Driving the paradigm shift towards Open Science

ELIXIR All Hands meeting

June 9th, 2021

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European Commission

Data

530%

increase of global data volume

From 33 zettabytes in 2018 to 175 zettabytes

€829 billion

value of data economy in the EU27

From €301 billion (2.4% of EU GDP) in 2018

10.9 million

data professionals in the EU27

From 5.7 million in 2018

65%

Percentage of EU population with basic digital skills

From 57% in 2018

Source: European Data Strategy, February 2020

Open Science at the EC

- **Open Science** means **sharing knowledge and tools as early as possible**, not only **between researchers** and **between disciplines**, but also with **society at large**.
- Open Science improves the **quality**, **efficiency** and **creativity** of research and the **trust by society in science**. In particular, OS is beneficial for science, scientists and funders, e.g.:
  - tackles the reproducibility crisis;
  - faster response to societal challenges e.g. Coronavirus, Ebola;
  - access to and sharing results yields higher impact through collaborations;
  - generates new research findings and decreases inequalities;
  - large opportunity costs of non-FAIR data—€10.2bn/year (source: Cost-benefit analysis of FAIR research data, 2017).
- The Commission acts as **policy maker** (propose legislation and encourage MS), a **funder** (we set requirements to our projects) and a **capacity builder** (we fund 'enabling' projects).

Main challenges and priorities for Open Science

Improve the practice of research and innovation

- Openly accessible scholarly publications
- Early sharing of all research outputs
- All data FAIR, RDM
- Reproducible results
- Societal engagement and responsibility

Develop proper enablers

- Rewards and incentives to adopt Open Science practices, with appropriate metrics
- Appropriate skills and education, including for research integrity
- Open Research Infrastructures including the European Open Science Cloud (EOSC)

Involving all the actors *Engaging internationally*

Changing research culture

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A new ERA for R&I

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ERA Communication: A New ERA for R&I

Communication on a new European Research Area for Research and Innovation (September 2020)

Deepening the ERA

The Commission will: (Action 9)

- Launch, via the Horizon Europe Programme, a **platform of peer-reviewed open access publishing**;
- **analyse authors' rights** to enable sharing of publicly funded peer-reviewed articles without restriction;
- ensure a **European Open Science Cloud** that is offering findable, accessible, interoperable and reusable research data and services (Web of FAIR); and
- incentivise open science practices by improving the **research assessment system**.

Citizen Engagement

The Commission will: (Action 13)

- Organise with Member States and stakeholders Europe-wide **citizen science campaigns** to raise awareness and networking, crowdsourcing platforms and pan-European hackathons, in particular in the context of Horizon Europe Missions. The Commission will develop with Member States best practices to open up science and innovation to citizens and youth.

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Research Assessment

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Towards a new *modus operandi* for Science

Current System (dominant)		Open Science	
Excellence defined largely on the basis of *where* scientists publish		Composite definition of excellence	
Incentivises researchers to produce specific outputs (*mainly publications*) and to publish as much and as fast as possible (*publish or perish!)*	Use of quantitative metrics	Incentivises researchers to share knowledge/data early and openly, to collaborate, and to increase quality and impact; While considering diversity of outputs and research cultures	Use of qualitative and quantitative metrics
Rewarding individual competing scientists - gaining scientific prestige		Rewarding team work, collaboration and sharing to achieve societal impact (e.g. Covid-19)	

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Policy context for changes to research assessment

- **Commission Recommendation** of 25 April 2018 on “Access to and preservation of scientific information”
  - Recommends that Member States and research institutions adjust the assessment of research, researchers and institutions to reward a culture of sharing of knowledge and data
- **Open Science Policy Platform** final report submitted to the Competitiveness Council in 2020
  - Identifies the reform of the system used for assessing research, researchers and institutions towards a system that incentivises the practice of open science, as a priority
- **Commission Communication** of 30 September 2020 on “A new ERA for R&I”
  - Includes action 9 to ”(…) incentivise open science practices by improving the research assessment system”

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Changing the research assessment system

- The Commission **is currently consulting** research funders, research performers, policy makers, and other stakeholders, **on how to advance with reforming the research assessment system**.
- A proposed way forward is to **reach an agreement by 2022** (such as an MoU) **between those willing to reform the current research assessment system**, which would be signed by an increasing number of funders and research performing organisations.
  - Agreement setting ambitions, specifying broad lines of action, and committing signatories to act;
  - For a more qualitative assessment of research, researchers and institutions, that considers the value and impact of a diversity of outputs and research cultures, and that incentivizes open collaboration and knowledge and data sharing.

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European Open Science Cloud

European Open Science Cloud

- The European Open Science Cloud (EOSC) (European Cloud Initiative Communication, 2016) will federate existing and emerging infrastructures to offer a **trusted** and **open distributed** system for the scientific community, providing **seamless access to data** and **interoperable services** addressing the **whole research data lifecycle**

- EOSC is the basis for a **science, research and innovation data space** that will bring together data resulting from research […] and will be **connected** and fully articulated with the **sectoral data spaces** (European Data Strategy, COM(2020) 66 final). EOSC is also a **key action** in the ERA Roadmap & an **ERA pilot** as indicated in the Council conclusions

- An initial offering of **EOSC resources** and services (e.g. repositories) can be found in the EOSC Portal

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EOSC in the European Data Strategy

(February 2020)

The EU will create a single market for data by:

- Setting clear and fair rules on access and re-use of data;
- Investing in next generation standards, tools and infrastructures to store and process data;
- Joining forces in European cloud capacity;
- **Pooling European data in key sectors, with EU-wide common and interoperable data spaces;**
- Giving users rights, tools and skills to stay in full control of their data.

*"**EOSC** is the basis for a science, research and innovation data space that will bring together data resulting from research and deployment programmes and will be connected and fully articulated with the sectoral data spaces."*
(European Data Strategy, COM(2020) 66 final)

EOSC in the new European Research Area

(September 2020)

Prioritising investments

Improving access to excellence

Deepening the ERA

- Improving Researchers' careers
- Empowering universities
- **Boosting Open Science**
- Boosting access to R&I infrastrcutures
- Engaging citizen in science
- Developing inclusive gender equality plans

Translating R&I results into economic value

Key action 9 of the **ERA roadmap**:

- Launch, via the Horizon Europe Programme, a platform of peer-reviewed open access publishing; analyse authors' rights to enable sharing of publicly funded peer-reviewed articles without restriction;
- **Ensure a European Open Science Cloud that is offering findable, accessible, interoperable and reusable research data and services [Web of FAIR data and services for science];**
- Incentivise open science practices by improving the research assessment system.

The new EOSC Association

- Founded on 29 July 2020 as an AISBL under Belgian law
  First constitutional General Assembly on 17 December 2020
- Shall represent **the broader EOSC stakeholder community**
  Currently: more than 130 provisional members and 48 observers
- Planned signature in April 2021 of a Memorandum of Understanding for an EOSC **European Partnership** with the Commission

Possible core functions for the EOSC Association:

- Develop and govern the EEOSC federating core;
- Manage the EOSC compliance framework (Rules of Participation);
- Manage trusted certification;
- Manage the EOSC AAI capacity;
- Manage / implement EOSC PID policies
- Outreach to stakeholders
- Monitor EOSC services and transactions
- Manage EOSC trademark(s)
- Contribute Horizon Europe programme and EU policies

FAIR data sharing in action:
The European COVID-19 Data Platform

20 April 2020, launch of the European COVID-19 Platform

"*The platform is an important part in the building of the EOSC*".

President U. von der Leyen

- The European Commission launched on 20 April 2020 the **European COVID-19 Data Platform** together with EMBL-EBI, ELIXIR, and other partners, as part of the ERAvsCORONA action plan supported by the Member States.
- The Platform is a thematic priority pilot to realise the **EOSC vision** and to showcase the added value of **FAIR data sharing** to advance science and benefit researchers
- It responds to the need to capitalise on the quick and wide **sharing**, **re-use**, **processing** of and **access** to **data** and **metadata** on the SARS-CoV-2, and the related COVID-19 disease.
- A very strong focus is placed on ensuring that data and metadata on this Platform are as **open** and as **FAIR** as possible.

Press release:
https://ec.europa.eu/commission/presscorner/detail/en/ip_20_680
Video: https://audiovisual.ec.europa.eu/en/topnews/M-004711
European COVID-19 Data Platform: https://www.covid19dataportal.org/

National Coordination Teams

- The main means to interact between EMBL-EBI, ELIXIR and MS/AC, and to raise awareness of the Platform nationally
- First coordination meeting in May 2020 with mapping of national efforts; 9 further meetings since
- Role:
  - Update participants on the Platform's development and new features
  - Highlight relevant national initiatives, share best practices, lessons learnt and identify bottlenecks
  - Identify priority areas and main obstacles

COVID-19 Data Portal SWEDEN
COVID-19 Data Portal NORWAY
COVID-19 Data Portal TURKEY
COVID-19 Data Portal SPAIN
COVID-19 Data Portal SLOVENIA
COVID-19 Data Portal ITALY
COVID-19 データポータル JAPAN
COVID-19 Data Portal POLAND

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Are we making progress?

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Is COVID-19 accelerating a long-term shift?

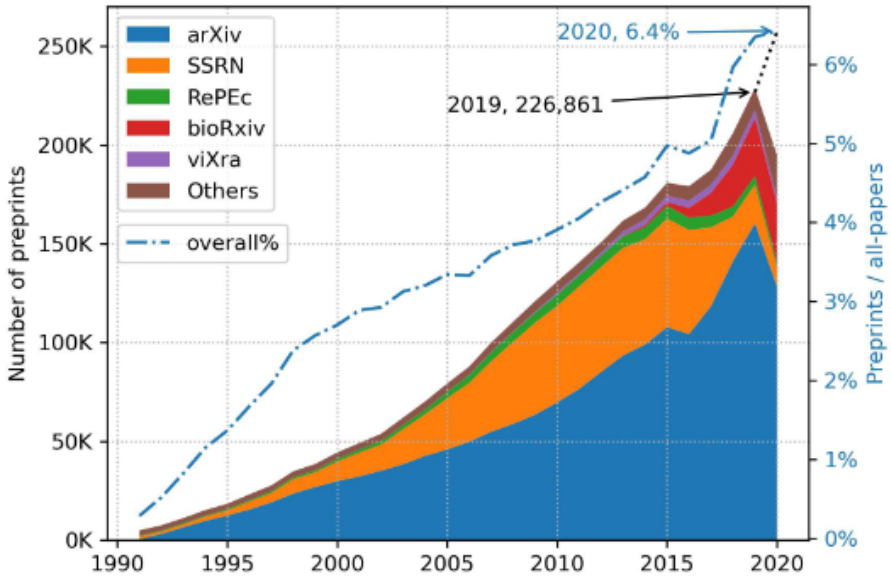
Some positive trends:

- Early and fast share of results through increased use of preprints
- Publishers temporarily opening up some of their publications (although not permanently)

But challenges remain, such as:

- Most open access papers (even COVID-19 ones) do not make their underlying data available without restrictions
- Research data are not fully interoperable and reusable

Annual number of preprints/all-papers rate growth



Source: arXiv:2102.09066v1

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Some remaining questions…
(beyond incentives and assessment)

- A more systemic approach to addressing data interoperability
- Autonomy and ownership of data and infrastructure
- The data deluge
- First mover advantage or the second mouse eats the cheese?
- Open science and IP protection
- Aligning the stakeholders

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Open Science in Horizon Europe

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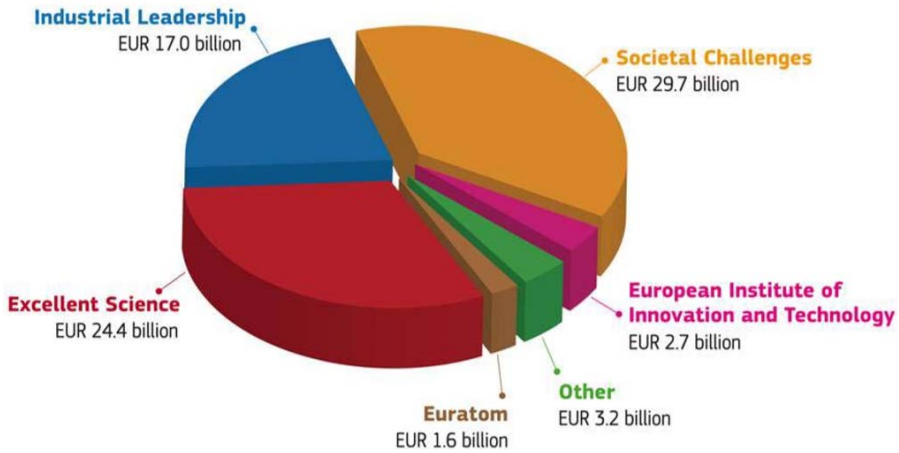
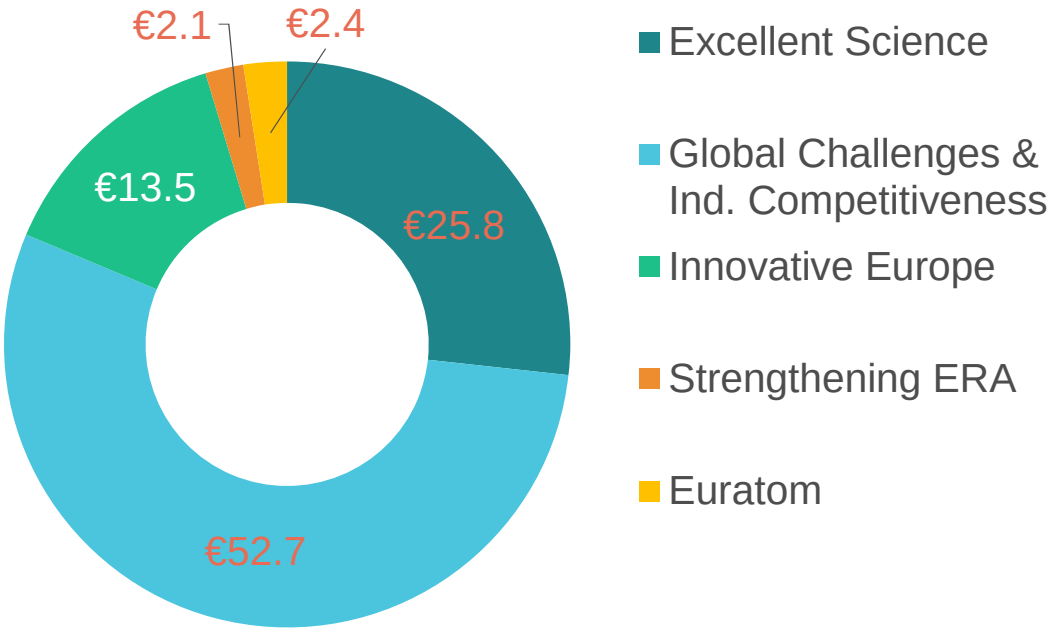
Horizon 2020 & Horizon Europe

Horizon 2020: ~ €80bn



Horizon Europe: ~€95.5bn



- The Commission invests heavily in Research and Innovation.
- Over **30000 H2020 projects**—Projects produce **research outputs**, **data**, **deliverables**, etc.
- It becomes increasingly important to make the **best possible use** of previous work.

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Evolution of our policies across the FPs

2008

FP7

OA **Pilot**

Deposit and open access

2014

H2020

OA **Mandatory**

Deposit and open access

& ORD/DMP **Pilot**

2017

H2020

OA **Mandatory**

Deposit and open access

& ORD/DMP **by default (exceptions)**

Under **Horizon Europe (2021)**:

- Open Science (OA, RDM, citizen´s engagement, etc.) embedded throughout the FP. OS to play a role in the:
  - **Evaluation** of proposals (excellence - methodology, quality & efficiency of implementation)
  - **Grant Agreement**
  - **Reporting**—during the project's lifetime
- Strengthening of the obligations with respect to open access and focus on responsible RDM in line with FAIR

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Open Science throughout project lifetime

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Research data under Horizon Europe

- The governing principle is to manage research data **responsibly**, **in line with FAIR**:
  - At proposal stage, beneficiaries will be **evaluated** on **preliminary RDM considerations**
  - All projects that **generate** (and/or re-use) research data will have to establish and regularly update a **Data Management Plan** (living document)
  - Beneficiaries will have to **deposit data in a trusted repository and ensure open access** ASAP and within the deadline set up in the DMP under CC BY or CC0 (or equivalent), **unless exceptions apply** (justified in the DMP), following the principle “as open as possible, as closed as necessary”
  - Data must be linked to publications they underpin, if applicable
    - For some actions, an additional obligation to deposit in a repository that is federated under **EOSC**.

Other results under Horizon Europe

- Data is not the only result that should be managed in a research project → **digital**: Software, algorithms, protocols, workflows, models, and **physical**: reagents, antibodies, hardware, etc. all need to be properly managed:
  - We would like to see these other results also **described in the DMP**.
  - Beneficiaries are encouraged to **deposit and provide open access via a repository** to research outputs, unless legitimate interests or constraints apply.
- Results, either digital or physical, should also be findable, interoperable, accessible and re-usable.

Trusted repositories under Horizon Europe

- Trusted repositories are either **certified repositories** (e.g. CoreTrustSeal, nestor Seal DIN31644, ISO16363) and/or **disciplinary/domain repositories** that are commonly used/endorsed by the research communities (e.g. ELIXIR deposition databases).
- **General-purpose repositories** and **institutional repositories** are, in general, also acceptable.
- Trusted repositories share essential properties:
  - Mechanisms to ensure **integrity** and **authenticity** of contents.
  - Offer clear **information** about their **policies/services**.
  - Provide broad, and ideally **open access** to content (consistent with legal and ethical constraints).
  - Assign **PIDs**, ask for detailed **metadata** in a standardized (e.g. Dublin Core) and machine-readable way.
  - Ensure mid- and long-term **preservation** of contents, **expert curation**, **quality assurance**.
  - Meet national and/or international **security** criteria

Evaluation of proposals and Open Science

“Excellence” criterion

(methodology)

- Evaluation of the quality of open science practices
- Up to 1 page to describe OS practices + up to 1 page to describe research data/output management

“Quality and efficiency of implementation” criterion

(capacity of participants and consortium as a whole + list of achievements)

- Explain expertise on OS
- List publications, software, data, etc, relevant to the project with qualitative assessment and, where available, persistent identifiers

Publications are expected to be open access; datasets are expected to be FAIR and ‘as open as possible, as closed as necessary‘. **Significance of publications to be evaluated on the basis of proposers’ qualitative assessment** and not per Journal Impact Factor

Exceptions: ERC + some EIC programmes for now evaluate OS practices under impact

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More information at this [link]

28 JUNE	INFRASTRUCTURES	
29 & 30 JUNE	DIGITAL, INDUSTRY & SPACE	CLUSTER 4
30 JUNE	CIVIL SECURITY FOR SOCIETY	CLUSTER 3
01 JULY	CULTURE, CREATIVITY & INCLUSIVE SOCIETIES	CLUSTER 2
01 JULY	MARIE SKŁODOWSKA-CURIE ACTIONS	
02 JULY	HEALTH	CLUSTER 1
05 & 06 JULY	CLIMATE, ENERGY & MOBILITY	CLUSTER 5
07 & 08 JULY	FOOD, BIOECONOMY, NATURAL RESOURCES AGRICULTURE & ENVIRONMENT	CLUSTER 6
09 JULY	ERA & WIDENING	

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Thank you

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