EUTOPIA TRAIN
Transforming Research and Innovation

Open Science in Horizon Europe: a short introduction

Quick guide for researchers (v1.0)

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CY CERGY PARIS UNIVERSITÉ

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University of Ljubljana

upf. Universitat Pompeu Fabra Barcelona

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Content

Introduction

- Horizon Europe is the main Research & Innovation funding programme of the European Union with a total budget of around €95.5 billion between 2021 and 2027.
- Building on the experience of Horizon 2020, Horizon Europe includes new and expanded Open Science requirements and recommendations.
- The provisions for Open Science are mentioned and explained in a number of documents on Horizon Europe, which can make it difficult to get a full picture of the various expectations for your project.
- This guide aims to help you navigate the mandatory and recommended Open Science practices and prepare a winning proposal with Open Science at the core, which is evaluated under the Excellence criterion.

Watch the EUTOPIA-TRAIN Webinar - Navigating Open Science in Horizon Europe (May 2022) for a full overview (https://youtu.be/nGKAq_T5EnE)

Where to get started

- Horizon Europe differentiates between **mandatory** and **recommended practices,** and between elements **before and during the project**.
- Find the **official texts** in the Horizon Europe Annotated Model Grant Agreement (MGA), the Horizon Europe Programme Guide, the standard Proposal Template, and the Data Management Plan Template. These and more documents are available via the reference documents.
- The **European Research Council** (ERC) partially deviates from the default Open Science layout of Horizon Europe. This concerns mainly the structure and evaluation of proposals and not the general mandatory requirements. The ERC has released detailed information via the ERC Magazine, their project management guidance, as well as their Information for ERC Grantees booklet.
- A few online resources prepared by a number of universities and research organisations have inspired this guide and could also help you with including Open Science in your project (OpenAIRE, University of Turin, Politecnico di Torino, Ghent University, KU Leuven).

Overview

Open Access to publications as well as research data and research output management are **mandatory**. Measures to ensure the reproducibility and validation of results are also mandatory. These build strongly on the requirements familiar from Horizon 2020.

Additional Open Science practices in the research methodology are **recommended.**

- This may include early and open sharing of research, open peer-review activities, and broader involvement of "knowledge actors" (i.e., engaging with academia, industry, government or citizens/civil society).

- The provisions are explained in detail in the Horizon Europe Programme Guide together with valuable examples. The mandatory and recommended Open Science actions must be explained in the proposal – which includes Open Science in different parts of the **proposal evaluation**.

It is possible that a call has extra requirements, for example on public health grounds, or asks beneficiaries to align their actions with the European Open Science Cloud (EOSC). It is therefore crucial that the description of the call is checked thoroughly.

What?	How?	Mandatory in all calls/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	Information on outputs/tools/instruments and access to data/results for validation of publications	**Mandatory**
Open access to research outputs through deposition in trusted repositories	Open access to publications	**Mandatory** for peer-reviewed publications
	Open access to data	**Mandatory** for research data **but** with exceptions ('as open as possible, as closed as necessary")
	Open access to software, models, algorithms, workflows etc.	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

Source: Alea Lopez de San Roman, Dagmar Meyer, Emilie Hermans, & Ellen Leenarts. (2021, September 22). Horizon Europe train-the-trainer workshop. Open Science Fair 2021. Zenodo. https://doi.org/10.5281/zenodo.5549524 (CC-BY 4.0)

Mandatory practices

Open access to publications

- Under Horizon Europe, all **peer-reviewed scientific publications** must be made available in Open Access under retention of copyright by the author immediately at the moment of publication. Horizon Europe follows the principles of Plan S.
    - **Peer-reviewed articles** must be licensed using Creative Commons Attribution (CC BY 4.0) or a similar license.
    - **Books and long formats**, if they fall under the definition of peer-reviewed ("if the manuscript or a substantial part thereof has been reviewed at least by one independent expert external to the publisher or to the series scientific editor") *must also be published in Open Access*. Books and long formats can exclude commercial use and the creation of derivative works through Creative Commons Attribution Non-Derivative (CC BY-ND) or Non-Commercial licenses (CC BY-NC).
- For journal articles, you can publish in *fully Open Access journals* (findable e.g., via the Directory of Open Access Journals (DOAJ) or the cOAlition S Journal Checker) and *in subscription or hybrid journals,* as long as the Author Accepted Manuscript or Version of Record are made immediately available via a repository. The Author Accepted Manuscript or Version of Record must be made accessible *immediately via a repository at the time of publication* – for all peer-reviewed publications.
- **Publication costs** such as Article/Book/other long format Processing Charges (APCs/BPCs) are eligible as project expenses for fully Open Access outlets – *but not for hybrid journals or books*. Many fully Open Access journals listed in DOAJ do not charge any fees at all. Another option may be the Open Research Europe platform with no publishing charges for Horizon 2020 and Europe beneficiaries. It also accomplishes the recommended practices of *early sharing* via preprints and *open peer review*, and it serves as a platform for *registered reports* or *data papers,* among many other functionalities.
- Note that the obligation to publish in Open Access is not an obligation to publish results in general, which may be exploited or disseminated in other ways. It only concerns peer-reviewed publications.

Research data management

- Horizon Europe follows the principle “as open as possible, as closed as necessary” and requires beneficiaries to manage research data according to the FAIR principles. There is no possibility to opt-out from the data management requirements any longer. Reasons for restricting access to data may include reasons such as data protection, privacy, trade secrets, IPR, confidentiality, security, legitimate interests of a beneficiary etc.

- Beneficiaries are required to **submit a short Data Management Plan (DMP) with a maximum length of one page as part of the project proposal.** This DMP should outline the types and amount of data produced, the measures to make the data FAIR, as well as responsibility and costs for curating the date. Data management costs are eligible costs for the project budget.

- The first version of the full DMP has to be submitted as a deliverable by month six of the project. We would recommend to update the DMP throughout the project to maximise its use as a planning tool and to revise it at the end of the project as a milestone or deliverable. A template is available.

- Specific requirements for data management include:

    - The recommendation to use a trusted or certified repository for your data. At minimum, the repository must support persistent identifiers for data sets (e.g., DOIs) and researcher IDs such as Orcid or ResearcherID in their metadata. Ideally, the repository should also allow metadata entries for organization ID (e.g., ROR) and grant IDs. (see also Open Research Europe → Select a Repository)
    - Metadata must be FAIR and available in the public domain (CC0).
    - In principle, you can choose an institutional, general-purpose or discipline-specific repository, as long as these provisions are followed. You can use services such as re3data or FAIRsharing to look for suitable repositories.
    - Try to use existing data standards and vocabularies for your data and metadata as much as possible. Usually, general-purpose or institutional repositories will follow a minimum requirement, while more specialized repositories will support more discipline-specific standards. Collections of different metadata standards are available via FAIRsharing, the Research Data Alliance and the Digital Curation Center.

Information to validate the conclusions of the scientific publication

- This is a **requirement aiming to ensure the reproducibility of research results** funded by Horizon Europe. Here, you should consider how you inform potential re-users and readers about data, software, algorithms, protocols, models, workflows, electronic notebooks and other outputs that are needed for the validation of the results of your publications or re-using your published data.

- Be aware that this only refers to the outputs required “to validate the conclusions of the scientific publication” or to allow the re-use of a published data set and does not constitute a generic requirement to disclose otherwise protected outputs.

- In addition, you should outline how you will provide **digital or physical access to data or other results needed for the validation** of the conclusions of scientific publications. This should take place to the extent that “legitimate interests or constraints are safeguarded”, i.e., you may restrict access to data and other outputs for reasons such as such as data protection, privacy, trade secrets, IPR, confidentiality, security, or legitimate interests of a beneficiary (see articles 13, 15, 16, or 17 of the MGA for more details).

- For research data, the information required to validate the results should be given “via the repository” and, for publications, “via the repository (or via the copy of the publication deposited in the repository)”. In practice this can be achieved by adding README files and other supplements to datasets, explaining and citing specific tools via the repository, and including explanations in the methods sections, annexes or supplementary files of publications.

Recommended practices

Recommended practices

- Horizon Europe recommends to use additional Open Science practices as part of the methodology section. As this is recommended, **it is within the discretion of applicants to use practices that support the research project**. You are not obliged to use additional Open Science practices, although **a justification has to be given if you decide not to use any** (with the exception of ERC projects). According to the European Commission, you will not be penalized for not implementing any recommended practice, but **it can increase the score if sufficiently addressed**.

- The sections below provide an overview over these recommended practices based on the Programme Guide. They are not exhaustive and not prescriptive, i.e., **you are allowed to employ other approaches not listed here**.

- Some of these practices reinforce each other. T**hink about synergies from the very beginning**. If, for example, you plan to produce and share code and software, you will be more efficient in fulfilling the requirements concerning the validation of results and the re-usability of research data. Some publication and journals platforms use preprint sharing and open peer review and by this allow you to implement mandatory and recommended practices in a more efficient way.

Early and open sharing

Preregistration and registered reports

Preregistration is a practice in which a project, for example a clinical trial, is registered in a public database. This allows tracking the results of different projects and increases their transparency. A thorough general introduction about preregistration is available via the Center for Open Science, which also maintains a preregistration service.

Other venues for preregistration of studies include: AsPredicted is a domain-general registry service providing standardised preregistration templates; PreclinicalTrials.eu collects preclinical animal study protocols; PROSPERO – for health and social care; Evidence in Governance and Politics - for political sciences); Registry for International Development Impact Evaluations – for development research/social sciences; PLOS offers two journals with preregistration options.

Registered reports are a format in which you submit a project to a specific publication venue, which will give you feedback and permission to publish the results of the project later. The idea is to ensure that all research results, including negative ones, see the light of day. This ensures that not only positive results are published and thereby reduces the risk of certain malpractices. It is also a means to receive feedback on your research methodology early on in the process. The Center for Open Science maintains a collection of journals accepting registered reports.

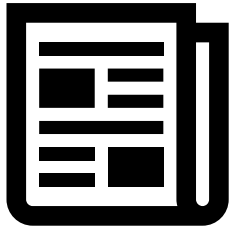
The UK Reproducibility Network has also developed a comprehensive primer on preregistration and registered reports. Another useful guide has been published by PhD on Track.

Preprints

Preprints are manuscripts typically released before or during submission to a journal to collect feedback. Preprint papers are usually not yet peer reviewed. They are common practice in many disciplines and respective preprint servers exist in various fields. Some platforms and services combine preprint publishing with open peer review (see below) and sharing of the final version.

Repositories suitable for preprint publishing include: Zenodo (multidisciplinary), Preprints.org (multidisciplinary), bioRxiv (Life sciences), medRxiv (Medicine and health sciences), PsyArxiv (Behavioural sciences), SocArXiv (Social sciences and humanities), LawArXiv (Law), OSF Preprints (multidisciplinary and underlying service for many other preprint archives), IDEAS (economics), ArXiv (physics, mathematics, computer science), ResearchSquare (multidisciplinary).

Participation in open peer review



Open peer review is a term for different types of practices in which reviews of articles are published alongside the article. It aims to render reviews transparent, reduce potential conflict of interest of reviewers, and to make the overall contribution of reviewers to the publishing process more visible.

There are different types of open peer review, for instance with or without the name of the reviewer and often with the author's responses.

An overview of peer review formats and their advantages and disadvantages has been collected by PLOS.

The number of journals using open peer review has been growing steadily. Many journals plan to use it in the future.

A list of journals with Open Peer Review is available via Publons. Preprints can be discussed and reviewed with tools such as PubPeer and ScienceOpen.

Many journals and platforms, including Open Research Europe, nowadays employ some form of open peer review. F1000, PCI, or PeerJ also integrate Open Peer Review in their publishing process.

Open access to software, models, algorithms, workflows etc.

The creation, management and analysis of research data is closely tied to the software and infrastructure used in this process.

Protocols and workflows also enable reproducibility and re-use of results.

In order to increase the open sharing and recognition of such outputs, Horizon Europe considers them a recommended practice.

- **Archiving and sharing of software and code** is a growing field. Organisations such as the Software Sustainability Institute or Software Heritage provide resources, information and infrastructure for software sharing and archiving.
  - **Repositories for software** include SourceForge, Launchpad, Savannah or GitHub, by using the added function to archive GitHub on Zenodo. Software journals or papers are another emerging way to share research software.
  - For sharing software, pay attention to use **specific licenses** such as those listed as free by the Free Software Foundation or listed as open source by the Open Source Initiative. The website choosealicense.com is also a useful resource.
- Sharing **workflows and protocols** is yet another option to increase openness of different steps of the research process. Some platforms include Protocol Exchange, protocols.io, myexperiment, or researchequals.com. This may further include using open (lab) notebooks or shareable computational notebooks such as jupyter books.

Involving knowledge actors

- This category picks up from the Citizen Science and Responsible Research & Innovation themes of Horizon 2020. It is specifically aimed for “interaction from across the quadruple helix (academia-industry-government-civil)” and therefore covers a broad range of engagement with different stakeholders. The European Commission suggests activities such as “Co-design, Co-creation, and Co-assessment” in the official Programme Guide.
- Good initiatives and platforms to get started are eu-citizen.science and ecsite. Projects such as RRI-tools or newhoRRIzon have also compiled lists of helpful resources.
- Within EUTOPIA, the Warwick Institute of Engagement and the VUB Science Outreach Office support researchers developing ideas and approaches along the same lines.

When to do what

When to do what

- Horizon Europe requires you to think about Open Science from moment you write your proposal.
- This is in particular for Research Actions (RA), Research & Innovation Actions (RIA), and Coordination and Support Actions (CSA).
- ERC and MSCA proposals slightly differ in the structure and content of the proposal, but there is no difference of requirements for Open Access to publications and research data management during the project.

For the proposal

Outline your FAIR research data management practices on approximately 1 page in the methodology part. It is not possible to opt-out of the data management plan any longer.

Outline your Open Science practices likewise on approximately 1 page – justify it well if you do not choose to use any Open Science approach.

In the dissemination and impact section, you could explain if/how different Open Science practices in your project support the targeted impact.

Budget in the respective costs, for instance for research data management or publishing costs (e.g., APCs).

You can address how the consortium addresses Open Science in the “consortium as a whole” section, for instance showcasing which partner will be mainly responsible for research data management and preservation.

In the Achievements section (Part A) you are asked to provide previous achievements (publications, data, software, etc.) in Open Access and with a short qualitative assessment.

Evaluation of proposals

Your explanation of research data management and Open Science practices in Part B will be evaluated as part of Excellence criteria of the proposal (except for ERC grants). Addressing them thoroughly can give you an edge over proposals that do the bare minimum.

To understand how reviewers are evaluating the mandatory and recommended practices, we recommend this video by the European Commission.

https://youtu.be/EiJ8RaD3WBw

During the project

Here, include a data management plan (DMP) as a deliverable at Month 6. It is good practice to include a review of the DMP towards the end of the project as a deliverable or milestone.

Follow through on the Open Access requirements, in particular the depositing of the article or Version of Record in an appropriate trusted repository.

Follow through on the data management requirements (FAIR data, open metadata as a minimum) and the practices, including early sharing, from your proposal.

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Contributors

Lennart Stoy (Vrije Universiteit Brussel)
Robin Green (University of Warwick)
Tania van Loon (Vrije Universiteit Brussel)
Marina Losada (Universitat Pompeu Fabra)
Mojca Kotar (University of Ljubljana)
Pieter de Bruyn (Vrije Universiteit Brussel)
Özgün Ünver (Vrije Universiteit Brussel)
Edo Martens (Vrije Universiteit Brussel)
Dirk Vervenne (Vrije Universiteit Brussel)
Elisa Maes (Vrije Universiteit Brussel)

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