

About OPEN SCIENCE

Diego Coglitore

Project Manager, APRE

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WELCOME AND AGENDA

Open Science: definitions, tools and european policy

Open Access in Horizon Europe

Open Data: Data Management Plan and other tools

Citizen Science

Open Science in Horizon Europe: novelties in the template

Open Science in the project methodology: differences in the different practices

Q&A

Agenda

Trainer



Diego Coglitore



I am convinced that excellent science is the foundation of future prosperity, and that **openness is the key to excellence**. We are often told that it takes many decades for scientific breakthroughs to find commercial application.

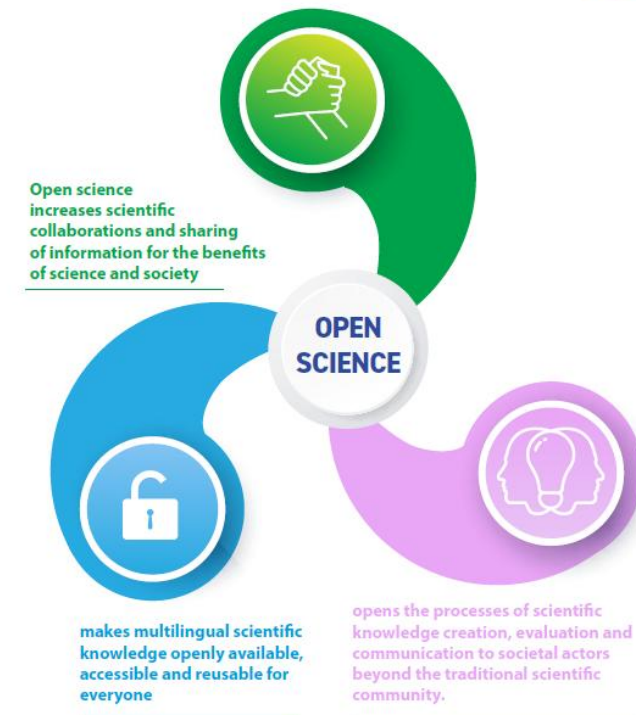
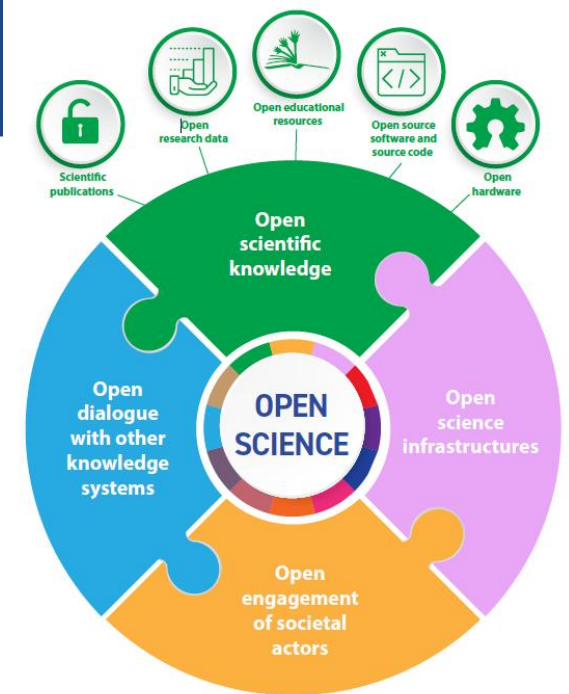
From 2014 until 2019, Moedas served as European Commissioner covering the portfolio of Research, Science and Innovation under the leadership of President Jean-Claude Juncker.



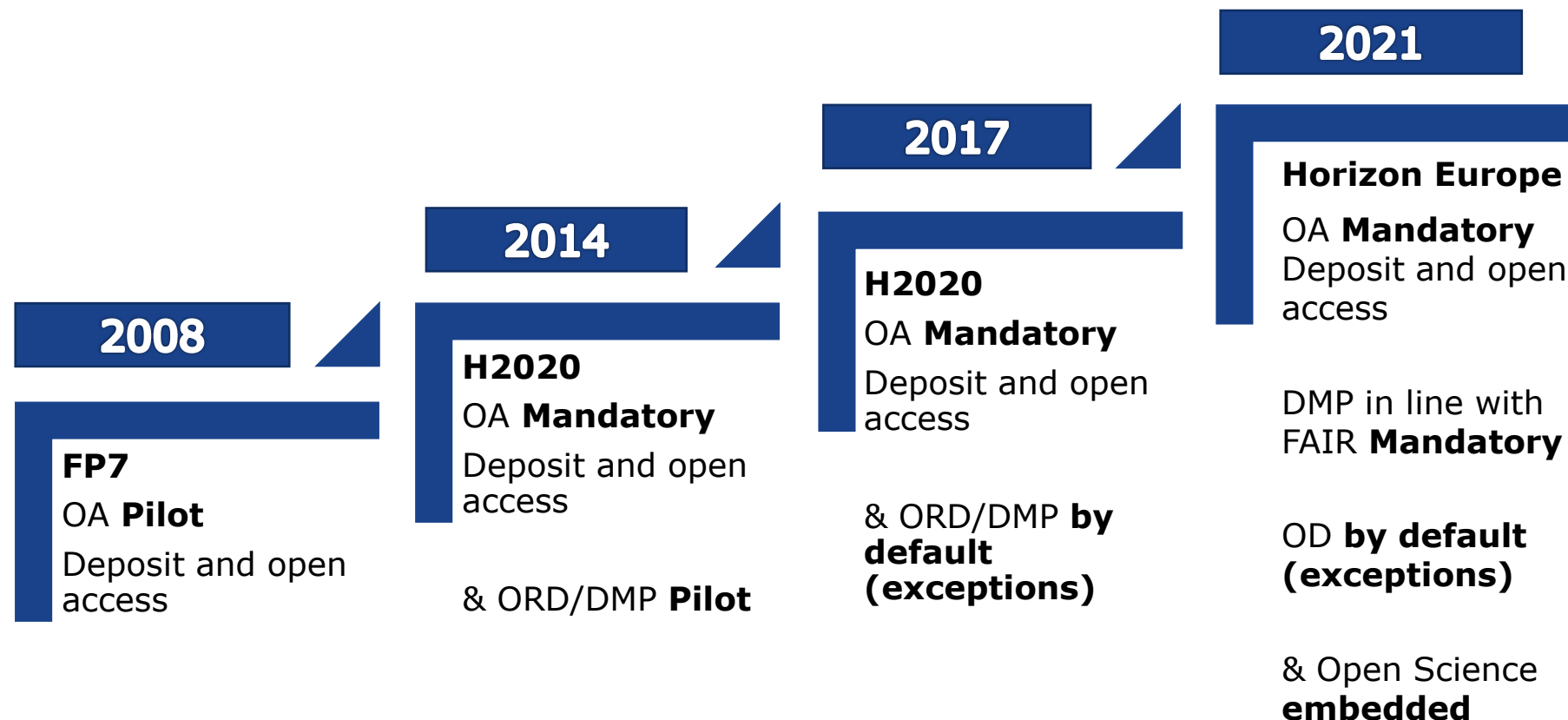


Open Science is defined as an inclusive construct that combines various movements and practices aiming to make multilingual scientific knowledge openly available, accessible and reusable for everyone, to increase scientific collaborations and sharing of information for the benefits of science and society, and to open the processes of scientific knowledge creation, evaluation and communication to societal actors beyond the traditional scientific community. It comprises all scientific disciplines and aspects of scholarly practices, including basic and applied sciences, natural and social sciences and the humanities, and it builds on the following key pillars: **open scientific knowledge, open science infrastructures, science communication, open engagement of societal actors and open dialogue with other knowledge systems.**

<https://en.unesco.org/science-sustainable-future/open-science/recommendation>

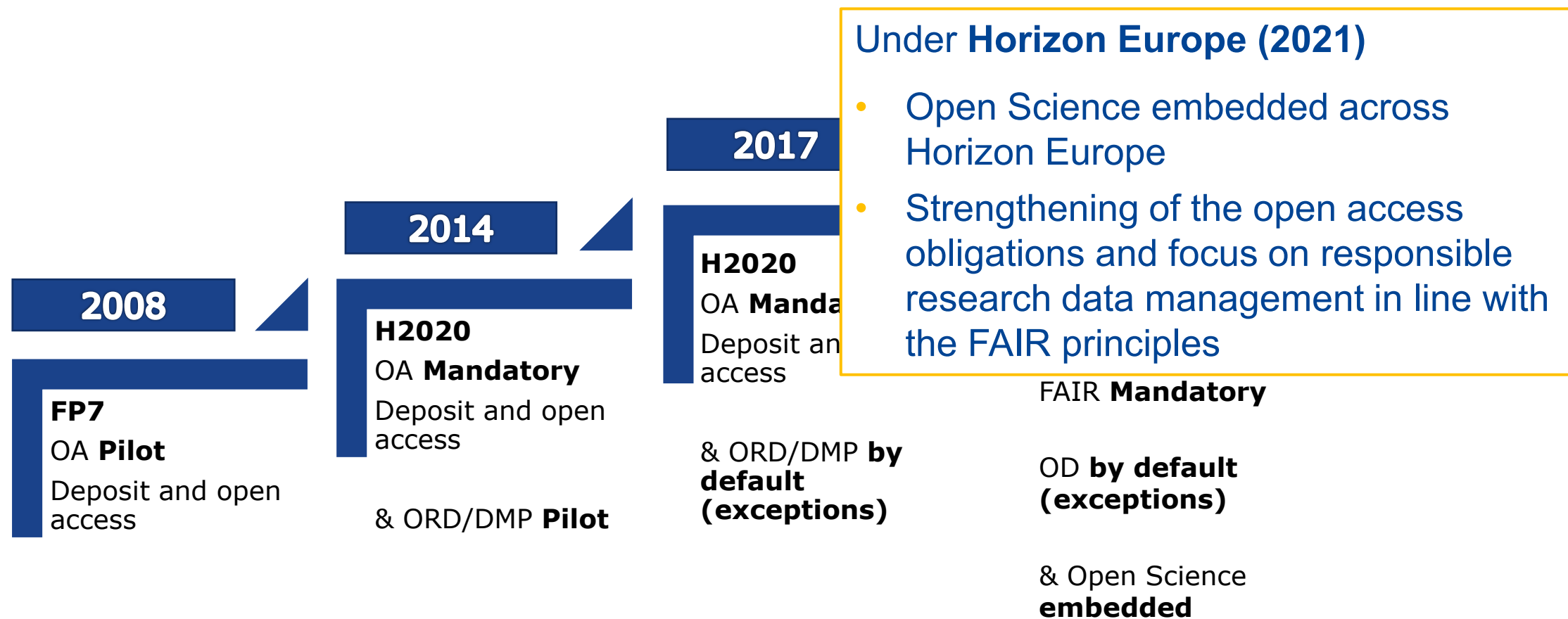


European Policies evolution



From «Fit for Purpose! Shaping Open Access and Open Science Policies for Horizon Europe» Victoria Tsoukala, PhD - DG RTD Open Science (Unit G4) - PUBMET 2019, Zadar, September 19th, 2019

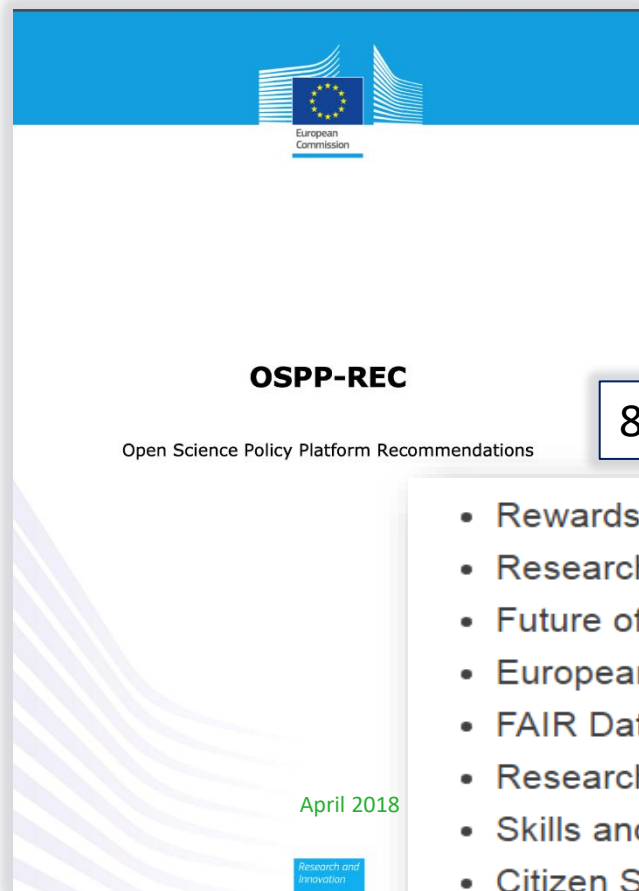
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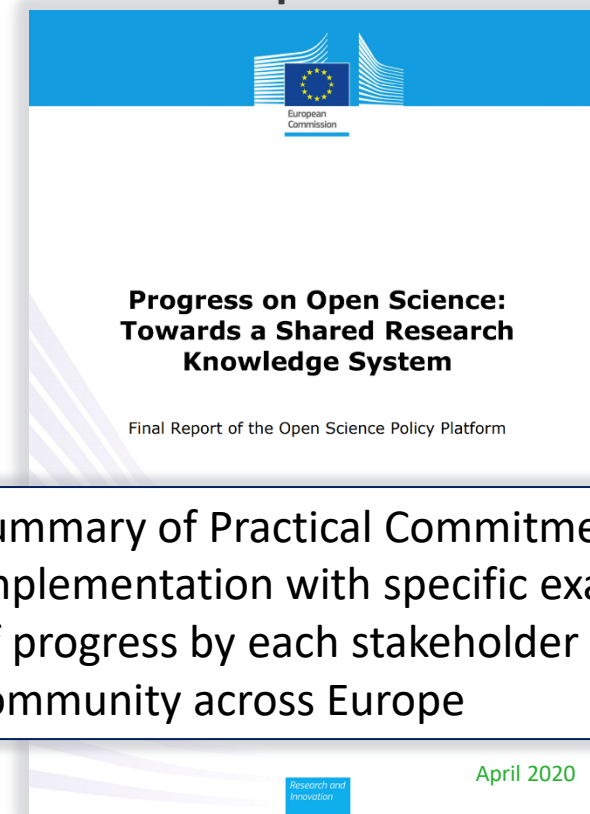
Open Science in Europe: Open Science Policy Platform

✧ Expert Group to provide advice about the development and implementation of open science policy in Europe (2016-2020)



8 priorities identified

- Rewards and Incentives
- Research Indicators and Next-Generation Metrics
- Future of Scholarly Communication
- European Open Science Cloud
- FAIR Data
- Research Integrity
- Skills and Education
- Citizen Science



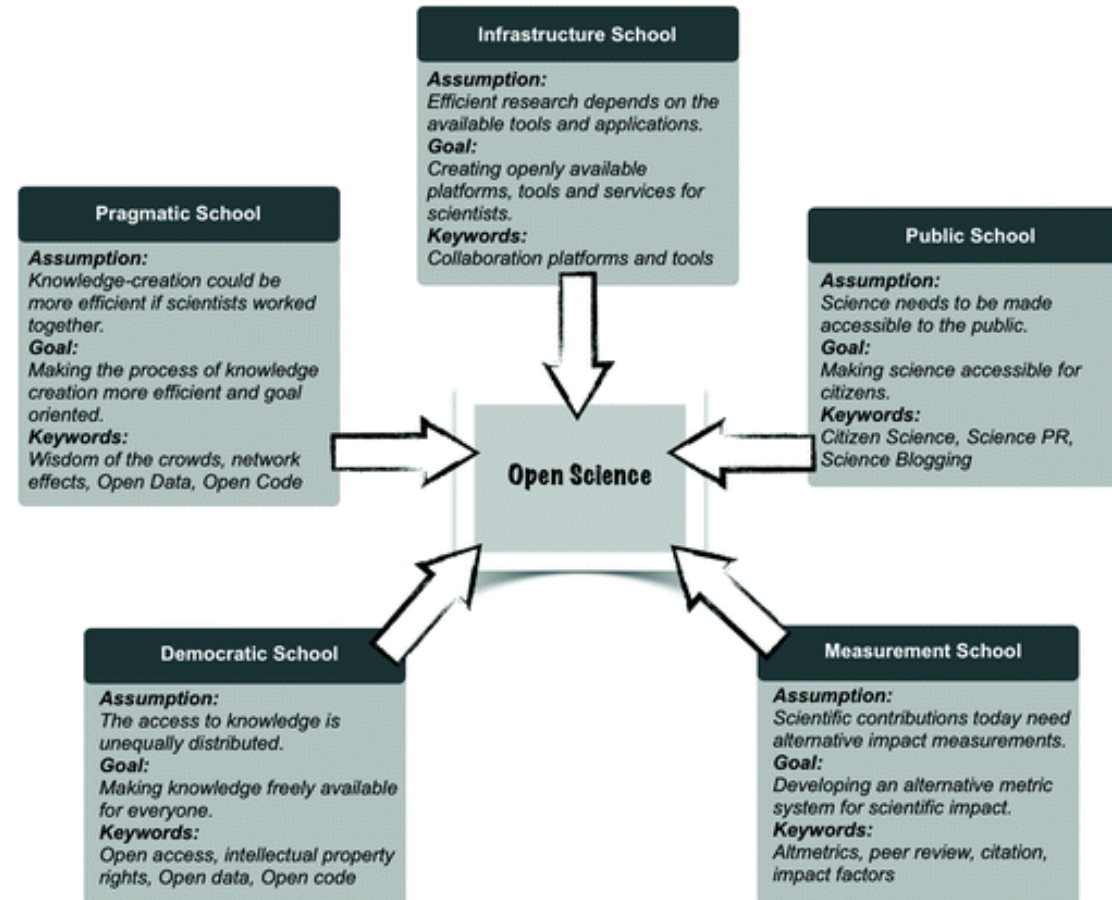
Summary of Practical Commitments for Implementation with specific examples of progress by each stakeholder community across Europe

What is Open Science?

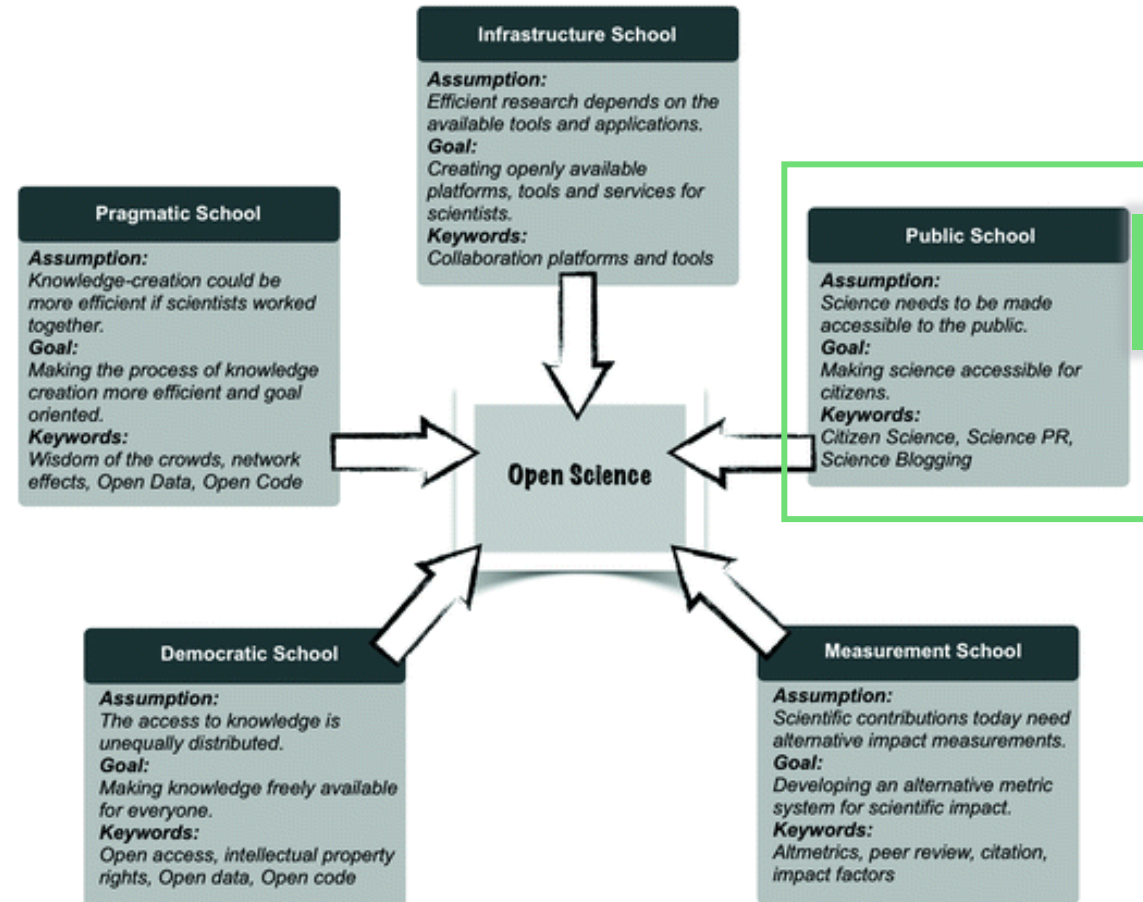


“Open Science represents a **new approach** to the scientific process based on cooperative work and new ways of diffusing knowledge by using digital technologies and new collaborative tools. The idea captures a **systemic change** to the way science and research have been carried out for the last fifty years: shifting from the standard practices of publishing research results in scientific publications towards sharing and using all available knowledge at an earlier stage in the research process.”

Open Science: One Term, Five Schools of Thought



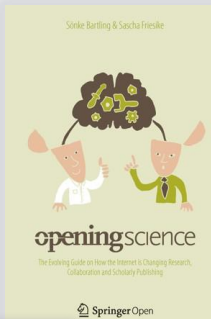
Open Science: One Term, Five Schools of Thought



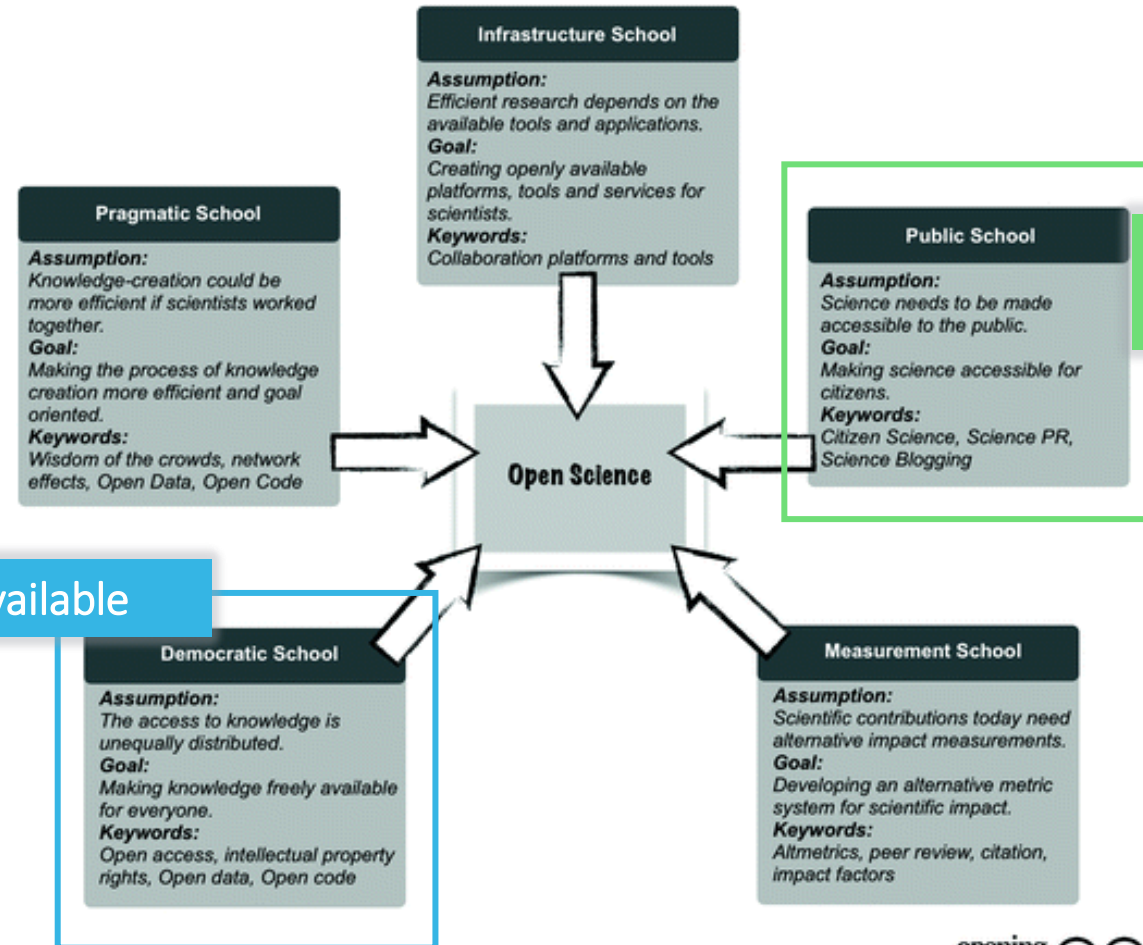
The Obligation to Make Science Accessible to the Public

accessibility of the research process (the production) and participation

comprehensibility of the research result (the product)



Open Science: One Term, Five Schools of Thought



The Obligation to Make Science Accessible to the Public

accessibility of the research process (the production) and participation

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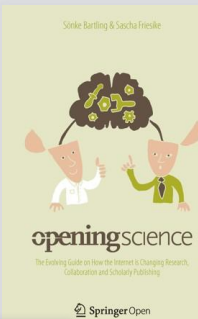
Making Research Products Available

Research publications (Open Access)

Scientific data (Open Data)



Open Science: One Term, Five Schools of Thought

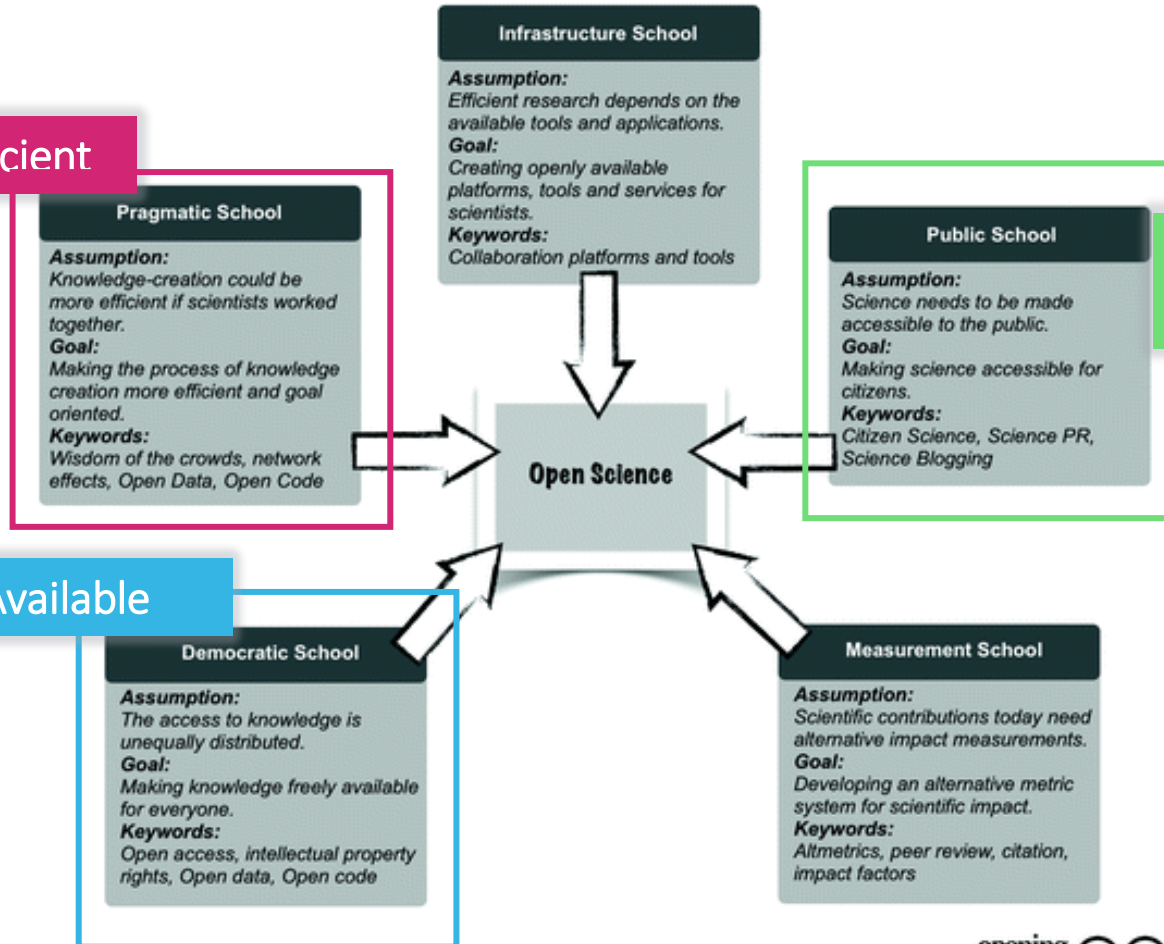


Making Research More Efficient

opening the scientific value chain (external knowledge, collaboration through online tools)

Making Research Products Available

Research publications (Open Access)
Scientific data (Open Data)



The Obligation to Make Science Accessible to the Public

accessibility of the research process (the production) and participation
comprehensibility of the research result (the product)



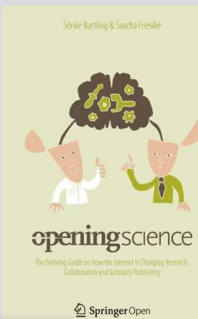
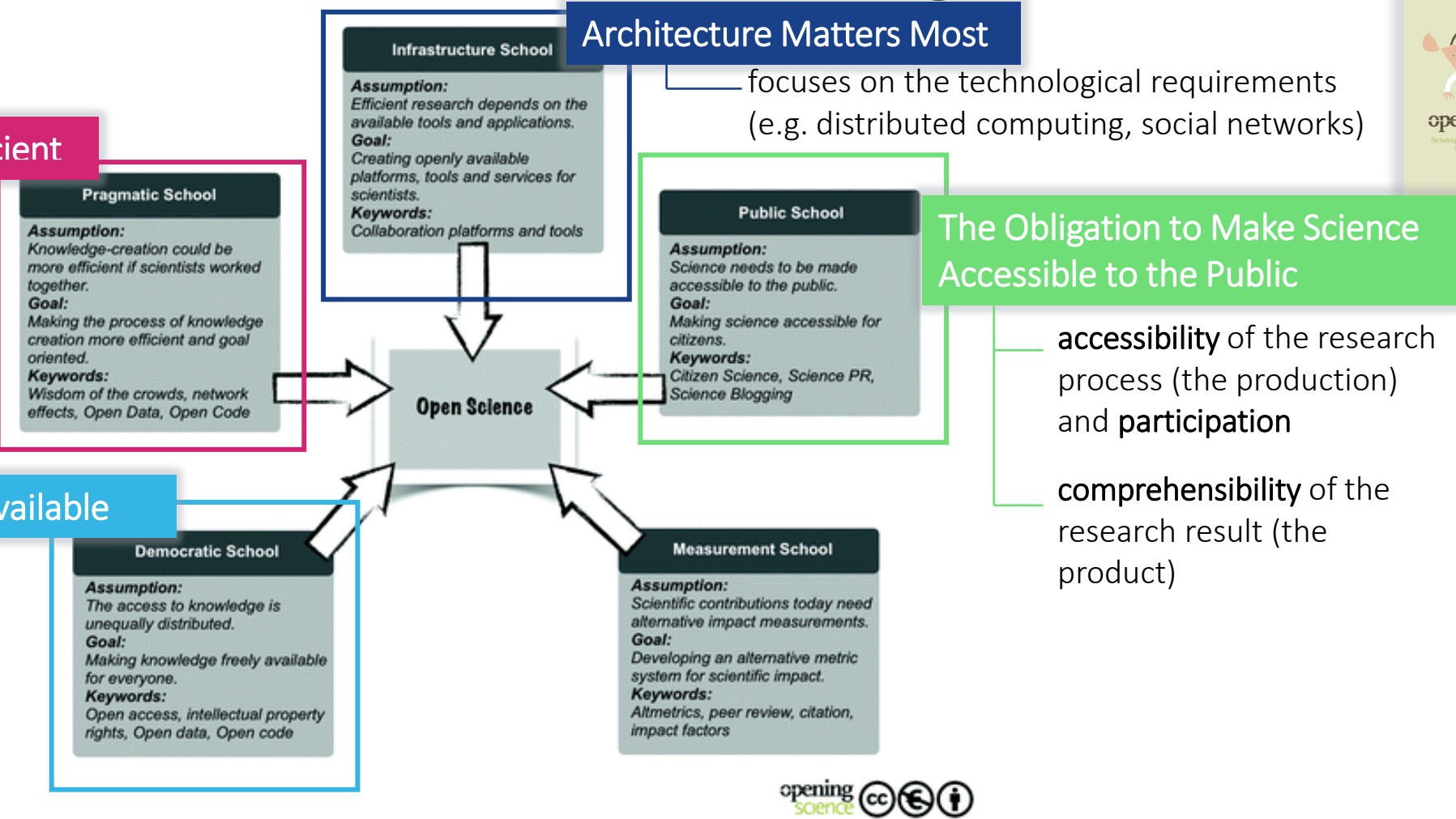
Open Science: One Term, Five Schools of Thought

Making Research More Efficient

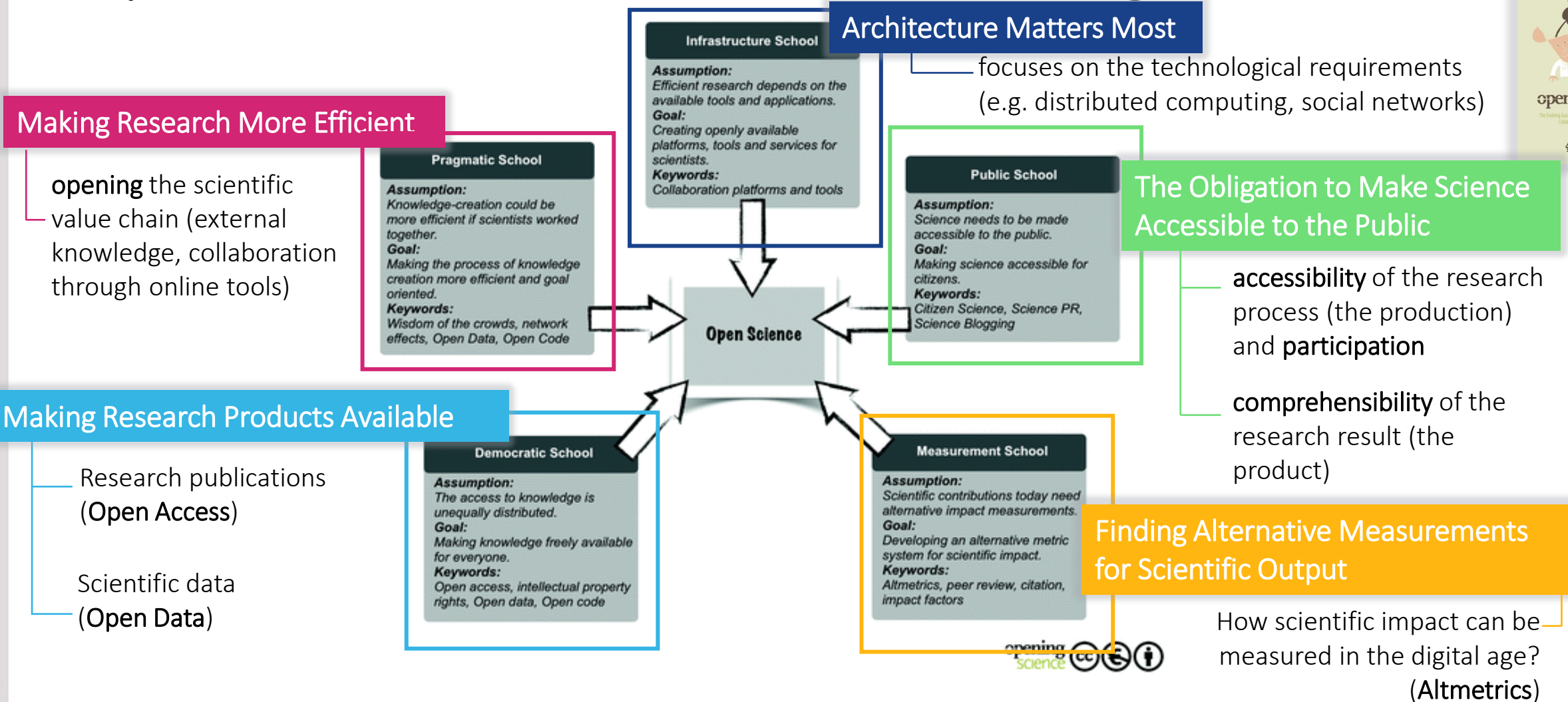
opening the scientific value chain (external knowledge, collaboration through online tools)

Making Research Products Available

Research publications (Open Access)
Scientific data (Open Data)



Open Science: One Term, Five Schools of Thought





What is Open Science?

Open Science refers to a scientific culture that is characterized by its openness. Scientists share results almost immediately and with a very wide audience. (Bartling and Friesike, 2014)

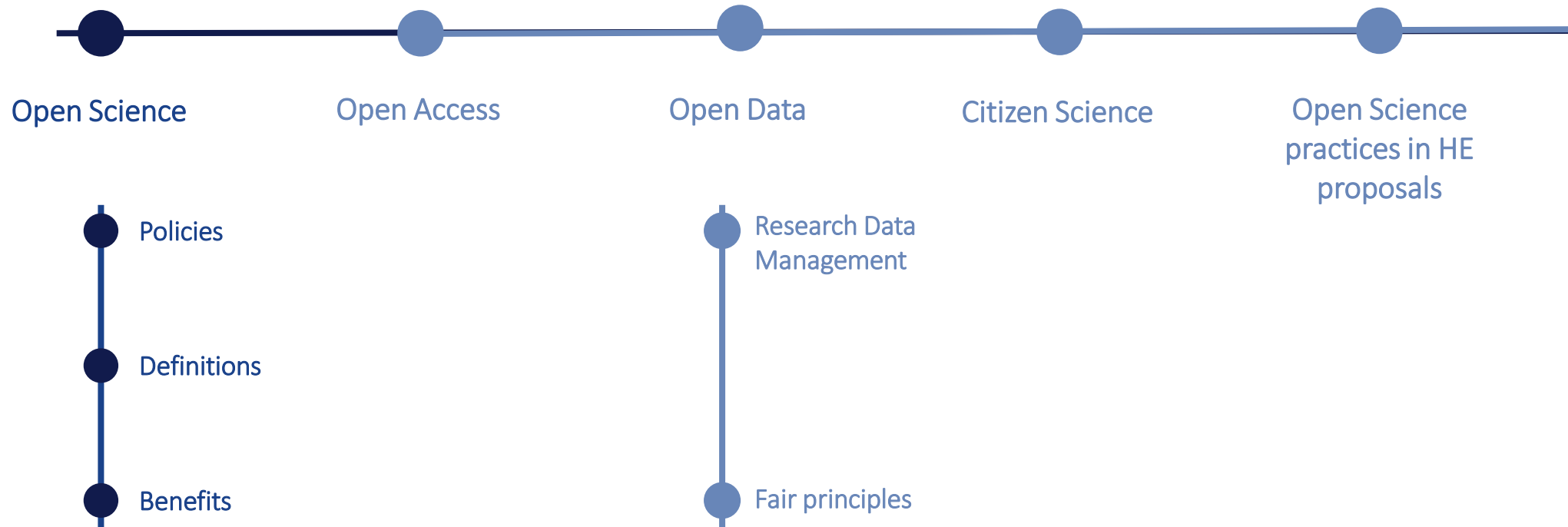
Open Science is not about dogma; it is about greater efficiency and productivity, more transparency and a better response to interdisciplinary research needs (Leru 2018)

Open Science is a “movement which aims to make scientific research, data and dissemination accessible to all levels of an inquiring society” (FosterOpenScience.eu)

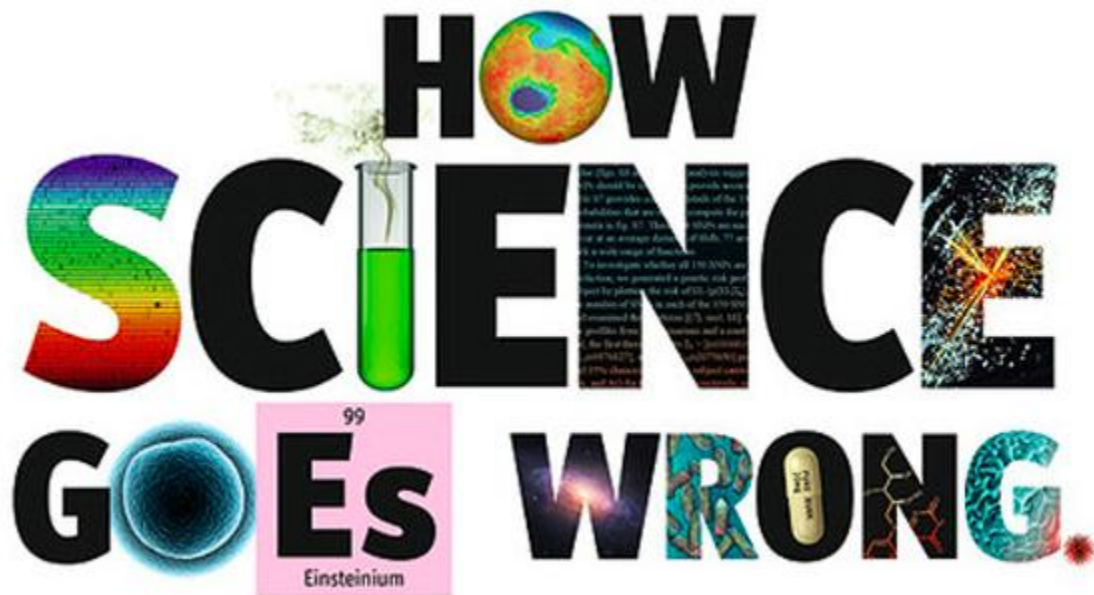
Open science is the practice of making everything in the discovery process fully and openly available, creating transparency and driving further discovery by allowing others to build on existing work (Watson, 2015)

Open Science is the practice of science in such a way that others can collaborate and contribute, where research data, lab notes and other research processes are freely available, under terms that enable reuse, redistribution and reproduction of the research and its underlying data and methods. In a nutshell, Open Science is transparent and accessible knowledge that is shared and developed through collaborative networks (Vicente-Sáez & Martínez-Fuentes 2018).

Outline



Why the Science goes wrong?



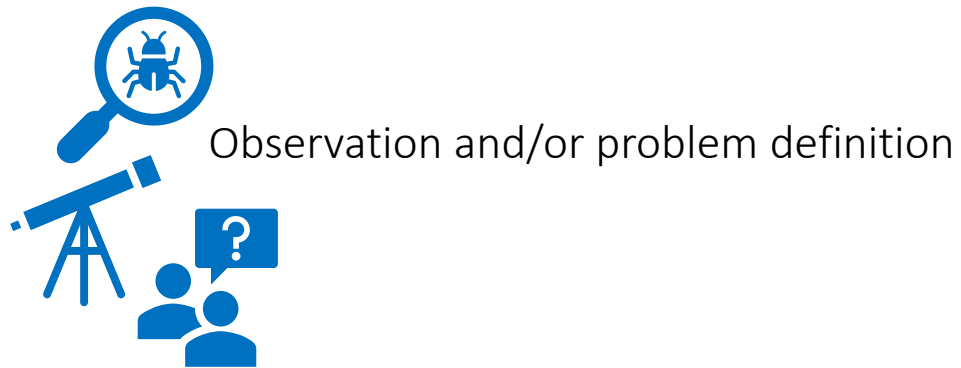
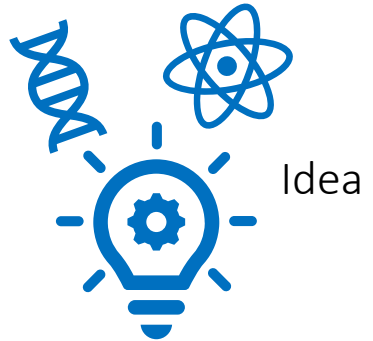
- Access Cost
- Reproducibility
- Evaluation Metrics

How does science work?

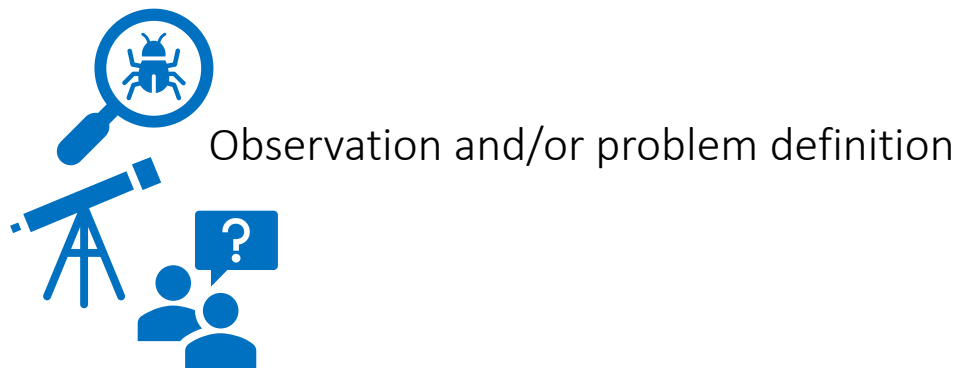
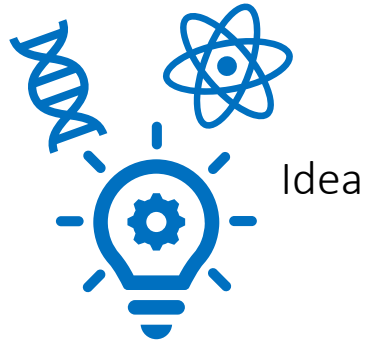


Observation and/or problem definition

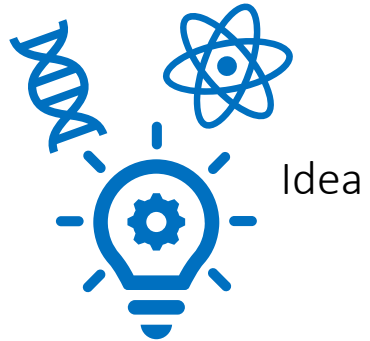
How does science work?



How does science work?

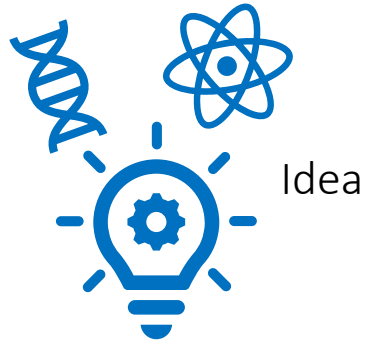


How does science work?



Observation and/or problem definition

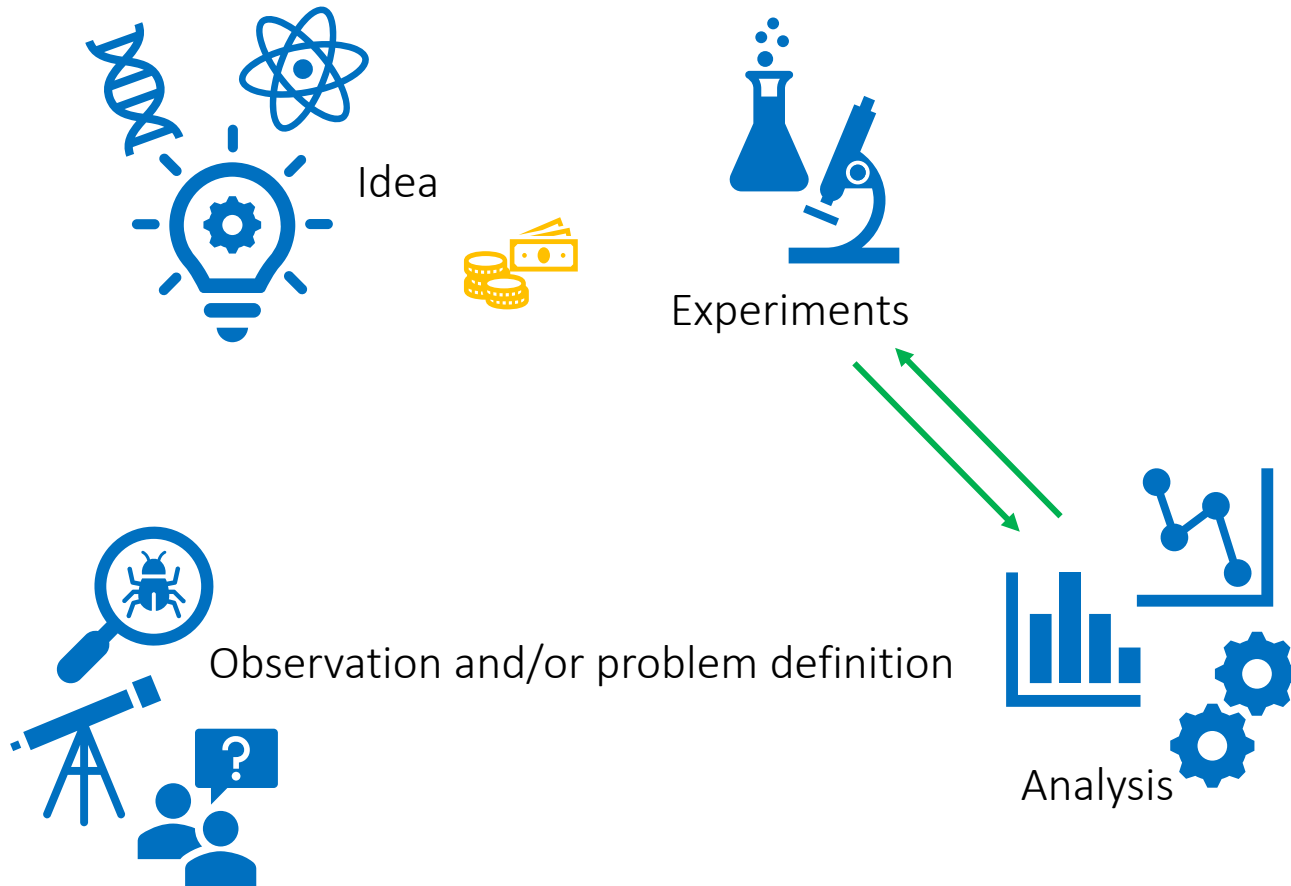
How does science work?



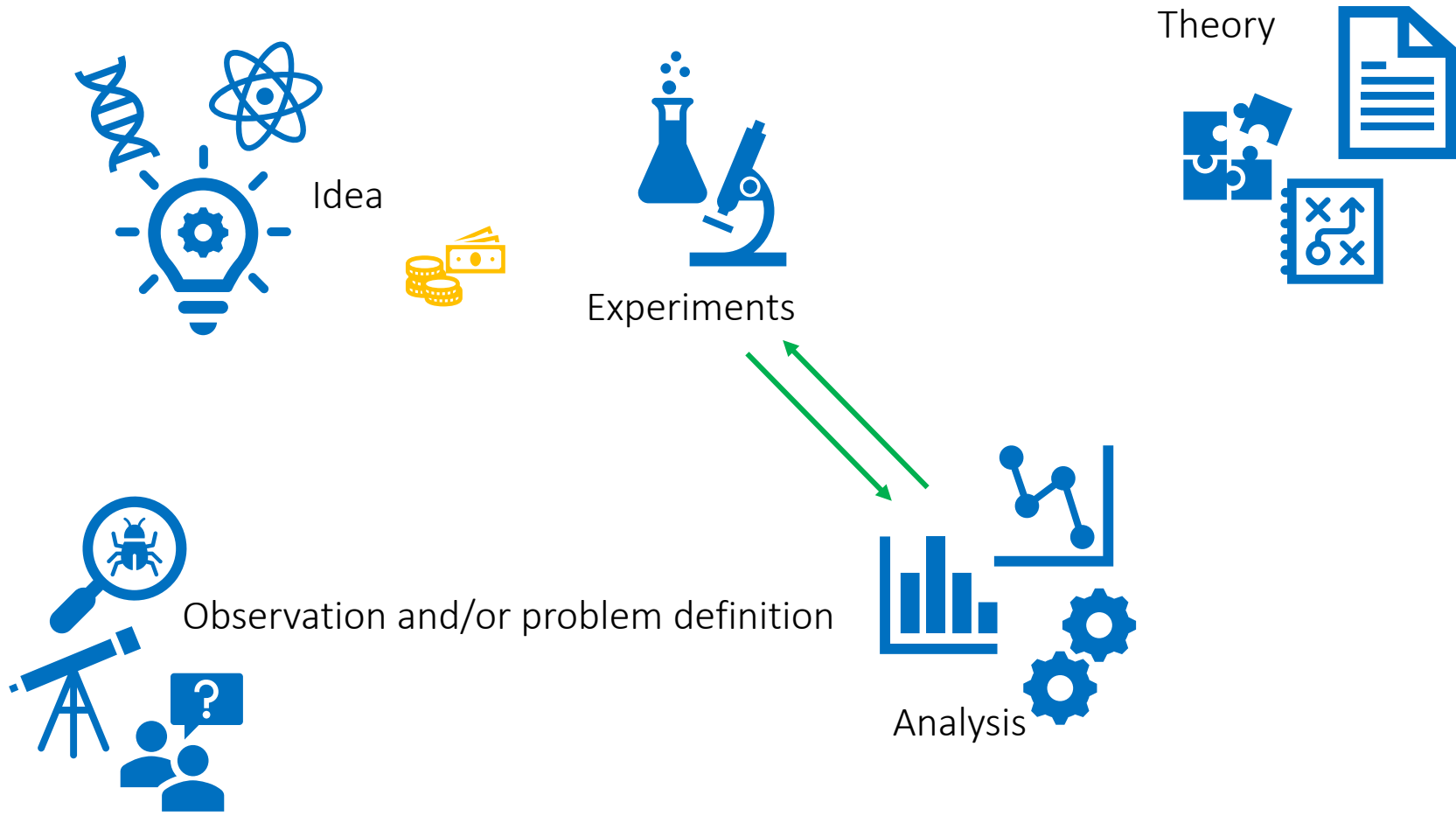
Observation and/or problem definition



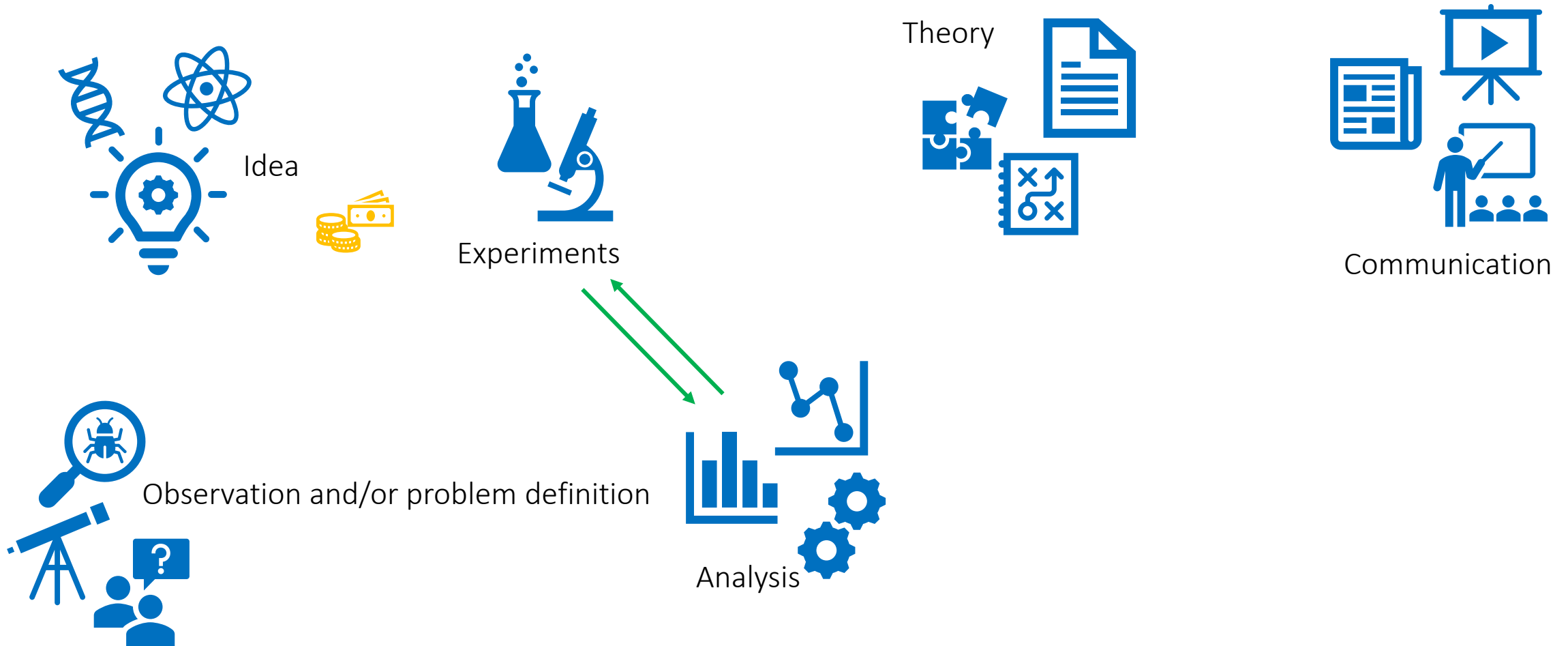
How does science work?



How does science work?



How does science work?



Science Communication in the past

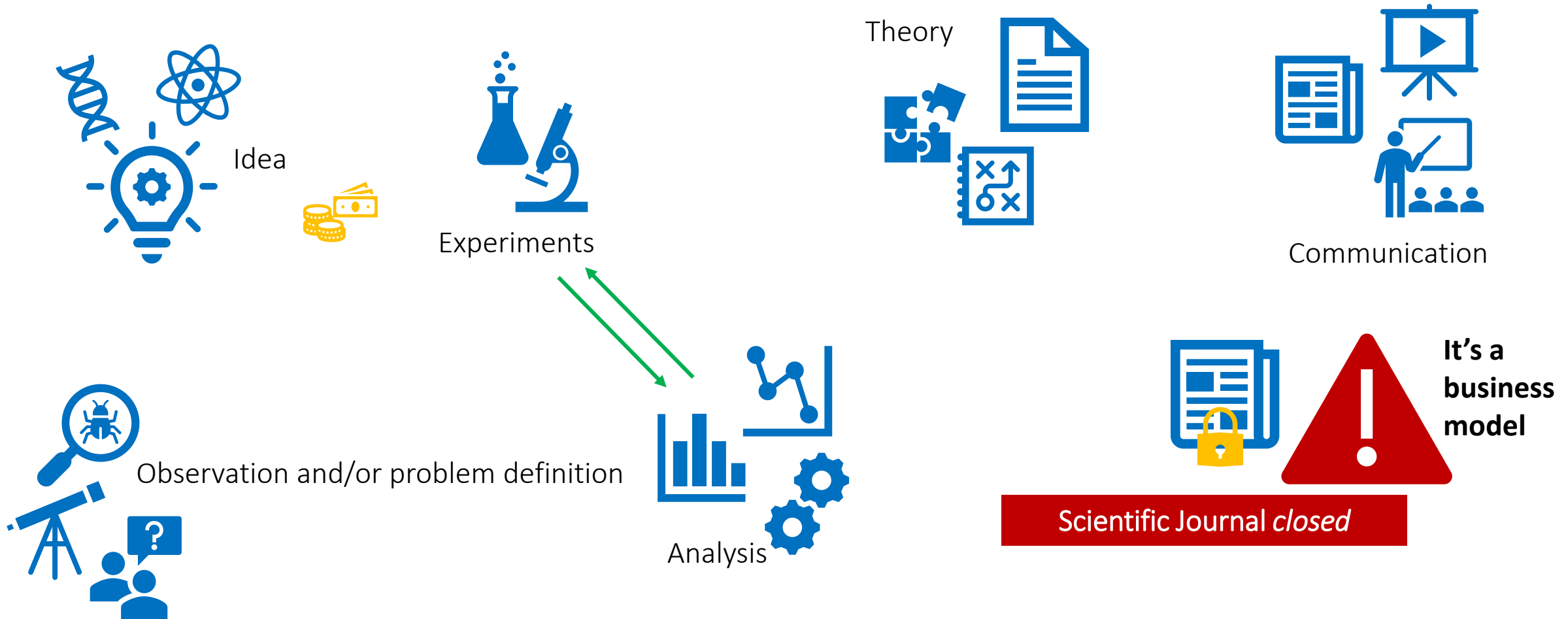


Galileo wrote some of his essays in *volgare*

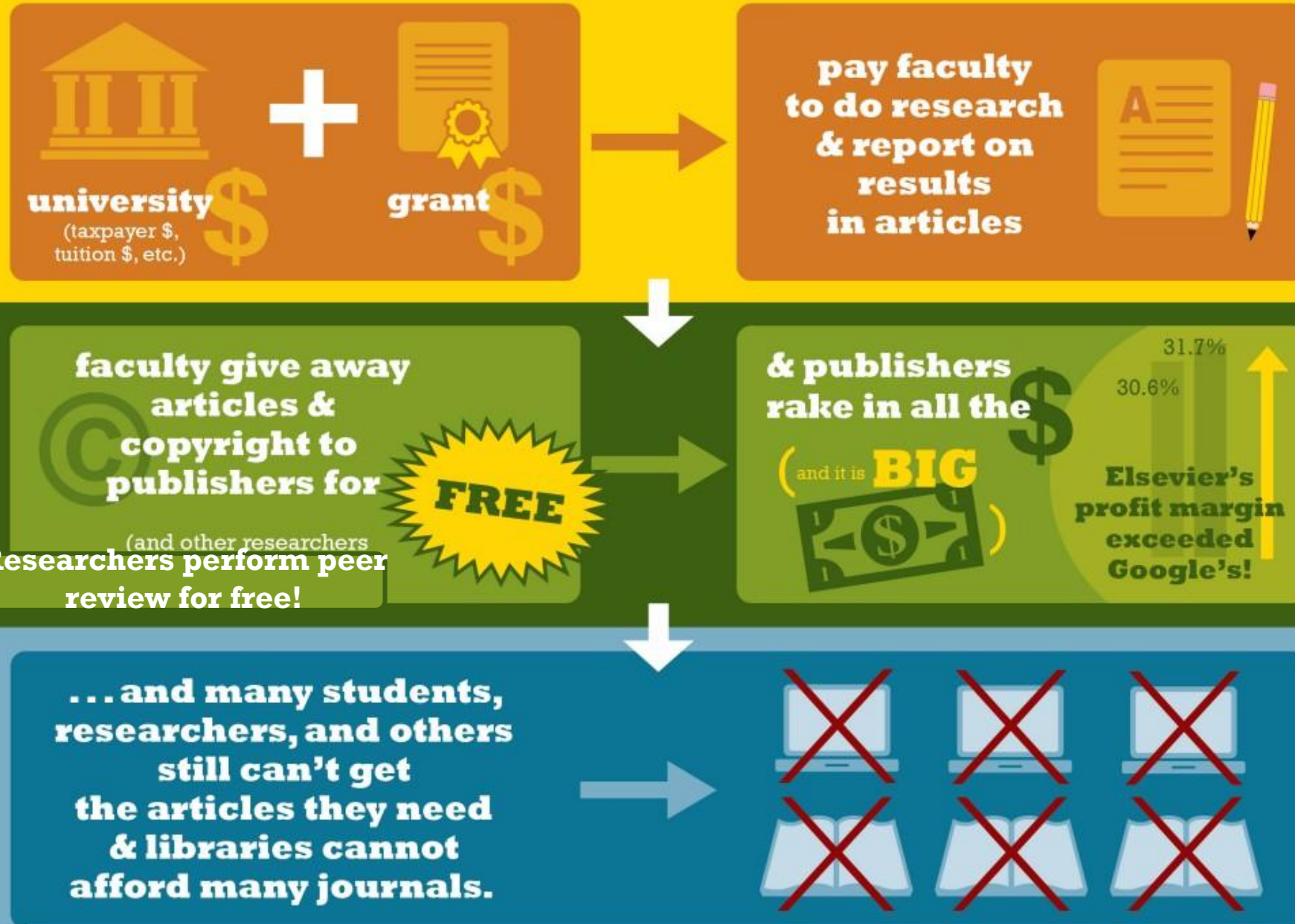


Faraday gave regular lectures at the Royal Institution about the last science progresses. He initiated the **Christmas Lecture series** in 1825. The lectures present scientific subjects to a general audience, including young people, in an informative and entertaining manner¹

How does science work?



WHAT IS THE PROBLEM?





Access cost for Academia: Paywall

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The Guardian International edition ▾

News Opinion Sport Culture Lifestyle More ▾

Education ▶ Schools Teachers Universities Students

Open access scientific publishing

Harvard University says it can't afford journal publishers' prices

University wants scientists to make their research open access and resign from publications that keep articles behind paywalls



Ian Sample, science correspondent
@iansample
Tue 24 Apr 2012 17:45 BST

THE WORLD UNIVERSITY RANKINGS

PROFESSIONAL JOBS EVENTS RANKINGS STUDENT AB



UK universities 'paid big publishers £1 billion' in past decade

Huge bill for journal access revealed as UK institutions begin strategy talks over Elsevier renewal deal

March 12, 2020

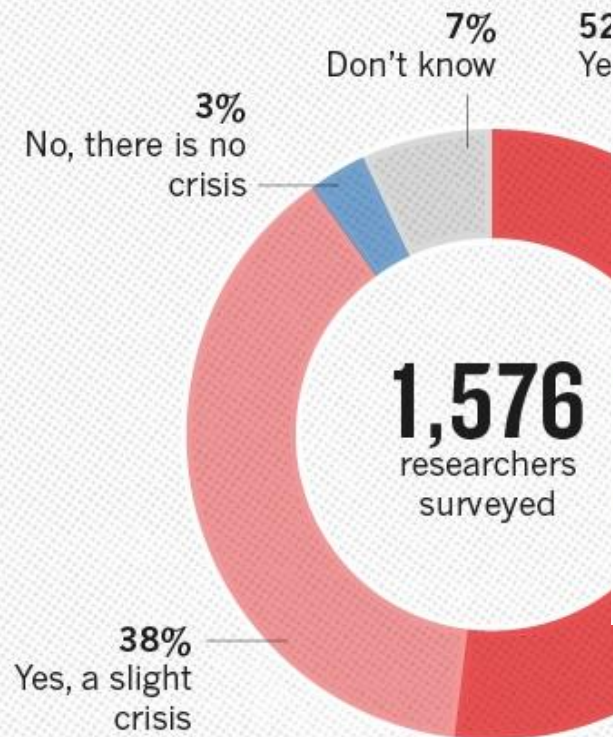
By [Jack Grove](#)

Twitter: [@jgro_the](#)

which bill the library around \$3.5m a year

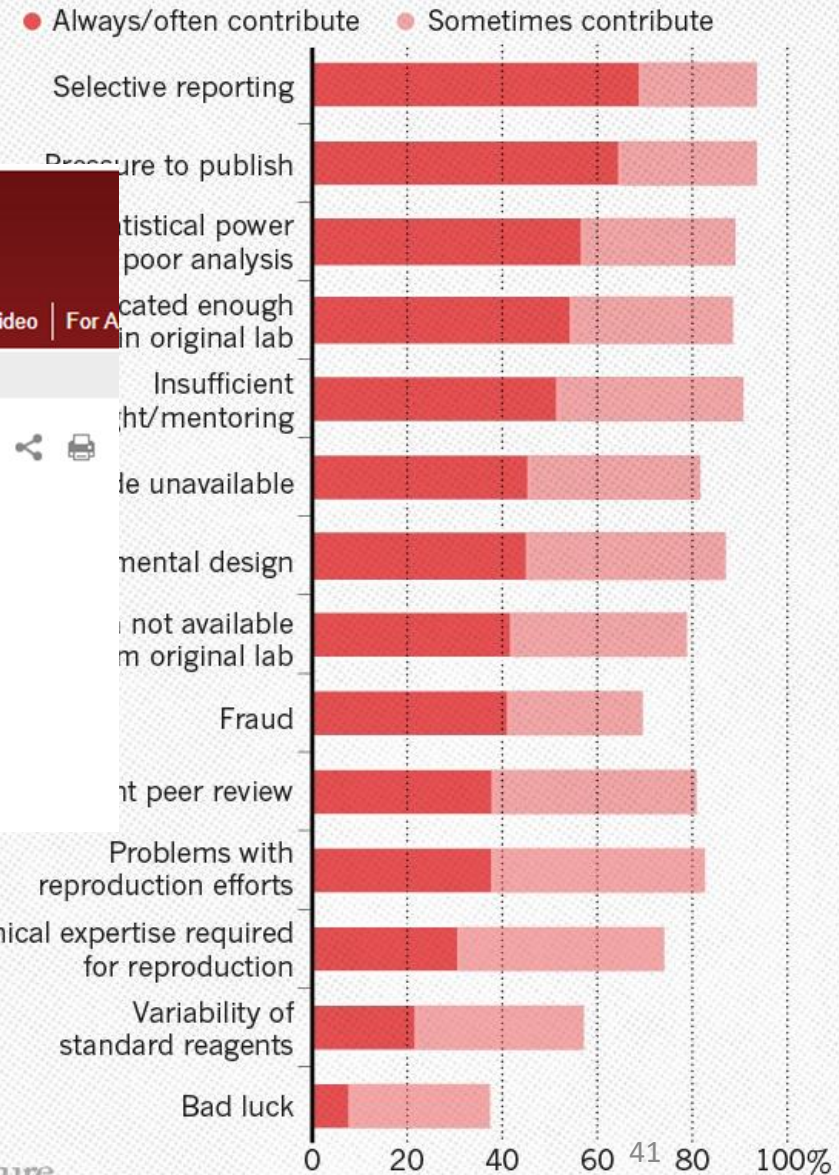
Is there a reproducibility crisis?

IS THERE A REPRODUCIBILITY CRISIS?



WHAT FACTORS CONTRIBUTE TO IRREPRODUCIBLE RESEARCH?

Many top-rated factors relate to intense competition and time pressure.



File Drawers effect

It's a bias that occurs when authors are more likely to submit positive results than negative or inconclusive results. The term arose from the image that these nonsignificant results are placed in researchers' file drawers, never to be seen by others

or editors are more likely to accept positive results than negative or inconclusive results



the results available provide a biased portrayal

NATIONAL

Most Scientific Research Data From the 1990s Is Lost Forever

A new study has found that as much as 80 percent of the raw scientific data collected by researchers in the early 1990s is gone forever, mostly because no one knows where to find it.

DANIELLE WIENER-BRONNER DEC 23, 2013

Highlights

- We examined the availability of data from 516 studies between 2 and 22 years old
- The odds of a data set being reported as extant fell by 17% per year
- Broken e-mails and obsolete storage devices were the main obstacles to data sharing
- Policies mandating data archiving at publication are clearly needed

Current Biology

REPORT | VOLUME 24, ISSUE 1, P94-97, JANUARY 06, 2014

The Availability of Research Data Declines Rapidly with Article Age

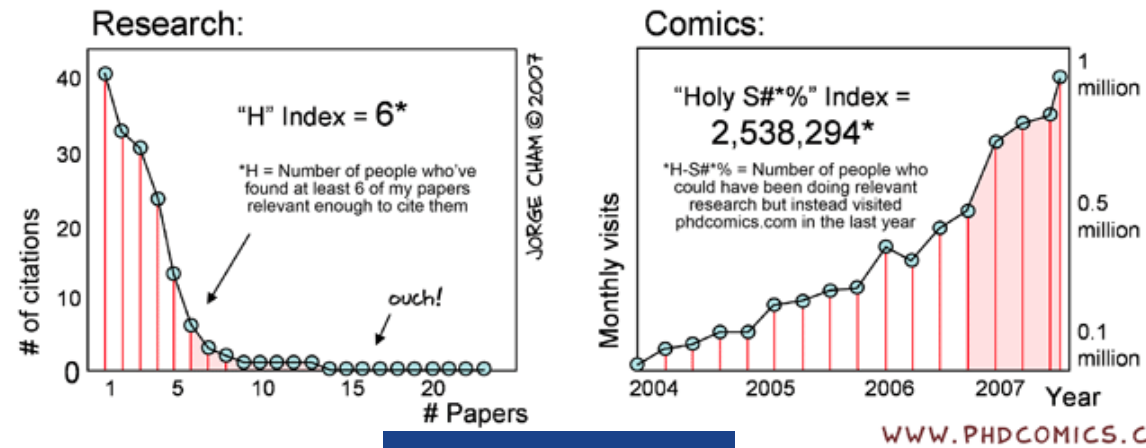
[Timothy H. Vines](#) • [Arianne Y.K. Albert](#) • [Rose L. Andrew](#) • ... [Jean-Sébastien Moore](#) •

[Sébastien Renaut](#) • [Diana J. Rennison](#) • [Show all authors](#)

[Open Archive](#) • Published: December 19, 2013 • DOI: <https://doi.org/10.1016/j.cub.2013.11.014> •

Evaluation metrics

Jorge Cham's "Impact Factor": my contribution to the advancement of human knowledge



H-Index

Impact Factor

Your (real) Impact Factor

$$\text{Impact Factor (corrected)} = \frac{\begin{array}{l} \# \text{ times your work is cited} \\ - \# \text{ citations that actually trash your work} \\ - \# \text{ times you cited yourself (nice try)} \\ - \# \text{ times you were cited just to pad the introduction section} \\ - \# \text{ citations the editor pressured the author to include to increase the journal's impact factor} \end{array}}{\begin{array}{l} \# \text{ original articles you've written} \\ + \# \text{ articles you were included in out of pity or politics} \\ + \# \text{ not-so-original articles you've } \text{written} \text{ copied and pasted} \end{array}}$$

JORGE CHAM © 2008
WWW.PHDCOMICS.COM

https://en.wikipedia.org/wiki/Piled_Higher_and_Deeper

Open Science



Horizon Europe moves **beyond** open access to open science, for which it features a comprehensive policy implemented from the proposal stage to project reporting.

Definition

Open science is an approach based on open cooperative work and systematic sharing of knowledge and tools as early and widely as possible in the process.

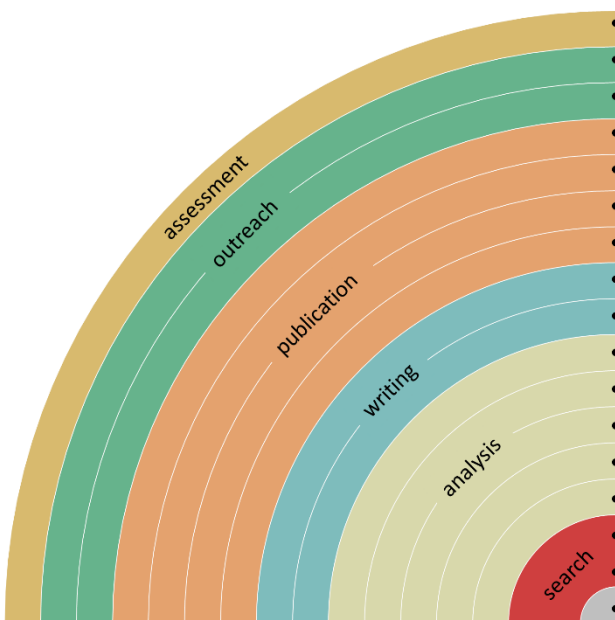
Includes the active engagement of all relevant actors, including society.

- ✓ It has the potential to increase the quality and efficiency of research and accelerate the advancement of knowledge and innovation by sharing results, making them more reusable and improving their reproducibility.
- ✓ It makes science more efficient through better sharing of resources, more reliable through better verification and more responsive to society's needs.
- ✓ Is mainstreamed throughout Horizon Europe, from evaluation to implementation. (be aware of differences compared to Horizon 2020!)



You can make your workflow more open by ...

Open Science in your research activities



- adding alternative evaluation, e.g. with altmetrics
- communicating through social media, e.g. Twitter
- sharing posters & presentations, e.g. at FigShare
- using open licenses, e.g. CC0 or CC-BY
- publishing open access, 'green' or 'gold'
- using open peer review, e.g. at journals or PubPeer
- sharing preprints, e.g. at OSF, arXiv or bioRxiv
- using actionable formats, e.g. with Jupyter or CoCalc
- open XML-drafting, e.g. at Overleaf or Authorea
- sharing protocols & workfl., e.g. at Protocols.io
- sharing notebooks, e.g. at OpenNotebookScience
- sharing code, e.g. at GitHub with GNU/MIT license
- sharing data, e.g. at Dryad, Zenodo or Dataverse
- pre-registering, e.g. at OSF or AsPredicted
- commenting openly, e.g. with Hypothes.is
- using shared reference libraries, e.g. with Zotero
- sharing (grant) proposals, e.g. at RIO

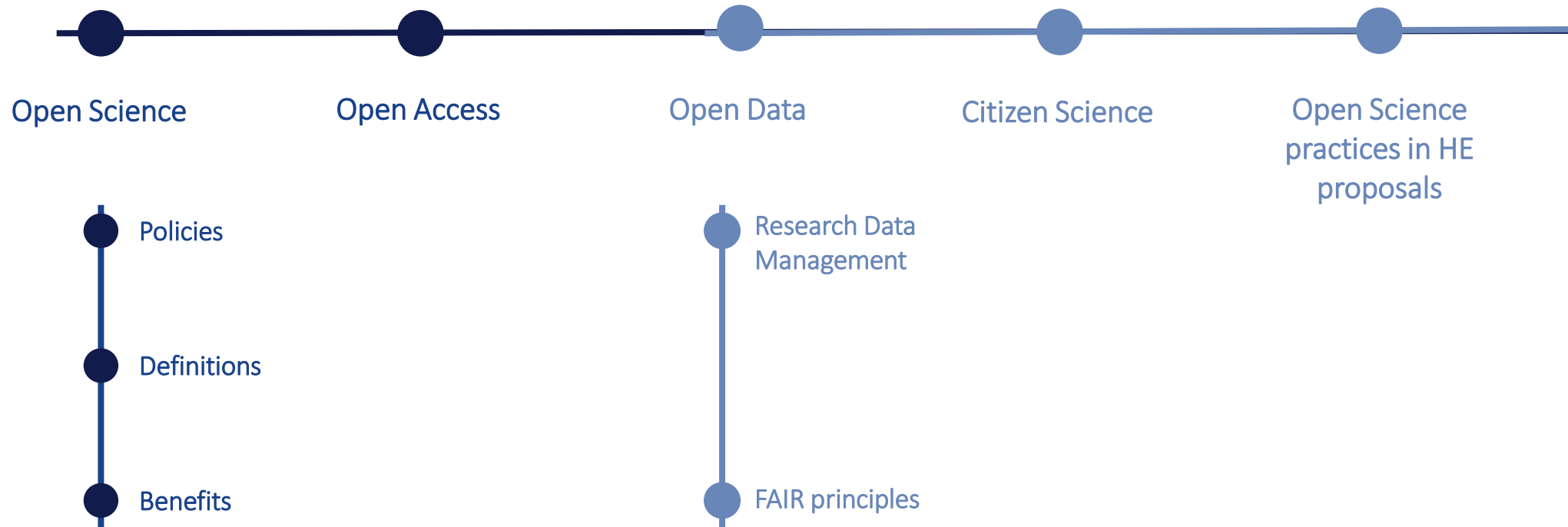


Bianca Kramer & Jeroen Bosman <https://101innovations.wordpress.com>

[DOI: 10.5281/zenodo.1147025](https://doi.org/10.5281/zenodo.1147025)



Outline



1. Open access to publications (1/2)



Beneficiaries must ensure **open access to peer-reviewed scientific publications** relating to their results. In particular, **they must ensure:**

- ❑ at the latest upon publication, **deposition** of the Author Accepted Manuscript or Version of Record in a trusted repository + **immediate open access via the repository** under a Creative Commons Attribution license (CC BY) or equivalent (Creative Commons Attribution Non Commercial/Non Derivatives licenses or equivalent are allowed for long-text formats)
- ❑ **information** via the repository about any research output/tools/instruments needed to **validate the conclusions of the scientific publication**

Metadata must be open under a Creative Commons Public Domain Dedication (CC 0) or equivalent, **in line with the FAIR principles** and provide information about the licensing terms and persistent identifiers, amongst others.

Open access to publications (2/2)

- Beneficiaries (or authors) **must retain sufficient intellectual property rights** to comply with the open access requirements
- Publication in venue of their choice but **publication fees are reimbursable only if publishing venue is full open access** (publication fees in hybrid venues are not reimbursed)
- Beneficiaries have the possibility to publish at no costs in **Open Research Europe**, the European Commission open access publishing platform.



Scientific Publications



1

Author



Scientific Publications



Scientific Publications



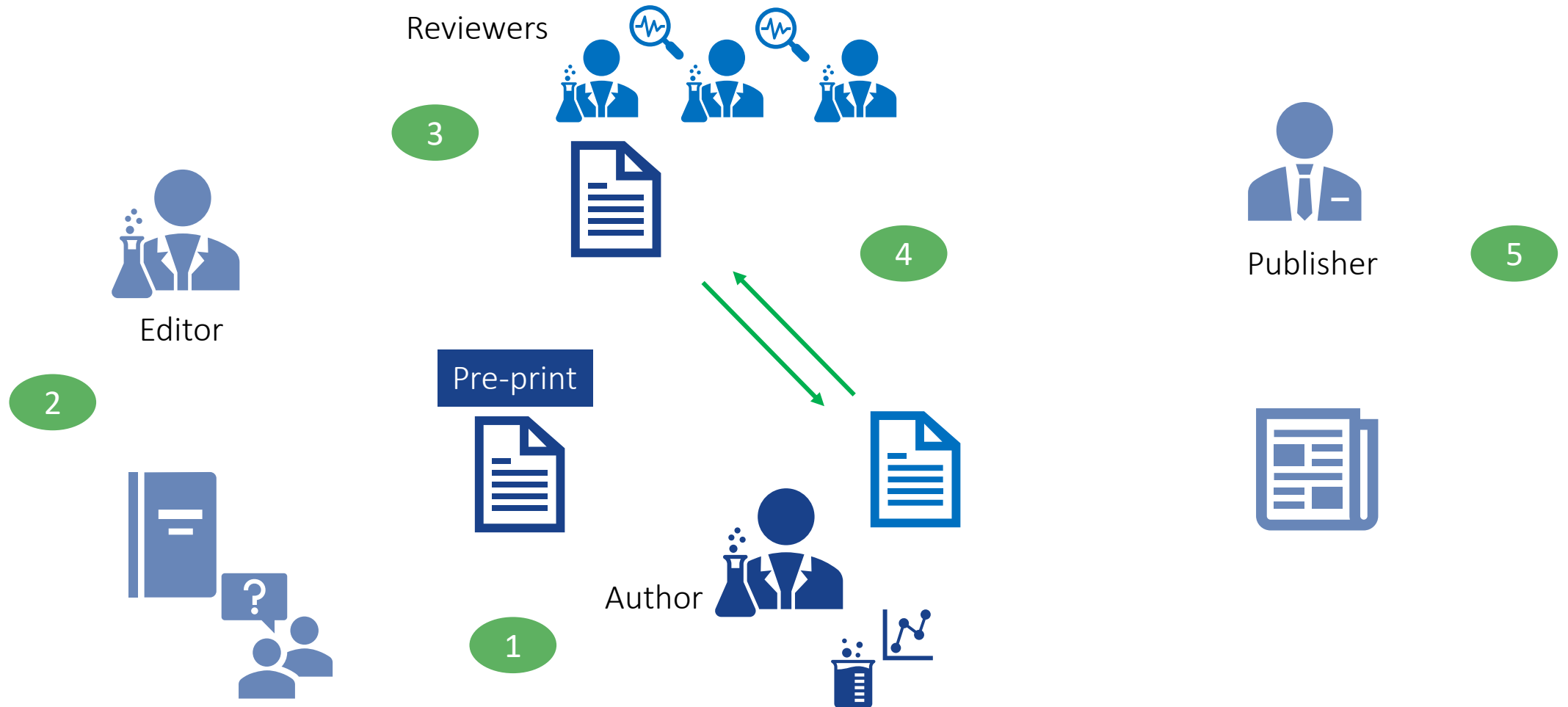
Scientific Publications



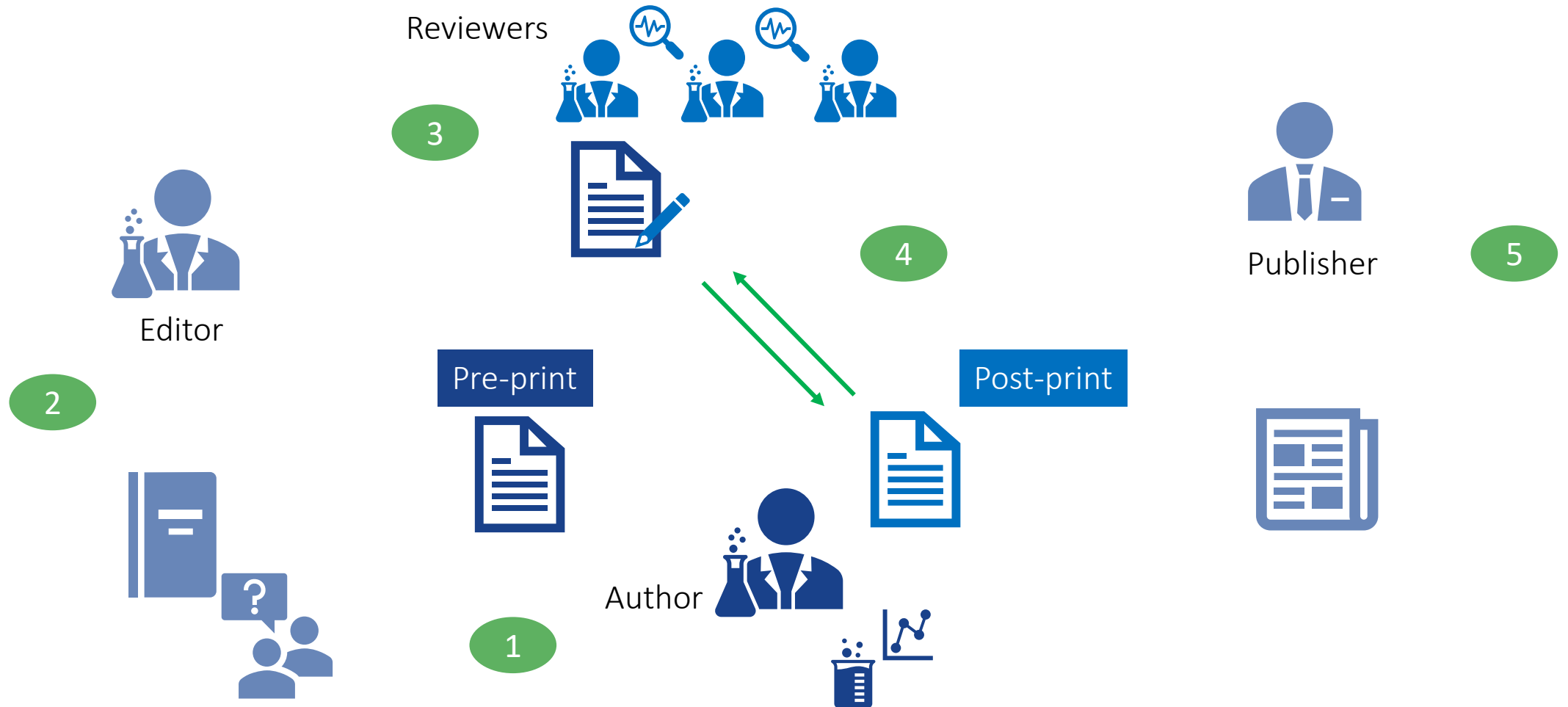
Scientific Publications



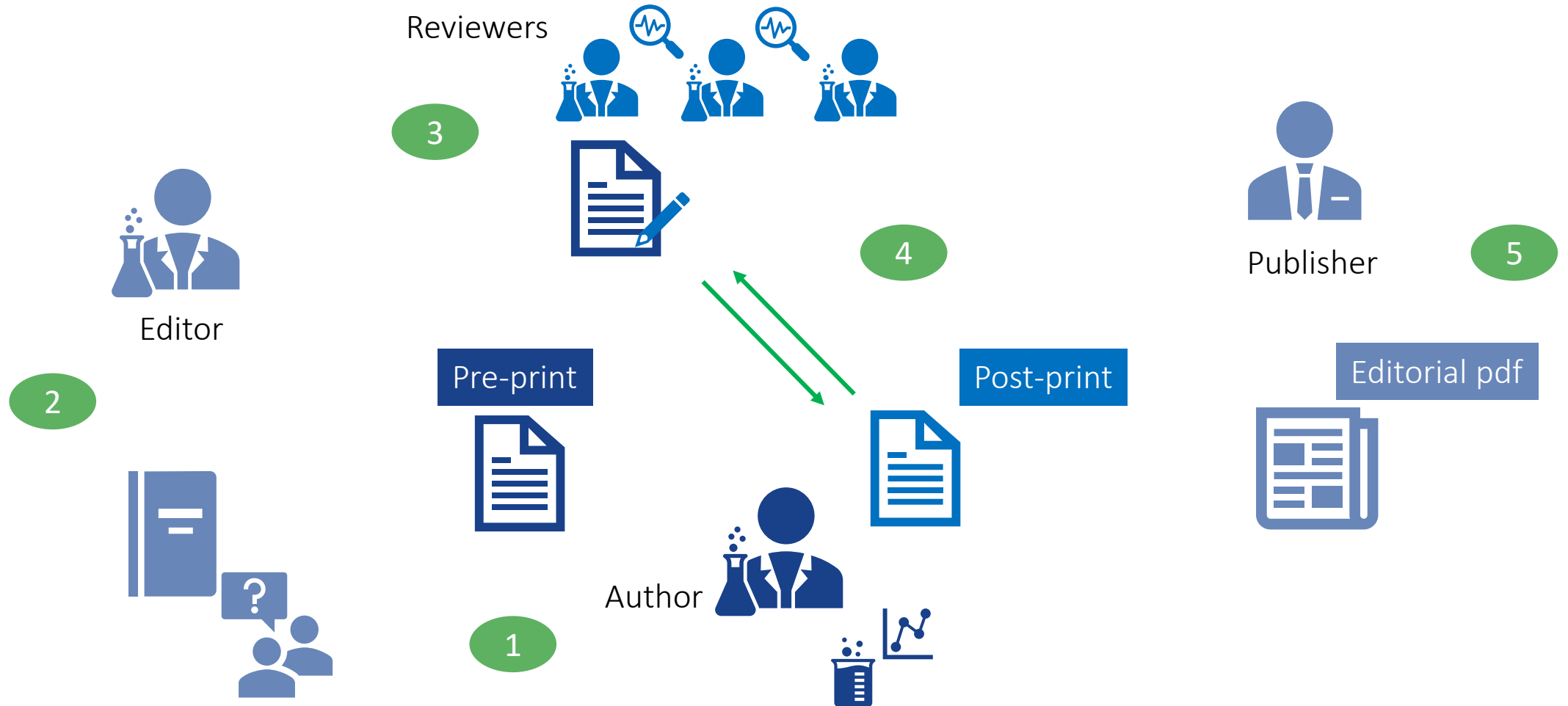
Scientific Publications



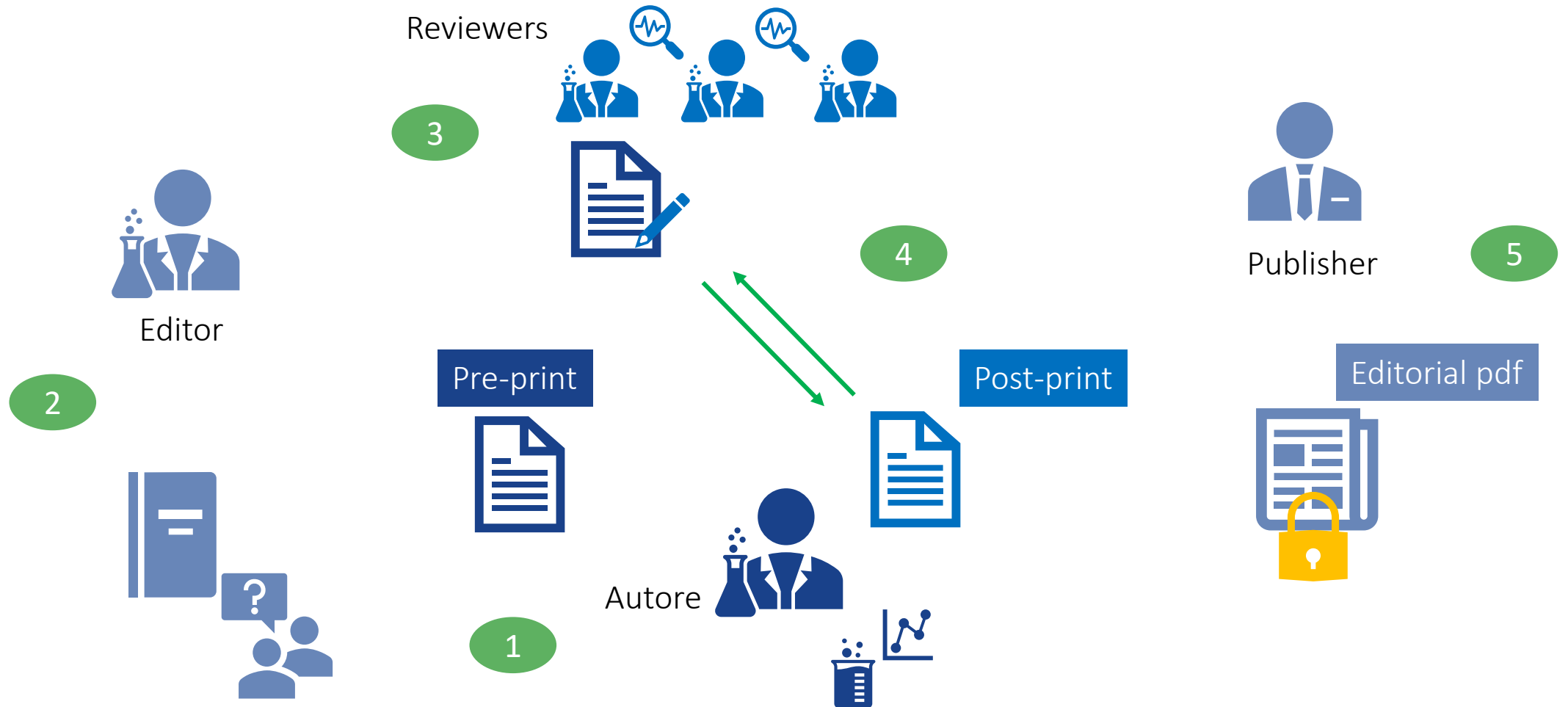
Scientific Publications



Scientific Publications



Scientific Publications



Pre-prints and post prints

- Amongst **academics: pre-print** is to describe the first draft of the article - before peer-review, even before any contact with a publisher
- Amongst **publishers: pre-print** is the finished article, reviewed and amended, ready and accepted for publication - but separate from the version that is type-set or formatted by the publisher
- The **copyright transfer agreement** lists **pre-prints** as the version of the paper before peer review and **post-prints** as being the version of the paper after peer-review, with revisions having been made
- This means that **in terms of content, post-prints are the article as published.** However, in terms of appearance this might not be the same as the published article, as publishers often reserve for themselves their own arrangement of type-setting and formatting (editorial layout). Typically, this means that the author cannot use the publisher-generated .pdf file, but must make their own .pdf version for submission to a repository.

*<https://www.sherpa.ac.uk/romeoinfo.html>



Dear Prof. XYZ,

Our records show that, for the project in reference and of which you are coordinator the reported peer-reviewed publication indicated below still appear as non-available in open access:

Publication1

Publication2

I would like to remind you that, each beneficiary must ensure open access (free of charge, online access for any user) to all peer-reviewed scientific publications relating to its results generated in a Horizon 2020 action, in accordance with the conditions set out in Article 29.2 of Horizon 2020 Grant Agreement. If a beneficiary breaches this obligation, the grant may be reduced (see Article 43 of the Grant Agreement). Such a breach may also lead to any other measures described in Chapter 6.

I would therefore like to ask you to take immediate action to ensure that the beneficiaries concerned provide open access to the peer-reviewed articles mentioned above. Please reply to this letter within 30 calendar days by indicating whether the non-compliance has been remedied, or in case of continued non-compliance provide the reasons for non-compliance.

For more information about open access to peer-reviewed scientific publications (and in particular, the obligation to deposit publications in repositories and to provide open access to these publications), please visit the section on Open Access available on the [Funding & Tenders Portal](#) or check the [Annotated Grant Agreement](#) (art 29).

For more information about how to encode or update the data of your peer-reviewed publications in the continuous reporting, please check the [H2020 online manual](#).

Open Access Repository

A repository is a **digital** platform working as an open archive, that holds research outputs and provides **free, immediate and permanent access** to research results for anyone to download, use and distribute

The Zenodo logo is displayed in white lowercase letters on a blue rectangular background.

How select the right repository?

Open Access Repository Directory
www.openoar.org

Registry of Research Data Repository
<https://www.re3data.org/>

Institutional

Thematic

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

Deposit in a repository

Versions:

- **PRE-PRINT**: the version submitted to the journal (without comments of reviewers)
- **POST-PRINT** o **ACCEPTED MANUSCRIPT**: final version embedding the reviewers comments. Content-wise it's identical to the published version but WITHOUT the editorial layout
- **EDITORIAL PDF** or **PUBLISHED VERSION**: the published version WITH the editorial layout

If you need to know which version you need to deposit and the embargo, check

[SHERPA-RoMEO](#)

To find an Open Access journal and check the APC (Article Processing Charges) check DOAJ, [Directory of Open Access Journals](#)

OA to scientific publications

The obligation to ensure open access under the conditions set out in the Grant Agreement precedes any subsequent publishing agreement and is therefore a **prior obligation** with respect to such agreements.

To help you find publishing venues that comply with Horizon Europe open access requirements, you can use:

- the [Journal Checker Tool](#) can help to determine whether a specific publishing venue allows compliance with the open access obligations of Horizon Europe
- the [Directory of Open Access Journals](#) can help to identify full open access journals that allow open access publishing under CC BY or an equivalent license
- [Open Research Europe](#), open access publishing platform of the European Commission, allows automatic compliance with the Horizon Europe requirements.

Open Access in Horizon Europe

Open science: open access to scientific publications

The beneficiaries must ensure open access to **peer-reviewed scientific publications** relating to their results. In particular, they must ensure that:

- ✓ at the latest at the time of publication, a machine-readable electronic copy of the published version, or the final peer-reviewed manuscript accepted for publication, is **deposited in a trusted repository** for scientific publications
- ✓ **immediate open access is provided** to the deposited publication via the repository, under the latest available version of the Creative Commons Attribution International Public Licence (CC BY) or a licence with equivalent rights; for monographs and other long-text formats, the licence may exclude commercial uses and derivative works (e.g. CC BY-NC, CC BY-ND) and
- ✓ information is given via the repository about **any research output** or any other tools and instruments needed to validate the conclusions of the scientific publication.

Beneficiaries (or authors) must retain sufficient intellectual property rights to comply with the open access requirements.

Metadata of deposited publications must be open under a Creative Common Public Domain Dedication (CC 0) or equivalent, in line with the FAIR principles (in particular machine-actionable) and provide information at least about the following: publication (author(s), title, date of publication, publication venue); funding statement (see Article 17); grant project name, acronym and number; licensing terms; persistent identifiers for the publication, the authors involved in the action and, if possible, for their organisations and the grant. Where applicable, the metadata must include **persistent identifiers** for any research output or any other tools and instruments needed to validate the conclusions of the publication.

Only publication fees in full open access venues for peer-reviewed scientific publications are eligible for reimbursement.

From Art.17 - EU Grants: HE MGA — Multi & Mono: V1.0 DRAFT – 25.02.2021

3. Additional Open Science practices

- Where the call conditions impose **additional obligations** regarding OS practices:
 - the beneficiaries must also comply with those
- All projects have additional **obligations regarding the validation of scientific publications** which must be complied with.
 - Beneficiaries must provide **(digital or physical) access** to data or other results needed for validation of the conclusions of scientific publications, to the extent that their legitimate interests or constraints are safeguarded (and unless they already provided the (open) access at publication)

3. Additional Open Science practices- Public emergency

- If imposed by the call conditions in case of a public emergency, beneficiaries must (if requested by the granting authority) immediately **deposit any research output** in a repository + **provide open access to it under CC BY, CC 0 or equivalent.**
 - As an exception, if the access would be against the beneficiaries' legitimate interests, beneficiaries **must grant non-exclusive licenses** — under fair and reasonable conditions — **to legal entities that need the research output to address the public emergency + commit to rapidly and broadly exploit the resulting products and services at fair and reasonable conditions.**

This provision applies up to four years after the end of the action.

Horizon
Europe

<https://www.apre.it/aprequaderni/>



"S-LÉGAMI!"

OPEN ACCESS - MANUALE D'USO PER RICERCATORI

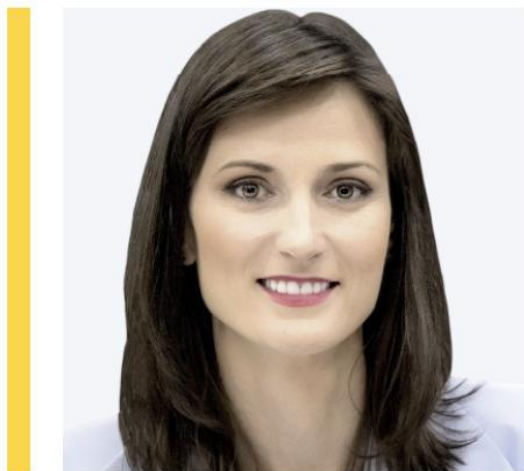
Seconda edizione

aggiornata e ampliata con circa
100 domande sull'Open Science



APREquaderni
1192
OPEN SCIENCE

ORE: Open Research Europe, the European Commission open access publishing service



“Open Research Europe is a great step forward for EU R&I programme beneficiaries and research communities from all scientific, social science and humanities fields. The new publishing platform will enable them to fully embrace Open Science meeting their publishing needs and openly share, use and find linked publications and data.”

Mariya Gabriel

Commissioner, European Commission

<https://open-research-europe.ec.europa.eu/>

ORE: Open Research Europe, the European Commission open access publishing service

Open Research Europe



What is Open Research Europe?

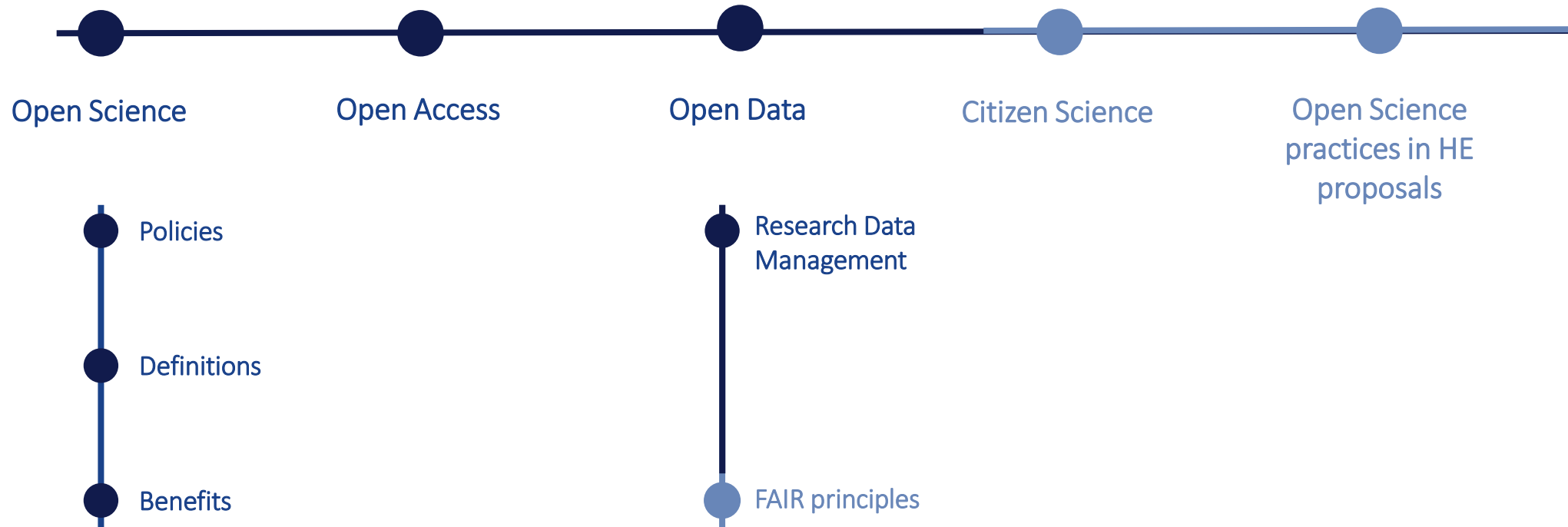
- **A peer-reviewed publishing platform.** Not a repository. Post-publication peer-review model. First you publish, then review takes place. Publication and review reports open access under CC BY licenses. Optional service for our beneficiaries at no cost to them.

Why Open Research Europe?

- **Supports our open access policy** and beneficiary capacity to adhere to it and also enables **publishing post-grant**
- Leading by example in operationalising **open science principles** within scientific publishing, and **enabling the European Research Area**
- Contribute to **transparency** and **cost-effectiveness** and explore **sustainable** open access publishing business models



Outline



Research data management (1/2)

Beneficiaries **must manage the digital research data** generated in the action responsibly, **in line with the FAIR** (“Findable”, “Accessible”, “Interoperable”, **Reusable**) principles and:

- ☐ establish + regularly update a **data management plan** (‘DMP’) for generated (and/or collected) data
- ☐ as soon as possible and within the deadlines set out in the DMP, **deposit** the data in a trusted repository (federated in the EOSC if required in the call conditions) + ensure **open access** under CC BY, CC 0 or equivalent, following the principle ‘**as open as possible as closed as necessary**’
- ☐ provide information via the repository about any research output/tools/instruments needed to **re-use or validate the data**

Metadata must be open under CC 0 or equivalent (to the extent legitimate interests or constraints are safeguarded), **in line with the FAIR principles** and provide information about the licensing terms and persistent identifiers, amongst others.



Research data management (2/2)

There are exceptions to open access to research data.

Data may be kept **closed** if:

- providing open access is against the **beneficiary's legitimate interests**, including regarding commercial exploitation;
- it is contrary to **any other constraints**, such as data protection rules, privacy, confidentiality, trade secrets, Union competitive interests, security rules, intellectual property rights or would be **against other obligations** under the Grant Agreement.

Open Data in Horizon Europe

The beneficiaries must manage the digital research data generated in the action ('data') responsibly, in line with the **FAIR principles** and by taking all of the following actions:

- establish a **data management plan** (DMP) (and regularly update it)
- as soon as possible and within the deadlines set out in the DMP, **deposit the data in a trusted repository**; if required in the call conditions, this repository must be federated in the **EOSC** in compliance with EOSC requirements
- as soon as possible and within the deadlines set out in the DMP, **ensure open access — via the repository — to the deposited data**, under the latest available version of the Creative Commons Attribution International Public License (CC BY) or Creative Commons Public Domain Dedication (CC 0) or a licence with equivalent rights, following the principle 'as open as possible as closed as necessary', unless providing open access would in particular:
 - ✓ *be against the beneficiary's legitimate interests, including regarding commercial exploitation, or*
 - ✓ *be contrary to any other constraints, in particular the EU competitive interests or the beneficiary's obligations under this Agreement; if open access is not provided (to some or all data), this must be justified in the DMP*
- **provide information** via the repository about any research output or any other tools and instruments needed to re-use or validate the data

Metadata of deposited data must be open under a Creative Commons Public Domain Dedication (CC 0) or equivalent (to the extent legitimate interests or constraints are safeguarded), in line with the FAIR principles (in particular machine-actionable) and provide information at least about the following: datasets (description, date of deposit, author(s), venue and embargo); funding statement; grant project name, acronym and number; licensing terms; persistent identifiers for the dataset, the authors involved in the action, and, if possible, for their organisations and the grant. Where applicable, the metadata must include persistent identifiers for related publications and other research outputs.

What is a Data Management Plan

Data Management Plans (DMPs) are a key element of good data management. A DMP describes the life cycle of the data management of data collected, processed and/or generated by a Horizon Europe project. To make research data findable, accessible, interoperable and re-usable (FAIR), a DMP should include information on:

- ❏ How the research data will be managed during and after the end of the project
- ❏ What data will be collected, processed and/or generated
- ❏ Which methodology and standards will be applied
- ❏ Whether data will be shared/made accessible and
- ❏ How data will be treated and preserved (including after the end of the project)

**Quality and
Protection**

A DMP is required for all projects participating in the extended ORD pilot, unless they opt out of the ORD pilot. However, projects that opt out are still encouraged to submit a DMP on a voluntary basis.

The DMP is a **living document**.

You are not required to provide detailed answers to all the questions in the first version of the DMP (due M6)

1

START EARLY

Read the guidance and ask for advice early on in the process, as writing a DMP may take some time

2

CONSIDER REUSE

Think about reusing existing data. Describe what you will need to know about your data five years from now

3

CHECK POLICIES

Talk to your supervisor or lab members about existing data management policies and standards

4

MAKE USE OF SUPPORT

Use your in-house support services like RDM Support, the Library, IT department or legal desk

5

THINK BROAD

Also address software code, algorithms and any other valuable research assets in your DMP

6

COPY WHERE YOU CAN

Look at other (submitted) plans and copy when appropriate

7

BE UNIQUE WHERE NEEDED

Since every research project is unique, so are the data it generates. Copying from sample DMPs is not sufficient

8

BE CONCRETE

Make your answers as concrete as possible. Show that you have consulted RDM experts

9

SAY SO IF YOU DON'T KNOW

Indicate what you do not yet know and how you will resolve these questions later

10

UPDATE

DMPs add to the planning of your research methods. Therefore define, carry out and update your DMP just as you would any method



Example

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3 Data collection

This section describes the methods of data collection for each work package as indicated by the work package leaders. For each work package, the following items are checked and described, as far as applicable.

Type of data

In ZERO BRINE project, the following type of data will be documented:

- *Observational data*: this type of data will be captured real-time and, typically, cannot be reproduced exactly, which makes the strategies applied for documentation of this type of data extra important. Therefore, a careful and elaborated preparation of the way that data will be captured (instruments, calibration, conditions and observation method) is crucial before recording this type of data. Once this type of data is captured, all subsequent steps (filtering, aggregation, processing, analysis and visualization) will be reproducible.
- *Experimental data*: this type of data will be achieved from the laboratory analysis or from used equipment. This type of data can be reproduced most of the time, but the reproduction may be expensive. Also, for this type of data, a thorough and elaborated preparation is needed before the capturing. The steps after the capturing are reproducible for this type of data.
- *Simulation data*: this type of data will be obtained from models. The reproducibility of this data is subjected to knowing the input, version control of the input and software code as well as information about running environment such as operating system, release date, software dependencies, etc.
- *Derived or compiled data*: this type of data will be obtained from data mining or statistical analysis. The reproducibility of this data is subjected to a good documentation of original data.
- *Metadata*: metadata are information about the data. The reproducibility of metadata depends on the availability of the original data that metadata give information about.

Data can also be classified in the following three (3) broad categories: (a) Input or “raw data”; (b) Processed or “research-ready” data; and (c) Output or “Publication-ready” data.

Data collection process

This is provided by Work Package in the sections below.

Version control

Versioning is important for long term-research data management where metadata and/or files are updated over time. For scientific projects wherein different parties are involved, it is more efficient that the data storage system is with version control function to prevent losing of data. A version control system (or revision control system) is a system that tracks incremental versions (or revisions) of files and, in some cases, directories over time. Of course, merely tracking the various versions of a user’s (or group of users’) files and directories isn’t very interesting in itself. What makes a version control system useful is the fact that it allows you to explore the changes which resulted in each of those versions.

Example

Deliverable 1.2: Data Management Plan

3.1 Work Package 1

The information was collected by the Work Package leader (Roelof Moll/ TU DELFT) through the use of questionnaires. The results are summarized below.

Pre-existing data

Grant Agreement, Consortium Agreement, TSAT Agreement.

Source of pre-existing data

Project proposal preparation.

Conditions for use of pre-existing data

Data is available for internal use within ZERO BRINE; no specific conditions applicable.

Type of data collected

Agenda and minutes of meetings.

Aim of this data

Project coordination.

Process of data collection

Generation internally.

Format of data collected

- | | | |
|--|--|---------------------------------------|
| ☒ .doc / .docx | ☐ Photo formats | ☐ .txt |
| ☒ .xls / .xlsx | ☐ Video formats | ☐ .csv, .tab |
| ☒ .ppt / .pptx | ☐ .xml | ☐ .sgm / .sgml |
| ☒ .pdf | ☐ Others | ☐ .nc, .cdf |

Estimated size of data

500 MB.

Software needed to create/process/visualize the data

Standard Microsoft software.

Storage of data

DataVerse as successor to SURFDrive. SURFDrive will still be used for minutes of meetings related to the organization of the Work Packages (non confidential data).

Access to data

ZERO BRINE partners only.

Deliverable 1.2: Data Management Plan

4 Data storage and backup

Storage media and location

ZERO BRINE involves collaboration with 22 partners and a large amount of data is being and will be generated. To manage such quantities of data and allow the partners (and other researchers) to share them with each other, suitable storage media should be used that comply with European privacy legislation.

The following storage media are NOT appropriate for storing the data generated in ZERO BRINE project:

- Cloud storage, such as Dropbox and Google Drive.
These are popular services by general public and not appropriate for sensitive data storage. If cloud storage is used for storage of a part of data their service level agreements should be studied before using them;
- Local drives, cloud storage and external portable storage devices
These are storage facilities that do not fall under surveillance of this data management plan. Local drives such as PCs and Laptops are convenient for short-term storage and data processing. However, relying on local drives for storing master copies should not be encouraged, unless backup of data is made through networked drives regularly; and
- External portable storage devices, such as external hard drives and USB drives.
These are very common among individual researchers and students because they are convenient, cheap and portable. However, they are not recommended for long-term storage as their longevity is uncertain and they can be easily damaged or lost.

The consortium partners will deposit the data generated by the project in the data archive provided by the 4TU.Center for Research Data (4TU.ResearchData in short) belonging to TU Delft. A Data Lab will be established in order to store data generated during the project, to share this data with project partners, to process them and to visualise them. A data lab is a secure online environment (with or without screening) for storing, processing and sharing dynamic research data, digital tools and software, visualisations and other items with fellow researchers. DataverseNL is one of the possibilities offered for 4TU-ResearchData as a type of Data Lab.

This data repository can be accessed here: <https://data.4tu.nl/repository/>

DataverseNL (see also [here](#))

DataverseNL is an open source application that makes research data accessible to others. [DataverseNL](#) is specifically designed to store, back-up, organise, annotate and share research data with colleagues all over the world. This open source application can grant multiple individuals controlled access to data. DataverseNL provides for the following:

- Organization of data files in dataverses and datasets
- Addition of metadata and documentation
- Version management
- Management of access rights
- Easy collaboration with fellow researchers or project partners, beyond university or research institute



Example

5 Data documentation

This section describes how data will be documented to help new members of the team and future (secondary) users understand and reuse it. A simple file identification system is prepared to upload files to selected system (DataverseNL) and to communicate on files amongst consortium/work package partners. The same identification system is used for files that are uploaded to the EU participants portal.

Below more information are provided regarding the type of documentation that will accompany the data to help secondary users to understand and reuse the data, as well as information regarding the identification of the data.

Meta-data

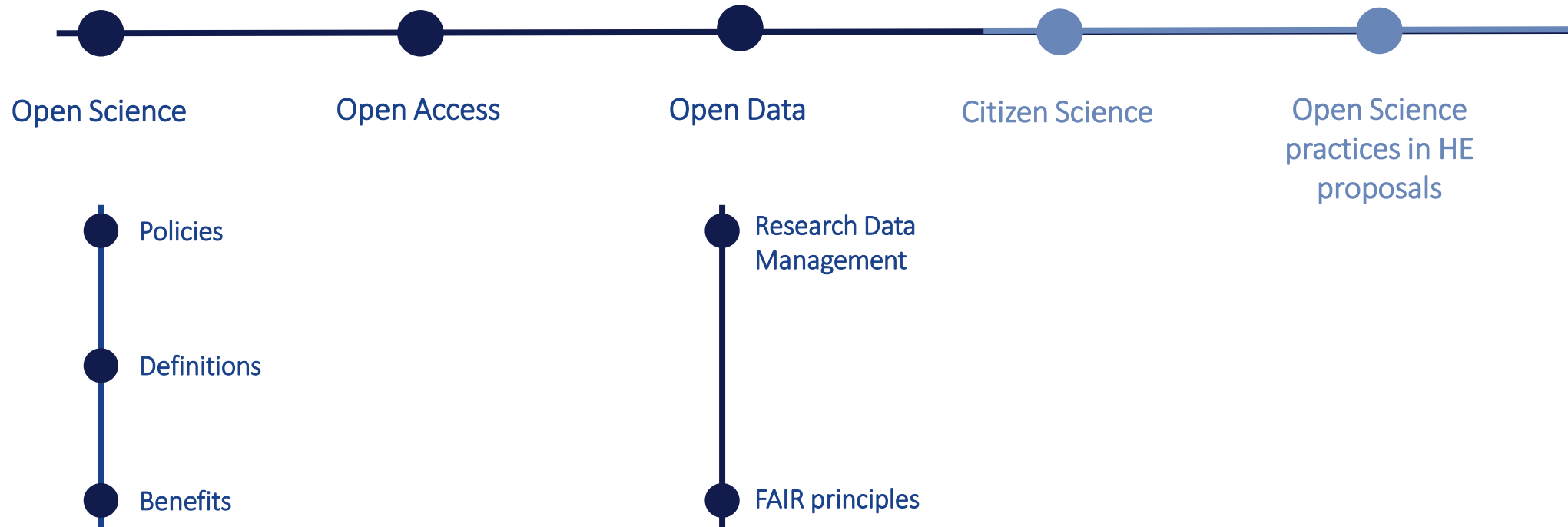
Along with the data files, metadata records will be produced to describe and contextualize the data. Both descriptive and substantive metadata will be produced:

- ✓ **Descriptive metadata** are indispensable for the preservation, retrieval and re-use of datasets. These provide answers to questions concerning the person creating the data, the subject of the data, the type of file, geographic information and other aspects. In other words, metadata are 'data about data'. Metadata make use of international standards for data exchange. This ensures that the information and the associated dataset can be found by search engines. The descriptive metadata that will be produced are listed in Table 5-1.
- ✓ **Substantive metadata** is important primarily for the user of the data. For example, consider a codebook that tells how the data should be read or interpreted. In many cases, such information is added in the form of Readme.txt files or similar descriptions

Table 5-1: Descriptive metadata that will be included in the documentation of ZERO BRINE data

Creator*	Main researchers involved in producing the data.
Title*	Name or title by which the dataset is known.
Contributor	Institution where the data was created or collected. A person or organization responsible for making contributions to the dataset.
Publisher*	A holder of the data (including archives appropriate) or institution which submitted the work. Any others may be listed as contributors.
Publication year*	The year when the data was or will be made publicly available.
Date created*	Date the resource itself was put together; this could be a date range or a single date.
Description*	Concise description of the contents of the dataset. Describe the research objective, type of research, method of data collection and type of data.
Subject	Subject, keyword, or key phrase describing the resource.
Temporal coverage	Indicate the dates to which the data refer. Enter the year, or beginning and ending dates.
Spatial coverage	Describe the geographic area to which the data refer (e.g. municipality, town/city, region, country). The geographic coordinates of the area may be included, if desired.
Identifier	4TU.ResearchData automatically assigns a DOI to a dataset once the entire deposit procedure has been completed. In some cases, a dataset may be known by one or more other (persistent) identifiers.
Language*	The primary language of the resource. When no language is added, 4TU.ResearchData will automatically assign 'English'.

Outline





Cost of not having FAIR research data

Cost-Benefit analysis for FAIR research data

Following this approach, we found that the annual cost of not having FAIR research data costs the European economy at least €10.2bn every year. In addition, we also listed a number of consequences from not having FAIR which could not be reliably estimated, such as an impact on research quality, economic turnover, or machine readability of research data. By drawing a rough parallel with the European open data economy, we concluded that these unquantified elements could account for another €16bn annually on top of what we estimated. These results relied on a combination of desk research, interviews with the subject matter experts and our most conservative assumptions.

Moreover, while building on top of other available studies and being heavily reliant on existing material, we have come to realise ourselves how important is to have FAIR research data. Not only the time invested in this study could have been reduced by a significant amount, but the content could have been enhanced if more material had been accessible and reusable.

**€10.2bn+ €16bn
In Europa ogni anno**

Publicato il 2019-01-16

Corporate author(s): Directorate-General for Research and Innovation (European Commission) , PwC EU Services **Cost of not having FAIR research data**

Findable

The first step in (re)using data is to find them. Metadata and data should be easy to find for both humans and computers. Machine-readable metadata are essential for automatic discovery of datasets and services, so this is an essential component of the FAIRification process.

F1. (Meta)data are assigned a globally unique and persistent identifier

F2. Data are described with rich metadata (defined by R1 below)

F3. Metadata clearly and explicitly include the identifier of the data they describe

F4. (Meta)data are registered or indexed in a searchable resource



Use **metadata** and **specify standards** for metadata creation (if any). If there are no standards in your discipline describe what type of metadata will be created and how

Search **keywords**

Persistent and unique identifiers such as DOIs, ORCID etc. (a long-lasting reference to a document, file, web page, or other object)

File and folder naming conventions

Versioning of the datasets and clear version numbers

Where to find metadata standards

Metadata Standards Directory Broad,
disciplinary listing of standards and tools

Maintained by RDA group

<http://rd-alliance.github.io/metadata-directory>



Disciplinary metadata

<https://www.dcc.ac.uk/guidance/standards/metadata>

Biosharing

A portal of data standards, databases,
and policies for life, environmental and
biomedical sciences

<https://biosharing.org>

Links to other Resources

[FAIR Data point specification](#)

DOI – Digital Object Identifier

- ❏ In computing, a digital object identifier (DOI) is a persistent identifier or handle used to identify objects uniquely, standardized by the International Organization for Standardization (ISO).
- ❏ A DOI aims to be resolvable, usually to some form of access to the information object to which the DOI refers.
- ❏ This is achieved by binding the DOI to metadata about the object, such as a URL, indicating where the object can be found
- ❏ a DOI differs from identifiers such as ISBNs and ISRCs which aim only to identify their referents uniquely
- ❏ <http://www.doi.org>

Orcid

- Open Research and Contributor ID) is a nonproprietary alphanumeric code to uniquely identify scientific and other academic authors and contributors
- Do you have one? **You should...**

Accessible

Once the user finds the required data, they need to know how can they be accessed, possibly including authentication and authorisation.

A1. (Meta)data are retrievable by their identifier using a standardised communications protocol

A1.1 The protocol is open, free, and universally implementable

A1.2 The protocol allows for an authentication and authorisation procedure, where necessary

A2. Metadata are accessible, even when the data are no longer available



Explain which data can't be shared openly, if any
Specify how access will be provided in case of restrictions, e.g., through a data committee, a license, or arranged with the repository
Will the methods or software tools needed to access the data (if any) be included or documented?

Deposit the data and associated metadata, documentation and code preferably in certified repositories which support Open Access

Access Rights in Zenodo

-  Open Access
-  Embargoed Access
-  Restricted Access
-  Closed Access

Access right *

- ☐  Open Access
- ☐  Embargoed Access
- ☐  Restricted Access
- ☒  Closed Access

Required. Open access uploads have considerably higher visibility on Zenodo.

Access right *

- ☒  Open Access
- ☐  Embargoed Access
- ☐  Restricted Access
- ☐  Closed Access

Required. Open access uploads have considerably higher visibility on Zenodo.

Access right *

- ☐  Open Access
- ☒  Embargoed Access
- ☐  Restricted Access
- ☐  Closed Access

Required. Open access uploads have considerably higher visibility on Zenodo.

 Embargo date

Required only for Embargoed Access uploads. Format: YYYY-MM-DD. The date your upload will be made publicly available in the embargo period from your publisher.

Access right *

- ☐  Open Access
- ☐  Embargoed Access
- ☒  Restricted Access
- ☐  Closed Access

Open access uploads have considerably higher visibility on Zenodo.

B *I* S x_2 x^2                    

Interoperable

The data usually need to be integrated with other data. In addition, the data need to interoperate with applications or workflows for analysis, storage, and processing.

- 11. (Meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
- 12. (Meta)data use vocabularies that follow FAIR principles
- 13. (Meta)data include qualified references to other (meta)data



Allowing data exchange and re-use between researchers, institutions, organisations, countries, etc:
Specify what data and metadata vocabularies, standards or methodologies you will follow to facilitate interoperability
Aim for compliance to globally accepted practices

<https://www.go-fair.org/fair-principles/>

I= Interoperable

- ✚ Idealmente, per essere **Interoperabili**, i dati dovrebbero essere salvati in **formati non proprietari, non compressi, non criptati**, con standard documentati. Nella scelta di un formato, occorre tenere conto di alcune caratteristiche.
- ✚ Esempi di formati preferiti:
 - Containers: TAR, GZIP, ZIP
 - Databases: XML, CSV
 - Geospatial: SHP, DBF, GeoTIFF, NetCDF
 - Moving images: MOV, MPEG, AVI, MXF
 - Sounds: WAVE, AIFF, MP3, MXF
 - Statistics: ASCII, DTA, POR, SAS, SAV
 - Still images: TIFF, JPEG 2000, PDF, PNG, GIF, BMP
 - Tabular data: CSV
 - Text: XML, PDF/A, HTML, ASCII, UTF-8
 - Web archive: WARC
- ✚ Alcuni archivi inoltre assicurano la conservazione solo per alcuni formati: di questo va tenuto conto fin dall'inizio del progetto.

Reusable

The ultimate goal of FAIR is to optimise the reuse of data. To achieve this, metadata and data should be well-described so that they can be replicated and/or combined in different settings.

R1. (Meta)data are richly described with a plurality of accurate and relevant attributes

R1.1. (Meta)data are released with a clear and accessible data usage license

R1.2. (Meta)data are associated with detailed provenance

R1.3. (Meta)data meet domain-relevant community standards



License the data to permit the widest reuse possible

Specify a data embargo, if needed

If data re-use by third parties is restricted, explain why

How long will the data remain reusable?

Describe data quality assurance processes

Licensing your data: Creative Commons



FACT SHEET ON CREATIVE COMMONS & OPEN SCIENCE V.0.1

This information guide contains questions and responses to common concerns surrounding open science and the implications of licensing data under Creative Commons licences. It is intended to aid researchers, teachers, librarians, administrators and many others using and encountering Creative Commons licences in their work.

What is Open Science?

[Open Science](#) is the movement to make scientific research and data accessible to all for knowledge dissemination and public reuse.

How should I licence my data for the purposes of Open Science?

We recommend you use the [CC0 Public Domain Dedication](#), which is first and foremost a waiver, but [can act as a licence](#) when a waiver is not possible.

CC ZERO LICENCE, 'NO RIGHTS RESERVED' LOGO



By applying CC0 to your data you enable everyone to freely reuse your data as they see fit by waiving (giving up) your copyright and related rights in that data.

You should keep in mind that there are many situations in which data is **not** protected as a matter of law. Such data can include facts, names, numbers – things that are considered 'non-original' and part of the public domain thus not subject to copyright protections. Similarly, your database (which is a structured collection of data) might be considered 'non-original' and thus ineligible for copyright, and it might additionally be excluded

from other forms of protection (like the [EU sui generis database right](#), also known as the 'SGDR', for non-original databases).

In these cases, using a Creative Commons licence such as a CC BY could signal to users that you claim a copyright in the non-original data despite the law, and perhaps despite your real intention.

Finally, if your data is in the public domain worldwide, you might state simply and obviously on the material that no restrictions attach to the reuse of your data and apply a [Public Domain Mark](#).

PUBLIC DOMAIN MARK LOGO



When in doubt, consider which use may be appropriate according to the chart below:

CC0 & PUBLIC DOMAIN LICENCES WHICH LICENSE TO USE AND WHEN



'Creative arrangement' of data is original, but any copyright has been waived and content is made available copyright-free



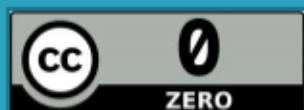
'Creative arrangement' of data is not original; the author acknowledges this and communicates the data is in the public domain

Dataset licensing

Horizon 2020
guidelines
point to:



or



Same in HE

* **OA of publications:** for monographs and other long-text formats, the license may exclude commercial uses and derivative works (e.g. CC BY-NC, CC BY-ND)

CREATIVE COMMONS LICENSES		COPY & PUBLISH	ATTRIBUTION REQUIRED	COMMERCIAL USE	MODIFY & ADAPT	CHANGE LICENSE
	PUBLIC DOMAIN	✓	✗	✓	✓	✓
	CC BY	✓	✓	✓	✓	✓
	CC BY-SA	✓	✓	✓	✓	✗
	CC BY-ND	✓	✓	✓	✗	✗
	CC BY-NC	✓	✓	✗	✓	✓
	CC BY-NC-SA	✓	✓	✗	✓	✗
	CC BY-NC-ND	✓	✓	✗	✗	✗

You can redistribute (copy, publish, display, communicate, etc.)
 You have to attribute the original work
 You can use the work commercially
 You can modify and adapt the original work
 You can choose license type for your adaptations of the work.

Choose a License

All [start again](#) questions or use the search to find the license you want

[Start again](#)

What do you want to deposit?

☐ Software ☐ Data

Search for a license...

Public Domain Mark (PD)

The work identified as being free of known restrictions under copyright law, including all related and neighboring rights.

[Publicly Available](#)

Public Domain Dedication (CC Zero)

CC Zero enables scientists, educators, artists and other creators and owners of copyright- or database-protected content to waive those interests in their works and thereby place them as completely as possible in the public domain, so that others may freely build upon, enhance and reuse the works for any purposes without restriction under copyright or database law.

[Publicly Available](#) [OPEN DATA](#)

Creative Commons Attribution (CC-BY)

This is the standard creative commons license that gives others maximum freedom to do what they want with your work.

[Publicly Available](#) [OPEN DATA](#)

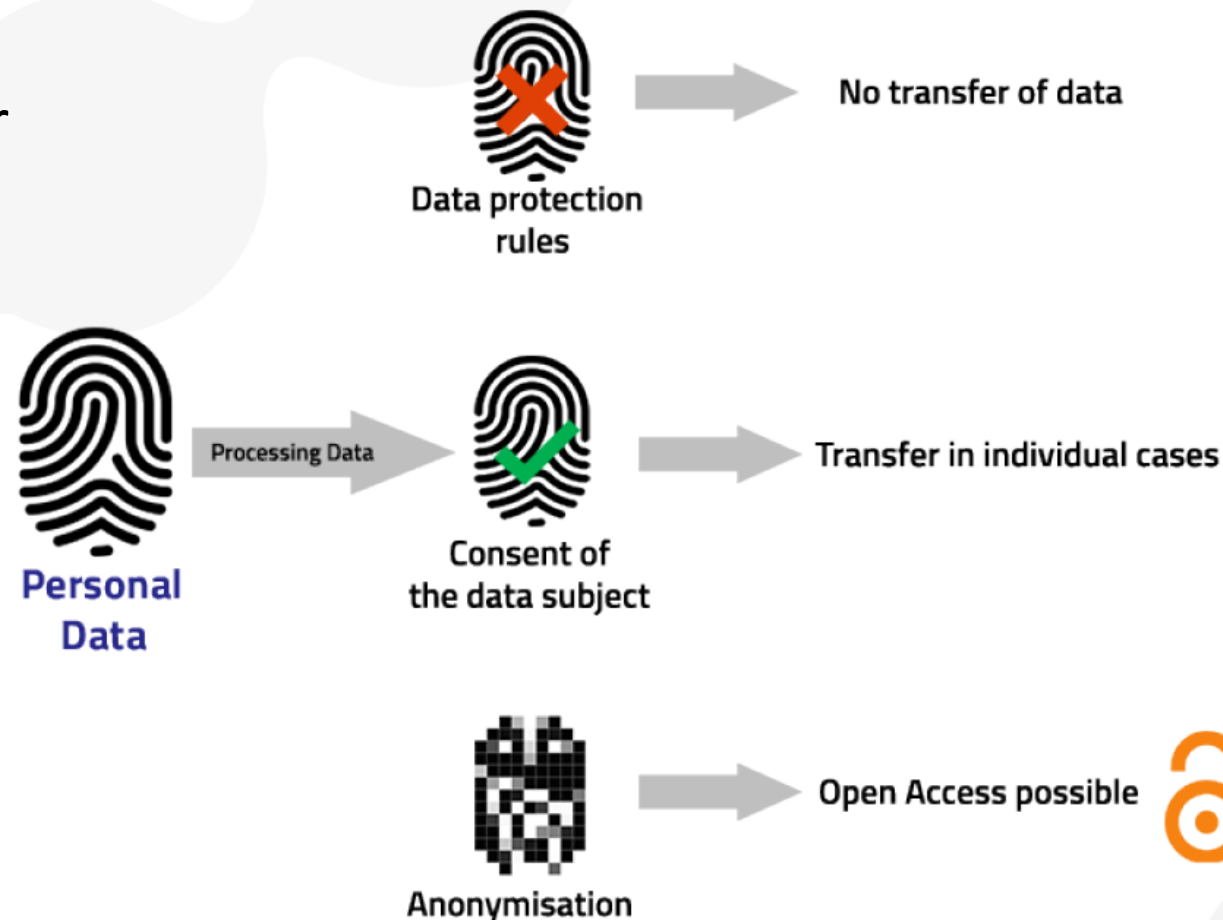
Creative Commons Attribution-ShareAlike (CC-BY-SA)

<https://ufal.github.io/public-license-selector/>

Personal data and the Open Research Data Pilot

“Personal data” means any information relating to a natural person who is either identified or who could be identifiable by that data

Anonymisation of personal research data is the effective solution to comply with the data protection legislation and the requirements of the **Open Research Data Pilot**.



European Open Science Cloud - EOSC

EOSC aims at creating a **virtual research environment** to access and interoperate research data and other research outputs in Europe across the different disciplines

More info:

- www.eoscsecretariat.eu
- <https://www.eosc-portal.eu/>





EOSC – European Open Science Cloud



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☐ Earth & Related Environmental Sciences 9

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3DBionotes-WS

3DBIONOTES-WS a web application designed to automatically annotate biochemical and biomedical information onto structural models.

Organisation: [Centro Nacional de Biotecnología \(CSIC\)](#)

Scientific domain: [Computer & Information Sciences](#)

☐ Add to comparison ☐ Add to favourites

FULLY OPEN ACCESS



ADAM Platform

ADAM is a key technology to enable seamless access and view services to environmental data. ADAM removes the main barriers to realize the democratization data process.

Organisation: [Meteorological and Environmental Earth Observation](#)

Scientific domain: [Earth & Related Environmental Sciences](#)

☐ Add to comparison ☐ Add to favourites

ORDER REQUIRED



Materials Cloud Archive



A long-term FAIR data repository for computational materials science

SUGGESTED

DEEP training facility



Distributed training facility for Machine Learning, Artificial Intelligence and Deep

SUGGESTED



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3DBionotes-WS

3DBIONOTES-WS a web application designed to automatically annotate biochemical and biomedical information onto structural models.

Organisation: [Centro Nacional de Biotecnología \(CSIC\)](#)

☆☆☆☆☆ (0.0 / 5) 0 reviews ☐ Add to comparison ☐ Add to favourites

[Webpage](#) [Helpdesk e-mail](#) [Manual](#)

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ABOUT

DETAILS

REVIEWS (0)

The web platform 3DBionotes-WS integrates multiple Web Services and an interactive Web Viewer to provide a unified environment in which biological annotations can be analyzed in their structural context.

Current sources of information include post-translational modifications, genomic variations associated to diseases, short linear motifs, immune epitopes sites, disordered regions and domain families.

Since the COVID-19 outbreak, new structural data from many viral proteins have been incorporated in a new 3DBionotes-COVID-19 section.



[CANCEL AND QUIT](#)

[Next](#)

3DBionotes-WS

[Access instructions](#)

[Pin to a project](#)

This is an open access offer of the 3DBionotes-WS resource. Press [Go to the resource](#) button to reach the resource website. You may also add the resource to a [Project](#) in order to:

- Gain EOSC experts support
- Easily access the selected resource
- Organise your resources and orders into logical blocks

To find out more about Projects in EOSC Marketplace, please refer to our [FAQ](#)

[Go to the resource](#)



[Next](#)

SCIENTIFIC CATEGORISATION

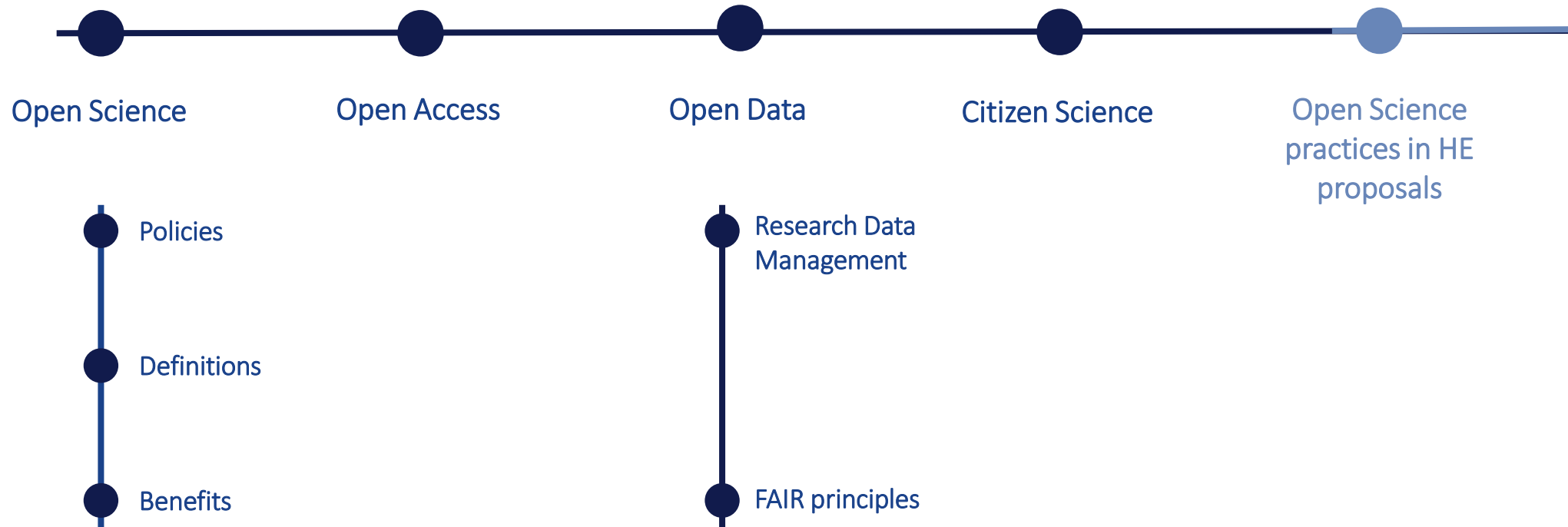


- Natural Sciences
 - Computer & Information Sciences

ITEGORISATION

- Data Analysis
 - Image/Data Analysis
 - Visualization
- Data Management
 - Validation

Outline



Citizen Science



“Interaction between citizens, scientists and policy makers is essential to enrich research and innovation and reinforce trust of society in science. I am proud of the hundreds of thousands empowered citizens that already contributed to research and innovation in recent years and look forward to continue opening up research towards society and the world.”

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

Citizen Science & Open Science

| Open science

- Open science is based on **open co-operative work** and the systematic sharing of knowledge and tools as early and widely as possible in the process.

- Open science practices include involving all **relevant knowledge actors** such as citizens, civil society and end users in the **co-creation of R&I agendas and contents**.

Citizen Science & Open Science

| Open science

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What is Citizen Science?

A broad understanding of citizen science

- *Citizen science should be understood broadly, covering a range of different levels of participation, from raising public knowledge of science, encouraging citizens to participate in the scientific process by observing, gathering and processing data, right up to setting scientific agenda and co-designing and implementing science-related policies. It could also involve publication of results and teaching science (European Green Deal Call).*
- *Haklay et al.: A "proliferation of typologies of citizen science"; "fluidity of definitions reflect the diversity of the field"; "leave the necessary space for methodological advancements, disciplinary cross-fertilisation and overall, for the growth of citizen science as a field for science innovation" (2020, Contours of citizen science: a vignette study).*



Some characteristics emerging since the beginning

First definition of CS in an issue of the MIT Technology Review in 1989: recruitment of volunteers in acid-rain campaign, to collect acid rain samples, test their acidity and report to scientists. The information were then used to influence the Congress (USA).

What we can learn from this example?

- It includes the **generation of scientific data** (through the testing of the acidity of rainwater),
- engages volunteers** over a large area (the continental USA), and
- addresses a **politically relevant issue** (acid rain and the lobbying process to reduce it).

Citizen Science: Definition

- ❏ **Citizen Science** refers to the general public engagement in scientific research activities when citizens actively contribute to science either with their intellectual effort or surrounding knowledge or with their tools and resources. (*White paper on Citizen Science for Europe*)
- ❏ **Citizen Science** is “scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions.” (*Oxford English Dictionary List of New Words, 13.09.2014*)
- ❏ **Citizen Science** [...] covers a range of different levels of participation: from raising public knowledge about science, encouraging citizens to participate in the scientific process by observing, gathering and processing data, right up to setting scientific agenda and co-designing and implementing science-related policies. (*EC, Horizon 2020, Science with and for society Work Programme 2018-2020, p.30*)

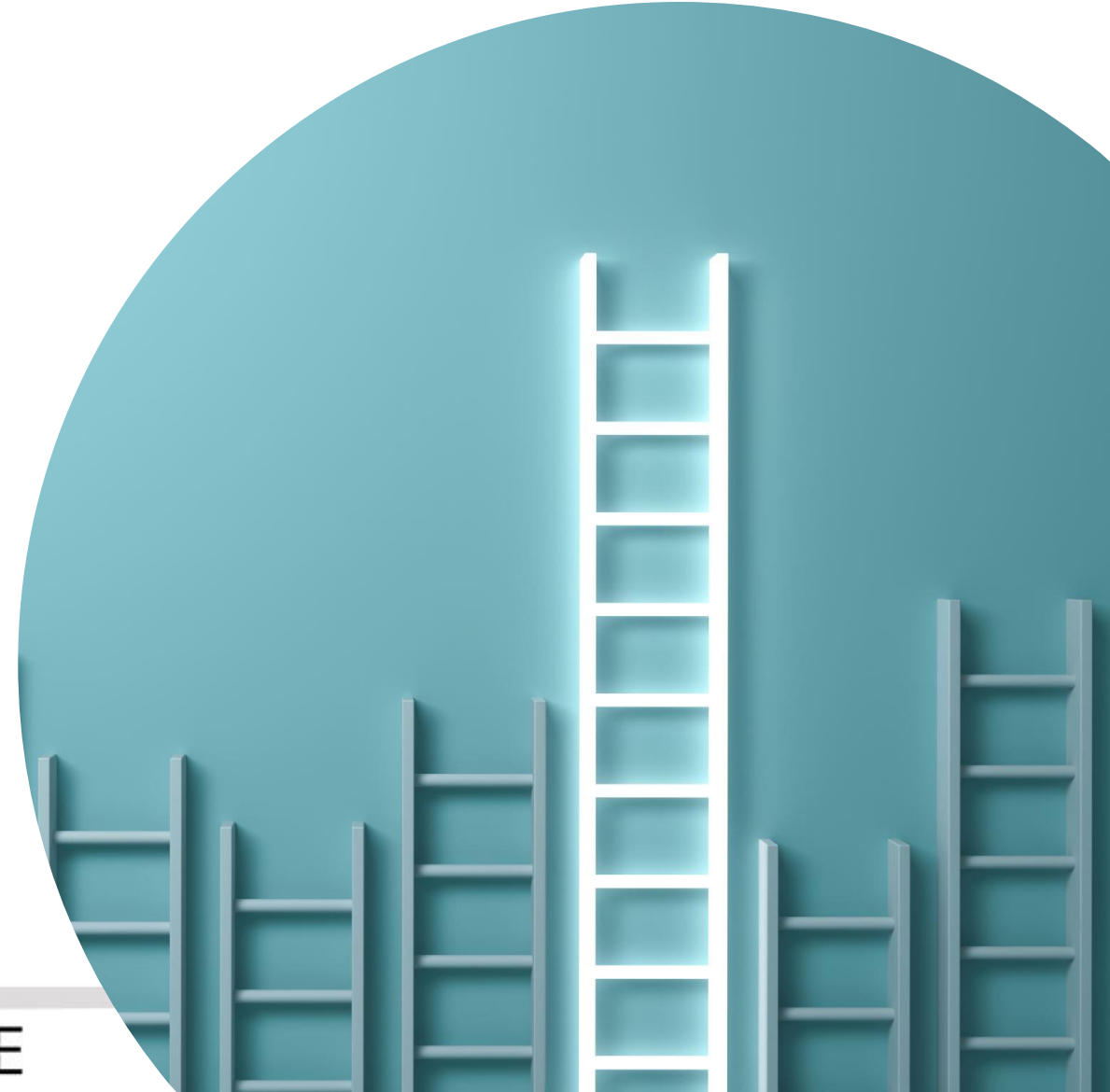
Citizen Science: Definition

- ❏ **Citizen Science** is “the collection and analysis of data relating to the natural world by members of the general public, typically as part of a collaborative project with professional scientists.” (*Oxford English Dictionaries*)
- ❏ **Citizen science** describes the engagement of people in scientific processes who are not tied to institutions in that field of science. Participation can range from the short-term collection of data to the intensive use of leisure time in order to delve deeper into a research topic together with scientists and/or other volunteers. Although many volunteer scientists do have a university degree, this is not a prerequisite for participating in research projects. However, it is important that scientific standards are adhered to. This pertains especially to transparency with regard to the data collection methodology and the open discussion of the results. (*Green Paper CS Strategy 2020 for Germany, p. 13*)



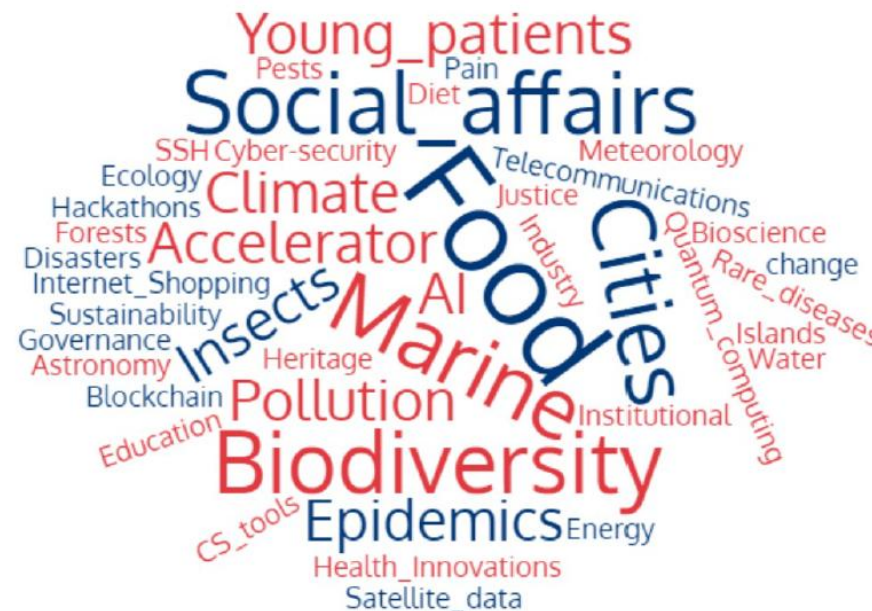
What's the best definition of CS?

- ❏ No one size one-size-fits-all: it must reflect the objectives of the actors and the extent of the engagement of citizens in the different processes generating scientific knowledge
- ❏ It depends on the context



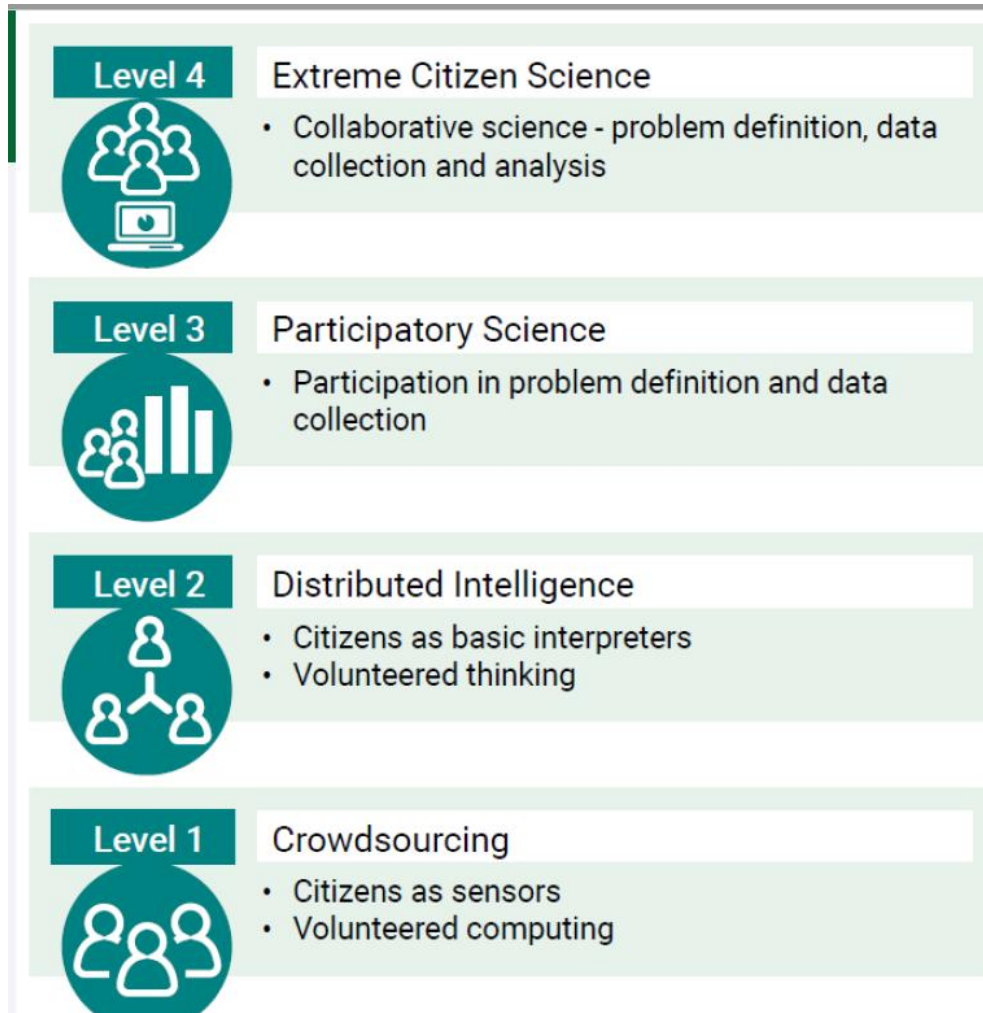
Scientific fields

Citizen science can apply across all areas of science and innovation

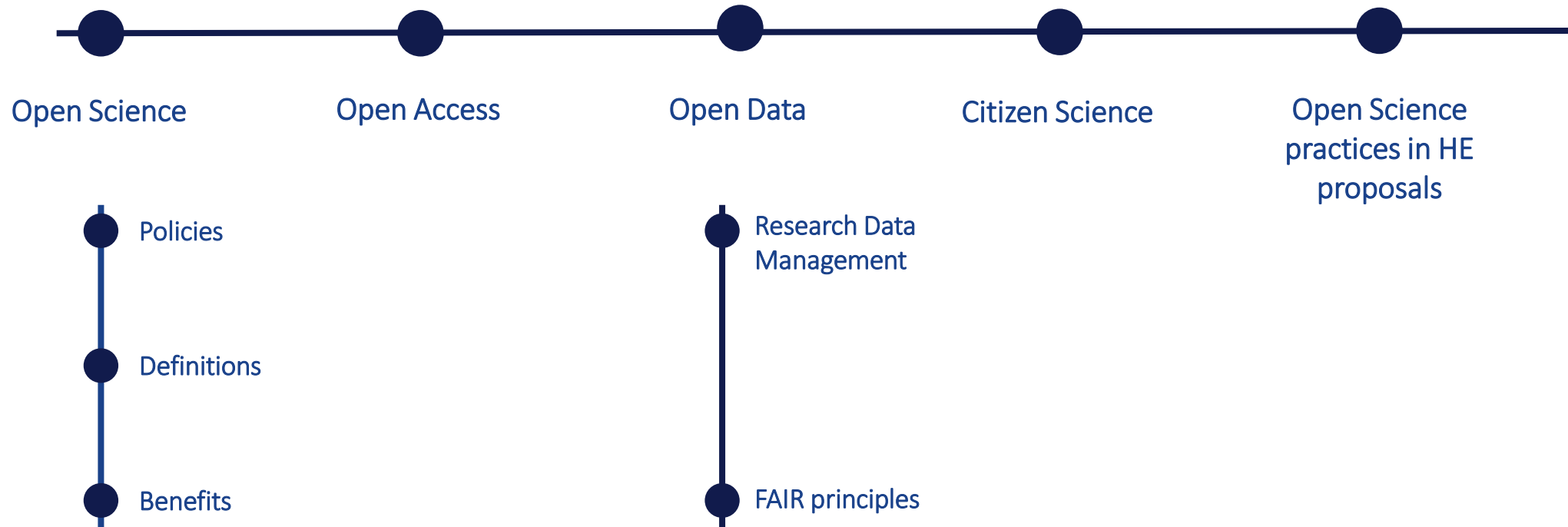


Source: SwafS-27-2020 - Hands-on citizen science and frugal innovation – Aggregated key themes of the 71 proposals

Citizen Science classification: level of engagement



Outline



Evaluation of proposals and Open Science

“Excellence” criterion (methodology)

- Evaluation of the quality of open science practices
- E.g. 1 page to describe Open Science practices + 1 page to describe research data/output management [RIA,IA]

“Quality and efficiency of implementation” criterion

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

- Explain expertise/track record on Open Science
- 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

Open Science in Horizon Europe Proposal Template

1.2 Methodology

[...]

Describe how appropriate **open science practices are implemented as an integral part of the proposed methodology**. Show how the choice of practices and their implementation are adapted to the nature of your work, in a way that will increase the chances of the project delivering on its objectives [e.g. 1 page]. If you believe that none of these practices are appropriate for your project, please provide a justification here.

- *Open science is an approach based on open cooperative work and systematic sharing of knowledge and tools as early and widely as possible in the process. Open science practices include early and open sharing of research (for example through preregistration, registered reports, pre-prints, or crowd-sourcing); research output management; measures to ensure reproducibility of research outputs; providing open access to research outputs (such as publications, data, software, models, algorithms, and workflows); participation in open peer-review; and involving all relevant knowledge actors including citizens, civil society and end users in the co-creation of R&I agendas and contents (such as citizen science).*
- *Please note that this question does not refer to outreach actions that may be planned as part of communication, dissemination and exploitation activities. These aspects should instead be described below under 'Impact'.*

https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/temp-form/af/af_he-ria-ia_en.pdf

Open Data in Horizon Europe Proposal Template

Research **data management and management of other research outputs**: Applicants generating/collecting data and/or other research outputs (except for publications) during the project must provide maximum 1 page on how the data/ research outputs will be managed in line with the FAIR principles (Findable, Accessible, Interoperable, Reusable), addressing the following (the description should be specific to your project): [1 page]

- **Types of data/research outputs** (e.g. experimental, observational, images, text, numerical) and their estimated size; if applicable, combination with, and provenance of, existing data.
- **Findability of data/research outputs**: Types of persistent and unique identifiers (e.g. digital object identifiers) and trusted repositories that will be used.
- **Accessibility of data/research outputs**: IPR considerations and timeline for open access (if open access not provided, explain why); provisions for access to restricted data for verification purposes.
- **Interoperability of data/research outputs**: Standards, formats and vocabularies for data and metadata.
- **Reusability of data/research outputs**: Licenses for data sharing and re-use (e.g. Creative Commons, Open Data Commons); availability of tools/software/models for data generation and validation/interpretation /re-use.
- **Curation and storage/preservation costs**; person/team responsible for data management and quality assurance.

*Proposals selected for funding under Horizon Europe will need to develop a detailed data management plan (DMP) for making their data/research outputs findable, accessible, interoperable and reusable (FAIR) as a deliverable **by month 6 and revised towards the end of a project's lifetime**.*

For guidance on open science practices and research data management, please refer to the relevant section of the HE Programme Guide on the Funding & Tenders Portal.

3.2 Capacity of participants and consortium as a whole [e.g. 3 pages]

- Describe the consortium. How does it match the project's objectives, and bring together the necessary disciplinary and inter-disciplinary knowledge. Show how this includes expertise in social sciences and humanities, **open science practices**, and gender aspects of R&I, as appropriate. Include in the description affiliated entities and associated partners, if any.
- Show how the partners will have access to critical infrastructure needed to carry out the project activities.
- Describe how the members complement one another (and cover the value chain, where appropriate)
- In what way does each of them contribute to the project? Show that each has a valid role, and adequate resources in the project to fulfil that role.
- If applicable, describe the industrial/commercial involvement in the project to ensure exploitation of the results and explain why this is consistent with and will help to achieve the specific measures which are proposed for exploitation of the results of the project (see section 2.2).
- **Other countries and international organisations:** If one or more of the participants requesting EU funding is based in a country or is an international organisation that is not automatically eligible for such funding (entities from Member States of the EU, from Associated Countries and from one of the countries in the exhaustive list included in the Work Programme General Annexes B are automatically eligible for EU funding), explain why the participation of the entity in question is essential to successfully carry out the project.

The 9 KIPs

1. Creating high-quality new knowledge

2. Strengthening human capital in R&I

3. Fostering diffusion of knowledge and Open Science

Scientific
Impact



4. Addressing EU policy priorities & global challenges through R&I

5. Delivering benefits & impact via R&I missions

6. Strengthening the uptake of R&I in society

Societal
Impact



7. Generating innovation-based growth

8. Creating more and better jobs

9. Leveraging investments in R&I

Economic/
Technological
Impact



Article 50 & Annex V 'Time-bound indicators to report on an annual basis on progress of the Programme towards the achievement of the objectives referred to in Article 3 and set in Annex V along impact pathways'

Open Science practices

What?	How?	Mandatory per Grant Agreement / Recommended
Early and open sharing of research	Preregistration, registered reports, preprints, etc.	Recommended
Research output management	Data management plan (DMP)	Mandatory
Measures to ensure reproducibility of research outputs	Access and/or information to research outputs and tools/instruments for validating conclusions of scientific publications and validating/re-using data	Mandatory
Open access to research outputs through deposition in trusted repositories	- Open access to publications - Open access to data - Open access to software, models, algorithms, workflows etc.	Mandatory for peer-reviewed publications Mandatory for research data but with exceptions ('as open as possible, as closed as necessary') - Recommended for other research outputs
Participation in open peer-review	Publishing in open peer-reviewed journals or platforms	Recommended
Involving all relevant knowledge actors	Involvement of citizens, civil society and end-users in co-creation of content (e.g. crowd-sourcing, etc.)	Recommended

- Open science practices are described in the HE Programme Guide (see Resources)
- This is a non-exhaustive list: other open science practices (on top of the four already mandatory ones) may be mandatory per specific work programmes or call conditions (i.e. imposed in case of public emergency)

3. Additional Open Science practices

- Where the call conditions impose **additional obligations** regarding OS practices:
 - the beneficiaries must also comply with those
- All projects have additional **obligations regarding the validation of scientific publications** which must be complied with.
 - Beneficiaries must provide **(digital or physical) access** to data or other results needed for validation of the conclusions of scientific publications, to the extent that their legitimate interests or constraints are safeguarded (and unless they already provided the (open) access at publication)

3. Additional Open Science practices- Public emergency

- If imposed by the call conditions in case of a public emergency, beneficiaries must (if requested by the granting authority) immediately **deposit any research output** in a repository + **provide open access to it under CC BY, CC 0 or equivalent.**
 - As an exception, if the access would be against the beneficiaries' legitimate interests, beneficiaries **must grant non-exclusive licenses** — under fair and reasonable conditions — **to legal entities that need the research output to address the public emergency + commit to rapidly and broadly exploit the resulting products and services at fair and reasonable conditions.**

This provision applies up to four years after the end of the action.

Important documents and resources

- **Model grant agreement (MGA), article 17** –lists the obligations you have, i.e. the requirements of the policy
- **Work Programme General Annexes**, evaluation criteria described; open science- a couple of additional obligations outlined there (access for validation and public emergency).
- **Proposal template**- shows where and how to address open science- definition of open science practices
- **Annotated Grant Agreement (AGA), article 17**- offers explanations and guidance for open science requirements
- **Horizon Europe Programme Guide** – presents what is required at proposal stage and how open science is evaluated; open science practices analysed and resources provided-useful for proposers and evaluators

Part A: Application form

Lista di 5 fra pubblicazioni, datasets, software, protocolli, ogni altro risultato rilevante per il progetto

- le pubblicazioni devono essere Open (NON "pubblicate", ok "depositate")
- i dataset devono essere FAIR e Open*

* "As open as possible, as closed as necessary"

Part B: Project proposal - Technical description

1 Excellence

1.1 Objectives and ambition

1.2 Methodology

Open Science [max 1 pag.]

In che modo il progetto adotterà /adatterà le pratiche Open Science obbligatorie e raccomandate?

Pratiche OS obbligatorie

Open Access[#] per le pubblicazioni: deposito+accesso immediato

Open Access* per i dati

Informazioni e documentazioni per validare la ricerca / per il riuso

Gestione responsabile dei dati in linea con i principi FAIR

Pratiche OS raccomandate

Condivisione aperta e immediata

Preregistrazione, open peer-review

Citizen science, public engagement

Gestione degli altri elementi della ricerca (oltre ai dati)

Riproducibilità

#1) pubblico in ORE-Open Research Europe

2) pubblico su rivista Open Access

3) pubblico su rivista tradizionale MA mantengo i diritti per deposito e accesso immediato

Research Data Management (RDM) and management of other research outputs (exc. publications) [max 1 pag.]

Come saranno gestiti i dati e altri elementi della ricerca in modo FAIR?

Dati e altri elementi...

...devono essere Findable Accessible* Interoperable Reusable

costi e responsabilità nella gestione, deposito e conservazione dei dati

Come applico Open Science alla proposta?



HORIZON EUROPE

Open Science (OS) gioca un ruolo fondamentale in Horizon Europe e le pratiche Open Science sono considerate nella valutazione della proposta di progetto.

Ci sono pratiche obbligatorie (Open Access a testi e dati) e raccomandate (open peer preview, preprint, pre registrazione...).

Se non fossero applicabili, occorre fornire una giustificazione solida.

3 Quality and efficiency of the implementation

3.1 Work plan and resources

Es. Date visibilità alla gestione dei dati con specifici tasks/work packages

Includete il Data Management Plan (DMP) completo come deliverable (M6)

Includete altre attività di gestione dati/elementi e mettete a budget i costi

3.2 Capacity of participants & consortium as a whole

Es. Descrivete le competenze dei partners nel fare Open Science

2 Impact

2.1 Project's pathways towards impact

2.2 Measures to maximize impact. Dissemination, exploitation & communication

Es. Serve solo uno schema. Fate riferimento alle pratiche Open Science descritte nella sezione Methodology (Open Access ai risultati, condivisione aperta e immediata...)

Controllate che le pratiche proposte siano compatibili con il Dissemination and exploitation plan (es. protezione della proprietà intellettuale) e con il Consortium agreement

Maggiori dettagli in Guida all'Open Science in Horizon Europe



<https://doi.org/10.5281/zenodo.4826662>



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