

Open Science - Open Access

This module is part of the Intensive programme for HE learner „Student spring School” within the project TrainRDM - component of the *Open Science* course

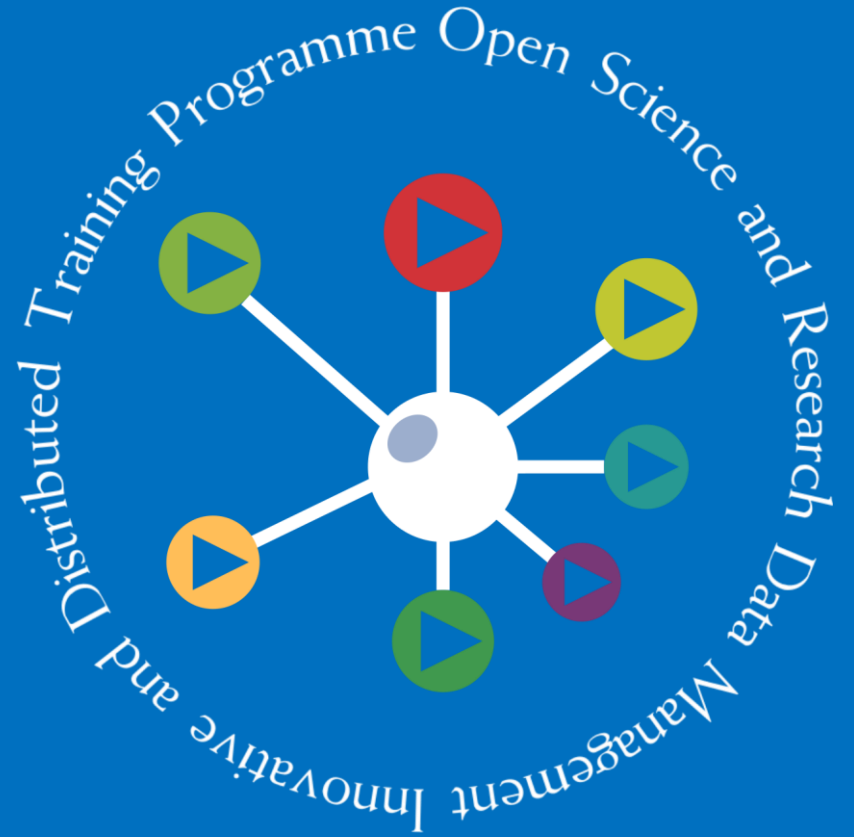
All materials are located here: [.....](#)

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Bucharest 27 – 30 March 2023

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Engineers Investigating NASA's Voyager 1 Telemetry Data



🌐 https://voyager.jpl.nasa.gov/news/details.php?article_id=124

- 🌐 Voyager 1 is currently 14.5 billion miles (23.3 billion kilometers) from Earth, and it takes light 20 hours and 33 minutes to travel that difference.
- 🌐 Voyager 1's twin, Voyager 2 (currently 12.1 billion miles, or 19.5 billion kilometers, from Earth), continues to operate normally.



© NASA/JPL

- 🌐 Launched in 1977, both Voyagers have operated far longer than mission planners expected, and are the only spacecraft to collect data in interstellar space. The information they provide from this region has helped drive a deeper understanding of the heliosphere, the diffuse barrier the Sun creates around the planets in our solar system.

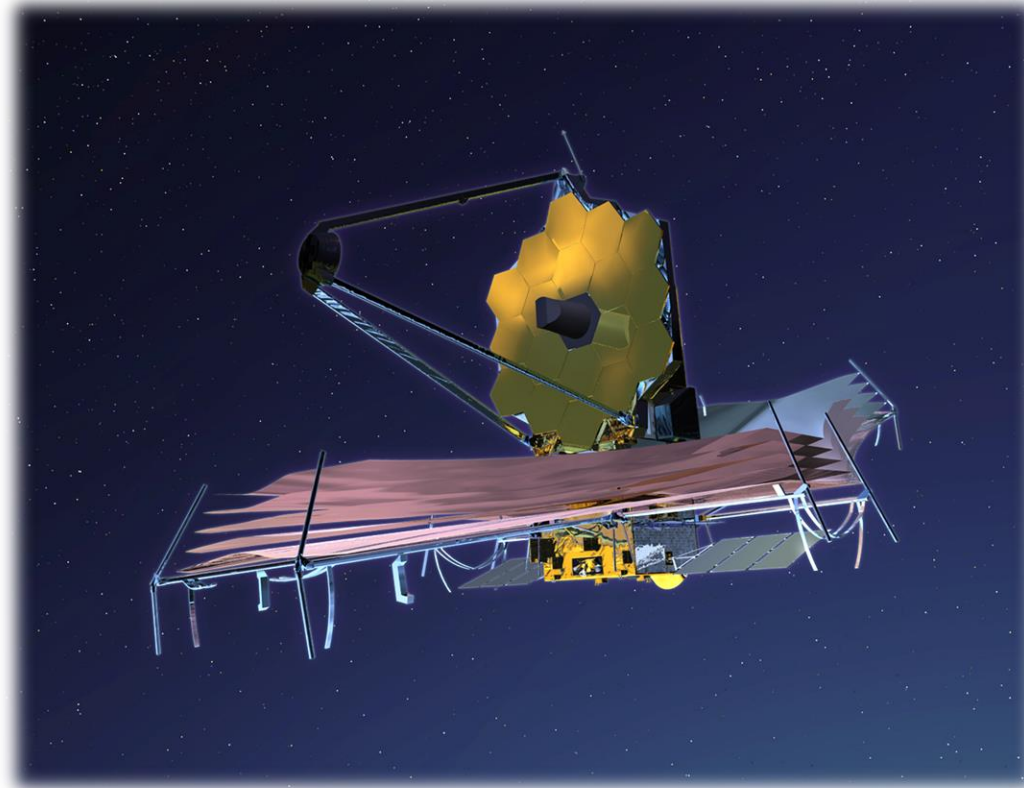
James Webb Space Telescope (I)



✿ The James Webb Space Telescope was launched.

(25 Dec.2021)

- ✿ It is the largest, most powerful and most complex observatory ever launched by humans and promises to revolutionize the observation of the Universe.
- ✿ It can study the light of the most distant galaxies in the universe.
- ✿ It can observe the formation of new stars.
- ✿ It can analyze in detail the chemical composition of the atmospheres of certain extrasolar planets (orbiting other stars and can find any signs of the presence of life on these planets.
- ✿ It can photograph some extrasolar planets directly.



© NASA/JWST

James Webb Space Telescope (II)



End 2022, JWTC spotted the most distant galaxies ever confirmed, about 300 million years after the Big Bang.



@ NASA, ESA, CSA, Tommaso Treu (UCLA), Zolt G. Levay (STScI)

„The City and the Stars”



- ✿ Total rudimentary or sophisticated weapons are used by us for our own destruction. These events support the phrase „closed as necessary” in science
- ✿ When will the end of our “childhood” come? When will this „Russian roulette” game with planet Earth stop?
- ✿ What would it be like to live in a city made up only of images, data, information about the past and the future stored in databases managed and processed by supercomputers? (e.g. The City and the Stars by Arthur C. Clarke)



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OS „As Open as Possible and as Closed as Necessary”

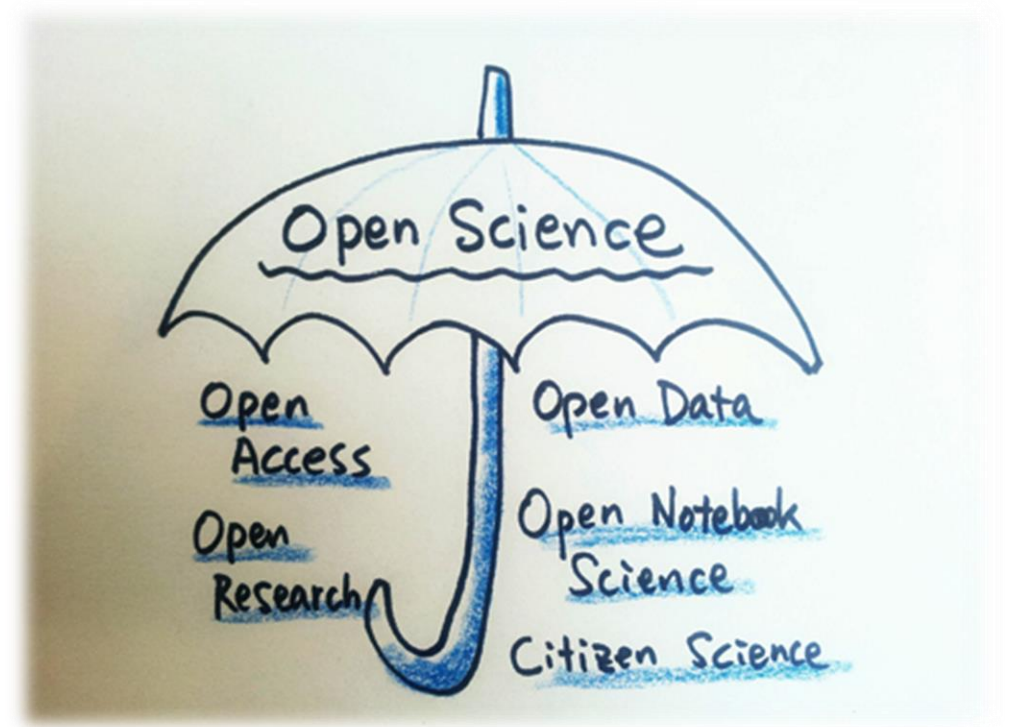


- ✿ We must now *close* certain scientific results, so as not to be used by those who have a different way of thinking and, therefore, undermine the principle of open use of knowledge, by stating that science should be as „open as possible and as closed as necessary”.
- ✿ For these reasons, at the European and world level, the countries with democratic regimes that had opted for a total openness of science, are moving towards a new Open Science approach regarding balancing Open Science with other needs:
- protect commercial interests,
 - protect intellectual property rights,
 - protect personal data (GDPR),
 - ensure integrity in the research process,
 - address concerns of knowledge security,
 - comply with export control and sanctions.

What is Open Science?



🌐 ‘Open Science is 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’ (UNESCO, 2021, p. 7)



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Open Science a „Grouping of Principles and Practices”?



- ✿ According to the [FOSTER taxonomy](#), "Open science is the movement to make scientific research, data and dissemination accessible to all levels of an inquiring society." It can be **defined as a grouping of principles and practices**:
- **Principles:** Open Science is about *increased transparency, re-use, participation, cooperation, accountability and reproducibility for research*. It aims to improve the quality and reliability of research through principles like inclusion, fairness, equity, and sharing. Open Science can be viewed as research simply done properly, and it extends across the Life and Physical Sciences, Engineering, Mathematics, Social Sciences, and Humanities ([Open Science MOOC](#)).
 - **Practices:** Open Science includes changes to the way science is done - including *opening access to research publications, data-sharing, open notebooks, transparency in research evaluation, ensuring the reproducibility of research (where possible), transparency in research methods, open source code, software and infrastructure, citizen science and open educational resources*.
- ✿ **A note on language:** As the English word "science" traditionally does not include the humanities and social sciences, more explicitly inclusive terms like “open scholarship” or “open research” are often used. As “Open Science” is the more common term, we shall use it here, but it should be read as referring to research from all scholarly disciplines.

Open Science „a Core Value of Modern Science” ?



Open Science to the Rescue? Open Science is presented as a policy strategy to achieve better and more efficient scientific knowledge, as well as closer citizen participation in the scientific process.

✿ Openness is also frequently portrayed as *a core value* of modern science, with an almost mandatory appeal to Robert Merton's ethos of science ([Schroeder, 2007](#)). **According to Merton's rule of communism or communalism, “The substantive findings of science are a product of social collaboration and are assigned to the community,” making secrecy “the antithesis of this norm”** ([Merton, 1974](#): 271).

✿ The ideal of Open Science is thus aligned with the traditional scientific ethos, only to be further supported by the ICT revolution. In other words, Open Science policies in the 21st century would instantiate the scientific value of communalism granting access through different types of ICTs, such as open access journals (e.g., PLOS), open electronic archives (e.g., arXiv), collective intelligence projects (e.g., Polymath), public computing projects (e.g., Rosetta@home), citizen science projects (e.g., the Galaxy Zoo Project), collaborative research environments (e.g., Open Science Grid), academic social networks (e.g., ResearchGate and [academica.edu](#)), and social reference managers (e.g., Mendeley and Zotero), among others.

Purpose of the Training Course



- ✿ *"When all researchers are aware of Open Science, and are trained, supported and guided at all career stages to practice Open Science, the potential is there to fundamentally change the way research is performed and disseminated, fostering a scientific ecosystem in which research gains increased visibility, is shared more efficiently, and is performed with enhanced research integrity."* [Open Science Skills Working Group Report](#) Hand Book (2017)
- ✿ Open Science, the movement to make scientific products and processes accessible to and reusable by all, is about culture and knowledge as much as it is about technologies and services. Convincing researchers of the benefits of changing their practices, and equipping them with the skills and knowledge needed to do so, is hence an important task. Hand Book (2017)

Open Science Training Course Development



✿ The eight pillars of Open Science identified by the European Commission* and used by LERU** in their advice paper on Open Science (OS) and the role of universities „A Roadmap of cultural change”:

The Eight Pillars of Open Science

- ▶ 1/ The future of scholarly publishing
- ▶ 2/ FAIR data
- ▶ 3/ The European Open Science Cloud (EOSC)
- ▶ 4/ Education and skills
- ▶ 5/ Rewards and incentives
- ▶ 6/ Next-generation metrics
- ▶ 7/ Research integrity
- ▶ 8/ Citizen science

*Collected from European Commission – Open Science: <https://ec.europa.eu/research/openscience/index.cfm>; last accessed 2 May 2018.

**League of European Research Universities

Open Science Training Course Development



🌐 „An Operational OS Approach” given by FOSTER, which describes the topics of each OS theme in a detailed taxonomy:

<https://www.fosteropenscience.eu/foster-taxonomy/open-science-tools>

🌐 Open Science

🌐 Research Data Management

🌐 Legal Issues

🌐 Text And Data Mining

🌐 TDM Methods

🌐 Research Workflow

🌐 RRI

Structure Proposed for the TrainRDM Toolkit

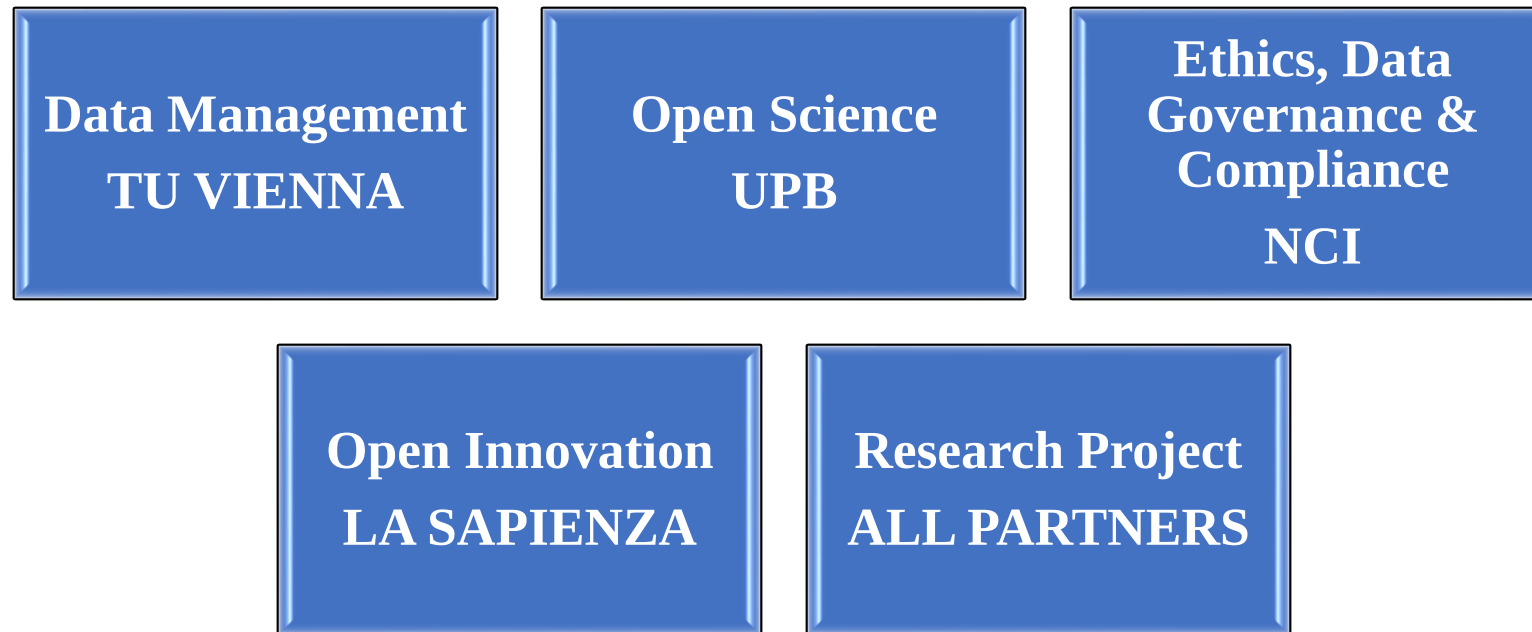


Fig.1. The five pillars of TrainRDM training

Open Science Taxonomy



Open Science

Research Data Management

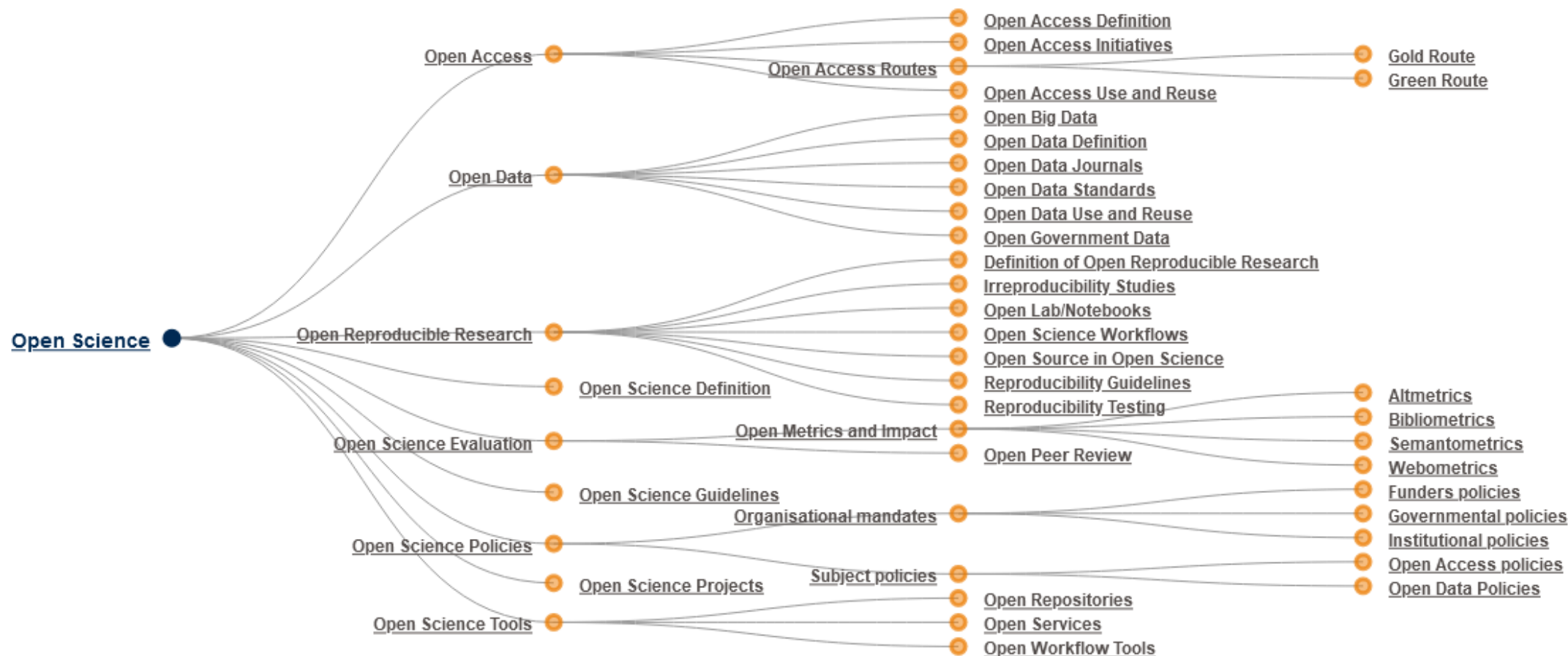
Legal Issues

Text And Data Mining

TDM Methods

Research Workflow

RRI



Organisation of the „Training week for PhD”



This training course is designed in a modular way:

- 🌐 **Day 1 Monday, 27.03.2023** - Open Science Basics. The topics pertaining to Open Science are presented and explained in this part of the course.
- 🌐 **Day 2 Tuesday, 28.03.2023** - Introduction to Semantic Web technologies and practices; Provenance and Auditability; Repositories (InvenioRDM); Research project: Reproducible science using Jupyter Notebooks (intro on tools).
- 🌐 **Day 3 Wednesday, 29.03.2023** - Privacy and Data Protection; Data Governance and Data Management; Fairness, Accountability, and Transparency of Algorithmic Systems; Reproducible science using Jupyter and Binder.
- 🌐 **Day 4 Thursday, 30.03.2023** - Open Innovation for HEIs - How universities can implement and benefit from OI; The exploitation of research results: from patent filing to licensing; Technology Transfer tools: Proof of Concept and entrepreneurial culture; Tools for Open Innovation - Canvas, Theory of Change, PEST model, crowdfunding; Research project: Reproducible science using Jupyter Notebooks.
- 🌐 **Day 5 Friday, 31.03.2023** - TrainRDM Multiplier Events.

Open Access vs Open Research



- 🌐 Open Access (OA) **refers** to all electronic **resources** that are made widely available on the internet without licensing and copyright restrictions. Open Access **resources** can include **articles, journals, books, conference proceedings, theses, videos, music**
- 🌐 Open access (OA) **means the free**, immediate, online availability of research outputs such as **journal articles or books, combined with the rights to use these outputs fully in the digital environment**. OA content is open to all, with no access fees.
- 🌐 **Open research** goes beyond the boundaries of publications to consider all research outputs – from data to code and even open peer review. Making all outputs of research as open and accessible as possible means research can have a greater impact, and help to solve some of the world's greatest challenges.
- 🌐 <https://www.springernature.com/gp/open-research/about/the-fundamentals-of-open-access-and-open-research>

Open Access is More than Free Access



- ✿ When people think about open access (OA), to *knowledge resources* they immediately relate it with **free access**. And yes, free access is an important asset of open access publications.
- ✿ However, there is more to open access, which is especially worthwhile *when you consider to publish open access yourself*. According to the [Open Definition](#) “knowledge is open if anyone **is free to access, use, modify, and share it**”,
- ✿ *3 features of OA has to be highlighted:*
 - ✿ **free access** is an important asset of open access publications
 - ✿ providing **reuse rights** is another important asset of open access and
 - ✿ a third feature of OA is that *the author of an open access publication* **holds copyright** on it instead of transferring all rights to the publisher.

Open Access is More than Free Access



✿ **Keeping copyright** on a publication means that **you** as an author **can do anything with the publication** without having to seek for permissions. You can republish it on a personal website, in a repository, such as [Staff Publications](#), as a chapter in a PhD thesis, use it in a course and distribute it to all course members, or reuse and modify parts of it. However, when **others want to reuse** your paper, **they need to ask your permission, except** when you provided your publication with a *Creative Commons license*.

✿ **Creative Commons licenses give everyone** from individual creators to large institutions **a standardized way to grant the public permission** to use their creative work under copyright law. From the reuser's perspective, the presence of a Creative Commons license on a copyrighted work answers the question, “*What can I do with this work?*”



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- ✿ If you have a choice, it would be to avoid any license with a non-commercial restriction in it, because in practice the term commercial turns about to be very vague and confusing. For scientific articles, it don't see a reason for the clause No Derivatives, unless if you want to be notified and asked for permission when somebody intends to translate your paper. I am in favour of the most open license: **CC BY**, because it allows unrestricted use of the publication in all forms of education including MOOCs.

The Movement Named Open Access

How Can I publish Open Access?



Rationale

-  One of **the most common ways to disseminate research results** is by **writing a manuscript and publishing it in a journal, conference proceedings or book.**
-  However, at the turn of the 21st century a new movement appeared with a clear objective: make all the research results available to the public without any restriction. **This movement took the name of Open Access** and established **two initial strategies** to achieve its final goal:
 -  **The first:** to provide tools and assistance to scholars to deposit their refereed journal articles in open electronic repositories with **the self-archiving** practices: researchers depositing and disseminating papers in institutional or subject based repositories.
 -  **The second:** to launch a new generation of journals using copyright and other tools to ensure permanent open access to all the articles they publish with **the creation of the open access journals** that provide free access to readers and allow reuse of their contents without almost any restriction.

Budapest Open Access Initiative - 2002

How Can I publish Open Access?



- ✿ A new OA approach established in the Budapest Open Access Initiative in 2002: the growth of new methods of dissemination: the publication **of preprints through institutional repositories and preprint servers.**
- ✿ **Preprints** are documents **that have not been peer reviewed** but are considered as a complete scientific publication in a first stage. Some of the preprints servers include open peer review services and the availability to post new versions of the initial paper once reviewed by peers.
- ✿ **Issue:** The choice of a journal *or* a publishing platform may affect the availability and accessibility of the research results. There are several options for researchers when deciding where, when, and how to publish their findings. It is fundamental to know all the implications to avoid future problems.

Open Access „a publishing model for scholarly communication”

The Main Routes



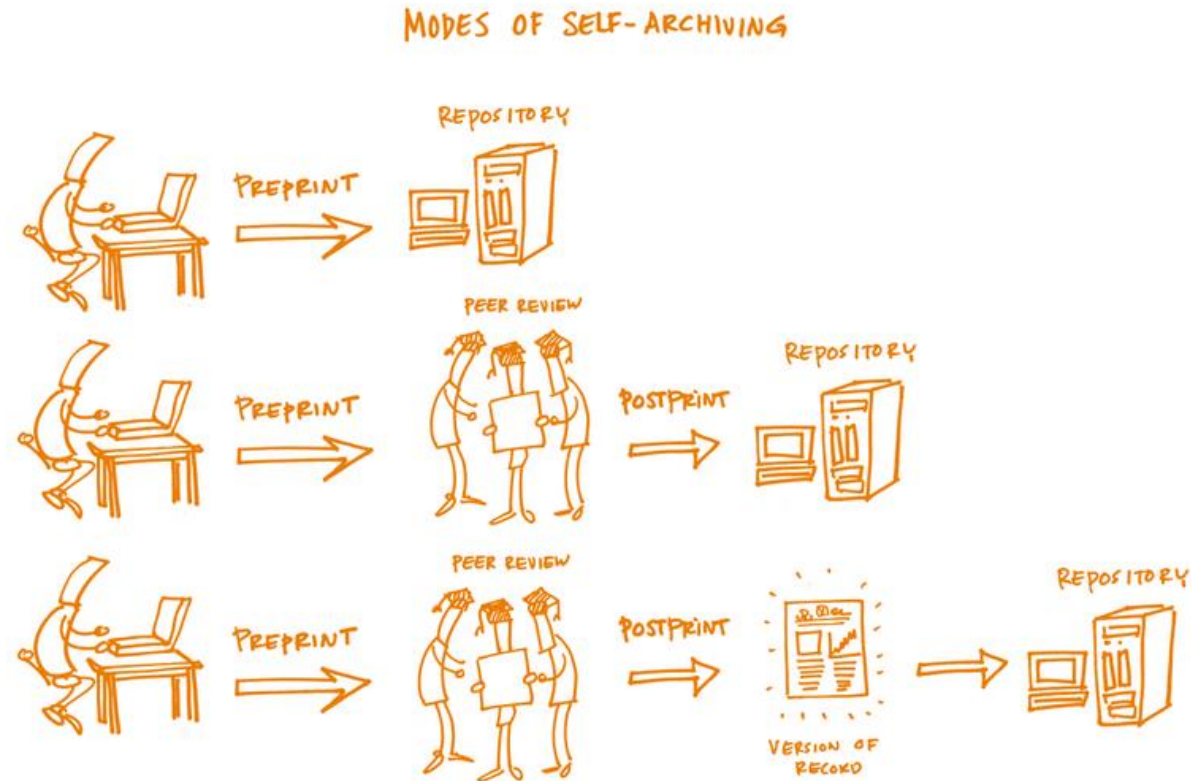
- ✿ Open access *is a publishing model* for scholarly communication that makes research information available to readers at no cost, as opposed **to the traditional subscription model** in which readers have access to scholarly information **by paying a subscription** (usually via libraries). At the very least, the publications (articles and books) **can be read online, downloaded and printed**. Ideally, **additional rights such as the right to copy, distribute, search, link, crawl and mine should also be provided**.
- ✿ Open Access can be realised through two main non-exclusive routes:
- **Green Open Access (self-archiving):** The **published work or the final peer-reviewed manuscript** that has been accepted for publication is made freely and openly accessible by the author, or a representative, in an online repository. Some publishers request that Open Access be granted only after an embargo period has elapsed. This embargo period can last anywhere between several months and several years. For publications that have been deposited in a repository but are under embargo, **usually at least the metadata are openly accessible**.
 - **Gold Open Access (Open Access publishing):** The published work is made available in Open Access mode by the publisher immediately upon publication. **The most common business model is based on one-off payments by authors (commonly called APCs – article processing charges – or BPCs – book processing charges)**. Where Open Access content is combined with content that requires a subscription or purchase, in particular in the context of journals, conference proceedings and edited volumes, this is called hybrid Open Access.

Repositories and Self-archiving



- ✿ More than 4600 repositories are available for researchers to self-archive their publications according to the Registry of Open Access Repositories.
1. These are: **institutional repositories or CRIS**, subject based or thematic repositories and harvester. Repositories have always been seen as an alternative way to access to scientific publications when accessing to the original source is not affordable. Currently there are tools like the Unpaywall browser extension that facilitates this alternative.
- ✿ The journal policy regarding **the transfer of copyright** and some **uses already granted** has to be known when choosing a journal to publish research results. Among those granted uses it can find teaching purposes, sharing with colleagues, and especially **how researchers can self-archive their papers in repositories**.
- ✿ When looking at the self-archiving conditions it must identify two key issues: ***the version of the paper*** that can be deposited and ***when it can be publicly available***.
- ✿ The journal can allow for the submitted version, **also known as preprint**, to be disseminated, and also its replacement for a reviewed version once the final paper has been published. Due to the increase of policies requiring access to research results, most of the journals allow to deposit **the accepted version** of the paper, also known as the **author manuscript or postprint**. The postprint is the final text once the peer review process has ended but it has not the final layout of the publication. Finally some journals allow researchers to deposit the final published version, also known as the **Version of Record**.

Repositories and Self-archiving



Repositories and Self-archiving



🌟 Self-archiving and requirements established by publishers

- 🌟 In relation to the moment to make the paper publicly available, many journals establish a period of time from its original publication: the embargo period, which can range from zero to 60 months. Some journals include or exclude embargoes depending on the versions. For instance the accepted version could be made publicly available after publication but the published version must wait 12 months.
- 🌟 Regarding self archiving, researchers are confused by the different requirements established by the publishers in relation with version of a paper that they can deposit in a repository and when this version can be available to the public. This delay in allowing public access to the full text is often called embargo period and it is not uniform for all the journals. Institutions who provide a repository for its researchers should facilitate self archiving practices by digesting all those publisher requirements.

Open access publishing



Journals

-  The number of Open Access Journals has increased during the last years becoming a real option for researchers when deciding where to publish their findings. According to the Directory of Open Access Journals ([DOAJ](https://doaj.org)), currently there are 19.121 journals out of which 13.091 journals without APCs (**article processing charges**)
-  Nevertheless is important to remark that an **open access journal must provide** free access to its contents but it also must license them to allow reusability. Although **the definition of an open access journal *does not include any condition about the business model***, there is a fact that those journals are commonly known as **journal where you have to pay to publish**.
-  Currently many **paywalled journals** offer individual open access options to researchers once the paper is accepted after peer review. Those options include the publication under a free content license and free accessibility to anyone since its first publication. This model is commonly known as the hybrid model because in the same issue of a journal, readers can find open access and paywalled contributions. Usually publishers ask for a fee to open individual contributions. Free content license and free accessibility to anyone since its first publication.

Open Access Publishing



Books

 Some disciplines prefer to use other formats than journals to publish results, for instance books. Initially, publishers were very reluctant to allow researchers to self archive a full book or even a book chapter. However, [some publishers](#) have begun to adopt policies to facilitate it. On the other hand, some university presses have shifted their publication model to open access to increase the visibility of their contents, especially *monographs*. This change can be explained as an answer to the cuts in some of the expenditures in monographs due to the restrictions in library budgets. A common model for this open access university presses is to provide a free version in PDF and sell paper or e-pub versions (see for instance UCL). Moreover, the creation of the [Directory of Open Access Books](#) have increased their discoverability. In a similar way than other journal initiatives, there have appeared some projects to join forces to establish a common fund to build open access monographs, for instance [Knowledge Unlatched](#).

Types of Open Access



 <https://oaaustralasia.org/2021/05/25/what-are-the-different-types-of-open-access/>

 <https://peerj.com/articles/4375/>

A. Self achieving

- Repository-based or “Green” open access(self-archiving)

B. Open Access Publishing

- Journal-based or “Gold” Open Access. (Open Access publishing):
- “Diamond” Open access. ...
- “Hybrid” open access. ...
- “Bronze” open access. ...
- “Black” open access. ...

Defining Open Access for Journals



- ✿ A truly Open Access article is an immediately free, online article with reuse rights. However, between open and closed access papers, a whole range of articles exist with different degrees of openness.
- ✿ Open Access shifts the costs of publishing so that readers, practitioners and researchers obtain content at no cost.
- ✿ Open Access encompasses a range of components such as readership, reuse, copyright, posting, and machine readability. **Journals can be more open or less open**, but their degree of openness is intrinsically independent from their:

Impact

Prestige

Quality of Peer
Review

Peer Review
Methodology

Sustainability

Effect on Tenure
& Promotion

Article Quality

- ✿ For these reasons and funding agencies have adopted many different policies, some of which are more open and some less open
- ✿ For a concise overview of all the shades of open access, I recommend the guide [HowOpenIsIt?](#) (PLoS/SPARC, 2014). This guide will help you move beyond the seemingly simply question, “Is this journal Open Access?” and toward a more productive alternative, „How OpenISIT”

Open Access rights for Journals



ACCESS	READER RIGHTS	REUSE RIGHTS	COPYRIGHTS	AUTHOR POSTING RIGHTS	AUTOMATIC POSTING	MACHINE READABILITY	ACCESS
 OPEN ACCESS 	Free readership rights to all articles immediately upon publication	Generous reuse & remixing rights (e.g., CC BY license)	Author holds copyright with no restrictions	Author may post any version to any repository or website with no delay	Journals make copies of all articles automatically available in trusted third-party repositories (e.g., PubMed Central, OpenAire, institutional) immediately upon publication	Article full text, metadata, supporting data (including format and semantic markup) & citations may be accessed via API, with instructions publicly posted	 OPEN ACCESS 
	Free readership rights to all articles after an embargo of no more than 6 months	Reuse, remixing, & further building upon the work subject to certain restrictions & conditions (e.g., CC BY-NC & CC BY-SA licenses)	Author retains/publisher grants broad rights, including author reuse (e.g., of figures in presentations/teaching, creation of derivatives) and authorization rights (for others to use)	Author may post some version (determined by publisher) to any repository or website with no delay	Journals make copies of all articles automatically available in trusted third-party repositories (e.g., PubMed Central, OpenAire, institutional) within 6 months	Article full text, metadata, & citations may be accessed via API, with instructions publicly posted	
	Free readership rights to all articles after an embargo greater than 6 months	Reuse (no remixing or further building upon the work) subject to certain restrictions and conditions (e.g., CC BY-ND license)	_____	Author may post some version (determined by publisher) to any repository or website with some delay (determined by the publisher)	Journals make copies of all articles automatically available in trusted third-party repositories (e.g., PubMed Central, OpenAire, institutional) within 12 months	Article full text, metadata, & citations may be crawled without special permission or registration, with instructions publicly posted	
	Free and immediate readership rights to some, but not all, articles (including "hybrid" models)	Some reuse rights beyond fair use for some, but not all, articles (including "hybrid models")	Author retains/publisher grants limited rights for author reuse (e.g., of figures in presentations/teaching, creation of derivatives)	Author may post some version (determined by publisher) to certain repositories or websites, with or without delays	Journals make copies of some, but not all, articles automatically available in trusted third-party repositories (e.g., PubMed Central, OpenAire, institutional) within 12 months	Article full text, metadata, & citations may be crawled with permission, with instructions publicly posted	
	Subscription, membership, pay-per-view, or other fees required to read all articles	No reuse rights beyond fair use/dealing or other limitations or exceptions to copyright (All Rights Reserved)	Publisher holds copyright, with no author reuse beyond fair use	Author may not deposit any versions to any repositories or websites at any time	No automatic posting in third-party repositories	No full text articles available for crawling	
 CLOSED ACCESS 						HowOpenIsIt?	 CLOSED ACCESS 

https://www.plos.org/files/HowOpenIsIt_English.pdf

Categories of OA Publishing Deals



- ✿ **Transformative agreements** - attempt to shift our spending on scholarly resources away from a subscription model of access towards open access publishing. Other names for them are read-and-publish deals, publish-and-read deals or transitional agreements
- ✿ **Read-and-publish deal** - the publisher is paid so that one can read their articles and publish articles in their journals. Publishing costs are brought together in a single contract, which means authors don't have to pay article processing charges (APCs) in an ad hoc manner when choosing to publish open access
- ✿ **Publish and read** deals - we pay the publisher to publish articles with them, and access to articles is included in that cost
- ✿ **repository-based or “green” OA**- when the author accepted version of a published work is deposited into a subject-based repository or an institutional repository
- ✿ **journal-based or “gold” open access** - refers to publishing in a fully open access scholarly journal, one where the publisher of the journal provides free and immediate online access to the full content of the journal and the final published versions of articles in that journal are fully open access
- ✿ **“diamond” open access** – refers to open access journals that are free for readers to access and for authors to publish in. These journals are often community-driven and supported by institutions or by national or regional infrastructure
- ✿ **hybrid open access** - an article processing charge is paid for an individual journal article to be made open access in an otherwise subscription journal. This type of open access always has an APC associated with it and these APCs are usually higher than for fully open access journals. Universities and research-performing organizations are their own policy regarding Hybrid open access, they may not be in favour or supportive of such an open access
- ✿ **“bronze” open access** - refers to a freely available journal article that has no open license (and hence cannot be considered fully open access)
- ✿ **“black open access”** - illegal open access

Thank you for your attention!