



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA



University Guidelines for Research Data Management

Guidelines prepared by:

Alma Mater Studiorum – Università di Bologna

ARIC – Research Division, Research Services and Division Projects Coordination Unit, Data Stewards

With the support of:

ARIN – Innovation Division, Knowledge Transfer Office Unit

ARPAC – Cultural Heritage Division, University Digital Library Management and Development Unit – AlmaDL; Electronic Resource Library Management and Development Unit – AlmaRE

GLOS – Open Science Working Group

Departmental Open Science Representatives

SSRD – Executive Support Services, “Personal Data Protection” Unit

APPC – Planning and Communication Division – Communication Unit – Graphic Design for Communication Office

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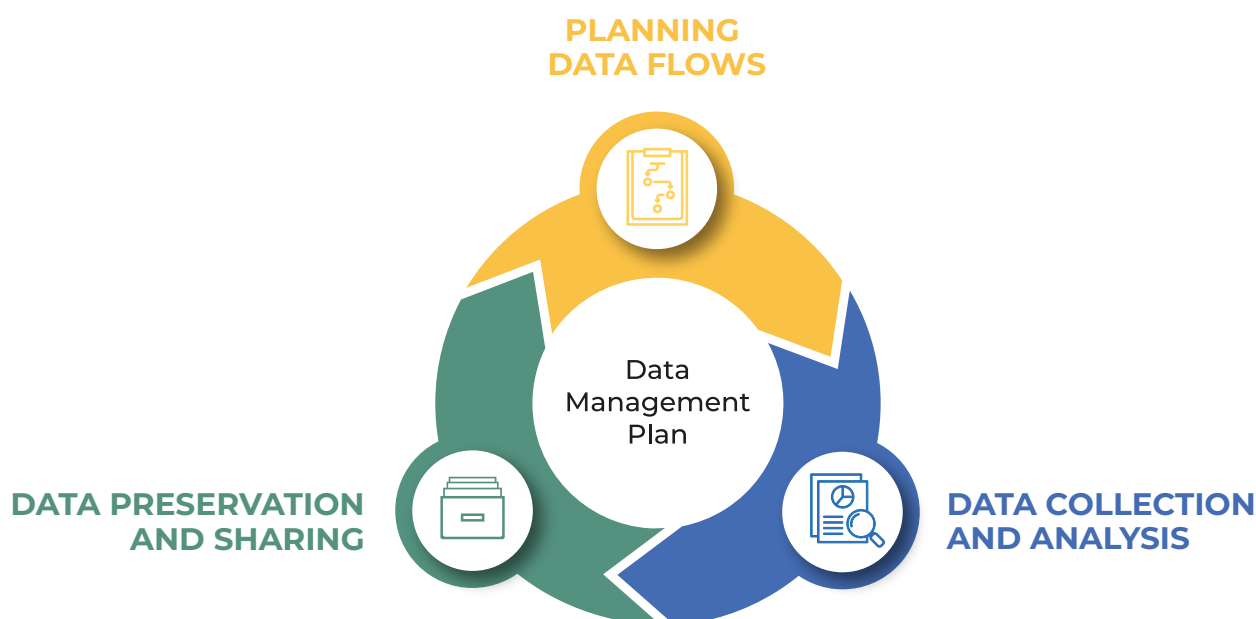
These Guidelines accompany *The University Policy on Research Data Management*, which lays down the criteria and principles to follow in order to manage data properly and consciously, in line with international standards and domain-specific peculiarities.

This document is intended for **all researchers of the University of Bologna**, regardless of their career level or disciplinary domain.

To manage means **to take care of research data and organise them carefully throughout the research cycle**, with a view to:

- making the research process as efficient as possible;
- making data interpretable, understandable and findable over time;
- fostering research integrity;
- encouraging cooperation with other researchers.

Data management needs to be **carefully planned** when starting research, accompanies all active phases of **data production, collection and analysis**, up to the **preservation** (i.e. long-term archiving) and, ideally, the **sharing** of research data.



These Guidelines present, one by one, the most significant aspects of the data management process, providing procedural instructions and useful tools for every step.

More details about the topics covered by these Guidelines are included in separate fact sheets. Reference to the fact sheets is made in the text as follows:  **Fact sheet title**.

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Useful links

The University Policy on Research Data Management:

<https://www.unibo.it/en/university/who-we-are/open-access-and-open-science>

University of Bologna's playlists (in Italian):

- "Dati: conoscerli e gestirli per valorizzare la ricerca"
<https://www.youtube.com/playlist?list=PLaUmBQ7P5K-AyDDnv1f8upAyEOtAF2gj3>
- "Open Access e Open Science"
https://www.youtube.com/playlist?list=PLaUmBQ7P5K-A83TIY96DyUl6t3rCryRK_

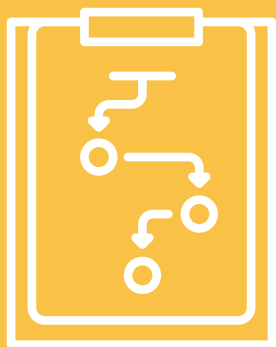
Research Data Management Decision Tree:

<https://doi.org/10.5281/zenodo.7190005>

TU Delft - Research Data Management 101 (RDM101) playlist:

https://www.youtube.com/playlist?list=PLdHnT1NHND-EA9wLpAfho_Wum9Xw6Q0_E

PLANNING DATA FLOWS





Main steps in this phase

- **Identify data** types,
 - **deciding whether to generate new data** and/or **reuse** available data from existing sources;
 - being aware of the ethical principles and privacy and intellectual property regulations to be complied with.
- **Identify the most important metadata** to describe the data you generate; when reusing existing data, pay close attention to the associated metadata.
- **Plan** how you will organise your data into **datasets**.
- **Prepare a Data Management Plan** to keep track of your choices.

Identifying data types

Research data is any **information**, in any format, which is used within a specific **research activity** and is necessary for the **validation of research results**. Data can come in a variety of types and is often identified and classified depending on the disciplinary domain 📖 **Research data: types, formats, methods**.

Right at the start of your research, you should:

- **Identify the data types** you will work with: to do this, consider every phase of your research to pinpoint **what type of information you will need to collect and/or use** to answer your research questions.
- **Always check for any existing data**, published by other researchers, that could be useful to answer your research questions.

If you produce new data:

- Always record the metadata related to the data and to their creation process (see [Identifying essential meta-data](#)).
- If your research involves vulnerable people, animals or certain technologies (artificial intelligence, dual-use technology, etc.), make sure to manage your data ethically and that you are duly authorised to collect them. Get in touch with the competent ethical committees, where appropriate.
- If your data contain personal data, make sure that you take the necessary precautions 📖 **Respecting privacy**.
- Consider if there are other reasons to keep your data confidential, e.g. commercial exploitation of related results or signed agreements with third parties.

If you reuse existing data:

- Carefully check the associated metadata, which contains essential information for proper reuse (see [Identifying essential metadata](#)).
- Through the metadata, find out whether you can reuse the data for your own purposes or there are restrictions imposed by the authors 📖 **Copyright**.
- Always make sure to reuse the data in compliance with ethical principles and intellectual property and privacy regulations.

🔗 Useful links

“Call them Data Stewards: specialists in research data management at the University of Bologna”: <https://magazine.unibo.it/archivio/2023/06/16/call-them-data-stewards-specialists-in-research-data-management-at-the-university-of-bologna>

Video “Data steward all’Università di Bologna”(in Italian) <https://youtu.be/6lc0isyefs8?si=JqCFzHlh2Hz1U2ee>

More resources on research data:

- The Turing Way Guide for Reproducible Research <https://the-turing-way.netlify.app/reproducible-research/rdm/rdm-data>
- Research Data Alliance <https://www.rd-alliance.org/>
- Digital Curation Centre (DCC) <https://www.dcc.ac.uk/>

Identifying essential metadata

Metadata is any **structured information** that accompanies research data (see [Identifying data types](#)). It is ‘data about data’, makes it easier to understand and reuse data and allows search engines and aggregators to index them 📖 **Metadata and documentation**.

Metadata is usually structured according to **standard schemas**, often **domain-specific**, implemented by infrastructures for long-term data archiving and access 📖 **Repositories**. Using controlled vocabularies ensures that the information included in the metadata is even more understandable and interoperable 📖 **Using different types of standards**.

Remember to:

- Identify the most appropriate **metadata schema** as soon as possible. Remember that this choice may be influenced by the repository where you will archive your datasets in the long term.
- Identify the **information** required by the metadata schema you are using and make sure to collect it throughout your research.
- Where possible, remember to use **controlled vocabularies**.
- When you deposit your data in a repository, remember to include the following key information in the metadata: **names and affiliations** (e.g. Alma Mater Studiorum – Università di Bologna) of anyone who contributed to creating the dataset in order to document authorship, a **Persistent Identifier**, or PID in short (e.g. Digital Object Identifier, or DOI), and the **type of licence** associated with the dataset (see also [Depositing data according to FAIR principles](#)).
- Remember: any information that cannot be structured in the metadata but that is needed in order to understand your data should be associated with the datasets as additional **documentation** (see [Gathering documentation](#)).

🔗 Useful links

Videoclip “5 Minute Metadata- What is metadata?” <https://www.youtube.com/watch?v=L0vOg18ncWE>

Resources to search for metadata schemas:

- FAIRsharing Standard Registry <https://fairsharing.org/search?fairsharingRegistry=Standard>
- RDA Metadata Standards Directory <https://rd-alliance.github.io/metadata-directory/standards/>
- DCC Guidance on Disciplinary Metadata <https://www.dcc.ac.uk/guidance/standards/metadata>

Planning how to organise data into different datasets

A dataset is a **structured set of related data** (see [Identifying data types](#)), in any format. Data are usually organised into datasets if they share a common goal (i.e. they answer the same research question) or reflect the results of a research activity 📊 **Datasets**. Datasets are crucial to ensure the quality and usefulness of research results. A well-organised and well-managed dataset is always accompanied by informative metadata (see [Identifying essential metadata](#)).

Right at the start of your research, remember to:

- **Organise** your data in a meaningful way.
- Use a **clear naming system** for the files and folders that will form your dataset, to clarify as much as possible their content and the relations between them.
- Start **gathering the documentation** you will need to make your datasets as understandable and reusable as possible (see [Gathering documentation](#)).
- Start thinking about which repository/ies may be most suitable to **archive your datasets** in the long term (see [Choosing the most appropriate repository](#)). The content and size of your dataset may limit your choices.

Drafting a Data Management Plan

A Data Management Plan (or DMP in short) is the main tool for **documenting all data management choices** made during a project. It is usually a text document and should be drafted **at a very early stage**. A DMP is also contractually required by many funding bodies.

- Start writing your DMP as soon as you begin thinking about how you will manage your data.
- Remember that data management strategies **evolve during the research** and that your DMP must **be kept up to date**.

In the document:

- Give a **detailed overview of your research data**, both new and reused data (see [Identifying data types](#)).
- Specify the **methodologies, tools and software** you employ to collect, create and analyse your data  **Managing software**.
- Identify the strategies you will implement to ensure **data quality** and avoid inaccuracies or inconsistencies (see [Ensuring data quality](#)).

- Include **data storage** strategies, e.g. whether you share data with collaborators or make backup copies (see [Saving data in appropriate storage spaces](#)).
- Describe **long-term archiving strategies** (see [Choosing what data to deposit](#) and [Choosing the most appropriate repository](#)) and how you apply **FAIR principles** to your data (see [Depositing data according to FAIR principles](#)).
- Describe **roles and responsibilities** within your research team.
- Document data management **costs**, also in terms of time spent.
- Cover the aspects of data management related to **privacy, intellectual property rights** and **ethics**  **Respecting privacy**  **Copyright**.

Useful links

Video “Dati: conoscerli e gestirli per valorizzare la ricerca. Il Data Management Plan” (in Italian)

<https://www.youtube.com/watch?v=SIOsrQdrhtQ>

Video “RDM101- Module5: Data Management Plan”

https://youtu.be/28rTTRFDq58?si=E1ZGfzU_Q8G7p2c

DMP preparation guidelines. Science Europe Templates and Guidelines

<https://scienceeurope.org/our-priorities/research-data/research-data-management/>

Online tools for preparing your DMP:

- Elixir Data Stewardship Wizard <https://ds-wizard.org/>
- DCC DMPonline <https://dmponline.dcc.ac.uk/>
- ARGOS <https://argos.openaire.eu/home>

Data Management Plan templates:

- Horizon Europe Data Management Plan Template https://www.openaire.eu/images/Guides/HORIZON_EUROPE_Data-Management-Plan-Template.pdf
- Science Europe Data Management Plan Template <https://scienceeurope.org/media/411km040/se-rdm-template-3-researcher-guidance-for-data-management-plans.docx>

DATA COLLECTION AND ANALYSIS





Main steps in this phase

- **Save** data in appropriate **storage spaces** and make the necessary **backup copies**.
- **Ensure** data **quality** through methodical processes and by
 - **keeping track** of file **versions**;
 - **organising files and folders** hierarchically, and naming them consistently;
 - **choosing the most appropriate formats** for your data, preferring standard and open formats whenever possible to facilitate interoperability and reusability.
- **Include** in the **documentation** all information necessary to understand and interpret your data.



Saving data in appropriate storage spaces

To **store** data (see [Identifying data types](#)) means to retain them in the **short or medium term**, e.g., during the active phases of the research process. **Storage systems** include external hard drives, cloud services and servers.

During your research:

- Plan how you will store your data early on, deciding **where to save it** and **budgeting** any potential **costs**.
- Remember that the choice of the most appropriate storage system depends on the **nature of the data**, **its volume** and how often different people **collaborate** on the same files.
- Make **backup copies** of your files on a regular basis, on different storage systems, to avoid data loss.
- If you need to share data with your research team, use storage platforms that allow for remote access and set **each member's access rights to files and folders** right from the start.
- Make sure that the storage infrastructure you choose allows you to monitor any **changes** to the data, who made them, as well as to recover any **previous versions**. These aspects are crucial in collaborative research contexts.
- Make sure to protect your data by **updating** your own personal **passwords** regularly and by keeping your computer's **antivirus** up to date.
- Remember that **managing and storing personal data** requires an additional level of protection, for which you can use a dedicated password or software that encrypts files and folders **Respecting privacy**.

Useful links

More on choosing the storage system:

- The Research Data Management Toolkit <https://rdmkit.elixir-europe.org/storage#what-features-do-you-need-in-a-storage-solution-when-collecting-data>
- The Turing Way Guide for Reproducible Research <https://the-turing-way.netlify.app/reproducible-research/rdm/rdm-storage>

File and folder encryption tools:

- Veracrypt <https://www.veracrypt.fr/en/Home.html>
- BitLocker <https://docs.microsoft.com/it-it/windows/security/information-protection/bitlocker/bitlocker-overview>

Data management budgeting tools:

- OpenAIRE RDM Cost Calculator <https://www.openaire.eu/how-to-comply-to-h2020-mandates-rdm-costs>
- UK Data Service RDM Cost Calculator <https://ukdataservice.ac.uk/app/uploads/costingtool.pdf>

Video “Dati: conoscerli e gestirli per valorizzare la ricerca. Salvare e condividere i dati” (in Italian)

<https://youtu.be/VQ0yK0tQ1N4?feature=shared>



Ensuring data quality

Ensuring data quality is a domain-specific process and as such goes beyond the scope of this Guidelines. However, it begins with a **set of methodical processes** that allow your data to be traced, used, and reused properly.

During your research:

- Choose a **clear organisation for folders and files** and keep track of ensuing versions.
 - Choose a clear and legible file **naming standard**. It is a good idea to enter the name of the author or the origin of the data, creation date and version number, without using spaces or special characters (e.g. FocusGroup1_20240502_v2.rtf).
 - Choose the **most appropriate format** for your data, preferring standard and open formats whenever possible to facilitate interoperability and reusability
-  **Research data: types, formats, methods.**
- **Validate and verify your data** to avoid inaccuracies, incompleteness or inconsistencies. Strategies include data entry validation, data interval control, removal/recording of inaccurate or missing variables, control of consistent data scales.
 - Define a **standard methodology and workflows** for data analysis and processing, especially in collaborative research contexts. For example, you can define which data to save in which folders, how and when to document the data, or which systems to use to share data with collaborators (see [Saving data in appropriate storage spaces](#)).
 - If your data is related to any other research results, describe this relationship in the documentation and **provide a full citation** (e.g. a dataset derived from an existing dataset) (see [Gathering documentation](#)).

Useful links

More on data quality control strategies:

- The Turing Way Guide for Reproducible Research <https://the-turing-way.netlify.app/reproducible-research/rdm/rdm-data-curation>
- The Research Data Management Toolkit https://rdmkit.elixir-europe.org/data_quality

File naming tools:

- Bulk Rename Utility (Free File Renaming Utility for Windows) <https://www.bulkrenameutility.co.uk/>
- File Naming Conventions <https://www.data.cam.ac.uk/data-management-guide/organising-your-data#Naming>

Methodology standardisation and sharing tools:

- Protocol Manager <https://protocols.io>



Gathering documentation

Your data and datasets (see [Planning how to organise data into different datasets](#)) can only be **intelligible and interpretable by others** if they are accompanied by additional documentation. For example, a README file is a free text document (i.e. human-readable) included within the dataset that **explains the data origin and how it is organised**.

During your research:

- Draw up the documentation during all active phases of data collection and analysis.
- Document the **data** that makes up the dataset, the **relationships** between data, and their **origin**.
- Provide comprehensive information about the **methodologies** (protocols, technical specifications, tools used) **applied** for data collection and/or reuse and/or generation.
- Document **quality assurance processes** during data generation and analysis (see [Ensuring data quality](#)).
- Provide information about any **tools or software needed** to open, read or interpret your data  **Managing software**.
- **Archive** the documentation **together with the data** at the time of deposit in a repository (see [Choosing what data to deposit](#)).
- Save the documentation in an open and accessible file format (e.g. .rtf, .md).

Useful links

CESSDA Data Management Expert Guide. Documentation and Metadata

<https://dmeg.cessda.eu/Data-Management-Expert-Guide/2.-Organise-Document/Documentation-and-metadata>

Utrecht University. Research Data Management Support Guides. Metadata and Documentation

<https://www.uu.nl/en/research/research-data-management/guides/during-research/metadata-and-documentation>

DATA PRESERVATION AND SHARING





Main steps in this phase

- **Choose what data to deposit** to ensure the best understanding, transparency and reproducibility of your research.
- **Choose the most appropriate repository** for your data to ensure its preservation and sharing in the long term.
- **Deposit your data** organised in datasets and according to **FAIR principles**.
- **Associate** your data with **a licence** that allows **as wide a reuse as possible**, unless you are limited by commitments towards third parties or by commercial exploitation strategies.



Choosing what data to deposit

To deposit data means to archive them in a digital infrastructure designed for their long-term preservation and called a **repository** (see [Choosing the most appropriate repository](#)). At this stage, data are **organised in datasets** (see [Planning how to organise data into different datasets](#)). The deposit can occur at the end of a research activity but needs to precede the publication of its results in a scientific article.

Deposit ensures **data preservation** and **visibility** well beyond the end of the research project that generated it.

During your research:

- **Select** which data to deposit to allow for the validation of your conclusions and the reproducibility of your research. Remember that the researcher who generates the data is **responsible for depositing** it.
- **Remember to deposit**, for example, original datasets or software, raw data obtained from the analysis of physical samples, and observational data that cannot be re-obtain  **Managing software**.
- **It is not necessary to deposit** data that is easy to re-obtain or that is too large compared to its actual usefulness.
- **Do not deposit** data that is already available, e.g. data you are reusing because someone else deposited it first.
- In any case, carefully **document** the **origin** of the data you deposit, as well as the **methodologies** with which it was produced and managed (see [Gathering documentation](#)).
- You can also deposit data that must remain inaccessible to third parties, for privacy, ethical or intellectual property reasons, provided you choose a suitable repository  **Respecting privacy**  **Copyright**.

Useful links

Video “UGent Open Science. Knowledge clip: Preserving data”: <https://youtu.be/UaiRAI-fwmw?si=b5YHHxNmXkUwEofM>

Video “Dati: conoscerli e gestirli per valorizzare la ricerca. Conservare i dati a lungo termine” (in Italian)

https://www.youtube.com/watch?v=J3VyrUzzj_E

More on long-term preservation of data:

- The Research Data Management Toolkit https://rdmkit.elixir-europe.org/data_publication
- Stanford University Library Guidelines on Data Management and Sharing <https://laneguides.stanford.edu/DataManagement/>
- Digital Curation Centre, How to Appraise and Select Research Data for Curation <https://www.dcc.ac.uk/guidance/how-guides/appraise-select-data>



Choosing the most appropriate repository

Repositories are infrastructures for the long-term archiving of datasets (see [Planning how to organise data into different datasets](#)). They can be disciplinary, institutional or generalist in nature. Repositories can also be officially certified. In all cases, reliable repositories assign a **PID** (such as a DOI) and allow authors to associate **metadata** (see [Identifying essential metadata](#)) and licences to datasets at the time of deposit (see also [Depositing data according to FAIR principles](#)). 📖 **Copyright**

During your research:

- Use a **registry** (see Useful links) to search for one or more repositories that suit your needs and the types of data you wish to deposit.
- Find out if there is a repository **specific to your research domain**. A disciplinary repository allows you to describe your data using a domain-specific metadata schema and makes them more visible to your scientific community.
- Check if your **home institution** has one or more repositories available to its members. The University of Bologna has two institutional data repositories, AMS Acta and AMS Historica, and related support, valida-

tion and data curation services. 📖 **Repositories**.

- Keep in mind that **generalist** repositories also exist and tend to collect heterogeneous data and materials (e.g., Zenodo).
- Choose a repository with a suitable security profile and that allows for **controlled access** if your data must remain inaccessible to third parties, for privacy, ethical or intellectual property reasons 📖 **Respecting privacy** 📖 **Copyright**.
- Remember that cloud storage services (see [Saving data in appropriate storage spaces](#)), personal or project websites, and social networking platforms such as ResearchGate and Academia.edu are not repositories because they do not ensure long-term preservation of your data.
- Be aware that some publishers and journals, especially in certain domains, have created their own repositories and advise (or sometimes require) authors to deposit their data there. We recommend that you (also) publish your data elsewhere – be it in a disciplinary, institutional or generalist repository.

🔗 Useful links

Video “UGent Open Science. Knowledge clip: Data repositories”. https://youtu.be/pm_COU8ByYE?si=-Mv_dqsH66amR6Zs

Video “Dati: conoscerli e gestirli per valorizzare la ricerca. Conservare i dati a lungo termine” (in Italian)

https://www.youtube.com/watch?v=J3VyrUzzj_E

Registries of repositories:

- Re3data <https://www.re3data.org/>
- OpenAIRE Explore <https://www.openaire.eu/find-trustworthy-data-repository>
- FAIRsharing Repository Database <https://fairsharing.org/search?fairsharingRegistry=Database>

University repositories:

AMS Acta <https://amsacta.unibo.it/> | AMS Historica <https://historica.unibo.it/>

Further information about the University repositories: “Preserving and disseminating research data in AMS Acta” (<https://sba.unibo.it/en/almadl/almadl-services/preserving-and-disseminating-research-data-in-ams-acta>);

“Preservation and enhancement of the digital cultural heritage”

(<https://sba.unibo.it/en/almadl/almadl-services/preservation-and-enhancement-of-the-digital-cultural-heritage>).

Generalist repositories:

Zenodo <https://zenodo.org/> | Figshare <https://figshare.com/> | Open Science Framework <https://osf.io>



Depositing data according to FAIR principles

Depositing data for long-term archival forms an integral part of responsible research data management, in line with FAIR principles.

First published in 2016, FAIR principles are general recommendations that aim to improve **research data reusability** by individuals and IT systems. To manage data in accordance with FAIR principles means making them **Findable, Accessible, Interoperable and Reusable** **FAIR principles**.

During your research:

- Deposit your data in a **repository**. This is the first step to making your data FAIR since every dataset (see [Planning how to organise data into different data-sets](#)) is accompanied by its metadata (see [Identifying essential metadata](#)), including a PID and a licence. **Repositories** **Copyright**.
- Choose **standard and open formats**. Where possible, use vocabularies, ontologies and taxonomies to make your data understandable, interoperable and reusable **Research data: types, formats, methods** **Using different types of standards**.
- If you publish your data according to FAIR principles, you make your data, their analysis and the derived publications **more citable and exploitable**. Your research becomes more **transparent and verifiable**, in line with the requirements of a growing number of funding bodies, including the European Union.
- While FAIR data is not always freely accessible to anyone, their metadata usually are (see [Associating a license with your data](#)).

Useful links

Wilkinson *et al*, *The FAIR Guiding Principles for scientific data management and stewardship*. Sci Data 3, 160018 (2016). <https://doi.org/10.1038/sdata.2016.18>

Video “UGent Open Science. Knowledge clip: FAIR data principles”. <https://www.youtube.com/watch?v=2uZxFu9SFf8>

More on the FAIR principles:

- GOFAIR. FAIR Principles <https://www.go-fair.org/fair-principles>
- FAIRsFAIR Fostering Fair Data Practices in Europe <https://www.fairsfair.eu/>
- How to FAIR <https://howtofair.dk/>

Video “Dati della ricerca: la European Open Science Cloud e i principi FAIR” (in Italian) <https://www.youtube.com/watch?v=eNiHNaU6MrQ>

Video “EOSC Portal. European Open Science Cloud- The New Frontier of Data-Driven Science” <https://youtu.be/3Hgnle1Xu8I?si=CjR4tLRYi-vAw1bu>



Associating a license with your data

Choosing a licence to associate with your datasets, in accordance with FAIR principles, allows you to specify to what extent they can be reused by others 📄 **Copyright**.

Publishing data openly fosters **collaborative research** and supports the Open Science movement. Open data is **distributed under a licence that ensures that they can be freely accessed, used, modified and shared** by anyone, requiring at most some form of attribution and integrity requirements while preserving openness.

Open Science is the movement to make **scientific research accessible without barriers to the scientific community and to citizens**. It is based on transparency, inclusion, correctness, fairness and sharing. It has been a strategic objective of the European Union since 2015, of UNESCO since 2021, and of the Italian Ministry of Research since 2022, under the *Italian National Plan for Open Science*.

Remember that the choice of licence for your data should be inspired by the ‘as open as possible, as closed as necessary’ principle.

In some cases, it may be appropriate to limit access to data if this is conducive to the exploitation of research for commercial purposes. This is in line with the University’s mission of fostering the transfer of research results to make an impact on the economy and society.

During your research:

- Manage your data according to FAIR principles throughout the data lifecycle and prepare a **Data Management Plan** (see [Drafting a Data Management Plan](#)) 📄 **FAIR principles**.
- **Publish your data in open access unless restrictions apply** due to third-party rights or other legal provisions and provided this does not undermine opportunities for commercial exploitation of research results.
- To distribute your data openly, choose **permissive licences** that allow for any use, with any means and format and for any purpose, including commercial ones. These licences include CC0 1.0, CC BY 4.0, CC BY-SA 4.0.

🔗 Useful links

Open Science on the University website <https://www.unibo.it/en/research/open-science/open-science>

The Turing Way Guide for Reproducible Research <https://the-turing-way.netlify.app/reproducible-research/open/open-data>

Open Definition “Defining Open in Open Data, Open Content and Open Knowledge” <https://opendefinition.org/od/2.1/en/>

Italian national plan for open science <https://www.mur.gov.it/it/atti-e-normativa/decreto-ministeriale-n-268-del-28-02-2022>

Further information about copyright and cultural heritage protection and enhancement:

<https://sba.unibo.it/en/almadl/almadl-services/legal-support-for-copyright-management-and-cultural-heritage-protection>

Conclusions

Research data management is a set of good practices aimed at making the most of research data throughout their lifecycle, from the planning phases up to deposit and sharing.

It has advantages for researchers in terms of research quality and impact, as well as dissemination and exploitation of research results.

As we have discussed, to ensure a proper, high-quality data management process, it is crucial that each step described in this Guidelines is taken consciously and at the right time.

The first, essential one is to identify the data types you will work with. And while data management at its core is based on a set of fairly standard steps, we recognize that every research project is based on data that are extremely varied in typology, origin and use, according to domain specificities.

Contact

At the University of Bologna, research data management is supported in several ways.

If you need support about managing data and writing your Data Management Plan, please contact the Data Stewards that work within ARIC – Research Division: aric.datasteward@unibo.it.

If you need support about using the University repositories (AMS Acta or AMS Historica), please contact: al-madl@unibo.it.

If you need support about copyright and related rights and about cultural heritage protection and exploitation, please contact: al-madl@unibo.it.

If you need support about the commercial exploitation of the University of Bologna's research results, please contact the Knowledge Transfer Office: kto@unibo.it.

If you need support about privacy matters, please contact: privacy@unibo.it.

 **Checklist:** The key steps for proper research data management.

PLANNING DATA FLOWS PHASE

- ☐ **Identify data types.**
 - ☐ Decide whether to **generate new data and/or reuse available data**.
 - ☐ Be aware of **ethical principles and privacy and intellectual property regulations**.
- ☐ Identify the **most important metadata**.
- ☐ Plan how you will **organise your data into datasets**.
- ☐ Prepare a **Data Management Plan**.

DATA COLLECTION AND ANALYSIS PHASE

- ☐ Save data in **appropriate storage spaces** and make **backup copies**.
- ☐ Ensure data **quality**.
 - ☐ Keep track of **versions**.
 - ☐ **Organise files and folders** consistently.
 - ☐ **Choose** the most appropriate data **formats**.
- ☐ Include the **documentation** necessary to understand and interpret your data.

DATA PRESERVATION AND SHARING PHASE

- ☐ Identify the **data that needs to be preserved in the long term**.
- ☐ Choose **the most appropriate repository** for deposit.
- ☐ **Deposit data** in datasets according to FAIR principles.
- ☐ Associate **the most appropriate licence** with your deposit.



ALMA MATER STUDIORUM
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