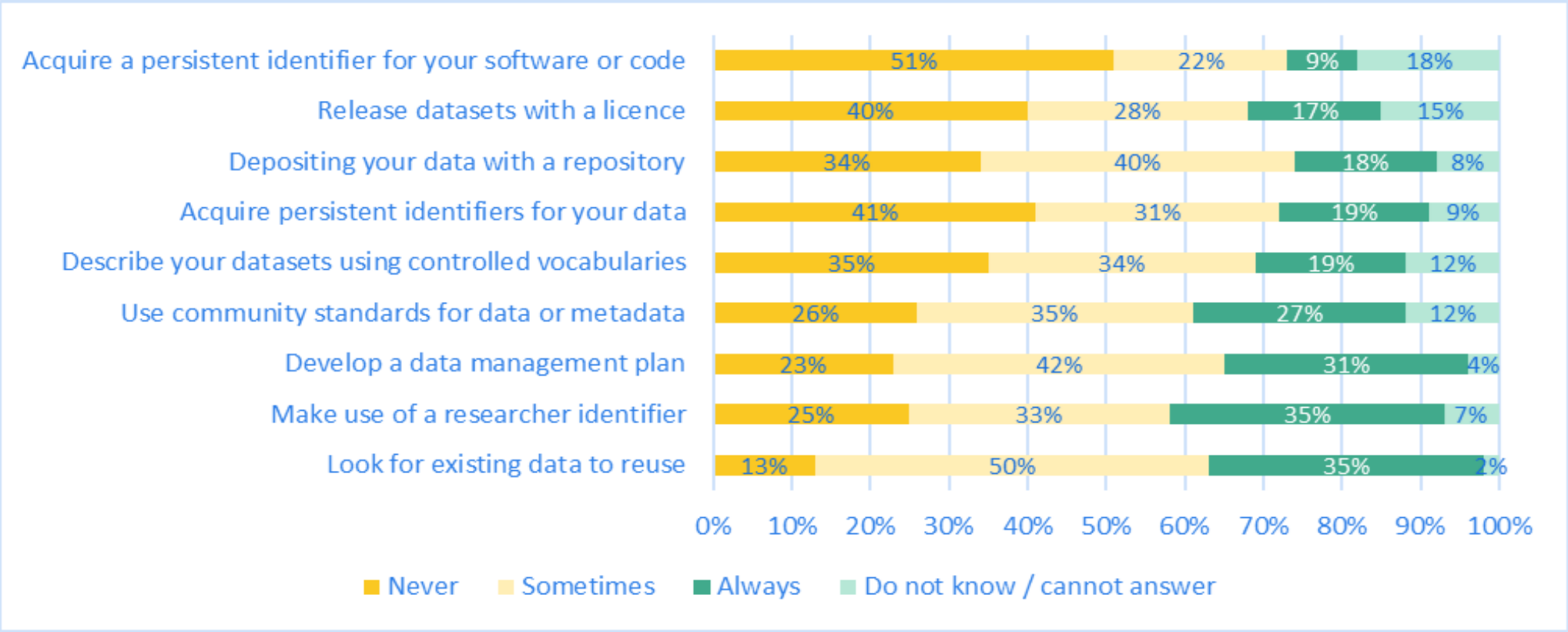
- About **2/3** researchers have **some level of familiarity** with the FAIR principles.
- More than **1/3** researchers have **never heard** of FAIR principles.



Source: European Research data landscape study 2022 commissioned by the European Commission
Elaboration by the study performers based on unweighted researchers' survey data. Total N=11,849

FAIR aligned practices

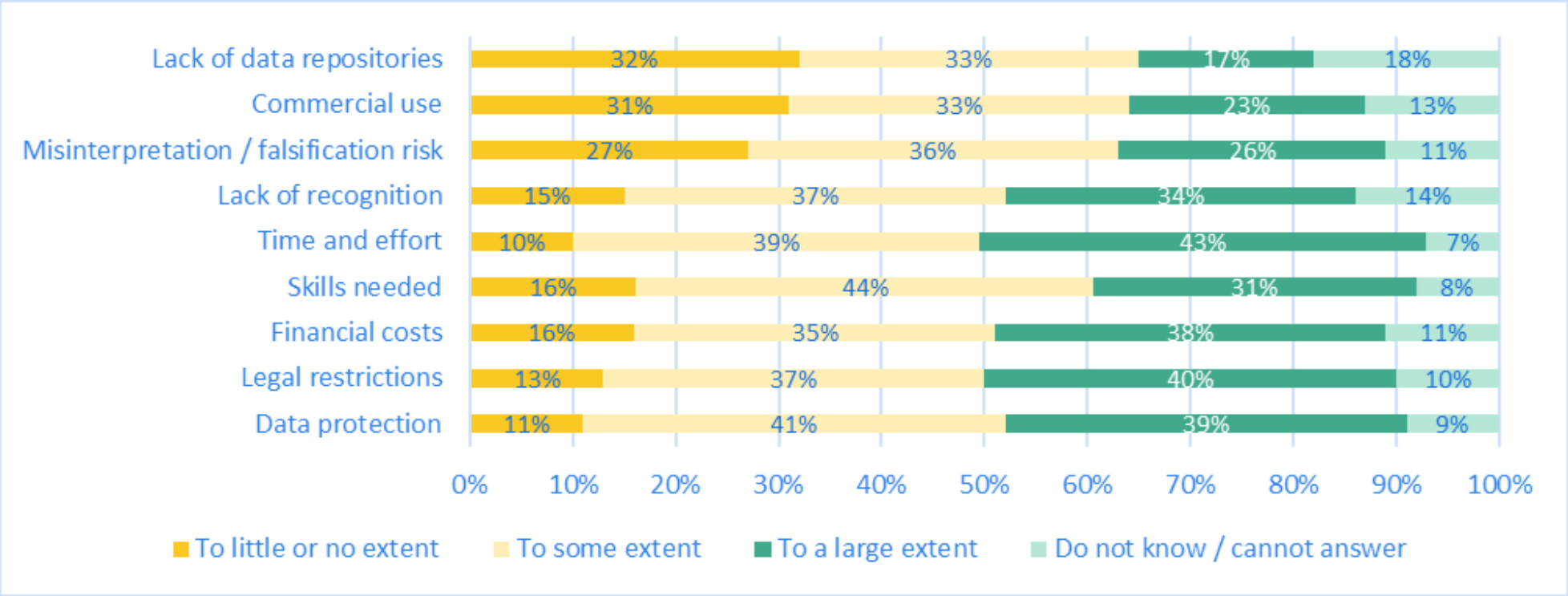
- More than **2/3** researchers develop **DataManagementPlans** but other FAIR-aligned practices are less common.
- **Allocating PIDs to data is the least common practices**



Source: European Research data landscape study 2022 commissioned by the European Commission
Elaboration by the study performers based on unweighted researchers' survey data. N=10,868-10,889, depending on option

Barriers

- **Time**, **effort** and **financial costs** required for RDM and data sharing are seen as a challenge
- **Data protection** and **legal restrictions** are also seen as big obstacles
- **Lack of recognition** also seen as a major barrier



Source: European Research data landscape study 2022 commissioned by the European Commission
Elaboration by the study performers based on unweighted researchers' survey data. N=9,898 (selected at least one option).

Funding Policies

Facts & Figures

- Up to 0.83% to 2.16% of the GDP is spent on research.
  This is well below the target of 3% in all countries.

- In several countries' investment strategies for research infrastructures, e-Infrastructures and data infrastructures are aligned to either national or European investment strategies.

- Only few countries have Open Science investment strategies in place.

Dale Robertson - EOSC Synergy Perspective and Recommendations on Funding

Funding Model

EOSC Pillar

To identify a single funding model for EOSC is very challenging and not an appropriate solution.

The financial models differ depending on the type of resources provided.

The current funding model for EOSC infrastructure, i.e. EU calls within Horizon Europe, does not suffice

EC funding for EOSC should be substantially complemented by national funding linked to the specific investments

Cost-sharing of infrastructure works if there is a clear scaling advantage

Funders and the broader research community need to think about the transition from project funding to sustained funding.

5 business model patterns suitable for OS services: advertising, commissioning (percentage-based fees), pay-per-use, subscription and public funding.

Rebecca Reichenbach - Getting a Grip on Sustainability

The new governance framework for digital transition launched in March 2021 by the European Commission (EDIC - European Digital Infrastructure Consortium) for funding multi-country projects deserves investigation by EOSC. It proposes a combination of investments from the EU budget, the Member States and the industry

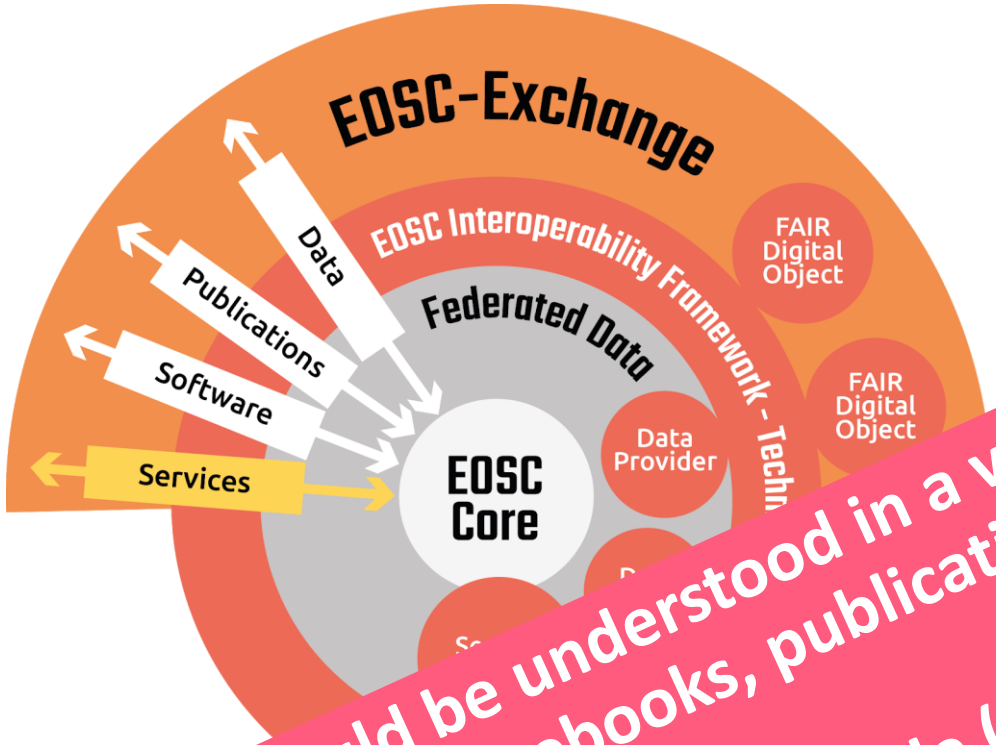
	Advertising	Commissioning	Pay-per-use	Subscription	*Public funding*
Data as a Service		x	x		*x*
Platform as a Service	x	x	x		*x*
Software as a Service		x		x	*x*

Lars Fischer - Funding Models supporting Cross Border Collaborations

Interoperability framework

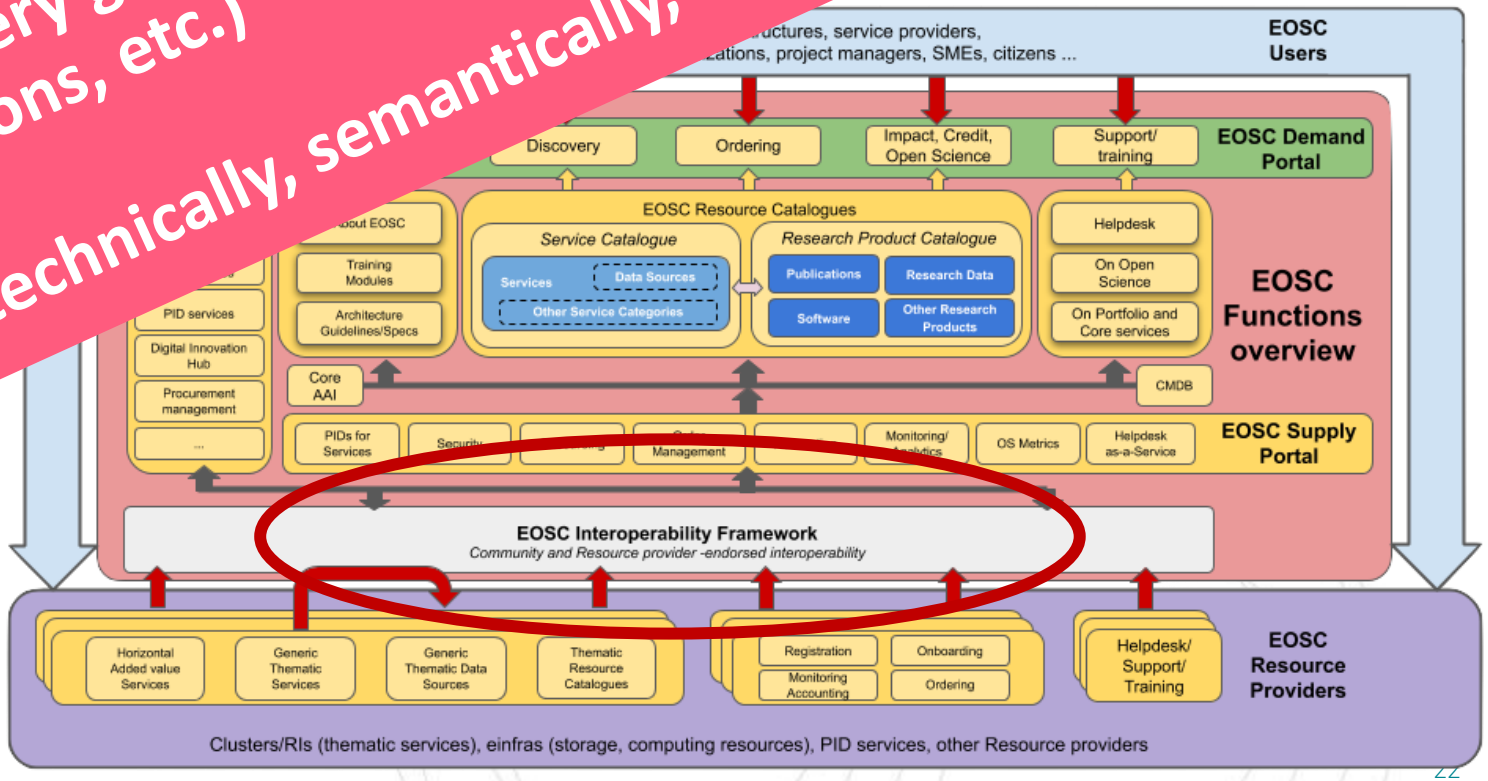
19 | 10 | 2022 by Marialuisa Lavitrano

EOSC Interoperability Framework in cont

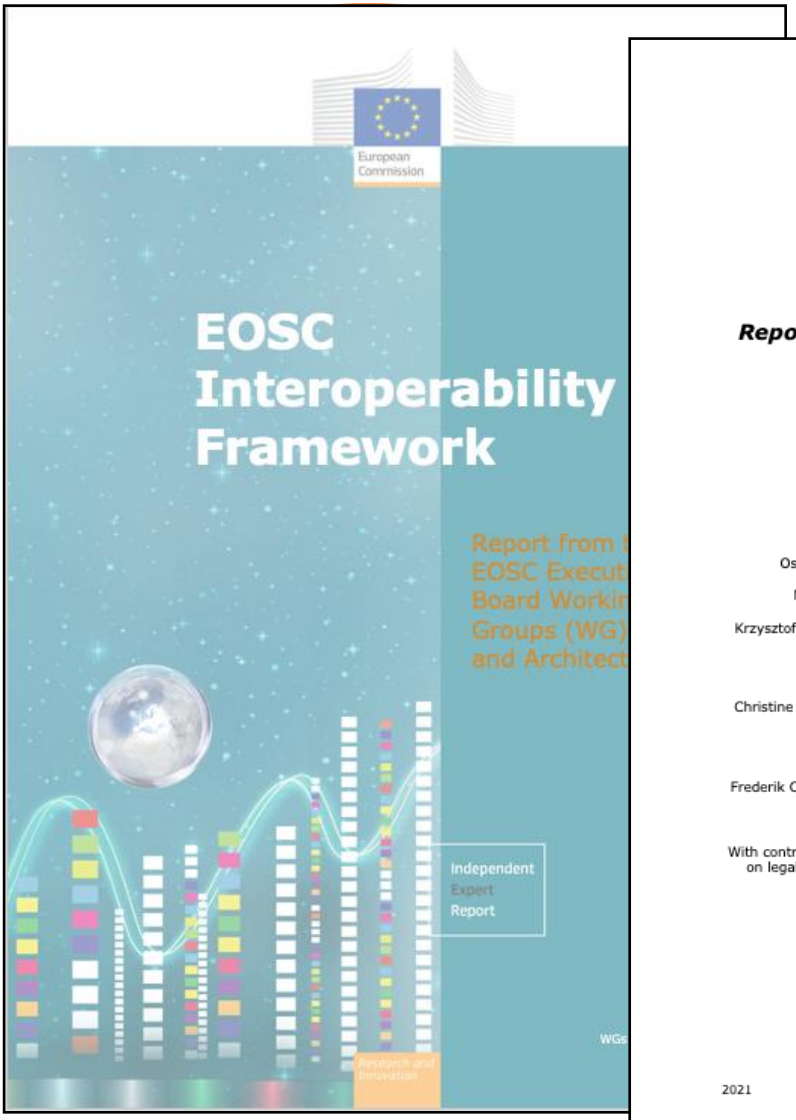


Data should be understood in a very general manner (also software, workflows, notebooks, publications, etc.)

As interoperable as possible (technically, semantically, legally, ...)



EOSC Interoperability Framework



EUROPEAN COMMISSION

EOSC Interoperability Framework

Report from the EOSC Executive Board Working Groups FAIR and Architecture

Edited by: the EOSC Executive Board

February 2021

Authors

Oscar Corcho, Universidad Politécnica de Madrid, 0000-0002-9260-0753

Magnus Eriksson, Swedish Research Council, 0000-0003-1877-6168

Krzysztof Kurowski, Poznań Supercomputing and Networking Center IBCH 0002-4478-6119

Milan Ojsteršek, University of Maribor, 0000-0003-1743-8300

Christine Choirat, Swiss Data Science Center, ETH Zürich and EPFL, 0000-0 9718

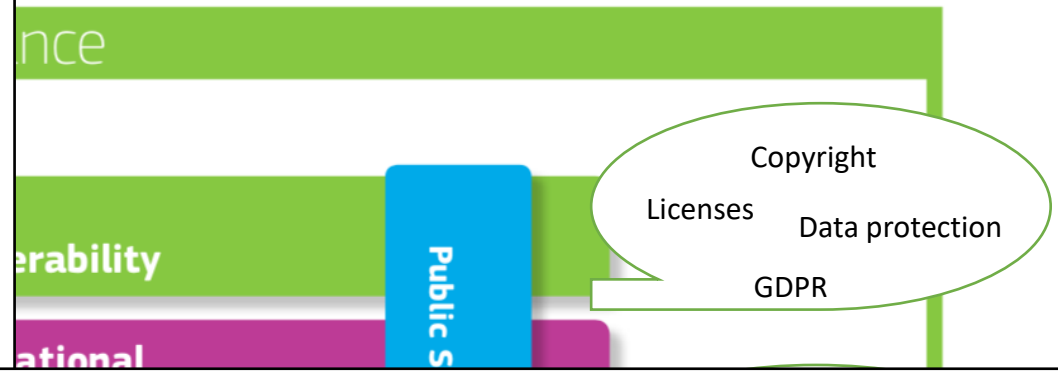
Mark van de Sanden, SURF, 0000-0002-2718-8918

Frederik Coppens, VIB-UGent Center for Plant Systems Biology, 0000-0001

With contributions from the EOSC FAIR WG chairs (Sarah Jones, Françoise C on legal interoperability from: Ohad Graber-Soudry, Timo Minssen, Danie Marcelo Corrales, Jakob Wested, Bénédicte Illien

EOSC Executive Board

2021 Directorate-General for Research and Innovation



1 INTRODUCTION 6
1.1 Context and definitions 6
1.1.1 The European Open Science Cloud (EOSC) 6
1.1.2 FAIR principles and the role of Interoperability 6
1.1.3 The European Interoperability Framework as a Starting Point 7
1.1.4 Definitions of relevant terms used in this document 7
1.2 Purpose and scope 9
1.3 How to read this document 9
2 INTEROPERABILITY LAYERS 11
2.1 Technical interoperability 11
2.2 Semantic interoperability 11
2.3 Organisational interoperability 12
2.4 Legal interoperability 12

Global Initiatives

19 | 10 | 2022 by Marialuisa Lavitrano

Open Science Global Initiatives

All Major Regions recognise the importance of Open Science

*"When **research is widely available to other researchers and the public**, it can save lives, provide policymakers with the tools to make critical decisions, and drive more equitable outcomes across every sector of society,"*
"The American people fund tens of billions of dollars of cutting-edge research annually. There should be no delay or barrier between the American public and the returns on their investments in research."
Dr. Alondra Nelson, Head of Office of Science and Technology Policy. USA
OSTP Issues Guidance to Make Federally Funded Research Freely Available Without Delay

*"The Research Center for Open Science and Data Platform (RCOS) was established at the National Institute of Informatics (NII) for the purpose of developing and operating research data infrastructure, thereby laying the foundation of **Open Science in Japan**. Research is expected to shift to a new research paradigm, specifically Open Science, through the open collaboration and sharing of research publications and data within academia and beyond, thus accelerating the progress of research and meeting the social challenges of today."*
Formed by National Institute of Informatics & Japan Science and Technology Agency
Research Center for Open Science and Data Platform (RCOS), National Institute of Informatics

*"To make the transition to an open science culture, **Australia** needs a national strategy. Such a strategy should bring together Australian governments, funding agencies, universities and other actors in the research sector."*
Call for an Australian Open Science Strategy

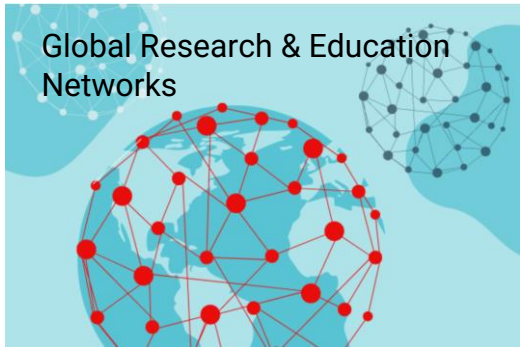
*"The objective of the **Roadmap for Open Science** is to provide overarching principles and recommendations to guide Open Science activities in Canada."*
"This Roadmap outlines next steps that should be taken to make federal science open to all, while respecting privacy, security, ethical considerations and appropriate intellectual property protection."
Mona Nemer , Chief Science Advisor of Canada
Canadian Roadmap for Open Science

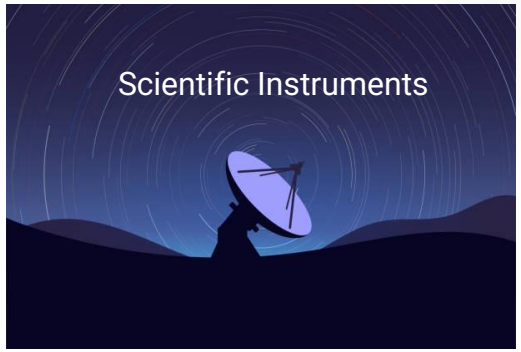
*"The **African Open Science Platform** – a multi-institutional and multidimensional initiative – makes a case for bold actions to mobilise the African scientific community in response to the opportunities and challenges presented by the digital world through open science. This platform provides African scientists with the necessary tools and concepts for practising open science, the stimulus for excellence in open science, and pathways to its application in the environment, business and society"*
Dr Sepo Hachigonta and Dr Aldo Stroebel
The African Open Science Platform

"Recognizing the urgency of addressing complex and interconnected environmental, social and economic challenges for the people and the planet, including poverty, health issues, access to education, rising inequalities and disparities of opportunity, increasing science, technology and innovation gaps, natural resource depletion, loss of biodiversity, land degradation, climate change, natural and human-made disasters, spiralling conflicts and related humanitarian crises"
UNESCO Recommendation on Open Science

Towards a Global Open Science Landscape

Uniting a plethora of stakeholders





The Global Open Science Cloud Landscape

EGI - October 2021

GOSC Initiative

The **mission of GOSC** is to **connect different international, national and regional open science clouds** and platforms to **create a global digital environment for borderless research and innovation**.

It **aims** to provide **better ways to harness digital resources from around the world**,

help bridge the division in infrastructure, technique and capacity building among different countries,

support global science collaborations and

foster truly international science.

Executive summary

This **report** collects the discussions and findings **from the 1st Global Open Science Cloud (GOSC)**, organised during the **EGI conference 2020**. Each chapter focuses on one special aspect including, preliminary policy landscape, requirements of international science communities, the state-of-the-art of global digital infrastructures, and funding opportunities.

Chapter 1. GOSC, the Concept and the Preliminary Landscape.

Chapter 2. Co-Design of GOSC with Research Communities.

Chapter 3. Global e-Infrastructure, Challenges and Opportunities in Achieving the GOSC Vision.

Chapter 4. Funding Agencies - Perspectives for GOSC.

GOSC is one of the global initiatives that will contribute to the session: Parallel Theme C: Research Infrastructures and Sharing Scientific Data Globally PT C/1: Data Sharing - Global Initiatives – Thursday 20 Oct.

In this session also OSCER – CODATA (Open Science Commons Executives' Roundtable - The Committee on Data for Science and Technology) will be presented. Aim: to collaborate in practice towards optimal global interoperability and reuse of data and services for the benefit of Open Science.

EOSC Association AISBL

Rue du Luxembourg 3
BE-1000 Brussels, Belgium
+32 2 537 73 18
info@eosc.eu | www.eosc.eu
Reg. number: 0755 723 931
VAT number: BE0755 723 931

Slides made by EOSC-A Board and Secretariat

Marialuisa Lavitrano, EOSC-A Director and vice-President
marialuisa.lavitrano@unimib.it