

# INFORMATION ON OPEN SCIENCE (OS)

This overview aims to summarize the information about OS principles and provide basic guidance to IMC employees on how to make research results available under the OS framework.

Instructions for publishing in open access (OA) are based on Directive No. 12 from 2022. Information about publishing research data reflects the conditions set by individual project providers.

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## What does OS mean?

**OS includes various practices and principles that enable free and immediate access to publicly funded research results.**

### ➤ **Basic elements of open science:**

- **open access (OA)** - open electronic access to publicly funded research results. The goal is to provide immediate, free, permanent, and unrestricted access for end users to publications
- **open data** – open access to research data
- other OS tools - open source, public licenses for works, open peer review, open research journals, open educational materials, and citizen science

For the needs of the staff of the Institute of Macromolecular Chemistry of CAS (hereinafter referred to as IMC), this methodology primarily focuses on OA and open data.

- **Pros of OS:** immediate and free access to scientific and academic publications; greater availability and visibility of scientific work; enhanced credibility and visibility of research.; higher citation impact; faster exchange of knowledge among scientists; increased transparency and quality of scientific work; efficient use of results, work, and funding; an informed public.

**Cons of OS:** high financial costs of publications; perceived lower quality of journals and their peer review process; the existence of predatory journals; the legal and publisher rights treatment needed; potential demands on technical infrastructure; long-term sustainability of funding.

### ➤ **Licenses and copyrights**

For publications or data to meet openness principles, they must be freely accessible without legal barriers. Authors use public licenses, specifying conditions for public access and use. Authors retain copyright.

The most commonly applied, and also directly required or recommended by some project providers, are Creative Commons public licenses (CC, latest version CC-BY 4.0). These licenses allow others to download, reuse, print, modify, share, and/or copy the work with proper citation. CC licenses are irrevocable but can be invalidated by user violations.

Several variants of CC licenses exist which differ in the levels of rights granted and reserved by the author to the work. →

→ Variants of licenses CC-BY:

# Creative Commons Licenses

Creative commons licenses enable less restrictive use of creative works than traditional, all rights reserved copyright. Authors reserve some rights, but depending on the license, allow users to share, use and build upon the work they've created.

## Different elements that make up a license

- Attribution (BY)**: The creator of the work must be credited.
- Share-alike (SA)**: Derivatives of the work can only be made under a license that is identical to the original work.
- Non-commercial (NC)**: The work cannot be re-used for commercial purposes without permission.
- No Derivatives (ND)**: The work may be re-used but not modified without permission.

### WHAT IS ALLOWED UNDER DIFFERENT LICENSES?

	Attribution required	Copy & publish	Commercial Use	Modify & adapt	Change Licence
CC BY	✓	✓	✓	✓	✓
CC BY SA	✓	✓	✓	✓	✗
CC BY NC	✓	✓	✗	✓	✓
CC BY ND	✓	✓	✓	✗	✓
CC BY NC SA	✓	✓	✗	✓	✗
CC BY NC ND	✓	✓	✗	✗	✓

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McTaggart, David. CC License infographic. In: City, University of London. City Blogs. [online] October 24, 2018. [cit. 2024-06-14]. Available from: <https://blogs.city.ac.uk/library/creative-commons-licenses-made-easy>

➤ OS Requirements in Research Projects

Research funders in the EU and the Czech Republic increasingly require open access to publications and source data. Legislative measures are also being implemented (e.g., amendments to Act No. 130/2002 Sb. in the Czech Republic). Some projects include open publications and data in their evaluation and outputs.

In general, the requirements of project funders include:

- Making publications available under a public license.
- Depositing publications in a trusted open-access repository.
- Ensuring open access to research data.
- Creating and updating a Data Management Plan (DMP).

Full details of the terms and conditions can be found on each funder's website:

- [Horizon Europe](#)
- [Programme Johannes Amos Comenius \(OP JAK\)](#)
- [Programme Exceles](#)
- [Technology Agency of the Czech Republic \(TACR\)](#)
- [Czech Science Foundation \(GACR\)](#)
- [Czech Health Research Council \(AZV ČR\)](#)
- [Czech Academy of Sciences - Support of Research](#)
- [Ministry of Education, Youth and Sports](#)

## Publishing in OA

➤ Authors can ensure open access to their publications through two main ways:

- **Green OA:** The author publishes the full text of the article in a subscription-based journal but also stores and makes the full text available in an open repository. This auto-archiving must be based on the compliance with publisher's license terms (whether the article can be made available, in which version, if immediately or after the embargo expires)
- **Gold OA:** The author publishes in an open journal, where the submitted article undergoes a peer-review process and is immediately freely accessible upon acceptance. The cost of publication in this case is covered by the author or his/her employer through the article processing charge (APC).

The Gold OA model also includes publications in hybrid journals, which contain both articles available on the basis of a classical subscription and freely available articles where authors pay for publishing in the OA mode.

Information on how to finance the article processing charges is provided below.

Other OA models:

- **Bronze OA:** publishing in journals without attached licenses (this is not true Open Access, there is no proper licensing (public licenses, e.g. CC-BY). Funders do not recognise this form of access as OA because of the legal uncertainty.
- **Platinum/Diamond OA:** publishing in open journals without APC, similar to gold OA, but fees are funded by the sponsor, foundation, or publisher, instead of the author.

➤ **Funding Options for OA:**

- APCs can often be covered by funders of projects - APCs are an allowable cost of the project for most grant agencies.
- APC is covered by transformative agreements with the publisher (Read & Publish model). Authors are not required to pay an article processing charge (APC) when submitting to a journal under the agreement. Researchers can publish through the publisher and it's automatically open access. The author retains the copyright of their work. IMC has concluded these contracts with selected publishers through the CzechELib national consortium. These "Read & Publish" contracts provide the Institute with a classic full-text subscription while allowing scientists to publish in OA mode for free.

**Current information on which publishers and under what conditions authors of the IMC can benefit from these agreements is available on the [IMC's library website](#) or intranet in the section [Information for referees/ Library](#).**

➤ **How to choose an open journal:**

There are many tools for choosing a suitable OA journal e.g. [SHERPA Romeo](#) or the [Directory of Open Access Journals \(DOAJ\)](#) – they provide information on OA policies of publishers and individual journal options.

**How to public an article in OA mode:**

1. Find out the specific requirements of the project funder.
2. Choose an open journal (e.g. using DOAJ) and find out in advance if the publisher requires an article processing charge for publishing.
3. Make clear funding options for article processing charge – whether the fee can be covered by the project or by a transformation agreement with the publisher (in this case contact the library, see above).
4. Save the article in the repository - follow [Guideline 12](#).
5. If the publisher's policy allows, you can deposit a preprint of the article in a preprint repository (e.g. arXiv) where it is freely available before official publication (optional).

 **Open Data – open access to research data**

➤ **What are open research data?**

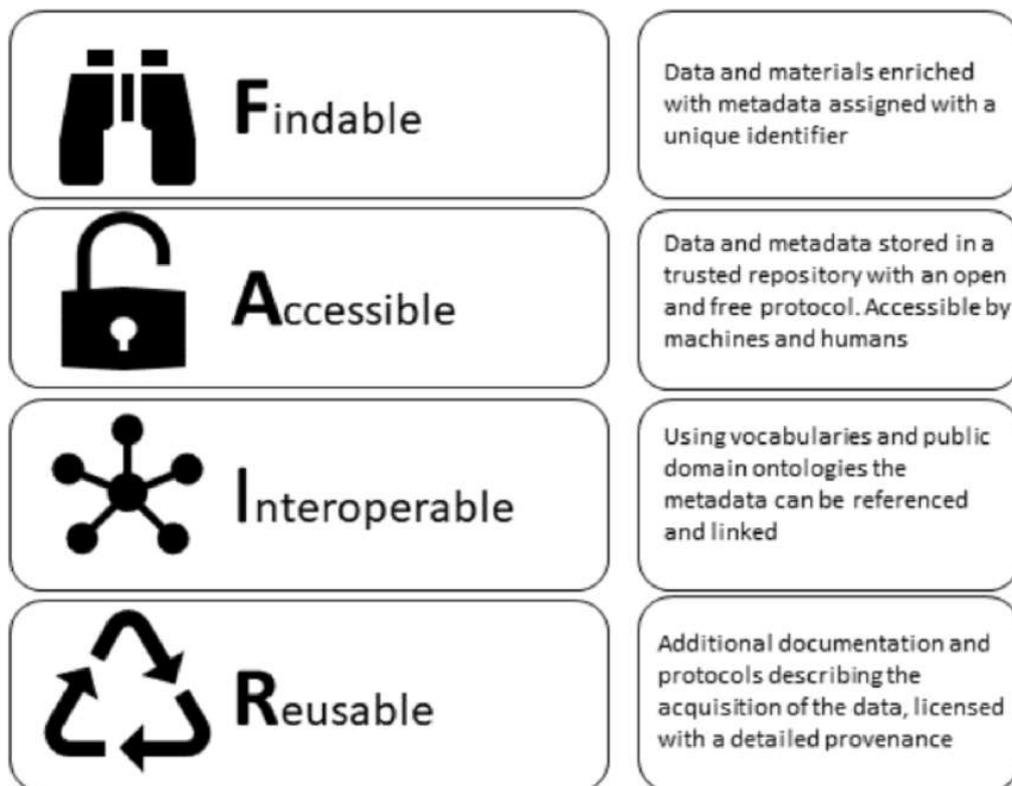
Data generated during research in analogue and electronic form, using various methods and software tools - e.g. tables, text documents, images, audio, photographs and pictures, software, database data, instrument outputs, laboratory logs, questionnaires, 3D models, scripts, etc. They are stored electronically, in various formats.

A clearly defined licence (e.g. CC-BY) defines access to them.

All collected data (collections) in different formats related to a specific research/project are organized into datasets which are described, stored and shared as a whole.

➤ **FAIR Principles:**

Research data should adhere to FAIR principles:



<https://doi.org/10.1016/j.ejmp.2021.01.083>.(CC-BY 4.0) Fig.1. Schematic representation and description of the FAIR data principles. In Kalendralis, Petros & Sloep, Matthijs & Soest, Johan & Dekker, André & Fijten, Rianne. Making radiotherapy more efficient with FAIR data. *Physica Medica*. 82, 2021, p. 158-162.

**Note:** Sharing data according to FAIR principles does not automatically mean that the data are freely available to everyone. Data sharing always follows the principle “**As open as possible, as closed as necessary.**” Not all data need to be shared (e.g., personal and other sensitive data, the disclosure of which could threaten security, trade secrets, patents, copyrights, internal data for organizational or group use, etc.). Once the reasons for restricting access to research data no longer apply, the data can be made available.

If necessary, data can also be anonymized to hide the identity of individuals or organizations in the research outputs. Tools for anonymization include Amnesia, NML Scrubber, and ARX Data Anonymization Tool. Refer to the Singapore PDPC Guide for guidance. If anonymization is not possible, user authentication or authorization must be set up for data access.

## ➤ Storing Open Data:

Store data in standard formats with metadata and persistent identifiers:

- **formats** – standard text (pdf, txt, rtf, html, xml..), video (mpeg, avi, mkv...), picture (jpeg, png, tiff...), archive (zip...), audio (mp3, flac, ...), measured data (in ASCII), software outputs
- **metadata** – details about datasets, they make data findable
- **persistent identifiers** – for permanent and unique identification of the entity (person, document, datasets, ...) including their metadata, regardless of location (ORCID for authors, DOI for documents, handle for documents, ROR for organizations)

PERSISTENT IDENTIFIERS FOR IMC:

[ROR: 0143w7709](#)

[ISN:0000000106676325](#)

Data sets are stored either separately in data repositories or as supplements to publications in open access mode.

### ▪ Data repositories

Repositories are used for storing, publishing, protecting and preserving the final data after the end of the research. Grant providers usually impose the condition of storing datasets in a trusted or certified repository. In general, it is recommended to find out who runs the repository, what functions it offers, whether it provides open access, licenses the data, whether it uses persistent identifiers for data, whether it allows updates, whether it has a certificate ([CoreTrustSeal](#), [Nestor Seal](#), [ISO16363](#)). All this information can be found e.g. in the OA directories of the [OpenDOAR](#) or [re3data.org](#).

### Types of repositories – branch, aggregating (Zenodo), institutional (ASEP).

For authors of the IMC, we recommend the [repository ASEP](#), for storing files with research data, which is managed by the Library of the Academy of Sciences of the Czech Republic and which we also use to record the publication activities of the institute's staff. Even in the case of datasets, please contact the documentation office in the library, Mrs. Eva Čechová, who is the authorized processor of entered data and publications.

Other recommended repositories by project providers:

[Zenodo](#) - an aggregating-type repository with open access for all disciplines developed as part of the European OpenAIRE program and operated by CERN. It allows researchers to store research papers, datasets, research software, reports and other research-related digital artefacts. Zenodo assigns Digital Object Identifiers (DOIs) to submissions.

## ➤ Data Management Plan

The **data management plan (DMP)** specifies what data will be created, how they will be managed and stored during the research, and how they will be made available and used further. Most project

providers stipulate in their terms and conditions that such a plan be created at the beginning of the project and regularly updated during the research. Various tools can be used to create a DMP, e.g. FAIR Wizard (service of the Academy of the Czech Republic), [DMP Online](#) (DCC), [Argos](#) (OpenAire and EUDAT). At the IMC, you can use the template for the DMP, which you can find on the internal web in the Project Department/Formulary section - <https://interni.imc.cas.cz/cs/formulare/3>

➤ **How to publish open research data**

1. Find out the specific conditions of the project provider
2. Prepare the dataset. Ideally, start creating a data management plan at the beginning of the research. The DMP will be updated throughout the project, but at the beginning, it is practical to set a baseline for data management practices (what formats, storage, etc.) from which to build. Ensure data is well organized and in an appropriate format. If possible, use commonly accepted standards and formats for your field.
3. Attach documentation to the data that explains the structure of the data, how the data was collected, the tools used, etc. Documentation can be e.g. in the form of a README file. Specify the data that can and cannot be shared (described in the DMP). All co-authors must agree to share. Sensitive data can eventually be anonymized or deleted (see above).
4. 4. Choose a suitable repository - either use the recommended repository according to the conditions of the project provider or choose the **ASEP institutional repository from the Academy of Sciences of the Czech Republic to store the dataset - in this case, please contact Mrs. E. Čechová (line 358)**, who is authorized to store data in repositories. Fill in the required metadata (author, dataset name, abstract, keywords, creation date and license terms). Repositories often provide a service to assign a persistent identifier for a dataset and since the identifier cannot be assigned to the data by the author himself, a provider with permission for this service is needed (this can be found with re3data.org). E.g. the ASEP repository has this option - when storing datasets in ASEP, the datasets are automatically assigned a doi identifier and a handle.
5. License the data - how to proceed:
  - Select the appropriate license. Creative Commons or Open Data Common licenses are recommended for open data (see page 1)
  - Decide what rights and restrictions you want to apply, and choose the appropriate variant of the selected license accordingly (e.g. CC-BY 4.0, CC0), see the table on p. 2.
  - Display the license in a visible place, e.g. on the project website, in the metadata of the dataset, or in the attached documentation (e.g. in the form of a LICENSE file).
  - Clearly formulate the terms of use of the data for its users.
  - If you have specific requirements, e.g. restrictions on sensitive data or you do not know how to formulate the terms of use exactly, you can contact the legal department of the IMC.
6. You can specify the recommended citation format for the data - some repositories offer these according to the specified metadata.
7. Update data as needed, upload new versions, update documentation. Some repositories also provide usage and citation statistics (Zenodo, Figshare).