Open Science and EOSC in ERA Action 1

EOSC Symposium 2022

Session: "Policy alignment & progress - where EOSC sits towards the 20 ERA Actions"

Prague, 15 November 2022

Dr. Michel Schouppe
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DG R&I, European Commission

Open Science and EOSC in the ERA Policy Agenda

ERA Priority Area:
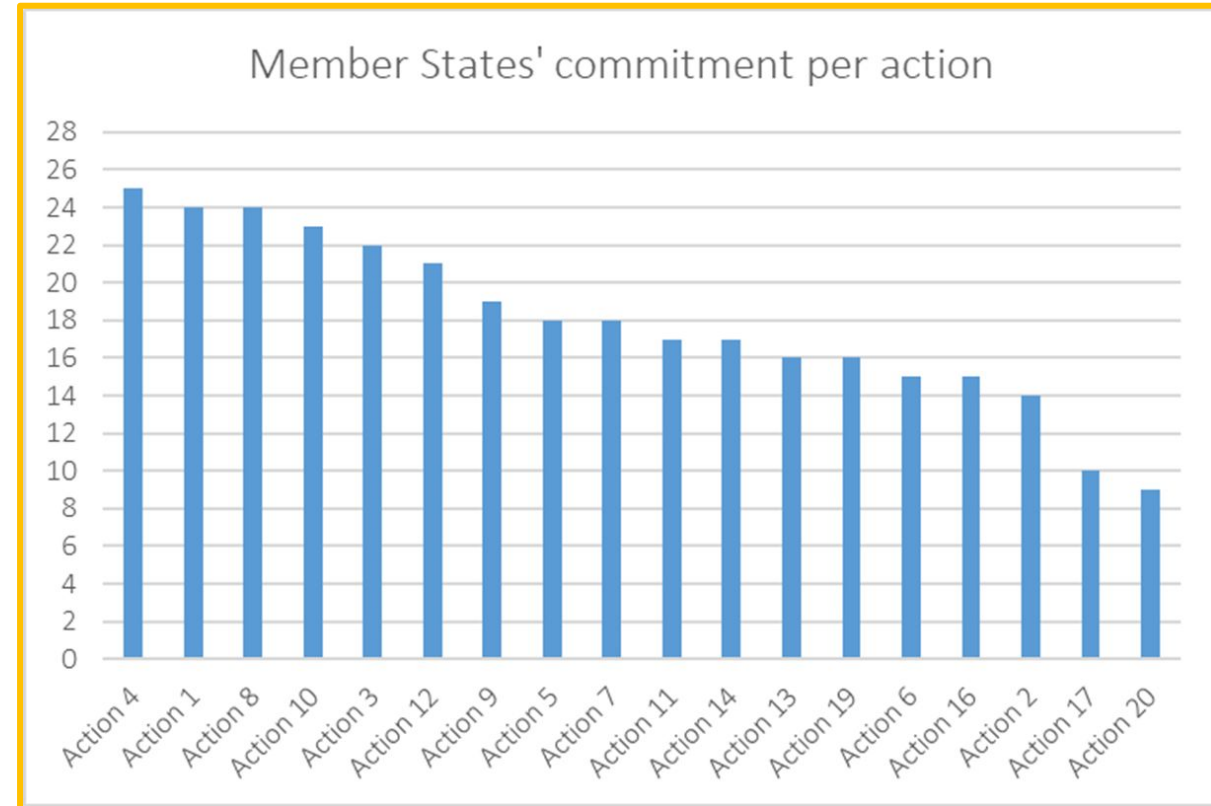"*Deepening a truly functioning internal market for knowledge*"

Action 1 (out of 20):
"**Enable the open sharing of knowledge and the re-use of research outputs, including through the development of the European Open Science Cloud**"

- Commitments by 25/27 MS
- Three outcomes by end of 2024 (see next slides)
- Synergies with other ERA actions:

Data legislative framework for research   Reform of the Research Assessment
Research Infrastructures   International cooperation
Empower higher education institutions ERA monitoring mechanism

European Research Area

Member States' commitment per action

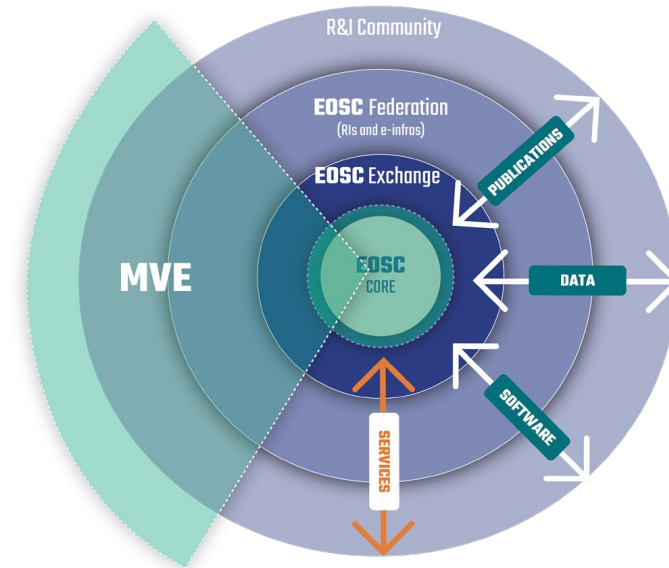# 1. Deploy Open Science principles & identify best practices

Motivation: Open Science (OS) practices and skills become the 'new normal'.

The action includes the following types of activities:

- Mainstream OS across national <u>research funding programmes</u>;
- Co-develop a <u>catalogue of Open Science best practices</u> across the Member States and Associated Countries;
- Intensify EOSC outreach and engagement including through <u>national EOSC tripartite events;</u>
- Establish a critical mass of <u>data scientists, data stewards</u> and general FAIR data-literacy in Europe;
- Provide services, <u>tools and data on the usage, quality and impact of research outputs</u> and on the uptake of open science practices.

2. Deploy the EOSC platform, federate data infrastructures in Europe and improve interoperability of research data

Motivation: Provide all European researchers with seamless access to a rich portfolio of FAIR data and services in all relevant domains (from data handling to computing, processing, analysis and storing).
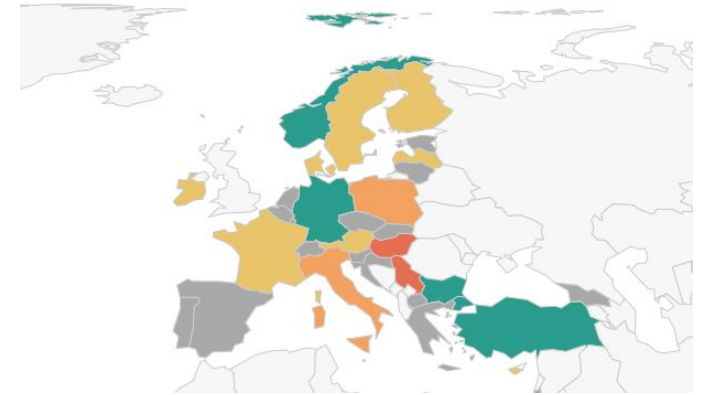
The action includes the following types of activities:

- Procure the 'EU node' of the EOSC federation with functionalities available 24/7;
- Increase the connection of national/regional research infrastructures to the EOSC federation;
- Develop community frameworks for interoperability of research data and quality control of EOSC resources;
- Develop sustainability options over the long-term to evolve the platform and advance the Web of FAIR research data

3. Establishment a monitoring capacity to support MS/AC and other EOSC stakeholders in tracking EOSC contributions

Motivation: Assess trends over time of the uptake of Open science practices across Europe. Elaborate or adjust policies

Four layers of data to support EOSC/Open Science monitoring in Europe:
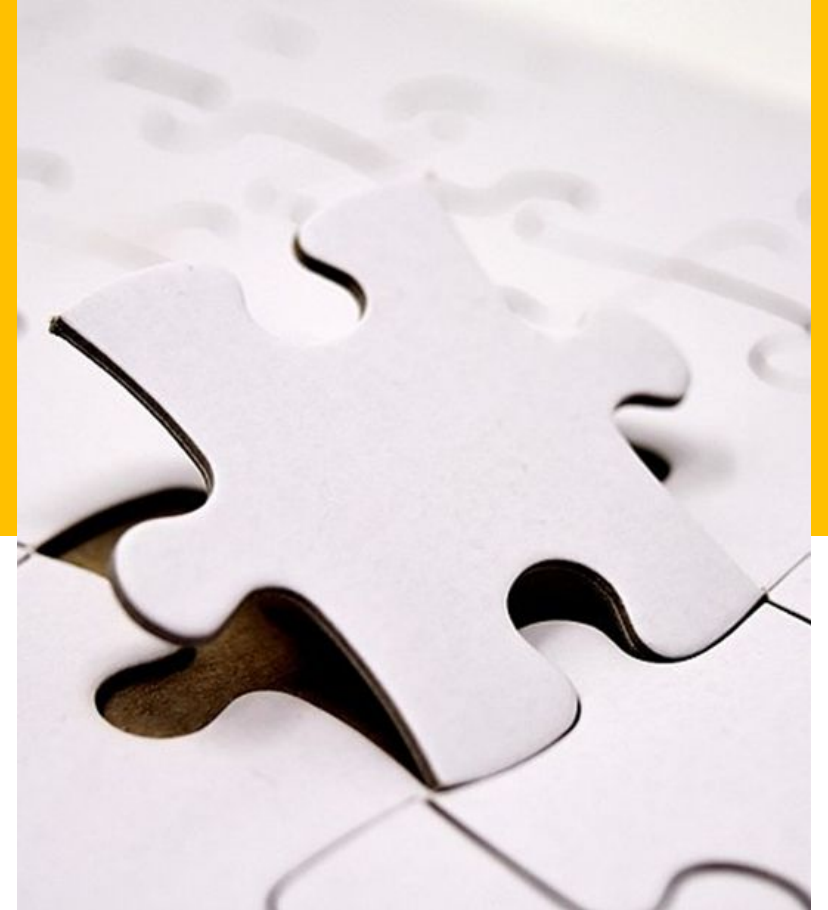
1. <u>EOSC-readiness by the member states and associated countries</u> (national policies and investments to the EOSC via surveys co-defined with MS and AC);

2. <u>Progress of the EOSC European Partnership</u> along on its Key Performance Indicators;

3. <u>In-kind contributions by the EOSC Association and its members</u> to the EOSC partnership;

4. <u>Other Open Science practices</u>, policies, infrastructures, data and services in Europe

EOSC in the international context of Open Science

EOSC is global in scope and European by focus

- EOSC is a multilateral initiative involving <u>more than 40 participating countries</u> including the EU member States and countries associated to Horizon Europe

- EOSC can be seen as a <u>European contribution to a global open research commons</u>:
  - EOSC operates in a global ecosystem to avoid the creation of Open Science silos;
  - EOSC interoperability options are inspired from or validated with the international research community including through the Research Data Alliance (RDA).

- EOSC is a European contribution to Open Science initiatives in the **G7, United Nations and CODATA-WDS** context.

- EOSC will enshrine a number of **principles regarding international cooperation** including:
  - <u>Openness</u>: third-country participants participate voluntarily in EOSC as users or service providers in compliance with EOSC rules of participation;
  - <u>Digital sovereignty</u> in compliance with relevant EU/national legislation;
  - <u>Interoperability</u> in compliance with the FAIR principles;
  - <u>Reciprocity:</u> access to other commons to enhance the free flow of data and services.

The success of EOSC will largely depend on a change of culture among the researchers towards openness. Research funders, like the Commission, are increasingly committed to foster open access, data management along the FAIR principles, as well as incentives and rewards.

Thank you

European Commission

European Commission

An EU copyright & data legislative & regulatory framework fit for research

Alea López de San Román

Legal & Policy Officer, DG Research & Innovation
European Commission
15 November 2022

#EUResearchArea

Research and Innovation

ERA Actions	Outcomes
1. Enable the open sharing of knowledge and the re-use of research outputs, including through the development of the European Open Science Cloud (EOSC)	• Deploy Open Science principles and identify Open Science best practices • Deploy the core components and services of EOSC and federate existing data infrastructures in Europe, working towards the interoperability of research data • Establish a monitoring mechanism to collect data and benchmark investments, policies, digital research outputs, open science skills and infrastructure capacities related to EOSC
2. Propose a EU copyright and data legislative and regulatory framework fit for research	• Identify barriers and challenges to access and reuse of publicly funded R&I results and of publications and data for scientific purposes, and identify potential impacts on research, through an analysis of relevant provisions under EU copyright and data legislation and related regulatory frameworks, and of relevant institutional and national initiatives • Propose legislative and non-legislative measures to improve the current EU copyright and data legislative and regulatory frameworks
3. Advance towards the reform of the Assessment System for research, researchers and institutions to improve their quality, performance and impact	• Analysis of legal and administrative barriers at national and trans-national level for a modern research assessment system • Create a coalition of European research funders and research performers who agree on a new approach for research assessment, following wide and inclusive consultations at European and international level • Implementation plan of the coalition to roll-out the new approach, including pilots in different domains

https://data.consilium.europa.eu/doc/document/ST-14308-2021-INIT/fr/pdf

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Overall objective

A **European Research Area** in which scientific knowledge and technology circulate freely -as ambitioned in Article 179 TFEU- implies that:

✔ scientific outputs are accessible and reusable,

✔ access and reuse of data for research purposes is supported.

An **adequate legislative and regulatory framework fit for research** is a necessary condition to deliver on this objective.

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Some of the concerns expressed by stakeholders

UNIVERSITY OF AMSTERDAM

Protect independent and public knowledge

A concise version of this speech was delivered by Rector Magnificus Karen Maex in Dutch on 8 January 2021 during the Dies Natalis.

1. Independent public knowledge: the role of libraries, monasteries and universities
In the year 48 BC, the celebrated library at Alexandria

both the sheer amount of knowledge and possibilities for its dissemination grew, large new public libraries began to emerge.

As well as gathering and disseminating knowledge in the form of texts and books, university libraries were also concerned with gathering existing and new

[...] context, notes and [...]lge was thus [...] knowledge thanks [...]. Or, to put it [...]ot only connect and [...]facilitate and [...]nental and [...]'. This function is

SCIENCE EUROPE
Shaping the future of research

Which Role for Research in the Future Data Act?

Science Europe Response to the European Commission Inception Impact Assessment for a Data Act

Access, interoperability, and the use of high-quality data are cornerstones of research and innovation. Science Europe, therefore, welcomes the initiative of the European Commission, as outlined in the European Strategy for Data from 19 February 2020, to create a single market for data that would enable the digital transformation of society through more and better access to data.

LERU NEW YEAR'S DEBATE

21.12.2021
University Autonomy threatened by EU Data Policy?

CESAER   COAR   LIBER

Scientific knowledge must be protected to ensure a Europe fit for the digital age

Joint statement dated 24 January 2022

CESAER, COAR and LIBER welcome the strong focus of the European Commission towards a A Europe fit for the digital age as part of its priorities from 2019 to 2024.

We are convinced that the importance of research and education needs a strong focus within these initiatives and call upon the EU institutions to (i) acknowledge the unique position of universities and other research performing organisations in the provision of digital services and infrastructure directed towards the common good and (ii) provide for an overarching legal framework excluding university and research related repositories and corresponding infrastructures from market-oriented EU legislation, in order to prevent any unintended collateral damage from current and future EU legislation aimed at commercial players.

The range of policies and legislation proposed by the Commission aimed at shaping the digital transformation includes the Digital Services Act (DSA), the Regulation laying down harmonised rules on artificial intelligence, the Data Governance Act, the Data Act and the upcoming review of the Database Directive. These follow the Copyright in the Digital Single Market Directive, Open Data Directive and the General Data Protection Regulation.

Ongoing EC analysis: main EU data & digital legislation concerned

	Open Data Directive (ODD)	Data Governance Act (DGA)	Data Act (DA)	Digital Services Act (DSA)	Digital Markets Act (DMA)
State of play	**Adopted in 2019.** Transposition was due by 17 July 2021.	**Published** in the EU Official Journal **on 3 June 2022**.	**EC proposal** adopted on 23 February 2022.	**Published** in the EU Official Journal **on 27 October 2022**.	**Published** in the Official Journal of the EU **on 12 October 2022**.
Scope	The Open Data Directive **replaces the Public Sector Information (PSI) Directive**. It mandates that data held by public sector bodies must be made available for commercial and non-commercial re-use and introduces the concept of high-value datasets.	The Data Governance Act **aims to create a framework that encourages greater reuse of data**. It aims to facilitate the reuse of certain categories of protected public-sector data and foster data altruism across the EU.	The Data Act aims to facilitate **access to and use of data, including business-to business, business-to-consumers and business-to-government.** It aimed to review the Database Directive	The Digital Services Act **regulates the obligations of digital services that act as intermediaries.** It aims to create an EU-wide uniform framework on the handling of illegal or potentially harmful content online, the liability of online intermediaries and the protection of users' fundamental rights online.	The Digital Markets Act introduces **rules for platforms that act as "gatekeepers" in the digital sector**. It aims at preventing gatekeepers from imposing unfair conditions on businesses and consumers and at ensuring the openness of important digital services.
Main relevance for research	**Article 10** on open access policies & publicly funded research data (+ recital 28).	**Reuse of public sector data for scientific research purposes and reuse of data held by research organisations** organised as public sector bodies.	**Data sharing for scientific research purposes** under the B2B/B2C and B2G provisions. Exercise of the possible sui generis database rights by data holders (recital 63).	**Possible impact** on research, researcher stakeholders´ operations, infrastructures and services.	**Possible impact** on research, researcher stakeholders´ operations, infrastructures and services.

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Ongoing EC analysis: main EU copyright legislation concerned

	Database Directive	Information Society Directive	Copyright in the Digital Single Market Directive
State of play	**Adopted in 1996**.	**Adopted in 2001**.	**Adopted in 2019**. Transposition was due by 7 June 2021.
Scope	The Database Directive seeks to provide **legal protection for databases** which has two aspects: • **copyright protection** for the intellectual creation involved in the selection and arrangement of materials; • **sui generis protection** for a substantial investment (financial and in terms of human resources, effort and energy) in obtaining, verifying or presenting the contents of a database.	The directive **harmonises key rights granted to authors and neighbouring rightholders** (the reproduction right, the right of communication to the public and the distribution right) **and — to a lesser degree — exceptions and limitations to these rights**. It also harmonises the protection of technological measures and of rights management information, sanctions and remedies.	The directive has 3 main objectives: • to **adapt certain key exceptions** to copyright to the digital and the cross-border environment; • to **improve licensing practices** and ensure wider access to content; and • to **achieve a well-functioning marketplace for copyright**.
Main relevance for research	**Exception for scientific research** (article 5).	**Exceptions** to restricted acts (art. 6) and to the sui generis right (art. 9) **for scientific research**	**Exceptions for Text and Data Mining** (TDM) (arts. 3&4 and corresponding recitals). **Exclusion of scientific repositories from the scope of article 17** on the use of protected content by online content-sharing service providers.

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Outcomes

Identification of barriers, challenges and potential impacts of EU copyright and data legislation on research:

- Four independent experts´ studies on EU copyright and access and reuse of publications and data and on data and digital legislation and research

  ❑ [Study on the Open Data Directive, Data Governance and Data Act and their possible impact on research](#)

  ❑ [Study on the Digital Services Act and Digital Markets Act and their possible impact on research](#)

  ❑ [Study on EU copyright and related rights and access to and reuse of data](#)

  ❑ [Study on EU copyright and related rights and access to and reuse of scientific publications, including open access](#)

- Two online workshops in June 2022

- Evidence gathering and meetings with experts

- Finalisation of the identification of barriers, challenges and potential impacts on research

Further expected outcomes

Study to assess the impacts of possible legislative & non-legislative measures in the field of EU copyright and data legislation

Guidance for research organisations on EU data and digital legislation

Proposal of potential legislative & non-legislative measures

Possible measures could include:

- Compiling research-related provisions in a structured way

- Guidelines regarding the application of relevant legislative instruments

- Specific legislative initiatives (e.g. making research exceptions in copyright legislation mandatory, EU secondary publication right?)

- Sectoral directive and/or regulation amending existing legislation in the form of a "Digital Research or Knowledge Act"

Thank you!

For more info:

**Commission's website on the European Research Area:
https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/our-digital-future/european-research-area_en**

ERA Action 3: Advance towards the reform of research assessment

#EUResearchArea

Need for reform of research assessment

- To reflect **evolving research processes**
  - ✔ Digital transition; Iterative and recursive; Collaborative and open

- To reflect **increasing demands on research**
  - ✔ Societal, environmental, economic challenges; Diversity of outputs

- To move away from **inappropriate uses** of journal- and publication-based metrics
  - ✔ Rewards quantity and publication venue rather than quality; does not reward sharing, collaboration and outputs other than publications

- To further support the **quality of research** and the **attractiveness of research environments**
  - ✔ Requires a system and cultural change, involving institutions, funders and researchers

Towards the Coalition for Advancing Research Assessment (CoARA)

Scoping report

Agreement on principles and way forward
November 2021

Agreement

Commits signatories to act on the basis on commonly agreed principles and commitments, within an agreed timeframe
July 2022

Coalition

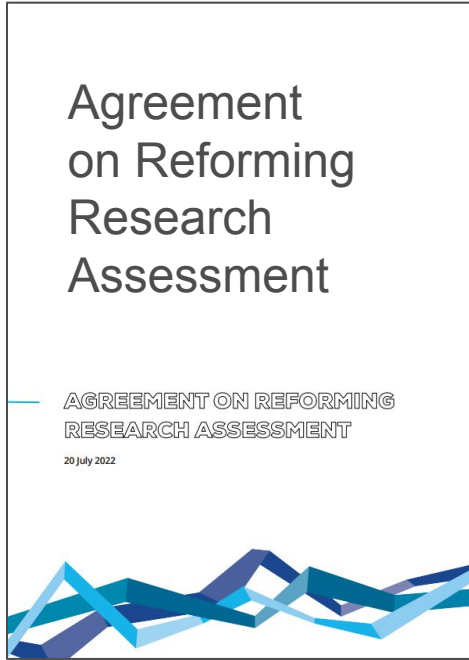Facilitates exchange of information and mutual learning
December 2022

CoARA

The Coalition for Advancing Research Assessment (CoARA) will bring support to the reform of research assessment. It will offer member organisations the possibility to exchange knowledge, work together, test and pilot, and be supported by peers, for advancing in the process of research assessment reform.
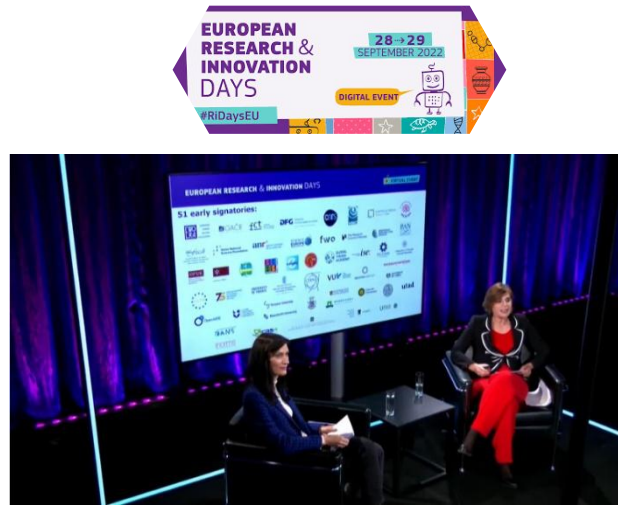
European Commission

Agreement and Coalition - State of play

Agreement
on Reforming
Research
Assessment

AGREEMENT ON REFORMING
RESEARCH ASSESSMENT

20 July 2022

Published on 20 July
2022

Opening of signature
on 28 September 2022

Mariya Gabriel ✓ @GabrielMariya · Nov 8
⊘ Official

Proud to announce @EU_Commission has signed the Agreement on
Reforming #ResearchAssessment & endorsed @DORAssessment.

We are committed to working with all stakeholders to support an
environment where researchers& research can thrive!👏 #EUResearchArea

👉 europa.eu/!My3F7f

The new European Research Area

The Agreement on Reforming Research
Assessment shows our commitment to
work with all stakeholders to support
an environment where researchers
and research can thrive.

Mariya Gabriel
Commissioner | Innovation, Research,
Culture, Education and Youth

EC signs the Agreement and
DORA declaration
8 November 2022

CoARA

Coalition for
Advancing Research
Assessment

Constitutive
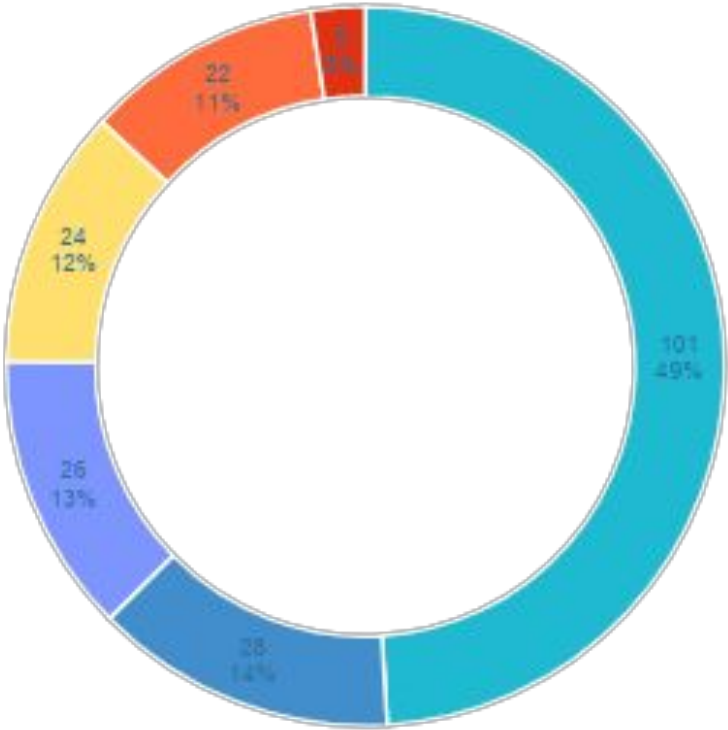Assembly on 1
December 2022

European
Commission

Agreement and Coalition – State of play

COARA

206 signatures to date

https://coara.eu/agreement/signatories/

- Universities and their associations
- Research centres, research infrastructures, and their associations
- Public or private research funding organisations and their associations
- Academies, learned societies, and their associations, and associations of researchers
- Other relevant non-for-profit organisations involved with research assessment, and their associations
- National/regional authorities or agencies that implement some form of research assessment and their associations

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Agreement on Reforming Research Assessment

4 Core commitments:

1. Recognise the **diversity of contributions to, and careers in research** according to the needs and the nature of the research

2. Base research assessment **primarily on qualitative evaluation** for which peer-review is central, **supported by responsible use of quantitative indicators**

3. **Abandon inappropriate uses** in research assessment of journal- and publication-based metrics, in particular inappropriate uses of journal impact factor (JIF) and h-index

4. **Avoid the use of rankings of research organisations in research assessment**
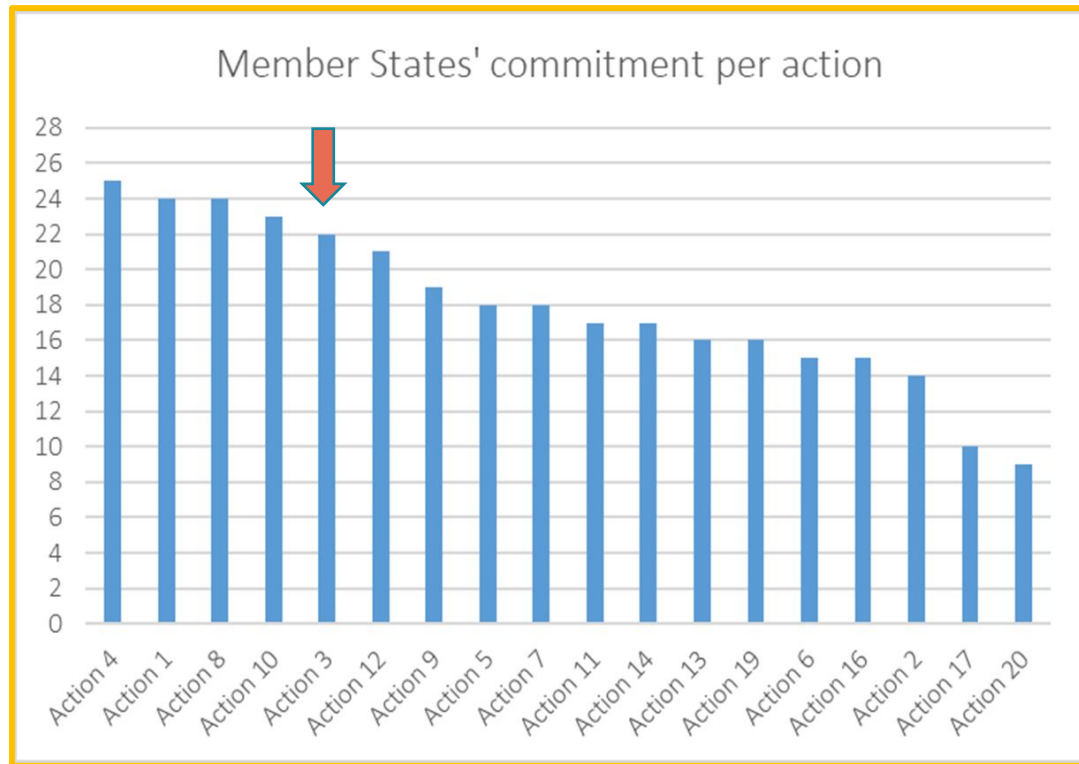
6 Support commitments:

- Three commitments to enable the move towards **new criteria, tools and processes** for research assessment

- Three commitments to facilitate **mutual learning**, **communicate progress** and ensure that new approaches are **evidence-informed**

Agreement & Coalition: key considerations

- The reform process is an enabler for collaborative and **Open Science** (but not only!).
- European initiative; **global in scope**: organisations involved with research assessment from **across the world** welcome to join.
- Respectful of **autonomy** of organisations, which keep full control of their reform journey.
- **Flexible and evolutive**: assessment practices can vary according to the context, type and purpose of the evaluation
- **Quantitative indicators**: responsible use, not abandoning them
- **Timeframe**: Touch-base points in years 1 and 5 after signature to communicate progress, based on self-assessment
- Special attention to and involvement of **young researchers**
- CoARA operating as 'communities of practice' and offering space **for mutual learning** and **collaboration**
- Working Groups identified and proposed **bottom-up** by members.

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ERA Action 3 – Support from Member States

- 22 Member States , 3 Associated Countries and 13 stakeholders in the ERA Forum have given support to ERA Action 3 to:

Member States' commitment per action

- Perform analysis of legal and administrative barriers for the reform process.

- Support the establishment of national framework conditions conducive to changes.

- The Commission will provide the link between the Coalition and national authorities, via the ERA Forum

European Commission

Thank you!

www.coara.eu/sign

Action 8 - *Strengthen sustainability, accessibility and resilience of research infrastructures in the ERA*

EOSC Symposium 2022
Session: "Policy alignment & progress - where EOSC sits towards the 20 ERA Actions"
Prague, 15 November 2022

Agnès Robin

Head of Sector Research and Technology Infrastructures Policy

DG Research & Innovation, European Commission

European Commission

Priority Areas of the Pact: ERA Policy Agenda 2022-24

Deepening the ERA

1. **Open sharing of knowledge, incl. EOSC**
2. Data legislation fit for research
3. Reform of the research assessment system
4. Strengthen research careers
5. Gender equality and inclusiveness
6. Protect academic freedom
7. Better knowledge valorisation
8. **Strengthen research infrastructures**
9. Promote international cooperation

Widening the ERA

15. Regional and national R&I ecosystems
16. EU-wide access to excellence
17. Strategic capacity of Europe's public research performing organisations

Broadening the ERA

10. R&I Missions and Partnerships for ERA
11. Green energy transformation
12. Green and digital transition of industrial ecosystems
13. Empower higher education institutions
14. Bring science closer to citizens

Prioritising investments and reforms

18. Coordination national support for ERA
19. ERA monitoring mechanism
20. Prioritisation and coordination of R&I investments and reforms

ERA Policy Agenda: Research Infrastructures

Deepening a truly functioning internal market for knowledge

Action 8 - Strengthen sustainability, accessibility and resilience of research infrastructures in the ERA

Set of foreseen activities

- **Strategic analysis** of the European Research Infrastructure **landscape**;

- Broader and more sustainable **access** for all countries to European research infrastructures and their services and revision of the **European Charter** of Access to Research Infrastructures;

- Update of the ESFRI **Roadmap** and implementation of the research infrastructures performance **monitoring** framework;

- Report on the **ERIC Framework**;

- Increased **cooperation** between research infrastructures, e-infrastructures and stakeholders, including through EOSC;

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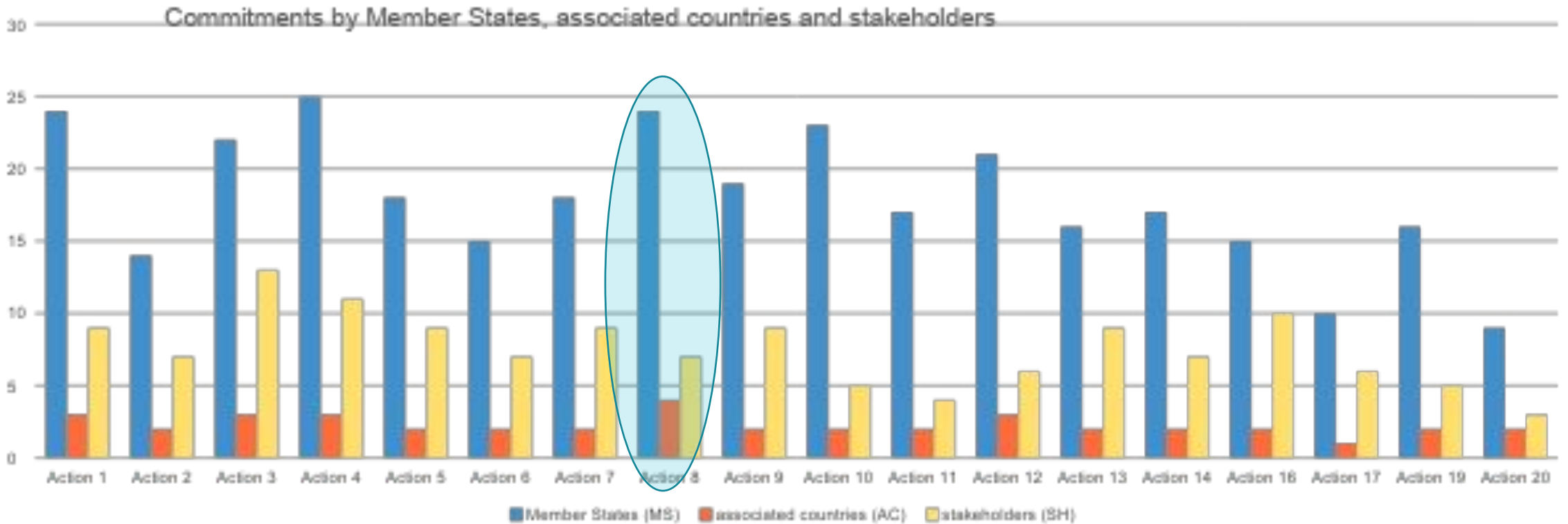
Key Actors

Coordination by

- **Commission**: ERIC Report, European Charter for Access to Research Infrastructures

- **ESFRI** (Member States and Commission): next research infrastructure roadmap, monitoring framework, consultation of stakeholders and associated/third countries as relevant

- **Member States** (Horizon Europe Programme Committee) and **Commission**: preparation of relevant Horizon Europe work programme actions

In addition, engagement of

- Member States (monitoring of national facilities and national nodes).

- Associated Countries in ESFRI in line with the new ERA and consulted (e.g. ERIC Report).

- **Research infrastructures** (notably ESFRI Landmarks, ESFRI Projects and ERICs), their umbrella organisations, such as the ERIC Forum, ERF, LEAPS, LENS, among others, as well as appropriate international organisations: consulted for all relevant activities.

Commitments by MS, AC & stakeholders

Commitments by Member States, associated countries and stakeholders

Overall, **action 8** received commitments by **24 Member States; 4 Associated Countries; 7 Stakeholders**

Engagement of stakeholders: recent workshops and events

Workshop on Research and Innovation needs of RIs (March 2022)

✔ **Participants** from Member States, research infrastructures, research performing organisations
✔ Align RI **policy and programmatic frameworks** underpinning a long-term vision
✔ **Roadmap-based methodologies** to anticipate future R&I needs

- Development of European research infrastructure **landscape**
- Delivering **services**
- Next generation of scientific **instruments, tools, technologies** and methods and digital solutions
- Cooperation with industry and support to **innovation**

ESFRI Workshop on Landscape Analysis (April 2022)

✔ **Participants:** ESFRI Delegates, National Experts, Research Infrastructures
✔ Stakeholder consultation (online survey)
✔ Strengths and weaknesses of the ESFRI landscape analysis
✔ Future scope and intended audience

Issues to look into for preparing the next Landscape Analysis

- Analysing **structure**
- Analysing **methodology**
- Analysing **tools and processes**
- Defining the **landscape outlook**
- **Long-term sustainability**
- Establishing structural **links with other processes**

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ESFRI Workshop on Monitoring (April 2022)

✔ **Participants:** ESFRI Delegates, ESFRI working groups, research infrastructures
✔ Context: request from Member States (Council concl. 2018) – Action 8 of the ERA Policy Agenda

Main points:
- presenting the **rationale, objectives and outline** of the methodology for the monitoring of Landmarks,
- clarifying open **questions**, potential doubts and uncertainties around the monitoring process;
- learning from Landmarks and other stakeholders directly concerned by the monitoring process about the main **added value of monitoring**, perceived **bottlenecks** and **challenges**;
- preparing ground for **finalising the monitoring methodology**, which would then be presented in a separate workshop for Landmarks only to kick-start the monitoring process.

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ESFRI Stakeholders Forum

- ESFRI Stakeholder Forum was launched in March 2022 with High-level event moderated by Jean-Eric Paquet.

- **1st Stakeholder Forum Meetup in Brussels on 15 September 2022**.

- Fully booked event with 150 participants on site.

- Plenary sessions and four parallel sessions on Climate, Energy, Oceans, and Culture.

- Panels discussed good practices and bottlenecks hindering the enhanced use of RI's services or delivery.

- Needs and future opportunities were flagged.

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Expected impact of ERA Action 8

- Strengthened research infrastructure **services**, better adapted to user needs (scientific challenges and EU policy priorities such as the green and digital transition)

- **Sustainability** of European research infrastructures (ERICs and others; system as a whole)

- Better **accessibility** of European research infrastructures and their services to users across the EU, including through the EOSC

- Stronger **engagement of stakeholders** in research infrastructures activities

- Robust **priority setting** for further investments in existing and new research infrastructures (evolving R&I landscape)

- Identification of opportunities for research infrastructure **clustering**

- Enhanced **impact on society**, skills and talents;

- Strengthened engagement with manufacturing industry and positive **impact on economy**

European Commission

Thank you!

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Policy alignment & progress - where EOSC sits towards the 20 ERA actions

Panel Discussion – Opening Remarks
Tuesday 15 November 2022
EOSC Symposium

Giovanni LAMANNA

How to pursue action 8 by leveraging action 1?

<u>Preamble</u>
A three-fold objective for "Open Science":
- Support FAIR data-intensive research (enhancing innovation, software developments and cross-fertilization among researchers, computer scientists and technologists).
- Involve fellow citizens in the scientific research process (thanks to digital objects and ICT technologies).
- Enhance the commitment of scientists in socio-economic challenges (from all domains).

Definition of ESOC:
- Science, research and innovation data space.

ERA action 8 - Strengthening RIs

My suggestions:

- "<u>Upgrade and sustain RIs that are already in operation</u>" deserve longer term investments for competitiveness.

- "<u>Update structure, terms and scope of investments</u>" for emerging RIs.

- "<u>Challenge new models and frameworks</u>" for economy of scale and for federating innovation capacities.

- "<u>Adopt a forward-looking approach</u>" of RIs for structural impacts on regional policies and society.

Avenues to explore towards a global RI ecosystem pioneering Open Science (also though EOSC):

1) Design Study (DS), Preparatory and pre-construction phases (PP) of ESFRIs, need to be followed up with further phases, such as:
   "Updating technologies and widening cooperation actions for ESFRI in operation".
   Ex.: new countries willing to join an ERIC/ESFRI by taking in charge some upgrading or acting to enhance opportunities to access the RI.
   It concerns also the virtual access to RIs, the digital innovation and therefore EOSC.

2) Include into DS and PP a request of an *"Open Science Programme (OSP)"* according to its three-fold objective. It would imply the gradual alignment of new emerging RIs into the EOSC ecosystem as well as the enhancement of researchers involved in EOSC.

3) Invest to support the <u>sustainability of Science Clusters</u> through the implementation of corresponding "*<u>Domain-based Competence Centre (CC)</u>*".

CCs to drive the OSP (as in item 2), to leverage the cross-cluster coordination as well as the EOSC Core and EOSC Exchange services (strengthening the adoption of commons).
The CCs are also "*<u>Science Cluster Instances delegated to operations</u>*".
RIs in a Science Cluster would second some common functionalities to a CC:
a) data management services;
b) user analysis platforms;
c) scientific software and workflow catalogues;
d) operate the domain-based data federation.

This approach avoids the support of repetitive functionalities per each RI, save single RI funding, avoid single RI's spending cuts on software/data/archive and innovation (as the most vulnerable items out of the list of expenditures and running costs) in case of budget restrictions. Consequences:
I) more investments for the CC needed;
II) gains by economy of scale (saving budget on a longer term);
III) incentive to a global and continuous innovation in Open Science targeted to and brought by the scientific community at large that acts as a global "*open science foundation*";
IV) a booster for EU member state institutes and research agencies (behind the CCs) that in any case are always part of the international consortia implementing and exploiting the RIs (and that finally pay for them).

4) A "*Forward-looking approach chart*" for socio-economic engagement both regionally (host and partner countries) and globally requested to each RI, integrated in their OSP and operated within EOSC.
RIs produce research digital objects to be fully articulated with the other sectoral data spaces defined in the European strategy for data.
This should facilitate or strengthen the capacities of RIs to engage through the EOSC with industry, government, politics and the labour market.

5) "*EOSC strengthening legacy technology know-how to accelerate further innovation with and within RIs*".
The Technology & Innovation (also produced by RIs) R&D published results have also a series of digital objects behind that potentially aimed at being FAIR and managed within the EOSC data federation.
This is one more way to foster the articulation of EOSC with the other sectoral data spaces defined in the European strategy for data.
The Science Cluster domain-based Competence Centre can be in charge of workout roadmaps and coordination among RIs for long-term technology and innovation prioritisation, coordination and direction of R&I investments for ERA … as well as their FAIRness.