

National Initiatives for Open Science in Europe

Main Concepts of Open Science

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- **Concept of Open Science**
- Aspects of Open Science and expected benefits
- Strategic framework at the international level
- EOSC

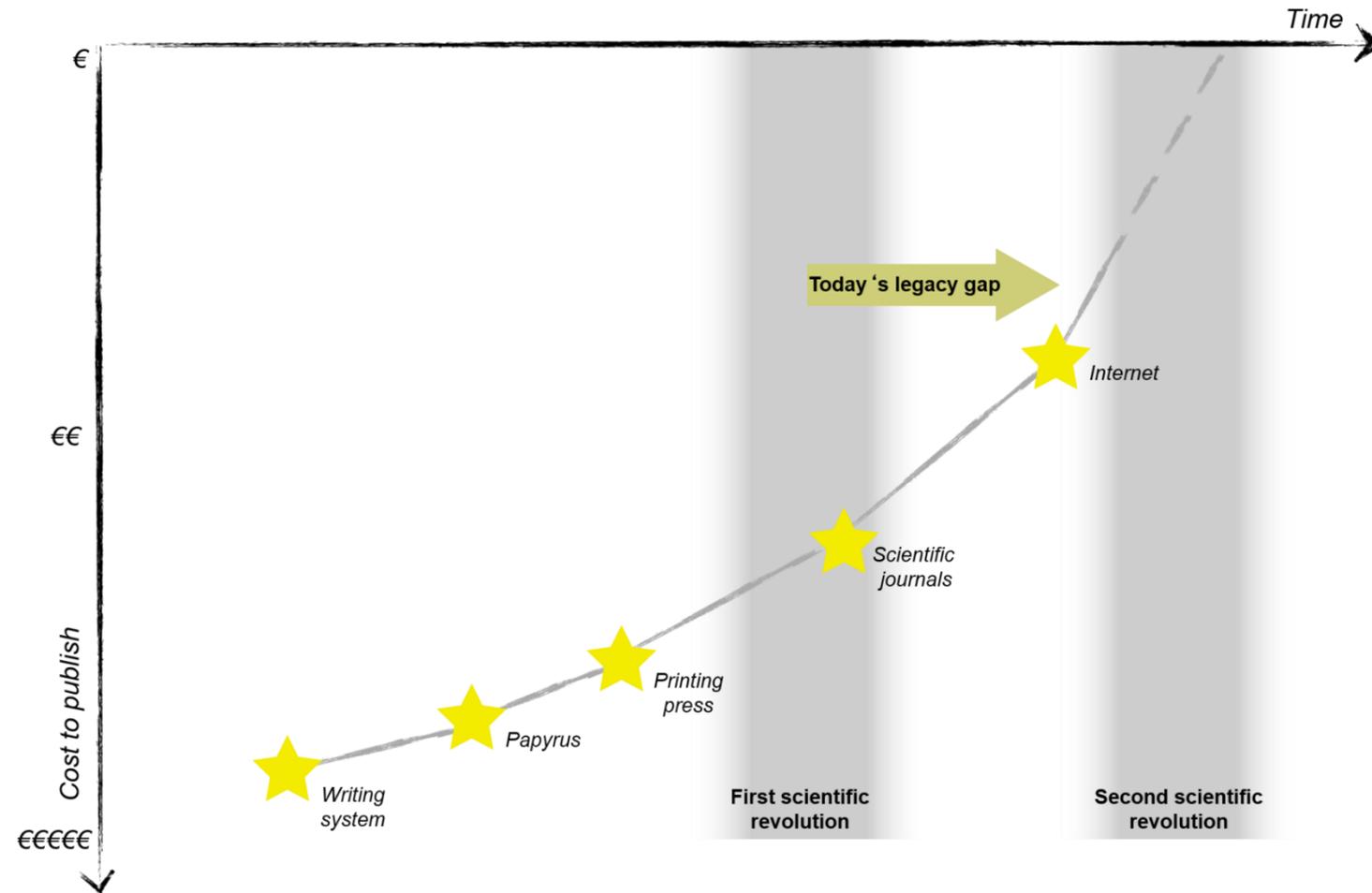
- ❑ The way research is performed, researchers collaborate, knowledge is shared and science is organized is changing rapidly in recent years.
- ❑ This change is enabled by the **availability of digital technologies** and driven by the exponential growth of data and the enlargement of the global scientific population.
- ❑ In the traditional model a discovery not published in a scientific journal/ monograph was not truly complete.

Move away from 300 years old model!



Work. Finish.
Publish!
(Faraday)

Necessity for change in publishing paradigm



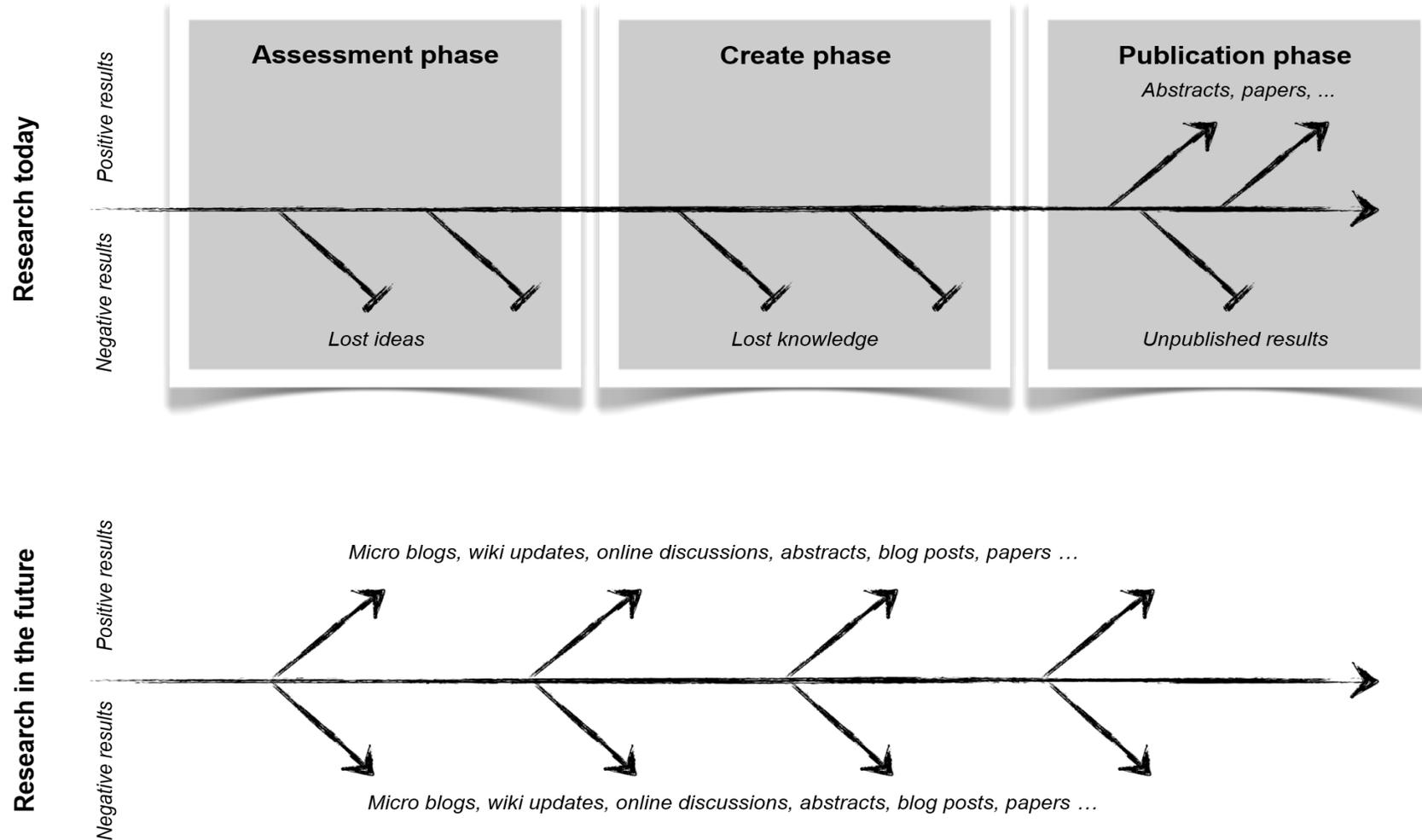
- ❑ The **first scientific revolution** happened when the publishing of scientific papers became the prevailing means of disseminating scientific knowledge.
- ❑ Today, publishers still hold the copyright for most of the published material.
- ❑ **Internet** provides novel means of publishing, which should be integrated into the scientific culture.

Source:

Opening Science - The Evolving Guide on How the Internet is Changing Research, Collaboration and Scholarly Publishing
ISBN: 331900025X



Necessity for change in publishing paradigm



“Dissemination of results of research is an essential, inseparable component of the research process”

Sparc.org

- ❑ Open Science is the movement to make scientific research, data and dissemination, **funded through public funds**, accessible to all levels of an inquiring society, amateur or professional.
- ❑ The main objective of Open Science is to make every step of the scientific process visible and accessible and to make it available to both the scientific and the wider community.
- ❑ **Open means anyone can freely access, use, modify, and share for any purpose (subject, at most, to requirements that preserve provenance and openness)**

Sharing ≠ Open

- ❑ In practice, scientific knowledge production has proven to be much more closed, fragmented and isolated due to:
 - ❑ Scientific practice has become locked in the pursuit of personal/individual success
 - ❑ Research assessment schemes use quantitative indicators based on citations as proxy for research quality
 - ❑ Scientific policies oriented to the commercialisation of scientific knowledge have increasingly locked up scientific knowledge

- ❑ Open Science should result in:
 - ❑ Better science
 - ❑ Increased trust in science
 - ❑ Meeting global challenges

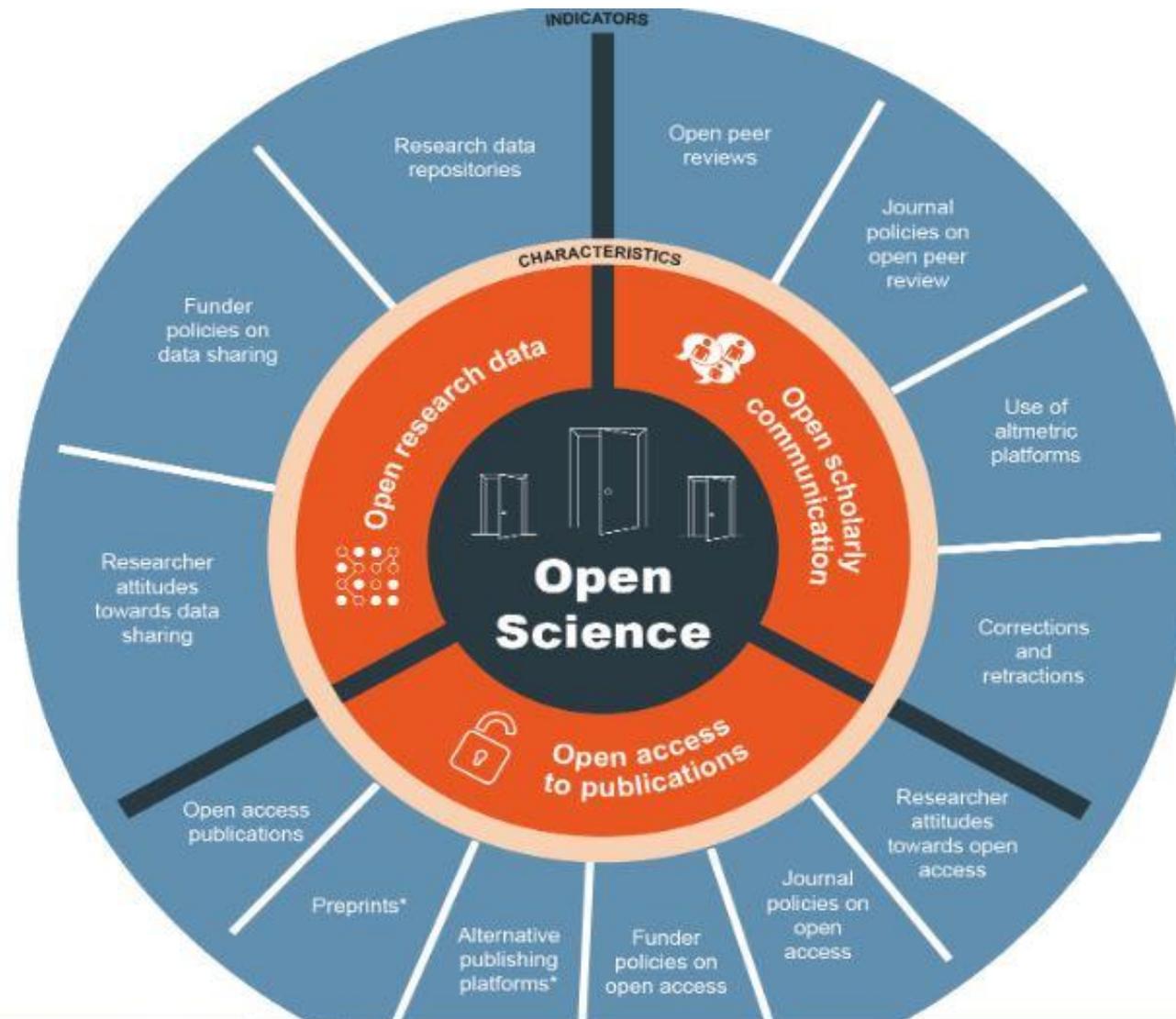
- ❑ Globally, the Open Science practice is being increasingly adopted, which reflects the fact that the **results of publicly funded research are a public good**, that can be fully exploited only if they are accessible to everyone without restrictions.

- ❑ Affordable and easy access to the results of **publicly funded research** is important for the scientific community, for innovative businesses and for society.

- ❑ Open Science policies, strategies and initiatives involve various actors, including:
 - ❑ Researchers and research organizations
 - ❑ National academies of science and science societies
 - ❑ Research funders
 - ❑ Universities and their libraries
 - ❑ Policy makers (government sector)
 - ❑ Publishers
 - ❑ Innovative organizations, SMEs,...
- ❑ Open science strives to reduce huge profits of publisher, achieved to subscription to scientific journals, as well as through hybrid model of publishing (both restricted access and open access in the same journal).

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Open Science building blocks



- ❑ **Open Science** encompasses a variety of practices, like are:
 - ❑ **open access to publications,**
 - ❑ **open research data,**
 - ❑ open methods,
 - ❑ open evaluation including open peer review,
 - ❑ open education,
 - ❑ citizen science,
 - ❑ open access to research infrastructure,
 - ❑

- ❑ Open access is a major pillar of the **Open Science**
- ❑ For the first time considered at EU level in **2002**, when **Budapest Open Access Initiative** is adopted
- ❑ Open Access to scientific publications is defined as unrestricted online (internet) access to scientific publications, which is free of charge for the end user and allows the reuse of scientific information (searching, reading, downloading, printing, distributing, indexing and / or use in any other lawful manner).

The two main ways to practice Open Access to scientific publications are:

- ❑ **“Green” open access** (self-archiving): a published paper, or a final peer-reviewed manuscript, is archived by the authors in a repository available on the internet, respecting copyright, before, after or in parallel with its publication.
 - ❑ Access to the paper is often postponed (“embargo period”) at the request of the publisher
- ❑ **“Gold” open access** (publishing with Open Access): allows the published paper to be open for access in the journal immediately after publication.
 - ❑ Copyright is managed through Open Access licenses (authors retain copyright over the material, and published paper can be archived in the repository).

Open access



Expected benefits

- ❑ Accelerate innovation (faster to market = faster growth);
- ❑ Foster collaboration and avoid duplication of efforts (greater efficiency);
- ❑ Build on previous research results (improved quality of results);
- ❑ Involve citizens and society (improved transparency of the scientific process).

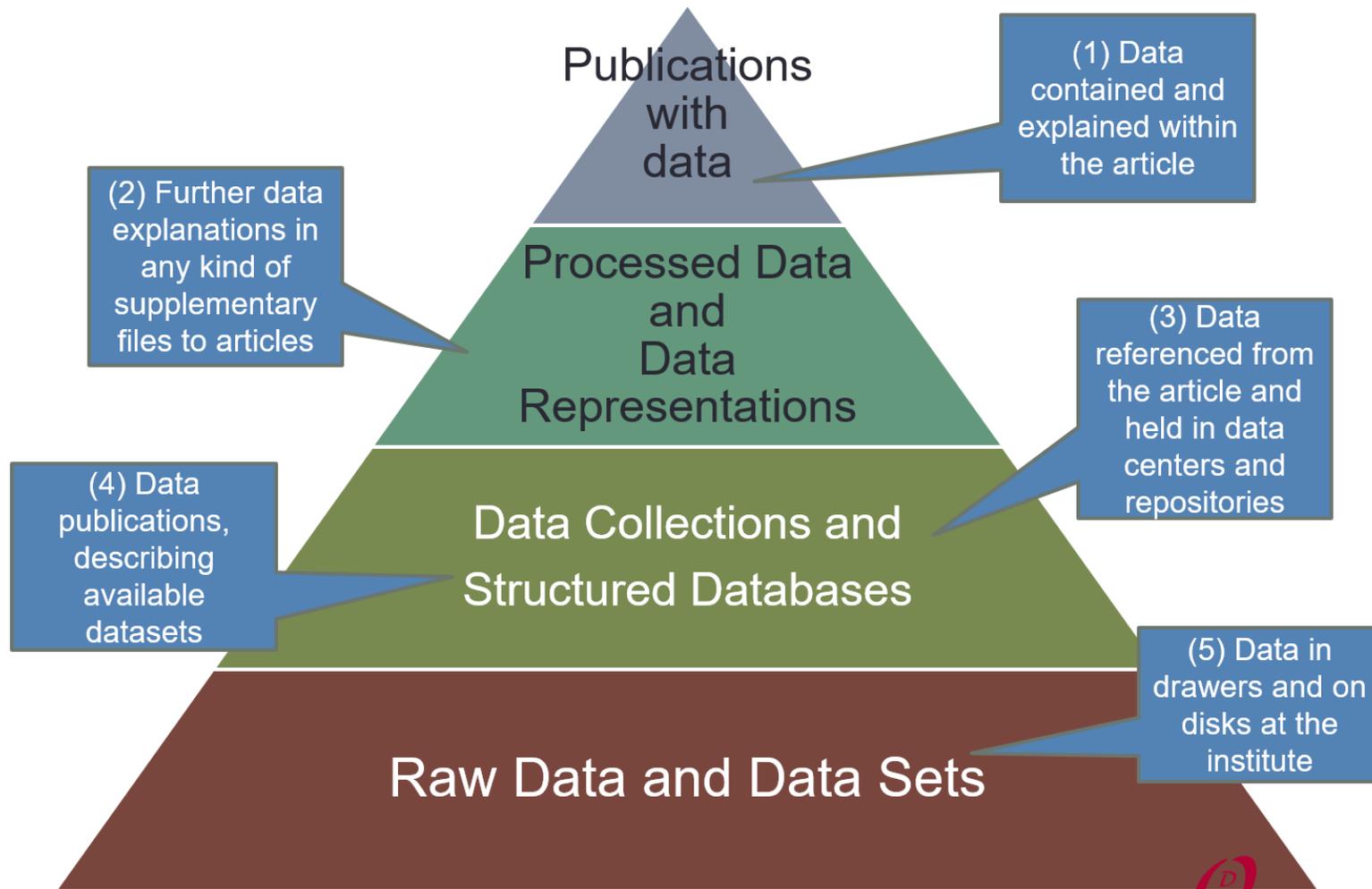


Benefits for researchers

- ❑ Open access to research data (Open data) refers to the right to access, via the internet, and freely use digital research data (experimental results, observations, computer-generated information, etc.) which form the basis for the analyses included in scientific publications.
- ❑ Research data generated through public funding should be as open as possible, as closed as necessary
 - ❑ Exceptions to the implied fully open access must be precisely defined and reasoned
- ❑ The aim of depositing research data in digital repositories is to ensure
 - ❑ permanent storage,
 - ❑ possibility of their reuse for scientific or other purposes,
 - ❑ verification of research results validity.



PUBLICATIONS AND DATA



- ❑ Due to data-intensive science, it is a great challenges to facilitate knowledge discovery
- ❑ In this regard, **FAIR** represents a set of guiding principles to make data **Findable, Accessible, Interoperable, and Reusable**
- ❑ **FAIR Data and Open Data are different concepts**, although similar and somewhat overlapping.
 - ❑ Open Data is available for everyone to reuse but may not bring the full characteristics of FAIR: e.g. no consistent way of accessing it, may lack in machine readability
 - ❑ FAIR Data presents a well curated digital manifestation of the data, persistent and consistent in the way it is accessed, but may be (partially) closed

For researchers

- ❑ greater visibility
- ❑ trust in research work
- ❑ trust of funders
- ❑ higher citation and influence
- ❑ opportunities for new partnerships and projects
- ❑ acquiring scientific reputation
- ❑ possible new engagements,..

For research funders

- ❑ More value for the invested money
- ❑ funding duplicate research works is avoided
- ❑ accelerated innovation process
- ❑ improved research quality
- ❑ policy makers are better informed,..

For society

- ❑ improving interaction (dialogue) between science and society
- ❑ removing social and national barriers
- ❑ opening opportunities for everyone to participate in research
- ❑ increasing people's trust in science
- ❑ improving public health and environmental protection
- ❑ greater societal support to research funding,..

- ❑ **Open methods:** The objective is to make clear accounts of the methods and sources used in research freely available via the internet. Scientific blogging and commenting culture are core practices in this regard.
- ❑ **Open evaluation:** implies combining several different metrics to assess the quality of a scientific publication, researcher, and even reviewers themselves. Entails publicly available paper reviews, ranking of papers based on multiple metrics (statistics on access to work, citations, etc.), ranking of reviewers, etc.
- ❑ **Open education:** includes freely distributable textbooks and teaching materials, such as filmed lectures, readings, education sets, but also interactive user forums.
- ❑ **Citizen science:** Supported by collaborative technologies, citizens can participate in the research design, data gathering, analytical process, as well as in dissemination and exploitation activities.
- ❑ **Open research infrastructure:** Aims to promote and enable unhindered access to research infrastructure, in order to improve research, development and innovation, as well as to improve research methods and human resources skills.

- ❑ Open Science and Open Access activities are rarely part of institutional reward systems
 - ❑ survey conducted in **2019** by the European University Association (EUA) in 32 countries
 - ❑ necessity to introduce incentives and rewards for researchers and institutions that practice OS
- ❑ In 2017, European Commission's Working Group on Rewards under Open Science published a report proposing the so-called **Open Science Career Assessment Matrix (OS-CAM)**
 - ❑ Besides publications, leadership skills, contribution to the teaching process, impact in the research area, overall research results and activities related to the research process are proposed as relevant measures. The focus is placed on Open Science aspects within these activities and research results are measured against FAIR principles related to data

- ❑ **San Francisco Declaration on Research Assessment (DORA)**, from 2012, makes a number of recommendations aimed at eliminating the assessment of researchers based exclusively on the rank of the journal itself.
- ❑ **Good practice examples:**
 - ❑ Ghent University, University of Bristol, Delft University of Technology
 - ❑ French National Research Agency (ANR), Austrian Science Fund (FWF), European Molecular Biology Organisation (EMBO), Cancer Research UK (CRUK), Dutch Research Council
 - ❑ Australian National Health and Medical Research Council (NHMRC), U.S. National Science Foundation,...
- ❑ H2020 Call from March 2020: “Open Science incentives and rewards: develop academic career systems that support and reward researchers who participate in engaging with society and in a culture of sharing the results of their research, in particular by ensuring early sharing and open access to their publications and other research outputs...”

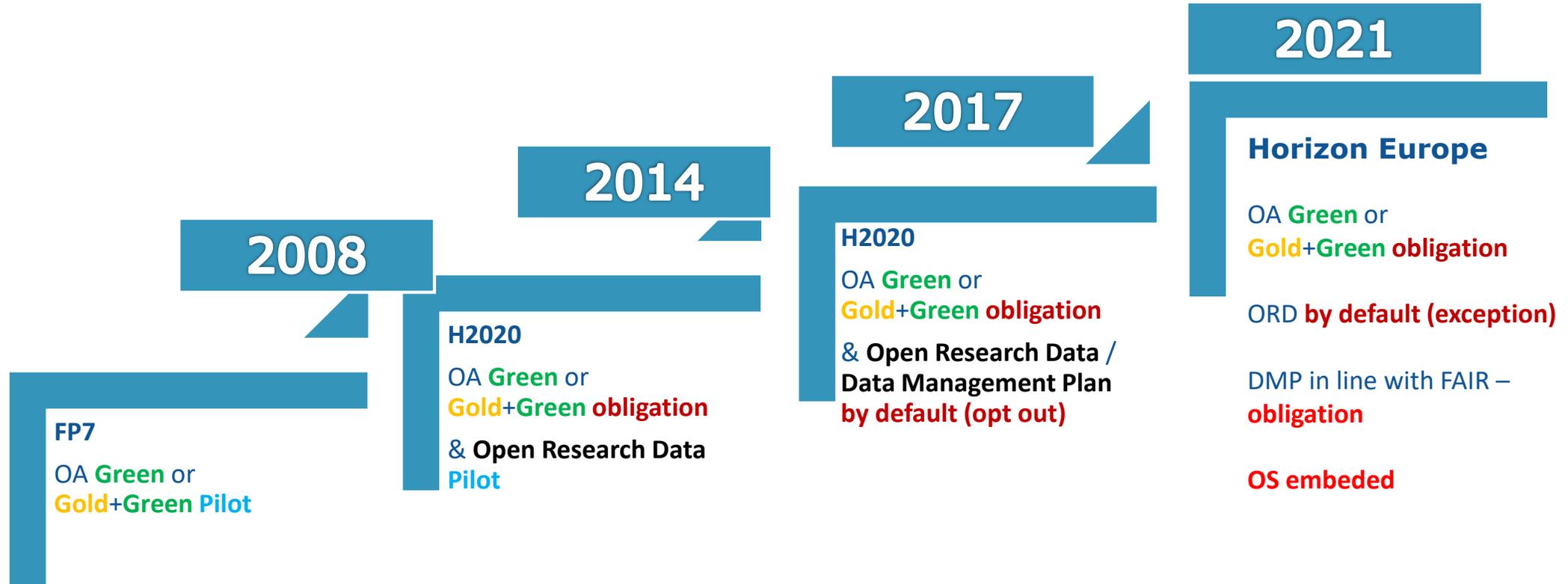
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- Launched in the United States in **1991** and currently managed by the **University of Cornell**, **arXiv** (arxiv.org) is an open access repository of electronic preprints (known as e-prints) approved for posting after moderation, but not full peer review.
- In France, **Hyper Articles on Line (HAL)** was launched in **2001**, as an open archive, where authors can deposit scholarly documents from all academic fields.
- On February 14, **2002**, the **Budapest Open Access Initiative** produced its original declaration, which launched the debate with publishers on legal or contractual issues about ‘ownership’ of the content.
- Max Planck Society hosted a conference on open access in **2003**, from which emerged **Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities**.

- **EC Recommendation C(2012) 4890 of 17.7.2012. - Member states on access to & preservation of scientific information**
 - **Key principle: bring coherence between the national environment of researchers 'at home' and the EU Framework Programme(s)**
 - **Creation of the European Commission Expert Group on National Points of Reference (NPR) on Scientific Information and relevant reports**
 - Premise: scientific information resulting from public funding should be accessible and re-usable with as few restrictions as possible
 - Aim: Member States put in place policies with respect to scientific publications in journal, research data, preservation and infrastructure & they report through NPRs
- **European Research Area (ERA) 2015-2020** fosters free circulation of researchers, scientific knowledge and technology

- *Open access to scientific publications*
- *Management of research data including open access (2012: open access to research data)*
- *Preservation and re-use of scientific information*
- *Infrastructures for open science (2012: e-infrastructures)*
- *Skills and competences* *new***
- *Incentives and rewards* *new***

Open science through framework programmes



- On **September 2018**, a group of national research funding organisations, with the support of the European Commission and the European Research Council (ERC), announced the launch of **cOAlition S**, an initiative to make full and immediate Open Access to research publications a reality.
 - It is built around Plan S, which consists of one target and 10 principles.

- Main principle of cOAllition S:

With effect from 2021, all scholarly publications on the results from research funded by public or private grants provided by national, regional and international research councils and funding bodies, must be published in Open Access Journals, on Open Access Platforms, or made immediately available through Open Access Repositories without embargo.

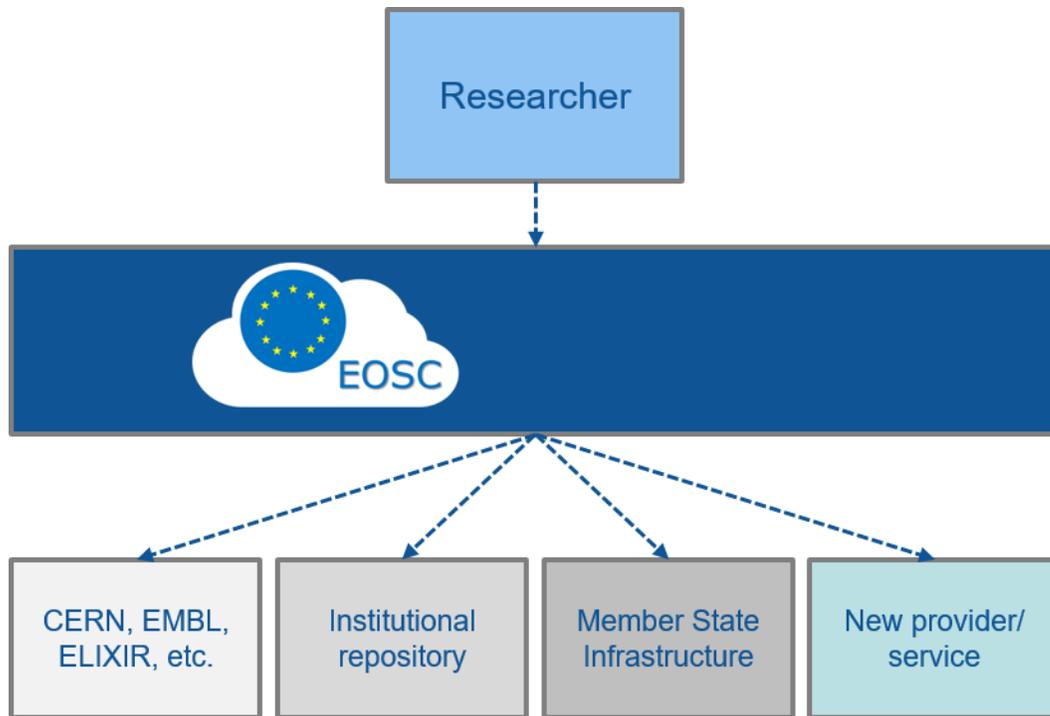
- *From July 2022 only publishers who adhere to the newly approved Plan S price transparency frameworks will be eligible to access funds from cOAlition S members*
- *The two approved frameworks are:*
 - **Breakdown of Publication Services and Fees** developed by the Fair Open Access Alliance, which has been implemented by **Frontiers**, **MIT Press**, **Copernicus** and **MDPI**.
 - **Plan S Price and Transparency Framework** developed by Information Power, which has been piloted by **Annual Reviews**, **Brill**, **The Company of Biologists**, **EMBO Press**, **European Respiratory Society**, **F1000 Research**, **Hindawi**, **IOP Publishing**, **PLOS**, and **Springer Nature**

- At its 40th session in **November 2019**, **UNESCO's General Conference** decided to prepare an international standard-setting instrument on Open Science, in the form of a **recommendation**.
 - Global online consultations were held between February and July 2020, with **over 2900 participants from 133 countries**
 - **First draft of the UNESCO Recommendation** on Open Science has been prepared for the UNESCO General conference, to be held in **November 2020**, in Paris
- UNESCO Open Science website is created
<https://en.unesco.org/science-sustainable-future/open-science>
- Under UNESCO umbrella, the broad **Open Science Partnership** brings together all the relevant and interested Open Science stakeholders across the world

- In the draft document of Recommendation, Open Science means a complex of at least the following key elements:
 1. Open Access
 2. Open Data
 3. Open Source/Software and Open Hardware
 4. Open Science Infrastructures
 5. Open Evaluation
 6. Open Educational Resources
 7. Open Engagement of Societal Actors
 8. Openness to Diversity of Knowledge

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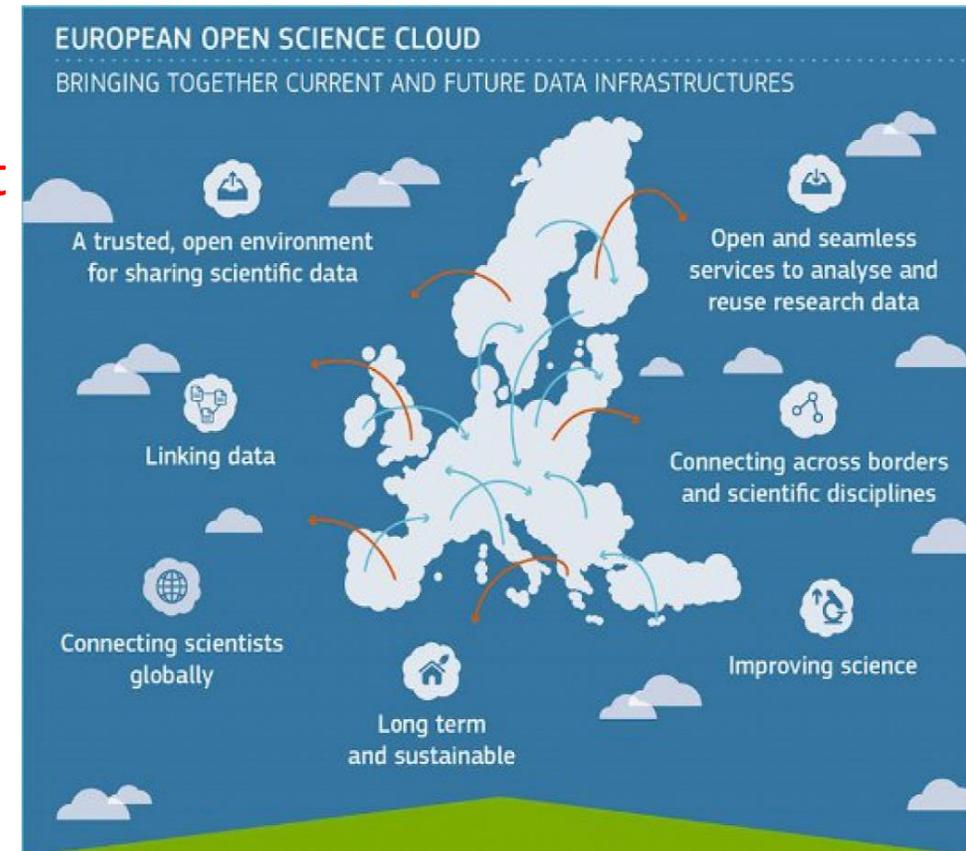
- ❑ European researchers face data fragmentation and unequal access to quality information sets
- ❑ The EOSC will allow for universal access to data



Seamless environment for interdisciplinary research

- ❑ Easy access through a universal access point for ALL European researchers
- ❑ Cross-disciplinary access to data and services unleashes potential of interdisciplinary research
- ❑ Services and data are interoperable (FAIR data)
- ❑ Data funded with public money is in principle open (**as open as possible, as closed as necessary**)
- ❑ EOSC will help increase recognition data intensive research and data science

- ❑ 'The EOSC aims to give Europe a global lead in scientific data infrastructures.... It will offer 1.7 million European researchers and 70 million professional in science and technology a virtual environment with free at the point of use, open and seamless services for storage, management, analysis, and reuse of research data, across borders and scientific disciplines' (COM(2016) 178final), p.6
- ❑ EOSC will join existing and emerging horizontal and thematic data infrastructures, bridging today's fragmentation and ad-hoc solutions





Former European Commission President
Jean-Claude Juncker

The EOSC initiative is the tangible outcome of a number of key European and global policy and position milestones regarding Open Science, including the **EC's Open Innovation, Open Science and Open to the World** – a vision for Europe.

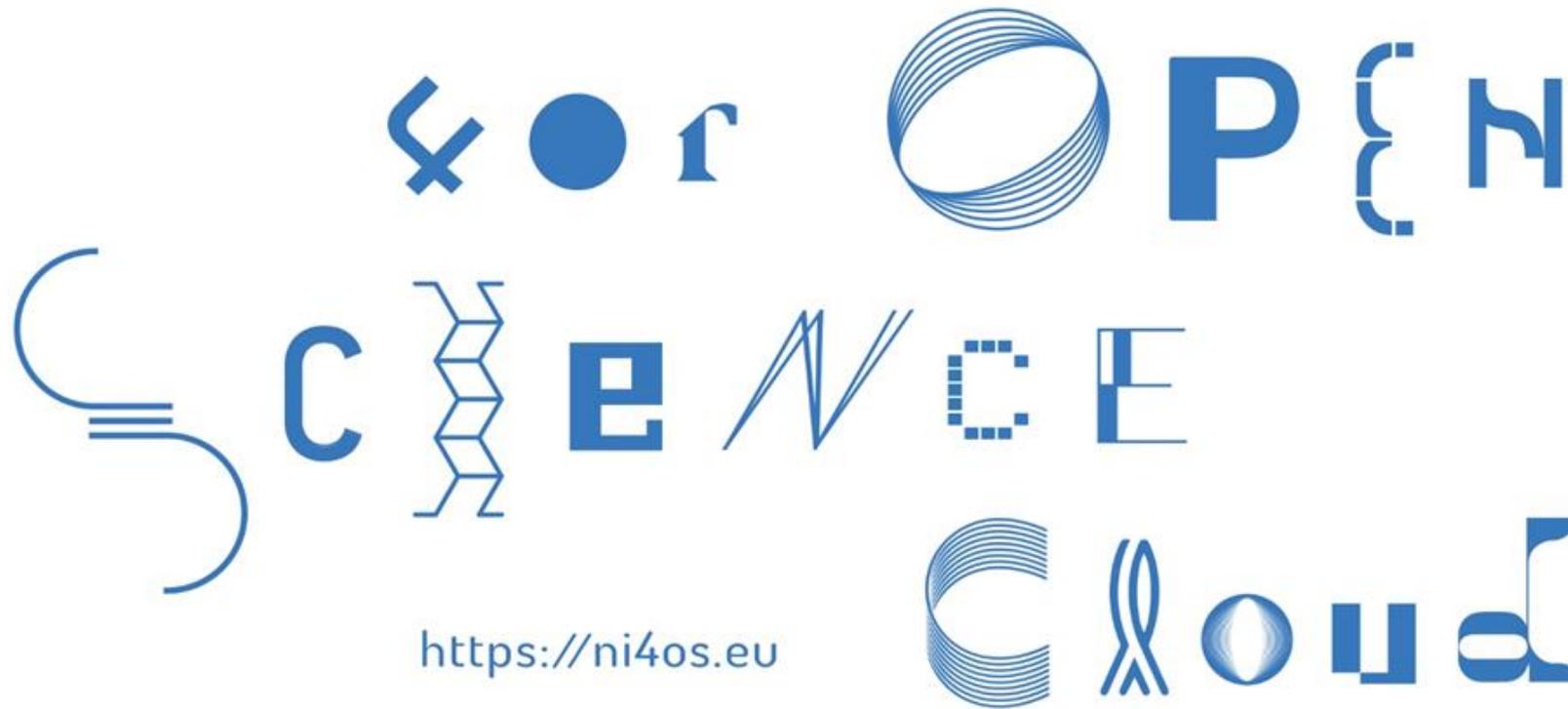
Digital Single Market (DSM)

April 2016: European Cloud Initiative COM(2016) 178
as part of the 'Digitizing Industry' package

- European Open Science Cloud (EOSC)**
- European Data Infrastructure (EDI)**
- Widening access and building trust**

- ❑ The Hague Declaration: <http://thehaguedeclaration.com/the-hague-declaration-on-knowledge-discovery-in-the-digital-age/>
- ❑ Berlin declaration: <https://openaccess.mpg.de/Berlin-Declaration>
- ❑ San Francisco Declaration: <http://www.ascb.org/dora-old/files/SFDeclarationFINAL.pdf>
- ❑ <https://ec.europa.eu/research/openscience>
- ❑ OpenAire <https://www.openaire.eu/>
- ❑ Research Data Alliance <https://rd-alliance.org/>
- ❑ LIBER 10 Recommendation on Getting Started in RDM
<http://libereurope.eu/wp-content/uploads/The%20research%20data%20group%202012%20v7%20final.pdf>

Thanks!



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