OPEN SCIENCE

A Guide for NOVA Researchers

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Table of Contents

Introduction

NOVA University Lisbon is committed to advancing science and the widespread dissemination of knowledge for the benefit of society, through the adoption of open, equitable, reproducible, and responsible research practices.

NOVA recognizes Open Science as a guiding paradigm and aims to promote it by supporting research processes and tools that lead to transparency, integrity, collaboration, inclusivity, and sustainability; promoting new working methods and new social partnerships; encouraging the free dissemination of knowledge and the accessibility and reuse of research results, stimulating open access to publications and data; supporting open participation and dialogue with civil society and other knowledge systems; and building the necessary infrastructures, skills, and incentives for Open Science.

This guide is aimed at researchers across all disciplines from NOVA University Lisbon, providing support through each stage of their research process, offering tools and practices in each chapter. From foundational principles on open-access publishing (chapter 2) to guidance on open research data (chapter 3), software (chapter 4) and citizen science (chapter 5), this document is here to help you navigate key concepts and best practices in Open Science.

With this guide, NOVA seeks to be aligned with the "UNESCO Recommendation on Open Science" the Portuguese Science Law DL-63/2019 of May 16, and with the recommendations and guidelines of the European Commission (EC), the Portuguese Foundation for Science and Technology (FCT), Science Europe, the European University Association (EUA), Coalition for the Advancement of Open Science (COARA), and Young European Research Universities Network (YERUN).

We hope these guidelines inspire and support you in practicing Open Science by sharing different aspects of your research with a wider audience.

Main Guiding Principles

NOVA is committed to implementing the values and principles of Open Science by:

- Normalizing the practice of open, immediate access without embargo periods or other restrictions on accessing scientific publications (unless otherwise required to protect intellectual property rights) and, whenever possible, data and other research results funded by public funds;

- Adopting the FAIR (Findable, Accessible, Interoperable, Reusable) and CARE (Collective benefit, Authority to control, Responsibility, Ethics) principles in scientific information management;

- Supporting open and transparent research practices;

- Promoting knowledge preservation to support its reuse and reproducibility;

- Generalizing the use of open licenses and encouraging copyright retention strategies;

- Encouraging the involvement of civil society, notably through citizen science;

- Creating and promoting the use of open educational resources;

- Building, maintaining and using the necessary infrastructures to support open science;

- Promoting literacy, skills, and developing incentives to support open science practices.
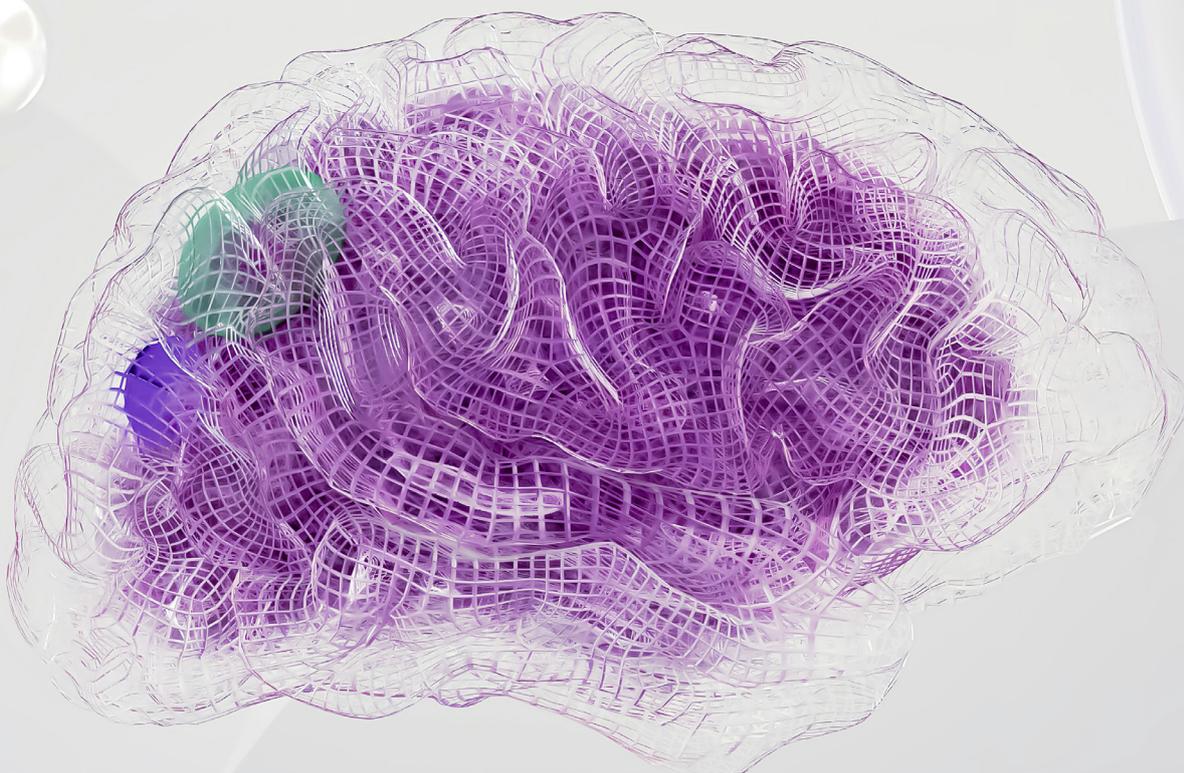
01 OPEN SCIENCE

What is Open Science?

Open Science is an umbrella term encompassing a range of movements and practices that strive to make all forms of scientific research - such as publications, data and tools - accessible at any stage of the research process.

According to the European Commission:

"Open Science consists in the sharing of knowledge, data and tools as early as possible in the Research and Innovation (R&I) process, in open collaboration with all relevant knowledge actors, including academia, industry, public authorities, end users, citizens and society at large. Open science has the potential to increase the quality, efficiency and impact of R&I, lead to greater responsiveness to societal challenges, and increase trust of society in the science system."[1]

Image adapted from UNESCO, Digital Library. *Towards a UNESCO recommendation on open science: building a global consensus on open science*

Open Source
Open Access
Open Infrastructures
Open Hardware
Open Educational Resources
Open Evaluation
Open Data
Citizen Science
Open Labs
Open Inovation
Open Notebook
CrowdFunding

Other authors mention that:

"Open Science is about increased rigour, accountability, and reproducibility for research. It is based on the principles of inclusion, fairness, equity, and sharing, and ultimately seeks to change the way research is done, who is involved and how it is valued. It aims to make research more open to participation, review/refutation, improvement and (re)use for the world to benefit."[2]

[1] European Commission, Directorate-General for Research and Innovation, *Horizon Europe, open science − Early knowledge and data sharing, and open collaboration*, Publications Office of the European Union, 2021 available at https://data.europa.eu/doi/10.2777/18252
[2] Bezjak et al. *The Open Science Training Handbook*, 2018 available at https://open-science-training-handbook.gitbook.io/book

Why is Open Science Important?

Open Science allows you to benefit from scientific findings. Sharing scientific results openly increases collaboration and the quality of research, leading to innovation and more transparent and efficient processes.

Open Science offers substantial benefits including[3]:

- Increased **impact** associated with wider sharing and reuse (e.g., the so-called "open access **citation advantage**").

- Maximize **reuse** while allowing the creator to retain ownership and receive credit for their work.

- **Public disclosure and engagement**: science should be open for the whole society, so it may promote awareness among citizens. It evidences the outcomes of public funded research, and would help to build trust and support for public policies and investments.

- **Innovation and knowledge transfer**: Open Science reduces delays in the reuse of the results of scientific research, promoting research innovation, new products and services.

- **Efficiency**: greater access to scientific inputs and outputs improve the effectiveness and productivity of the research system;

- **Quality and integrity**: open access to scientific publications, data and other assets that support the research process offer the opportunity of a wider evaluation and scrutiny by the scientific community and facilitates an early identification of any malpractice;

- **Economic benefits**: increased access to research results can foster spill overs not only to scientific systems but also innovation systems more broadly, as well as increase awareness and conscious choices among consumers.

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[3] Adapted from Bezjak et al. *The Open Science Training Handbook*, 2018 available at https://open-science-training-handbook.gitbook.io/book

FAIR Principles

FAIR principles have been developed to enhance the quality of scientific and scholarly research data. They were first published in 2016 and accordingly, the data should be **Findable**, **Accessible**, **Interoperable** and **Reusable**.

This refers to three types of entities: data (or any digital object), metadata (information about that digital object), and infrastructure. By following Findable, Accessible, Interoperable and Reusable (FAIR) principles researchers implement interoperability and increase the impact and reliability of their research. You can use the tool FAIR-Aware to ensure your research data follows the FAIR principles.

When implementing FAIR data principles, it is often said that the data should be **as open as possible, and as closed as necessary**. It means that access to scientific knowledge should be as open as possible, but sometimes access may need to be restricted, for example to protect human rights, confidentiality, intellectual property rights, personal information, threatened or endangered species, and sacred and secret indigenous knowledge. Open science encourages scientists to develop tools and methods for managing data so that as much data as possible can be shared, as appropriate.[4]

"As Open as possible, as closed as necessary"

In order to make research replicable, or at least reproducible or reusable in any other way, the best practice recommendation for research data is to be as **open** and **FAIR** as possible, while accounting for **ethical**, **commercial** and **privacy** constraints with personal and non-personal sensitive data or proprietary data.

FINDABLE
- (Meta)data are assigned a globally unique and persistent identifier
- Data are described with rich metadata
- Metadata clearly and explicitly include in the identifier of the data it describes
- (Meta)data are registered or indexed in a searchable resource

ACCESSIBLE
- (Meta)data are retrievable by their identifier using a standardized protocol
- The protocol is open, free and universal
- The protocol allows for authentication and authorization, as needed
- Metadata are accessible, even when the data are no longer available

INTEROPERABLE
- (Meta)data use a formal, accessible, shared and broadly applicable language
- (Meta)data use vocabularies that follow FAIR principles
- (Meta)data include qualified references to other (meta)data

REUSABLE
- (Meta)data are richly described with a plurality of accurate and relevant attributes
- (Meta)data are released with a clear and accessible data usage license
- (Meta)data are associated with a detailed provenance
- (Meta)data moot domain relevant community standards

Cambridge Crystallographic Data Centre (CCDC), FAIR Data Principles available here.

The European Commission perspective:

Results and data may be kept closed if making them public in open access is against the researcher's legitimate interests. Examples include to commercially exploit their research results, or if it is against any obligations mentioned in the Grant Agreement (e.g. personal data protection).

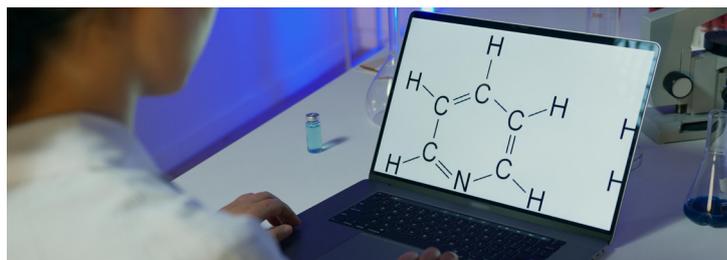Note that a publication made available as open access may also have, for example, the method described protected by a patent and/or design rights, and software code protected by copyright, i.e., **open science and intellectual property rights are not contradictory or incompatible as outlined by the EC.**[5]

Open Science > Useful tools and international Guidelines

- **Plan S**
https://www.coalition-s.org
- **UNESCO Open Science Toolkit**
https://unesdoc.unesco.org/ark:/48223/pf0000387983
- **EOSC European Open Science Cloud**
https://open-science-cloud.ec.europa.eu
- **Open Science Practice Corner**
https://www.openaire.eu/open-science-corner
- **OpenAIRE Guides for researchers**
https://www.openaire.eu/guides
- **Open Science Taxonomy**
https://doi.org/10.6084/m9.figshare.1508606.v3
- **The Open Science Training Handbook**
https://open-science-training-handbook.gitbook.io/book
- **License Chooser**
https://chooser-beta.creativecommons.org/

Towards Open Science > Checklist for NOVA Researchers

- Meet the Open Science requirements of your research funding agency.
- Create an ORCID ID (https://orcid.org/) for a free, unique, persistent identifier to use in your research.
- Assign a Digital Object Identifier (DOI) to all you research outputs (NOVA benefits from an FCT sponsored Datacite subscription for DOI minting. Check instructions at NOVA website (https://www.unl.pt/gestao-de-informacao-cientifica/) and contact your research support service or librarian for more information).
- Get an overview of journals, books or platforms that allow you to publish your research in Open Access (see Chapter 2).
- Check publishing agreement and copyright transfer agreement to protect intellectual property rights.
- Upload your research outputs once in PURE and take advantage of a connector with the institutional repository (RUN) and ORCID to guarantee the multiple reuse of information.
- Make your research data available in a data Repository (see Chapter 3).

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[5] European Union Publications Office of the European Union available at https://op.europa.eu/en/publication-detail/-/publication/42d27e04-b715-11ec-b6f4-01aa75e-d71a1/language-en

Creative Commons Licenses

For Open Science it is important to understand how to use licenses.

A license tells researchers what they can and cannot do with their research outputs. There are specific licenses known as Creative Commons for software, data and publications.

Creative Commons Licenses (CC)[6] are legal tools that creators and other rights holders can use to grant certain usage rights to the public, while reserving other rights. CC licenses are written as an agreement between the author and the general public, making usability and shareability the default – rather than restricting use. Like traditional licenses, they are designed to offer authors and creators legal standing from which to protect their intellectual property and act against those who use it improperly.

Creative Commons include six different licenses and one public domain dedication tool. It is important to specify which one of the seven legal tools you are applying to your research output. Along the document, you will find advice on what license(s) to choose for your research data and publications.

USEFUL TOOLS

Creative Commons (CC) licenses are often used for publications. You can usually find a CC license in the form of an emblem in the colophon, somewhere on the first or last pages of the publication, or in the readme.txt that accompanies a file, piece of software, or a document. They look like this:

0 - Available in the public domain without any restrictions (**Zero**)

BY - Credit must be given to the creator. This is part of all the licenses below. (**BY** whom was it made?)

SA - Adaptations must be shared under the same terms (**S**hare **A**like)

NC - Only non-commercial uses of the work are permitted (**N**on--**C**ommercial)

NO - No derivatives or adaptations of the work are permitted (**N**o **D**erivatives)

Combinations an, also possible:

Credit must be given to the creator, only non-commercial uses of the work are permitted, and adaptations must be shared under the same terms.

This license only allows reusers to copy and distribute the material in any medium or format in unadapted form and for non-commercial purposes.

Creative Commons has developed a tool to help you choose a license.

COPY & PUBLISH	ATTRI-BUTION REQUIRED	COMERCIAL USE	MODIFY & ADAPT	CHANGE LICENSE		CREATIVE COMMONS LICENSES
✓	✗	✓	✓	✓		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, com-muicate, etc.)

You have to attribute the original work

You can use the work co-mercially

You can modify and adapt the original work

You can choose license type for your adaptations of the work

✗ Not applicable under this license

Image adapted from FOTER

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[6] *Creative Commons (CC)* available at https://creativecommons.org/

OPEN ACCESS TO PUBLICATIONS 02

What is Open Access to Publications?

Open Access to publications means that research outputs can be accessed online, free of charge by any user, with no technical obstacles (such as mandatory registration, the use of proprietary software or login to specific platforms).

"By 'open access' to the literature, we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself."[7]

Following the policies of the European Commission (EC) and the Portuguese Foundation for Science and Technology (FCT), NOVA strongly encourages researchers to publish in Open Access.

All researchers with ongoing projects funded by EC and FCT must comply with the mandatory principles contracted in the grant agreement.

NOVA aims to be aligned with the principles of the international cOAlition S (check highlight), with the goal of guaranteeing that all future publications must be available in Open Access immediately upon publication.

Coalition and Plan S

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

The Portuguese Foundation for Science and Technology (FCT) also adopted Plan S, promoted by cOAlition S.

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[7] *Budapest Open Access Initiative (BOAI)* available at https://www.budapestopenaccessinitiative.org/read/

How to Start?

The greatest benefit of publishing OA is that anyone can read for free, share and reuse your research outputs, maximizing visibility and impact of your work, paving the way for new research opportunities and collaborative work.

Please check the section "**Share and preserve**" to get insights on how to share your research outputs and the different possibilities regarding different document versions, in order to successfully publish your work in OA.

CHOOSE A JOURNAL

There is a wide variety of Open Access journals in all areas of Science. This means that any work published in those journals has immediate free access.
You can browse the Directory of Open Access Journals (DOAJ): https://doaj.org/.
In this database you can find a variety of information for Open Access Journals, including costs and Licenses used.

CHOOSE A BOOK PUBLISHER

You can browse the Directory of Open Access Books (DOAB). Among non-Open Access journals, several have hybrid options that might comply with some Open Science obligations (see CHOOSE AN OPEN ACCESS PUBLICATION ROUTE). When choosing a journal you should consider the transformative agreements already negotiated by the Portuguese Foundation for Science and Technology (FCT) at national level or other agreements in place negotiated by NOVA (Transformative agreements). **These agreements can help you reduce your publication costs**.

b-on biblioteca do conhecimento online

Transformative Agreements (Foundation for Science and Technology)

- You can take advantage of the national strategy to encourage subscription publishers to transition to Open Access;

- In Portugal, it is possible to publish articles in open access under the b-on agreements for free or at lower rates;

- In particular with these agreements researchers can publish in open access journals at a discount or in hybrid journals with no Article Processing Charges (APC's);

- Check the b-on webpage below to have access to the most up to date information on the status of each agreement: https://www.b-on.pt/en/openaccess/

Share and Preserve

There are different versions of a research output that can be published OA, from the manuscript submitted to a journal, to the final editor's version.

If working on a draft, consider sharing a **Preprint** at submission. A **Preprint** (or **Submitted Manuscript**) is a preliminary version of a research paper that is shared publicly before it has been peer reviewed. Most Preprints are given a digital object identifier (DOI) so they can be cited in other research papers guaranteeing credit, feedback, and visibility to the author (Check the box on the right for the Advantages of preprint publishing).

Preprints do not guarantee OA, but help establish priority of results and increase the impact and citation count of a later peer-reviewed article.

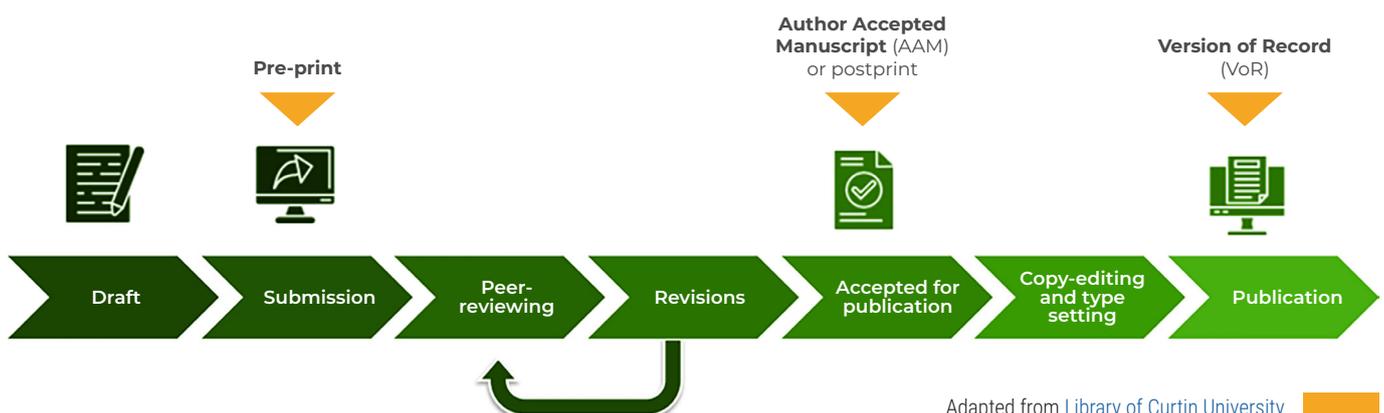For a comprehensive list of the most adequate Preprint servers for your scientific area, please check

the Directory of Open Access Preprint Repositories.

Especially when publishing in non-Open Access journals, it is important to make available in Open Access a copy as close as possible to the final manuscript. As it will be clarified in the next section the **Author Accepted Manuscript (AAM) can, in some cases, be legally made available in Open Access**.

In either case you have to deposit your research output in PURE, as soon as possible and at the latest upon publication, then the publication's metadata and file will be available at NOVA Research Portal and at the University Institutional Repository RUN. The AAM, or the VoR (Version of Record - the final copyedited and formatted version) can be used for those purposes.

Advantages of Preprint Publishing

- Rapid dissemination of research: makes research available and speeds up scientific communication.

- Early feedback: enables researchers to receive feedback from the community before formal peer review.

- Enhances transparency: allows the public and other researchers to see research results earlier, fostering a more transparent research process.

- Establishes priority: helps researchers establish priority for their discoveries, which can be important in competitive fields.

- Promotes collaboration: exposes research early, increasing collaboration and networking.

- Increases visibility and citations: preprints often gain attention and citations earlier, enhancing the researcher's visibility and impact.

- Flexible publishing options: researchers can submit to traditional journals or choose alternative publishing routes.

Pre-print

Author Accepted Manuscript (AAM) or postprint

Version of Record (VoR)

Draft → Submission → Peer-reviewing → Revisions → Accepted for publication → Copy-editing and type setting → Publication

Adapted from Library of Curtin University
Icons from manshagraphics on Flaticon

Choose a License

Each journal has its own licensing policies. The rights granted to your work should be explicit and should guarantee Open Access for the AAM or the VoR in order to comply with the requirements of most funding agencies and NOVA's and EU's guidelines. For example, for Open Access journals, this information can be found at https://doaj.org/. When the rights are omitted, you must formally request for that information. (Check Chapter 1 Open Science: Licenses)

Rights Retention Strategy

Before their works are published, authors tend to retain copyright, as per NOVA's IP Policy (Regulation no. 1104/2020, published in *Diário da República*, 2nd Series, December 22). However, upon acceptance, numerous publishers request authors to transfer these rights, imposing restrictions on how authors can utilize their research findings, such as making articles Open Access. To address this issue, a Rights Retention Strategy enables authors to uphold compliance with their funders' open access mandates.

- Authors must **retain sufficient intellectual property rights** to comply with the Open Access requirements

- Authors must ensure **Open Access to the Author Accepted Manuscripts (AAMs) or the Version of Record (VoR)** of research articles, at the time of publication. All research articles must be made available under a **Creative Commons Attribution "CC BY" license or equivalent**".

You can search for the license policy at the journal webpage or, for OA jounals, check at https://doaj.org/. You can also use the JISC Open Policy Finder (https://openpolicyfinder.jisc.ac.uk/). For a direct answer on compliance of a given journal with the funder OA policy you can use the the **journal checker tool**: https://journalcheckertool.org/.

Choose an Open Access Publication Route

There are two main non-exclusive routes to make research outputs openly accessible:

Gold OA involves publishing articles or books on a publisher's platform, freely and permanently accessible to everyone, immediately after publication, with publication processing charges involved (APCs – article processing charges, or BPCs – book processing charges). Articles published via gold OA can be published in either fully OA journals (where all content is published in OA) or in hybrid journals (a subscription-based journal with OA options).

Keep in mind that APCs of articles published in hybrid journals are not eligible for reimbursement in EC funded projects[8].
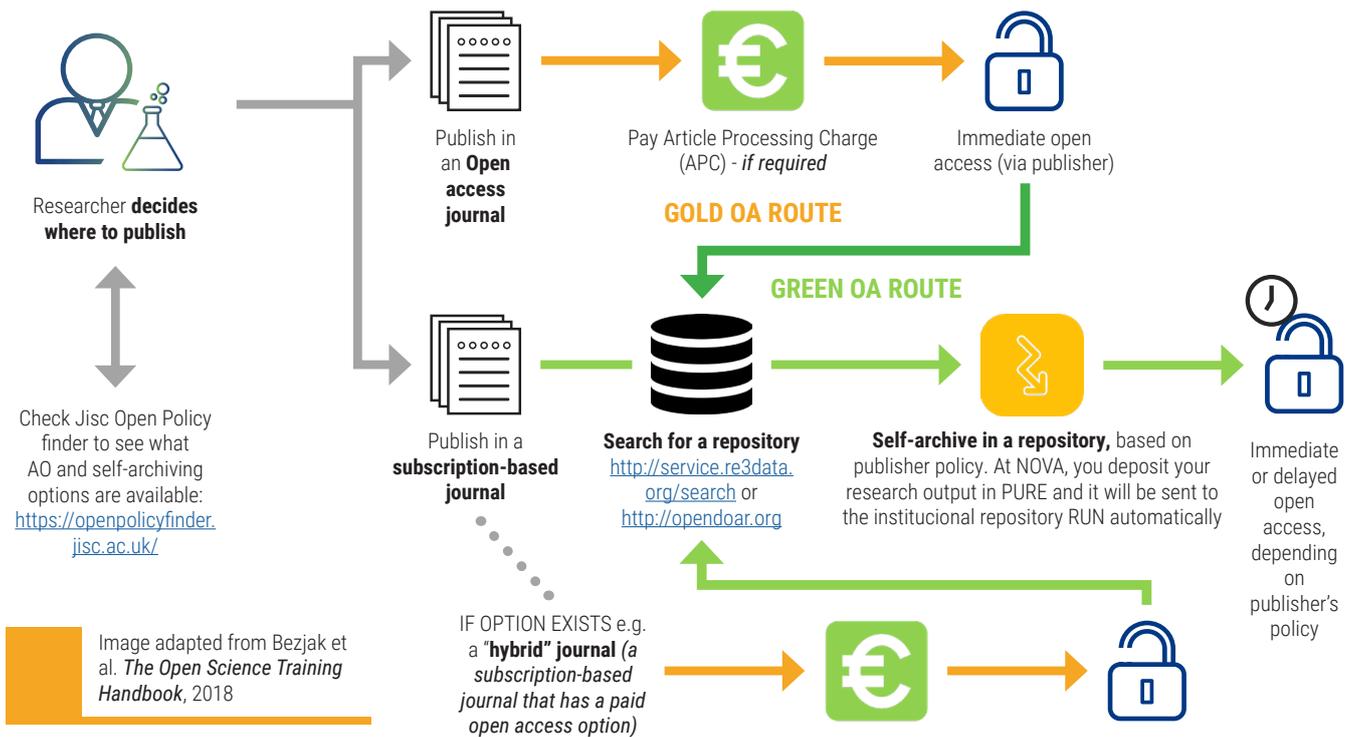
With the support of b-on, researchers in Portugal can publish in open access journals with discount or in hybrid journals with no APCs (check the transformative agreements box).

Green OA, involves self-archiving a version of the manuscript in an institutional or thematic repository. Depending on the journal and the version of the manuscript, the content can be made available immediately in OA or with an embargo period. Please be aware that an embargo period is not accepted for outputs of EU-funded projects and it is also not accepted according to the FCT policy document that was under discussion in 2023.

There is also another alternative route, **Diamond OA**, that refers to a scholarly publication model in which OA journals and platforms **do not charge fees to either authors or readers**.

For a list of Diamond OA publishers in your scientific area, please check the Directory of Open Access Journals (DOAJ).

Researcher **decides where to publish**

Check Jisc Open Policy finder to see what AO and self-archiving options are available: https://openpolicyfinder.jisc.ac.uk/

Publish in an **Open access journal**

Pay Article Processing Charge (APC) - *if required*

Immediate open access (via publisher)

GOLD OA ROUTE

GREEN OA ROUTE

Publish in a **subscription-based journal**

Search for a repository http://service.re3data.org/search or http://opendoar.org

Self-archive in a repository, based on publisher policy. At NOVA, you deposit your research output in PURE and it will be sent to the institucional repository RUN automatically

Immediate or delayed open access, depending on publisher's policy

IF OPTION EXISTS e.g. a "**hybrid"** journal *(a subscription-based journal that has a paid open access option)*

Image adapted from Bezjak et al. *The Open Science Training Handbook*, 2018

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8 European Commission, *Open science* available at https://rea.ec.europa.eu/open-science_en

Funders publishing platforms

PURE is NOVA's Current Research Information System (CRIS). Information held in PURE relates to research staff and their publications and activities information. The system allows for relationships and associations to be created between research inputs and outputs, providing a broad picture of research activity at individual, department, research unit, academic unit and University levels.

RUN - Repository of NOVA University stores, manages, and gives access to the university's intellectual output. All authors retain their rights and all works are available under a Creative Commons License.

RCAAP - «Repositórios Científicos de Acesso Aberto de Portugal» is a portal that aims to collect, aggregate and index Open Access scientific contents from Portuguese institutional repositories, such as RUN.

OpenAIRE - Open Access Infrastructure for Research in Europe is a network for Open Access repositories, such as RCAAP; archives and journals that are aligned with Open Access policies.

The drawback of APC-based publishing is that it gave rise to predatory publishers that are more interested in making money than in offering a sound peer-review process. When you consider publishing in an OA journal, always check if it is an authentic outlet for scholarly publishing. To check the trustworthiness of a journal, you can use the tool Think. Check. Submit.[9] You can always contact your School Library to help you out.

Self-archive

For long-term preservation purposes the European Commission (EC) and the Portuguese Foundation for Science and Technology (FCT) require self-archiving (by the author or a representative)

publications in a thematic or institutional repository (Green OA), such as RUN at NOVA. Before self-archiving your publications, check the journals copyright policies according to the box **Rights Retention Strategy**.

For more information on the self-archive workflow at NOVA illustrated below please visit: https://www.unl.pt/gestao-de-informacao-cientifica/

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9 *Think, Check, Submit: Identify trusted publishers for your research available* at https://thinkchecksubmit.org/

Open Access to Publications > Useful tools

- **DOAJ. Directory of Open Access Journals**
  https://doaj.org/
- **DOAB. Directory of Open Access Books**
  https://www.doabooks.org/
- **Journal Checker Tool**
  https://journalcheckertool.org/
- **JISC, Open Policy Finder**
  https://openpolicyfinder.jisc.ac.uk/
- **Open Access Books Toolkit**
  https://oabooks-toolkit.org/article/12789105-who-is-responsible-for-this-toolkit
- **B-on Transformative Agreements**
  https://www.b-on.pt/acesso-aberto/
- **Open Research Europe. Open access publishing venue for European Commission-funded researchers**
  https://open-research-europe.ec.europa.eu/
- **OAPEN. Online Library of open access books**
  https://www.oapen.org/
- **RUN**
  http://run.unl.pt
- **RCAAP. Repositórios Científicos de Acesso Aberto de Portugal**
  https://www.rcaap.pt/

Some Open Access Publishing FAQs

What is Green Open Access?
Making closed (traditional, non-OA) publications openly available in a repository is called Green Open Access. To achieve green Open Access, you should upload your accepted manuscript to the web and make this file available for download. This enables you to publish in a traditional journal while making your research more open by providing an additional, free route for users to discover and read the article. This is possible if you deposit your accepted (peer-reviewed) manuscript rather than the final, published version of the article.

Institutional repositories such as RUN facilitate green Open Access by giving researchers a place to upload their research. Temporary embargoes may apply, where the publisher asks for access to be restricted for a fixed time after the date of publication. It is possible to apply these restrictions in RUN. However, be aware that an embargo period is not accepted for outputs of EU-funded projects and it is also not accepted according to the FCT policy document that was under discussion in 2023.

How do I deposit in RUN?
Pure is the mandatory central source of research outputs at Nova University Lisbon. Uploading your work in Pure informs other systems at the University, including RUN, about your activity without the need to duplicate information. Guidance on depositing to Pure is available here: https://www.unl.pt/gestao-de-informacao-cientifica/.

What is Gold Open Access?
This is a way of making the version of record, the article as it appears on a journal's webpage,

freely available from the point of publication. Some journals make all their content freely available, while others offer a hybrid publication model, making some articles freely available to any user and others only available to subscribers. As there are no subscription or access fees, the cost of publication may be met by the publisher, particularly in the case of journals published by Universities or learning societies, or by the author. This fee, which varies across journals, is known as an article processing charge (APC) and is usually paid by the author's institution or research funder.

What is Hybrid OA?

Hybrid open access journals contain a mix of open access articles and closed access articles. A publisher following this model is partially funded by subscriptions and only provides open access for those individual articles for which the authors (or research sponsor) pay a publication fee (APC). Keep in mind that APCs of articles published in hybrid journals are not eligible for reimbursement in EC funded projects.

What is Diamond OA?

Journals that publish open access without charging authors article processing charges are sometimes referred to as diamond or platinum OA. Since they do not charge either readers or authors directly, such publishers often require funding from external sources such as academic institutions, learned societies, philanthropists or government grants.

What about Open Access Monographs?

Although the dominant type of scientific publication is the journal article, Grant beneficiaries must provide open access to other types of scientific publications including monographs, books, conference proceedings, grey literature (informally published written material not controlled by scientific publishers, e.g. reports).

Is the University a member of any discount scheme?

Yes. As a B-on subscriber, the university can take advantage of a few discount schemes as long as the corresponding author is from NOVA. To know more go to b-on or contact your research support service or librarian for more information.
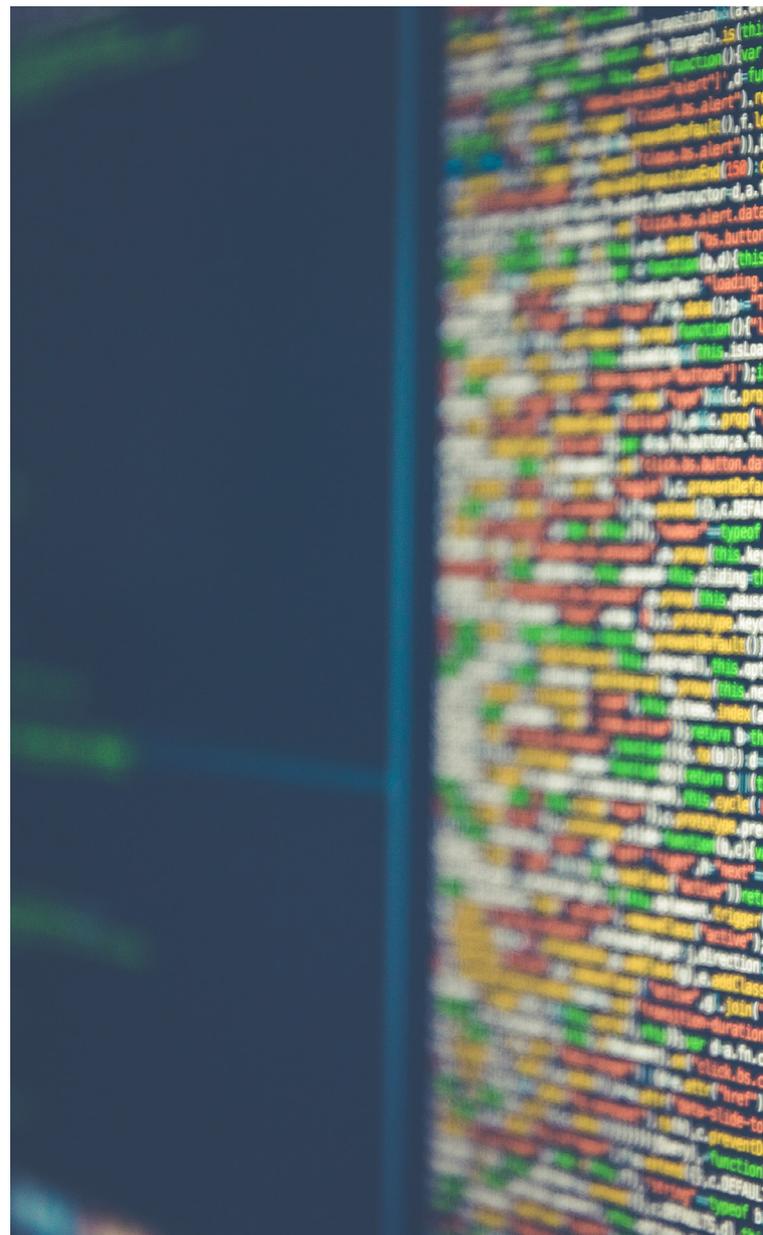
03 OPEN RESEARCH DATA

What is Open Research Data?

Data that is shared to be freely used, reused and redistributed, subject only, at most, to the requirement to credit the curator.

From the very start of your research, you will collect, produce, and use data. Research data is defined as "factual records (such as numerical scores, textual records, images and sounds) [...] used as primary sources for scientific research, and that are commonly accepted in the scientific community as necessary to validate research findings"[10].

"Open access to research data fits within the Open Science paradigm, situated within a context of ever greater transparency, accessibility and accountability. The main goals of these developments are to lower access barriers to research outputs, to speed up the research process and to increase the quality, integrity and longevity of the scholarly record."[11]

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[10] OECD *Recommendation of the Council concerning Access to Research Data from Public Funding*, 2024, OECD/LEGAL/0347
[11] OpenAIRE *What is open research data* https://www.openaire.eu/what-is-open-research-data

Research Data Lifecycle

When starting new research, take into consideration the data lifecycle below to anticipate the requirements involving the responsible management of data. This includes:

RDMkit
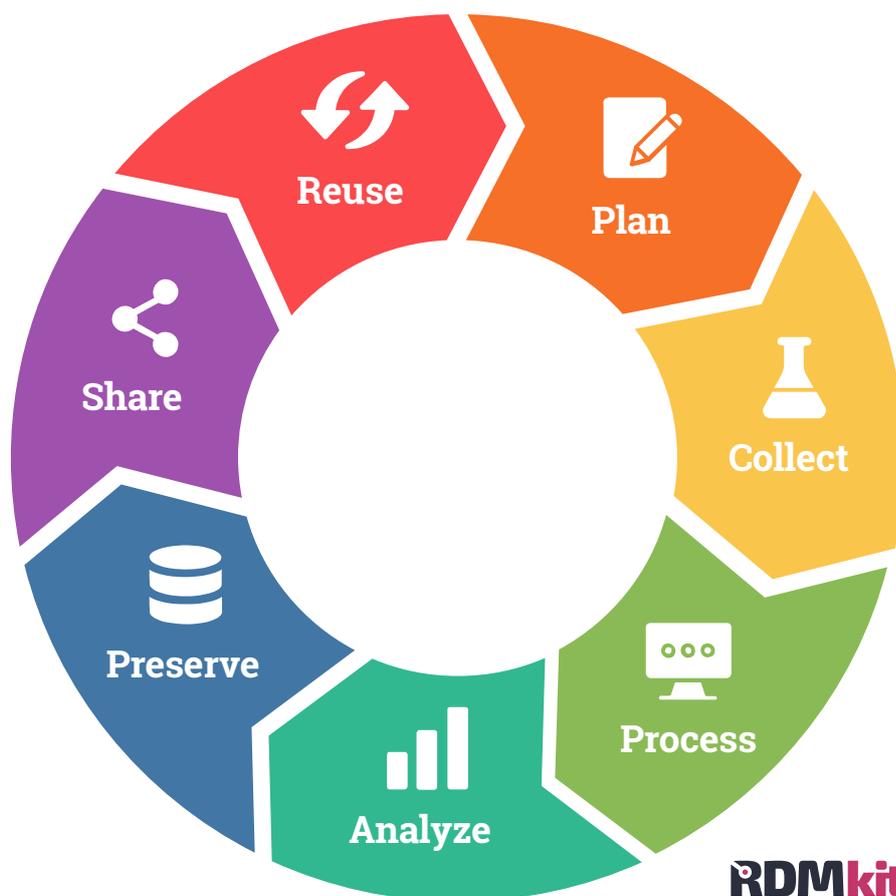
- **Plan:** Plan processes from onboarding to project closure and data resources;

- **Collect:** Organization and integration of data sets;

- **Process:** Curating, managing and storing data;

- **Analyze:** Processing, analyzing and preparing for sharing;

- **Preserve:** Data storage, back-up and archiving;

- **Share:** Distributing, establishing the reach and impact of data;

- **Reuse:** Ensuring the broad utility of your research data for other researchers.

Examples of research data are text documents, spreadsheets, statistics, results of experiments, measurements, observations resulting from fieldwork, survey results, interview recordings (audiotapes, videotapes), images, database contents, models, algorithms, and scripts.

In order to use and analyze this assortment of data in a reproducible and open fashion, it is essential to carry out Research Data Management (RDM). A carefully constructed Research Data Management Plan covers all activities involved in collecting, describing, storing, processing, analyzing, archiving, and accessing data, and makes your research more understandable and reproducible for peers[12].

12 *Open Science: a practical guide for Early-Career Researchers*, 2023 available at https://doi.org/10.5281/zenodo.7716153

How Should I Manage My Data?

Create a Data Management Plan (DMP)

In the scope of Horizon Europe projects grants, a detailed DMP should be submitted with other requirements about the project. A DMP is a document that details in advance how the data for a specific project will be created, collected, stored, and documented and who will oversee the preservation for long-term usability.

Although a DMP is not a static document and will suffer adaptations during the research process, the DMP will serve as a guideline to follow best practices for Research Data Management.

When creating a DMP, it is fundamental to organize and document data in a systematic way to facilitate future preservation and long-term storage. This means that you should be thinking in advance about formats and file names according to the instructions of the repository where the dataset is going to be archived.

Common topics in a DMP required by funders are the description of the data (content, type, format, volume), which methodology was followed when collecting the data, ethical and intellectual property of the data, data sharing plans (how, when and who), preserving long-term strategies.

"Data Management Plans (DMPs) are a key element of good data management. A DMP describes the data management life cycle for the data to be collected, processed and/or generated by a [...] project. As part of making research data findable, accessible, interoperable and re-usable (FAIR)"[13]

"A DMP can help to identify activities and potential costs at the outset of your project. Identifying Research data management (RDM) costs before you begin the project ensures that you will be able to request adequate funds to support good data management and enable data sharing"[14];

The DMP is mandatory in European Commission (EC) funded projects and also recommended by the Portuguese Foundation for Science and Technology (FCT).

The financed tool by the European Commission (EC) and recommended by the Portuguese Foundation for Science and Technology (FCT) for DMP creation is **Argos** (https://argos.openaire.eu/home). **The FCT recommended template is available** here. You can also use the available FCT template in Argos.

https://argos.openaire.eu/home

[13] Horizon 2020. *Online Manual: Data Management Plan – General Definition* available at https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/data-management_en.htm

[14] O'Connor, R., Delipalta, A., & Jones, S. *What will it cost to manage and share my data?* 2020, available at https://doi.org/10.5281/zenodo.4548344

Share and Preserve

Choose a License

Use a discipline specific repository to preserve the data according to recognized standards in your research area. As an alternative, use a cost-free data repository, such as Zenodo, that is recommended by the European Commission (EC), or search for other data repositories in re3data (FAIR-compatible repositories).

When dealing with sensitive data it is recommended to anonymize your data. You can use a tool like Amnesia, provided by OpenAIRE and aligned with the European Commission (EC) policies.

If your research data qualifies as a creative work, that is protected by copyright, then CC BY 4.0 is usually the best choice.

If your research data is a database or a dataset (unstructured data that do not meet the database definition) usually the best option is a CC0.

Keep in mind that CC licenses only deal with copyright and related matters. Personal data (information related to an individual, such as name, identification numbers) are not included in CC.

Open Research Data > Useful tools

Zenodo. A general-purpose open repository
https://zenodo.org

re3data. A global registry of research data repositories
https://www.re3data.org

AMNESIA, use it to transform personal to anonymous data
https://amnesia.openaire.eu

FAIR Self-Assessment Tool
https://ardc.edu.au/resource/fair-data-self-assessment-tool

FAIR Aware
https://fairaware.dans.knaw.nl/

License Chooser
https://chooser-beta.creativecommons.org/

zenodo

re3data.org
REGISTRY OF RESEARCH DATA REPOSITORIES

amnesia

OPEN RESEARCH SOFTWARE AND OPEN SOURCE

04

What is Open Research Software and Open Source?

Open source software (or free software) combines copyright and a license to grant users the freedom to run the software, to study and modify it, and share the code and modifications with others. It facilitates collaboration, innovation, and agility.[15]
Open access to the source code of research software allows developers to receive career credit for their efforts (citations) and helps improve the impact of the research by allowing the reutilization and improvements by other researchers.

Best Practices

Use a service such as **GitHub** to provide an interface to the developed software as well as remote storage services that can be used to preserve, share and collaborate;

It is equally important to have a persistent identifier associated with the software, such as a DOI. There are several ways of associating a DOI with a GitHub record. The easiest way is to use **Zenodo** to assign a DOI. **Zenodo integrates with GitHub** to archive the software and provides a DOI when developers make a formal release on GitHub.

https://github.com/

[15] **Open Source Initiative** Loek Brinkman et al. *The Open Source Definition,* 2023 available at https://opensource.org/osd

Choose a License

Publicly shared software is not actually open source unless accompanied by a suitable license, because by default software (along with any other creative work) falls under exclusive copyright to the creators, meaning no one else can use, copy, distribute, or modify your work;

Include an informative **README file** that describes what your software does and gives some helpful information (e.g., how to install, how to cite, how to run, important dependencies), tutorials/ examples, and/or API documentation;

If you use someone else's software that did some work essential to your results, interpretation, or conclusions, it is recommended that you cite it. When citing any software, you should include at minimum the **author's name(s)**, **software title**, **version number**, and **unique identifier/locator**.

Choose an appropriate license for your software (https://choosealicense. com/), based on what you would prefer to let others do (or prevent them from doing) with your code;

Once you select a license, put the text—edited to include the author's name(s) and year—in the software repository (such as GitHub) as a plain-text LICENSE file.

Please note that one cannot patent software programs, but computer-implemented inventions may be eligible for protection as industrial property

rights. You can consult NOVA's Guide to Intellectual Property and Knowledge Transfer to learn more about such possibilities.[16]

Open Research Software > Useful tools

Github
https://github.com/

Bitbucket
https://bitbucket.org/

SourceForge
https://sourceforge.net/

Open Science Reproducibility Checklist[17]

- Is your data available to others?
- Is 'reproducibility' included in your Data Management Plan?
- Does your research folder include a 'readme' file, explaining the context of the research, the file structure, and procedures?

- Does your research folder include a codebook, explaining all variables in your research?
- Are your analysis steps or scripts well described and available to others?
- Does your project minimise the effort it takes to reproduce your research?

- Is your research software available to others by attribution of a license?
- Will your results be reproducible in the future?
- Has the reproducibility of your work been verified by a colleague?
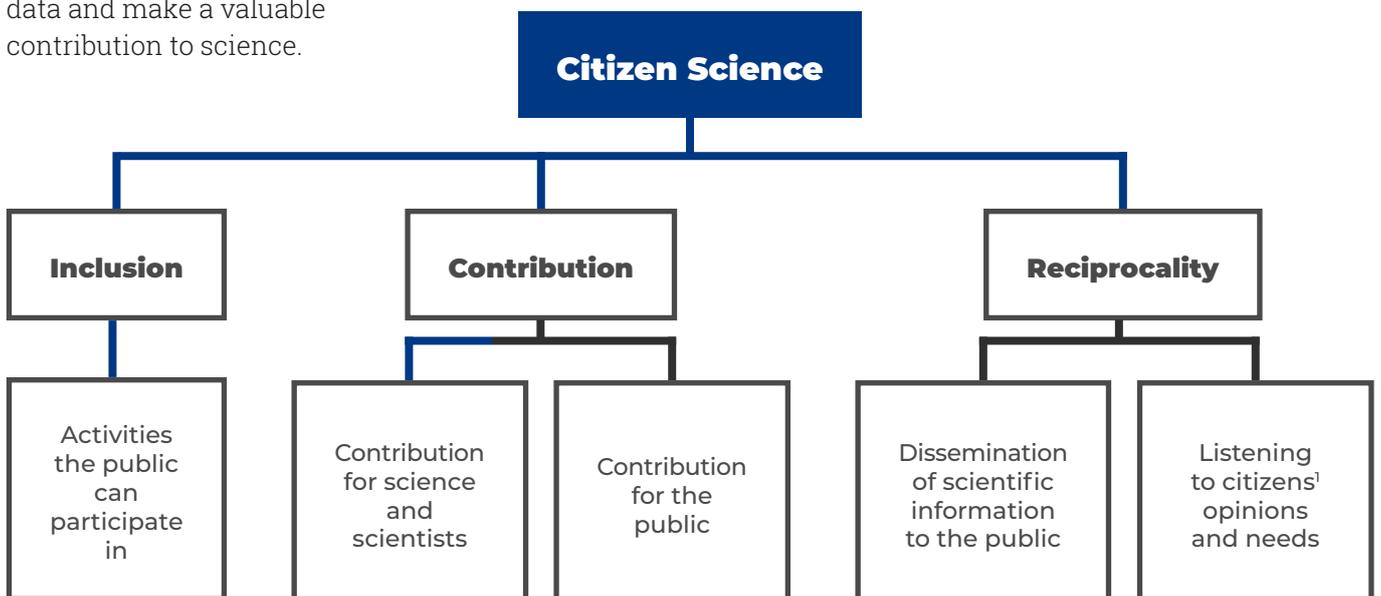- Do you know whom to contact if you need help with reproducibility?

[16] NOVA University Lisbon, NOVA Impact, NOVA's Guide to Intellectual Property and Knowledge Transfer, 2021, available at https://novainnovation.unl.pt/wp-content/uploads/2021/07/GuiaPITC_Digital_UNL2021.pdf

[17] Adapted from Loek Brinkman, Elly Dijk, Hans de Jonge, Nicole Loorbach, & Daan Rutten. *Open Science: A Practical Guide for Early-Career Researchers (1.0)*. available at https://doi.org/10.5281/zenodo.7716153

05 CITIZEN SCIENCE

What is Citizen Science?

Citizen Science is the involvement of the non-academic public in the process of scientific research. Citizens do scientific work—often working together with experts or scientific institutions. They support the collection, analysis or description of research data and make a valuable contribution to science.
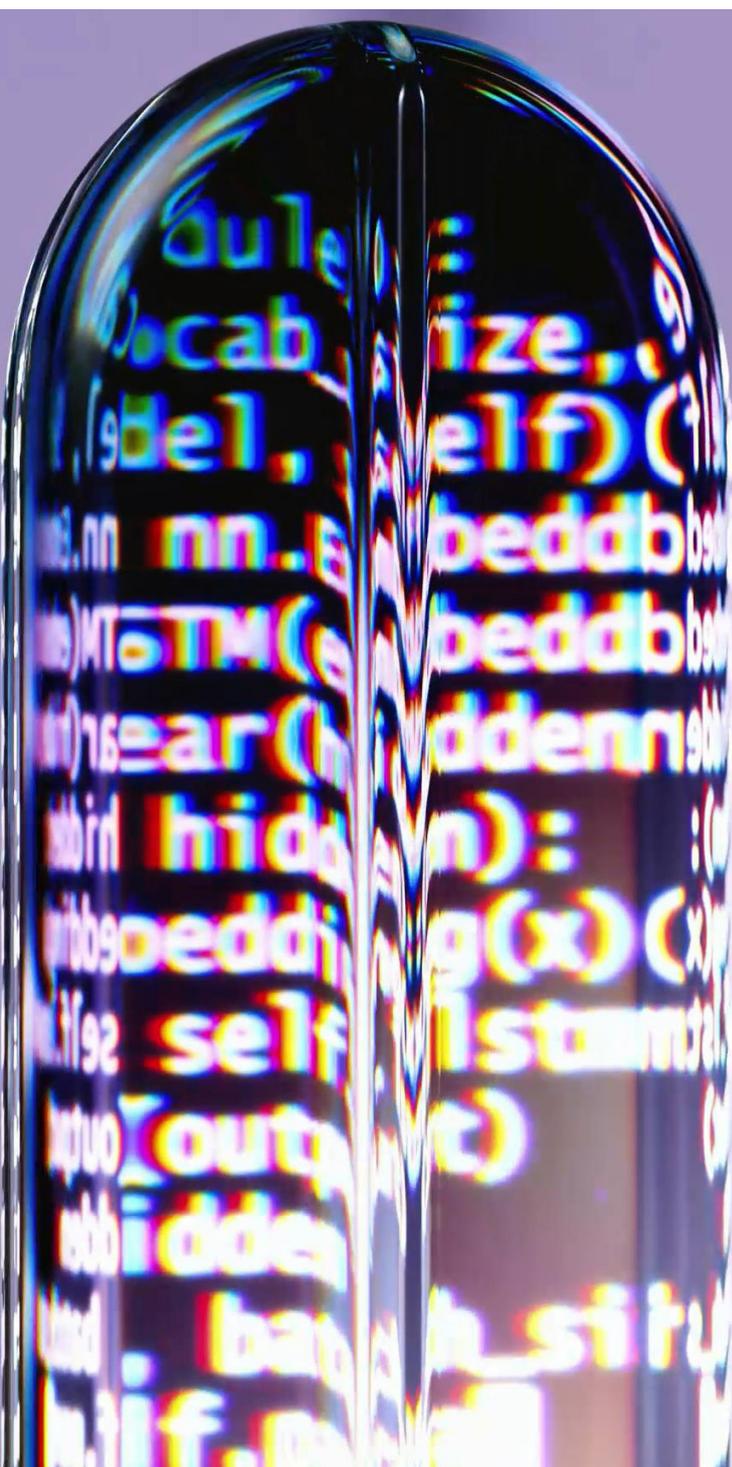

Citizen Science

- **Inclusion**
  - Activities the public can participate in
- **Contribution**
  - Contribution for science and scientists
  - Contribution for the public
- **Reciprocality**
  - Dissemination of scientific information to the public
  - Listening to citizens[1] opinions and needs

How does Citizen Science relate to Open Science?

The adoption of open science approaches and policies can significantly enhance citizen science by increasing its visibility, fostering collaboration, ensuring data persistence, and preserving its legacies and impacts in scientific research and policy. Simultaneously, citizen science promotes a more participatory approach to research, leveraging its transformative potential.

Exchanging experiences between citizen science practitioners and supporters, as well as open science practitioners and advocates, can help overcome technical, legal, and other barriers that hinder the adoption of open science practices in citizen science projects. Such collaboration will maximize the long-term impact of these programs. Additionally, learning from citizen science initiatives can inspire open science practitioners and advocates to further expand the boundaries of open research.

Note that a citizen scientist is more than a respondent, subjected to a survey or an interview. Rather, a true citizen scientist is someone who can complement the team of academic researchers in order to gather, analyze, and/or evaluate information.

Best Practices

The European Citizen Science Association (ECSA) created a best practice guideline on what constitutes good citizen science and wrote the **10 principles of Citizen Science**[18]

When starting a citizen science project there are a few key elements that must be considered:

- How are you going to engage citizens?
- How are you going to ensure data quality?
- How are you going to deal with ethics and legal issues?

Citizen science activities can be included as **societal impact** in **evaluation reports** like the case studies extracted from the UK Research Excellence Framework[19].

Management of citizen science data - Robust data and metadata collection, quality control, storage and sharing are fundamental to a successful citizen science project. When planned and executed well, citizen science can provide reliable data to increase scientific knowledge and raise people's awareness.

Citizen Science > Useful tools

- **ECSA. European Citizen Science Association**
  https://www.ecsa.ngo/
- **EU-Citizen.Science project**
  https://eu-citizen.science/
- **Open Science meets Citizen Science**
  https://cs4rl.github.io/open-science/
- **Citizen Science Global Partnership**
  https://citizenscienceglobal.org/
- **Scassa, T.; Chung, H. -** *Managing Intellectual Property Rights in Citizen Science: a guide for researchers and citizen scientists.* **Washington: Commons Lab, cop. 2015 available at**
  https://www.wilsoncenter.org/publication/managing-intellectual-property-rights-citizen-science-guide-for-researchers-and-citizen
- **Scassa, T. ; Chung, H. -** *Typology of Citizen Science Projects from an Intellectual Property Perspective: Invention and Authorship Between Researchers and Participants* **Washington: Commons Lab, Febr. 2015 available at**
  https://www.wilsoncenter.org/publication/typology-citizen-science-projects-intellectual-property-perspective

[18] ECSA (European Citizen Science Association). *Ten Principles of Citizen Science*, 2015 available at https://doi.org/10.17605/OSF.IO/XPR2N
[19] *REF impact found 33 Case Studies for: "Citizen Science"* available at https://impact.ref.ac.uk/casestudies/Results.aspx?val=%22Citizen+Science%22

06 OPEN SCIENCE POLICIES

Initial policies were aimed at requiring an **open dissemination** of the research results based on the idea that results achieved from publicly funded research should be available to the public without any restrictions;

The scope of the policies has now grown and we may find national policies fostering **Open Science practices at any point of the research level**. Even though a final version of the FCT policy on Open Science is yet to be released, there is already a proposal under discussion with guiding principles. NOVA will align with this national document, as soon as this policy is released.

European Commission (EC)

Horizon Europe Guidelines

Under the scope of the EC funding, the following guidelines **are considered mandatory**.

For Peer-Reviewed Publications:

- Open Access mandate extended to long-text formats such as books;

- **Immediate Open Access** (without embargo) through trusted repositories (green OA) at the latest at the time of publication. In addition, publication in Open Access venues (gold OA or diamond OA) are also encouraged. But only publications fees in **full Open Access journals or other venues are eligible for reimbursement**;

- Publications licensed under CC BY (or equivalent); CC BY-NC / CC BY-ND (or equivalent) are allowed for long-text formats;

- Information should be provided via repositories about all the other **scholarly objects, tools and instruments that are needed to validate the conclusions of the publication**;

- **Metadata licensed** under CC0 (or equivalent) and in line with FAIR principles;

- **Persistent Identifiers** provided for publications (e.g. DOI), authors and, if possible, for the organizations and grant;

- Beneficiaries/authors **must retain sufficient Intellectual Property Rights** to comply with Open Access requirements and in alignment with Plan S;

- Open Research Europe, an Open Access publishing platform, launched formally in March 2021, will be at disposition for beneficiaries of Horizon2020/Horizon Europe.

For Research Data:

- **Responsible management of research data** (Data Management Planning; FAIR data; long-term preservation of data); **There is no opting out of Research Data Management (RDM)**;

- Open Access to research data, including those underlying publications ('as open as possible as closed as necessary', i.e., **there can be exceptions to Open Access to research data** due to legitimate interests or constraints that must be justified in the Data Management Plan);

- Research data must be deposited in trusted repositories and made available in Open Access ASAP. Beneficiaries may also be required to deposit their data in a repository federated under EOSC;

- Open data licensed under CC BY or CC0 (or equivalent);

- Information should be provided via repositories about all the other **scholarly objects, tools and instruments that are needed to re-use or validate the data**;

- Metadata licensed under CC0 (or equivalent) and in line with FAIR principles; Persistent Identifiers provided for data (e.g. DOI), related publications, authors and, if possible, for the organisations and grant;

- **RDM costs** with data storage, preservation and others, are **eligible**.

Foundation for Science and Technology (FCT)

Current Open Access Policy

- Determines that **publications**, which are subject to peer review or other form of scientific review, must be deposited in one of the open access repositories of the **RCAAP** as soon as possible, preferably at the time of acceptance of the publication. An embargo period is allowed, after which all content of publications must be freely available;

- The policy applies to **articles in scientific journals, conference proceedings, posters, books and book chapters, monographs and master's and doctoral theses**;

- The policy on the availability of **research data** and other results of scientific research funded by the FCT encourages researchers to share primary results and other data with the scientific community, placing them in open access databases (such as Genbank, for example), as soon as possible;

- These policies apply to **R&D projects, scholarships and scientific employment contracts**.

- However, this policy is under revision and will most likely become more strict in the near future.

07

OPEN SCIENCE WRITE & PUBLISH CHECKLIST

Does the journal of your choice allow preprints?

If so, are there suitable preprint servers for your work? If yes, post your work as a preprint.

Does your funder require you to publish OA?

Check Jisc's open policy finder and the grant requirements of your funder.

Is it possible to publish OA in the journal of your choice?

Check the Directory of Open Access Journals (DOAJ). If not and you do want to publish OA, select another journal.

Can you cover the cost of OA publishing?

Does the journal charge APCs and if so, is it part of an agreement for a full discount? Check the b-on open access agreements and the Directory of Open Access Journals. If not, will your funder, university, faculty or department cover the cost?

In case of an OA journal, is it listed in the DOAJ?

If not, use the checklist on Think. Check. Submit. to find out if the journal is trustworthy to avoid predatory publishers.

Have you uploaded your publications to your university's repository?

If not, do so. For help and more information, contact your Academic Unit support services or the Research Information Management Office at the Rectorate (ugic@unl.pt).

Does your OA publication have a Creative Commons license?

Make sure it does. Check Chapter 1 for more information on Creative Commons licenses.

Did you make a Data Management Plan?

If not, use an online tool like ARGOS or DMPonline.

Have you made your research data FAIR?

Check this with the tool FAIR-Aware.

Does your research data have a Creative Commons license?

Make sure it does. The best option is usually CC0. For help and more information, contact your Academic Unit support services.

Did you submit your research data in a trusted repository?

If not, do so. For help and more information, contact your Academic Unit support services.
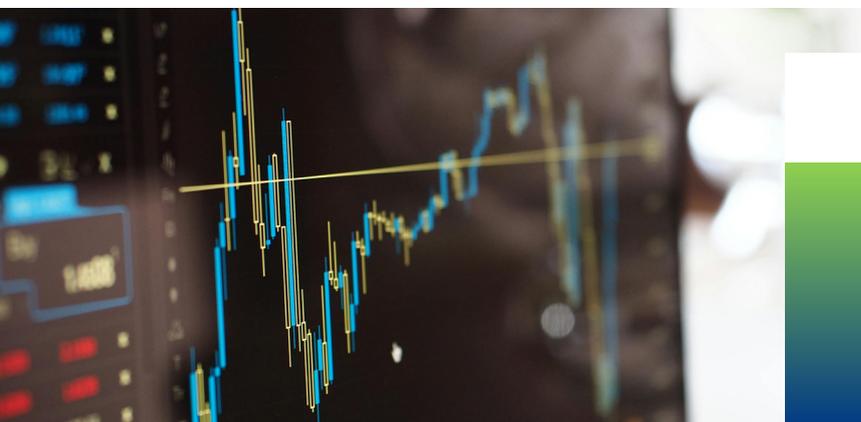
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European Commission, *Open Science* https://rea.ec.europa.eu/open-science_en

European Union. *Publications Office of the European Union* https://op.europa.eu/en/publication-detail/-/publication/42d27e04-b715-11ec-b6f4-01aa75ed71a1/language-en

EUA - European University Association, European University Association. *The EUA Open Science Agenda 2025* (2022) https://eua.eu/resources/publications/1003:the-eua-open-science-agenda-2025.html

Fundação para a Ciência e a Tecnologia *Política de Acesso Aberto a Publicações Científicas resultantes de Projetos de I&D Financiados pela FCT* (2014) https://arquivo.pt/wayback/20230526101628mp_/https://former.fct.pt/documentos/PoliticaAcessoAberto_Publicacoes.pdf

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https://www.openaire.eu/what-is-open-research-data

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REF impact found 33 Case Studies for: "Citizen Science"
https://impact.ref.ac.uk/casestudies/Results.aspx?val=%22Citizen+Science%22

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https://doi.org/10.5281/zenodo.7896247

Think, Check, Submit: Identify trusted publishers for your research
https://thinkchecksubmit.org/

UNESCO *Recomendação da UNESCO sobre Ciência Aberta* (2022)
https://unesdoc.unesco.org/ark:/48223/pf0000379949_por
https://unesdoc.unesco.org/ark:/48223/pf0000383328

UNESCO *Open Science Toolkit* available
https://www.unesco.org/en/open-science/toolkit

YERUN *(Young European Research Universities Network)*
https://yerun.eu/wp-content/uploads/2018/05/YERUN_OpenScience_Statement-3.pdf
https://yerun.eu/wp-content/uploads/2022/11/COARA.pdf

December 2024