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Research Data Management in Compliance with European Research Area Policies

Action plan for Open Science for the implementation of Objective 6.2: Open Science to improve the research quality, efficiency, and responsiveness of the Resolution

entific Research and Innovation Strategy 2030 (ReZrIS30)

University of Nova Gorica, December 6, 2024

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Formal Bases for Sharing Research Data in the ERA

In March 2022, the European Commission adopted the *Pact for Research and Innovation in Europe* and the ERA Common Policy which defines 20 concrete measures that will contribute to the realization of the goals set in the Pact in the period 2022-2024. First three measures directly address the aspect of open sharing of all research results:

- Implementation of open science, including through the European Open Science Cloud (EOSC);
- A draft EU copyright and data legislative framework for research;
- A reform of the assessment system for research, researchers and institutions.

European Union's Policy on Open Science

Open science is one of the European Commission's key priorities and a fundamental guiding principle in its research and innovation funding programs.
The EU's open science policy comprises eight aspects:

- Training and skills for practical implementation of open science,
- Recognition, promotion and rewards for open science practices,
- New-generation metrics and altmetrics,
- Open publishing and encouragement of early sharing of research results,
- Open data,
- Research integrity and reproducibility of scientific findings,
- European Open Science Cloud (EOSC),
- Citizen science.

Horizon Europe Programme

Under Horizon Europe, the sharing of research data and the creation of research data management plans have also become **mandatory**, alongside the requirement for open access publishing.

While certain exemptions may allow for the closure or restricted access of research data, metadata must always be made openly available.

Responsible research data management entails careful planning in advance, adherence to the FAIR principles as well as the principle »as open as possible, as closed as necessary«.

Horizon Europe also promotes several **recommended open science practices**, including project pre-registration, registration reports and publication of preprints.

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Key Horizon Europe Documents

Tender documentation and other related documents (including, for example, a template for the data management plan) can be found on the online portal of the European Commission, Funding & Tender Opportunities. The key documents you need to know are:

- **Horizon Europe Programme Guide**, which defines open science practices in chapters 14 (*Dissemination and exploitation of research results*) and 16 (*Open Science*),
- **EU Grants – AGA: Annotated Model Grant Agreement**, which precisely defines the conditions and methods for dissemination of scientific publications, data and metadata in Annex 5: *Communication, dissemination, open science and visibility*.
- **Horizon Europe (HORIZON), Euratom Research and Training Programme (EURATOM): General Model Grant Agreement, EIC Accelerator Contract**, which addresses aspects of confidentiality, security, ethics, data protection and intellectual property rights that determine eligible exemptions from openness in Section 2: *Rules for carrying out the action*.

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European Research Council

The ERC embraces the FAIR data principles. Research data should be findable, accessible, interoperable and re-usable.

This means that data should be:

- identified in a persistent manner using community conventions, and described using sufficiently rich metadata;
- stored in such a way that they can be accessed by humans and machines;
- structured in such a way that they can be combined with other datasets;
- licensed or having terms-of-use that spell out how they can be used by others.

More in
Open Research Data and Data Management Plans Information for ERC grantees by the ERC Scientific Council
.

Scientific Research and Innovation Activities Act (since 2021)

Scientific Research and Innovation Activities Act (ZZrID) defines the national principles of open science in Articles 40, 41 and 42. Open science primarily includes open access to research results, evaluation of the quality and impact of research work using responsible metrics, as well as active engagement of the interested public and their involvement in the research process.

ZZRiD specifies in Article 41 that the funding body will mandate and the performer of the scientific research activity will ensure **open access to all peer-reviewed scientific publications and research data that arise from research activities receiving a minimum of 50% public co-financing.**

Article 41 also specifies that open research data should be published or made available in a manner that ensures their discoverability, accessibility, interoperability, and reusability, **following the FAIR principles.**

Public Information Access Act and its Amendments (since 2022)

The Act Amending the Public Information Access Act (ZDIJZ-G) implemented the revised
Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information
into the Slovenian legal framework (further details about this directive can be found on the European Union policies subpage).

Article 6.č of the Act specifically governs the provisions related to the **reuse of research data**, namely:

- The Act mandates that **public service providers engaged in research** and **public service providers engaged in educational activities beyond secondary school level** must facilitate the reuse of research data generated from publicly funded research.

Decree on the Implementation of Scientific Research in Accordance with the Principles of Open Science (since 2023)

Decree on the Implementation of Scientific Research in Accordance with th e Principles of Open Science

mandates open access to research (meta)data and other research outcomes.

For this purpose, researchers are requiredto develop a research data management plan and adhere to the FAIR principles and the principle of "as open as possible, as closed as necessary."

The Decree outlines the procedures for the long-term preservation of research data and other research outcomes in repositories, as well as establishes citation guidelines.

In terms of copyright for scientific publications, the Decree addresses the management of these rights and specifies the permissible open licenses.

Institutional Policies: University of Ljubljana

In Article 50 of the chapter *Research Data Management*, the Rules on Doctoral Studies at the University of Ljubljana stipulate:

„Research data generated and gathered during the course of a doctoral dissertation must be made publicly available or otherwise accessible in a manner that ensures transparency, accessibility, interoperability, and the potential for re-evaluation and reuse. The doctoral student is responsible for depositing the research data in a suitable data repository, data center, or research data archive, thereby upholding the principles of verifiability, transparency, and open science. Whenever possible, it is advisable to utilize regional, national, or international data centers that specialize in specific types of data or to the Repository of the UL.“

What are Research Data?

Definition by Springer Nature:

Research data refers to the collection of files that support your research project, study or publication such as spreadsheets, documents, images, videos or audio. (www.springernature.com)

Definition by OECD:

Research data are defined as factual records (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. A research data set constitutes a systematic, partial representation of the subject being investigated. This term does not cover the following: laboratory notebooks, preliminary analyses, and drafts of scientific papers, plans for future research, peer reviews, or personal communications with colleagues or physical objects (e.g. laboratory samples, strains of bacteria and test animals such as mice). (OECD Principles and Guidelines for Access to Research Data from Public Funding)

Research Data Lifecycle

The research lifecycle refers to the process of conducting research, from the initial planning, funding, and designing of a project to publishing and disseminating the conclusions or scholarship. Although the research process varies across disciplines and research domains, it often includes validating a model or hypothesis by using information and data. This site refers to data in the broadest sense of the word, including experimental, observational, acquired, and simulated data, as well as any relevant information, artifacts, and original sources. The research lifecycle also includes publishing the data, code, and workflows to facilitate the reproducibility of the published results.

Source: Research Support at Harvard https://researchsupport.harvard.edu/research-lifecycle

Research Data Management Plan (DMP)

Research data management (RDM) is a process in the research lifecycle that includes the **creation (collection or acquisition) of research data**, their **organisation**, **digital stewardship**, **storage**, (**long-term) preservation**, **security**, **quality assurance**, **allocation of persistent identifiers**, **providing metadata**, **issuing appropriate licenses** and **procedures for data exchange, sharing and reuse**.

Research data management must be accurately planned in advance with the help of a data management plan (DMP). Data management plans are the basis of responsible data management and became mandatory in 2021 for the Horizon Europe and European Research Council (ERC) projects, regardless of whether data is created or reused. Beneficiaries must submit them within the contractual period, which is usually 6 months from the signing of the contract

Characteristics of DMPs

You can **create research data management plans yourself** or use **templates** that are often suggested by funders or institutions. Typically, the plan consists of questions that you answer in a way that is consistent with the goals and expected way of conducting the research. The form of the plan largely depends on the research itself.

The plan is also a living document that can be **updated and supplemented** as the project progresses. Changes may relate to newly generated data or to the originally planned activities. **For projects longer than 12 months, updating is mandatory**, both during the project and at the end, when the plan needs to be adapted to the actual situation.

The recommended practice is to **open and publish** plans on appropriate platforms, such as Research Ideas and Outcomes (RIO) Journal, or in dedicated repositories, such as DMP Online. You can also find many examples of good practices for creating research data management plans on both platforms.

Essential Contents of DMPs 1

1. Description of Data
A precise description of the generated or reused data, including the content aspect, data type and data volume assessment, is crucial for interoperability and reusability.

2. Standards and Metadata
Protocols and standards used in data structuring (e.g., standard metadata schemas) are also very important for ensuring interoperability and reuse. It is recommended to use standards that are recognized in the individual research field.

3. Persistent Identifiers
Information about the type of persistent identifiers you will use. Most trustworthy repositories assign persistent identifiers when archiving data to the repository.

Essential Contents of DMPs 2

4. Digital Stewardship and Data Protection
Information on data quality assurance, data lifetime, permanent storage and data access, including information about the repository and assessment of whether the repository is trustworthy.

5. Data Sharing Terms
Detailed information about the conditions of data sharing, including the terms of use and the license under which the data is accessible and can be reused.

6. Management of Other Research Results
For effective interoperability and reuse, it is necessary to provide information on how other research results (e.g., software) will be accessible.

7. Data Management Costs
Often, RDM costs are a eligible cost under the contract with the funder of the research work, but it is essential to note the cost estimate (e.g., data creation costs, documentation costs, storage costs, repository costs, data quality assurance costs, RDM staff costs) also in the RDM plan.

Research Data Management Plan Templates

Some current proposals for research data management plans prepared by funders and other institutions can be found at the links below:

- Data Management Plan - ARIS Form
- Horizon Europe Data Management Plan Template
- ERC Data Management Plan Template
- Prepare a Data Management Plan. A Set of Questions From the »*Data Management Expert Guide*« Online Textbook (adapted from the *Data Management Expert Guide* of the CESSDA consortium, recommended by the Social Science Data Archives)
- Recommendations for a computer code management plan (Software Sustainability Institute)

Since many research data management plans are very complex, especially those for Horizon Europe projects, CTK prepared an **annotated template of this plan**. We have added explanations to the basic template that will help you understand the plan and prepare answers to the questions asked. You can download the annotated template from the link below (it is currently only available in Slovenian).

Online Tools for Creating Research Data Management Plans

Creating a research data management plan is even easier with the help of some online tools that already contain proposals from different funders. The advantage of online tools is also the easy sharing of files with other members of the research group or project consortium and joint editing of documents. Here we will highlight the three most widely used tools.

The templates are mainly adapted to the requirements of the European Commission and European funding agencies, but some other templates can also be found, e.g., by the American National Science Foundation. The DMP Online website also serves as a repository of publicly available plans opened by other researchers. Use is free of charge:

- DMP Online: The DMP Online website also serves as a **repository of publicly available plans** opened by other researchers.
- DMP Tool: The templates are adapted mainly to the requirements of **American funding agencies and research institutions**.
- DataWiz: multi-functional online tool that offers fewer pre-made templates for research data stewardship plans than DMP Online and DMP Tool,
- NRRP Asistent: **Slovenian funder ARIS** tool with ARIS template, which also allows public publication of DMPs.

FAIR

Open research data must be published or otherwise accessible in a way that enables their **findability, accessibility, interoperability and reusability**, or, in short, according to the **FAIR principles**. FAIR principles are generally used for sharing all scientific findings, but they are especially important when sharing research data.

- **F: Findability:** The findability principle of represents the provision of easy findability of metadata and data, both for physical users and for search algorithms (robots).
- **A: Accessibility:** The accessibility principle represents the provision of data accessibility, including possible authentication and authorization procedures.
- **I: Interoperability:** The interoperability principle provides the possibility of integrating data with other data and the possibility of using applications or work processes for the needs of analysis, storage and processing.
- **R: Reusability:** The reusability principle ensures the possibility of data reuse. To achieve this, the data and metadata must be **described in sufficient detail to enable reproducibility or reuse for other purposes**. There are three key aspects to reuse, namely:
  - metadata and data must be **licensed** in a way that allows reuse,
  - when re-using data, it is essential that the user is familiar with the description of the method of data creation or with a **description of the origin (provenance)** of the data,
  - metadata and data must enable a **scientific level of reuse**.

FAIRification

The process of converting data into a format compliant with FAIR principles is called **FAIRification** and includes complex tasks:

- data generation,
- analysis of generated data,
- choosing (or creating) an appropriate semantic model for data and metadata,
- ensuring access to data,
- choosing an appropriate license to allow reuse,
- generation of rich metadata and publishing data together with rich metadata and an appropriate license that enable reuse.

You can read more about the FAIRification process at GoFair- FAIRification Process and FAIR Cookbook websites.

Formatting Research Data for Open Sharing

Research data must be properly formatted before sharing so that other researchers can understand and reuse them. In this way, we satisfy the FAIR principles of **interoperability** and **reusability**. In some cases, the formatting of research data for open sharing is not much different from its formatting for scientific publications, but a few details should be noted. In repositories, research data will stand on their own without an accompanying context, which is why it is necessary to pay attention to the:

- appropriate naming of files,
- the hierarchy of file folders,
- metadata (which can be described in ReadMe files or data articles),
- file formats (as only some are interoperable enough to be suitable for sharing).

More on https://dirrosdata.ctk.uni-lj.si/en/raziskovalni-podatki/oblikovanje-podatkov-za-deljenje/.

Metadata

Metadata are, simply put, “data about data”. They must contain all the information that makes the research data understandable, interoperable and reusable, except for the content of the research data itself. This means at least:

- information about the research project and authors,
- information about the origin (provenance) of data (time and place of creation, measuring instruments and their settings, methods of data processing...),
- accompanying documents, such as protocols and software required for data reuse.

Metadata are typically licensed with the CC0 license (“No Rights Reserved”) because they mostly represent non-copyrighted factual information.

Metadata can be recorded in various formats, from plain text to ReadMe files, from data papers to extensive, standardized, machine-readable metadata schemas. Individual disciplines or repositories may direct or even specify the content or format of metadata, preferably based on a formal standard.

Provenance (Origin) of Research Data

The concept of provenance or the origin of research data refers to all information about the circumstances of data creation, e.g., about authors, time of creation, research equipment and its calibration, etc., so provenance is one of the most important aspects of metadata.

Provenance information not only enables interoperability and reusability of the data but also contributes to maintaining research integrity and combating research irreproducibility.

Since the research data are very diverse (i.e. obtained experimentally, by observation, derived or compiled on the basis of other data sets, obtained through simulations or from reference or official databases), they also require a tailored level of detail in the description of their provenance.

Data Provenance Standards and Recommendations for FAIR Data

The Minimum Description of Provenance

For **projects within Horizon Europe**, the EU Grants - AGA: Annotated Model Grant Agreement specifies in *Annex 5: Communication, dissemination, open science and visibility* that a minimum description of provenance must contain the following metadata:

- information about the scientific publication (author(s), title, date of publication, publication venue - journal or publishing house);
- funding source (Horizon Europe or Euratom), including project name, acronym and number;
- licensing terms;
- persistent identifiers for the publication, authors, and, if possible, for their organizations and the grant (see also the article on persistent identifiers of non-digital objects).

Data Papers

Data papers most closely resemble the traditional forms of scientific reporting and are therefore the easiest to understand and most convenient for researchers. Like other forms of scientific publications, they go through a peer-review process.

Data articles describe data sets in detail but usually do not include any interpretation or discussion of the data, as original scientific articles do.

Other typical components of a data article include:

- information about the authors,
- abstract,
- a description of the materials and methods used to collect the data,
- instructions for re-use,
- authorship/contributorship statement,
- statement on ethical aspects and conflict of interests,
- acknowledgements,
- references.

Where to Publish Data Papers?

Some scientific journals offer data papers as **one of the possible publication formats** (e.g., *Ecology* published by the Ecological Society of America, *The International Journal of Robotics Research* published by SAGE, *Transportation* published by Springer).

There are also **specialized journals dedicated only to the publication of datasets** (e.g., *Data in Brief* by Elsevier, *Scientific Data* by Springer Nature, *Earth System Science Data* by Copernicus Publishing).

An option for publishing data articles is also the European platform Open Research Europe, where data papers are called Data Notes. The advantage of Open Research Europe compared to traditional scientific journals is the **free and transparent review and publication process.**

Readme Files 1

The ReadMe file must contain:

- domain-specific minimum information about the provenance of the data set,
- keywords,
- information about data licenses,
- **a description of the dataset**.

The provenance information:

- **who, where** and **when** was the measurement/research/survey/calculation done,
- which **method** was used (i.e. mass spectrometry, surveying…),
- which **instrument** was used (maker, type, name of the instrument),
- what were **environmental conditions** during measurement/research (i.e. temperature),
- what were **parameters/settings/assumptions** used during measurement/research (i.e. solvent type…),
- how was instrument/method **calibrated** (standards, procedure, who and when it was done),
- how was the **validity** of the data verified (control groups, background measurement…),
- what was the **accuracy** and **reproducibility** of the results,
- how were data **processed** (algorithms, parameters, software…).

Readme Files 2

The dataset description must also include:

- a brief **description** of the contents of each individual file or groups of related files,
- explanation of the **content and structure** of file folders,
- **relationships** between files if the data set contains several files that link to each other,
- the **dates** the files were created and updated (versioned), along with an explanation of the updates,
- explanations of the **file format** if it is not widely used or clearly recognizable from the file extension,
- explanations regarding the **software required** to open the files if the formats are proprietary or specific,
- information about **related data** that was obtained but not included in the data set.

Guide to writing “readme” style at the Cornell University website with the ReadMe sample file template in English.

Trustworthy Repositories

Research repositories are part of the digital infrastructure that supports open science. As such, they must conform to certain professional guidelines or standards, comply with applicable legal and ethical restrictions (e.g., allow varying degrees of content openness) and provide secure, permanent storage. We refer to such repositories as trustworthy.

Three groups of repositories can be considered trustworthy:

- **certified repositories** (according to CoreTrustSeal, DIN 31644 or ISO 16363 certificates),
- **domain-specific repositories** recognized and used by the research community in a particular research field, e.g., HEPData, Crystallography Open Database, PubChem…),
- **generalist and institutional repositories that have the characteristics of trustworthy repositories** (e.g., Zenodo).

Trustworthy repositories transparently provide accurate information about the **organisation and technical characteristics of their services** (e.g., access and retrieval of content, secure storage, long-term provision of services, including technical support and funding). Such repositories provide **appropriate metadata that include information about the origin of the content, are machine-readable and of sufficient quality to enable discovery, reuse and citation of data.** Trustworthy repositories also assign persistent, unique digital object identifiers (e.g., DOI, Handle, PURL, etc.) to content so that content is unambiguously citable and cited.

Persistent Identifiers

Persistent identifiers (*PIDs*) are **unique and lasting hyperlinks** leading to various digital objects (e.g., scientific publications, research data, registered reports), non-digital objects (e.g., affiliations, projects, objects) and people.

When digital objects are submitted, trustworthy repositories assign one of the persistent identifiers to the metadata and the digital object. The allocation of persistent identifiers is **one of the key properties** by which we judge whether a repository is trustworthy or not.

Some repositories assign persistent identifiers to datasets and other digital objects **by default** (e.g., Zenodo, Dryad, Mendeley Data), whereas others do so **at the request of users** (e.g., Figshare, 4TU.ResearchData, Social Science Data Archives).

Persistent Identifiers of Digital Objects

Digital Object Identifier (DOI)
Digital Object Identifier is a persistent identifier for digital and non-digital objects that can be established by member organizations of one of the DOI Registration Agencies.
DOIs are assigned to data sets by general repositories such as Zenodo, Dryad, Figshare, OSF, Harvard Dataverse and Mendeley Data, some institutional repositories (e.g., 4TU.ResearchData) and trustworthy domain-specific repositories (e.g., Slovenian Social Science Data Archives).

Handle (HNDL)
Handle is a persistent identifier for online resources managed by the American non-profit organization Corporation for National Research Initiatives. Handle is based on the technical infrastructure of DOIs, which are a subcategory of Handle identifiers. In Slovenia, Handle is used by the DiRROS repository and by the repository of the University of Nova Gorica.

Universal Resource Name (URN)
Archival Resource Key (ARK)
Persistent Uniform Resource Locator (PURL)

Persistent Identifiers of Non-digital Objects

For researchers, the most relevant identifiers for identifying authors are:

- International Standard Name Identifier (ISNI),
- Open Researcher and Contributor Identifier (ORCID iD),
- ResearcherID,
- Scopus Author ID.

There are also identifiers to indicate institutional affiliations and research funders:

- Funder ID,
- Global Research Identifier Database (GRID) ID,
- Research Organization Registry (ROR) ID.

In addition, permanent identifiers for research samples, materials and instruments are also useful:

- International Generic Sample Number (IGSN) for physical samples and specimens,
- Research Resource Identifier (RRID) for laboratory material in biomedicine (e.g., plasmids, cells, antibodies, organisms),
- Persistent Identifier of Instruments (PIDINST) for measurement instruments.

Licensing Research Data

To enable reuse of research data, it is imperative to assign an appropriate license to the data and metadata. By convention, research data are licensed under open licenses, such as Creative Commons. As a rule, data are licensed under CC BY and metadata under CC0. Creative Commons licenses are suitable for licensing all types of research data except software code.

Types of CC licences:

- CC0: “No Rights Reserved”
- CC BY: Attribution
- CC BY License - Attribution 4.0 International (CC BY 4.0) is the default license for open access research publication and research data licensing, 3. CC BY-SA: Attribution-ShareAlike
- CC BY-NC: Attribution-NonCommercial
- CC BY-ND: Attribution-NoDerivatives
- CC BY-NC-SA: Attribution-NonCommercial-ShareAlike
- CC BY-NC-ND: Attribution-NonCommercial-NoDerivatives

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Types of CC licences:

- CC0: “No Rights Reserved”
- CC BY: Attribution
- CC BY License - Attribution 4.0 International (CC BY 4.0) is the default license for open access research publication and research data licensing, 3. CC BY-SA: Attribution-ShareAlike
- CC BY-NC: Attribution-NonCommercial
- CC BY-ND: Attribution-NoDerivatives
- CC BY-NC-SA: Attribution-NonCommercial-ShareAlike
- CC BY-NC-ND: Attribution-NonCommercial-NoDerivatives

The cost of RDM

The cost of RDM is usually an eligible cost of funding.

Various items:

- labour costs,
- software, hardware, etc.
- data acquisition costs
- data storage during the research
- data sharing
- data storage while the survey is still ongoing.
- costs of storing data in a repository

Eligible Exemptions from Openness

The European Commission and the Slovenian Goverment stipulates that access to data is **open by default**. However, since there are circumstances that may prevent or restrict the open sharing of data, the European Commission determines **eligible exemptions from openness**. These exemptions can be claimed in cases where:

- open access to the data would endanger **the legitimate interests of the beneficiary**, including commercial exploitation (e.g., in the case of a planned patent application or trade secret protection),
- open access would conflict with any other restrictions, in particular with the **competing interests of the EU** or **the beneficiary's obligations under the funding agreement** (e.g., protection of personal data, statutory secrecy, non-disclosure of endangered areas, groups or species, etc.).

Handling Exemptions

When you cannot provide open access to data that would be necessary to confirm the conclusions of a scientific publication in which you report original results, you can still provide relevant access to data within a framework that takes into account your legitimate interests or legal or contractual restrictions. In these cases, you deposit in the repository a **detailed metadata record** that describes the data, where it is stored, and how it can be accessed.

The metadata must meet all legal and ethical obligations and must not contain confidential or personal information. In the scientific publication, on the other hand, you include the so-called **Data Availability Statement**, indicating where and how the data can be accessed.

Data Protection due to Legitimate Interests and Other Restrictions

If the data cannot be opened due to legitimate interests, e.g., industrial exploitation, or restrictions, e.g., confidentiality, security, competitive interests of the EU or the protection of intellectual property, including patents and trade secrets, this must be substantiated in the research data management plan. The funder may require the authors to provide evidence for their claims.

Scientific publications created on the basis of such data must contain:

- **a description of the restrictions on access to the data**,
- **all necessary information required for readers and reviewers to apply for access to the data**,
- **the conditions under which access will be granted**.

Alternatively, they can contain the persistent identifier of an open and FAIR metadata record containing this information.

Protection of Personal Data

Personal data must be processed in accordance with the relevant European and national data protection legislation, specifically with Regulation (EU) 2018/1725, Regulation (EU) 2016/679 - GDPR and ZVOP-1.

Where personal data cannot be satisfactorily anonymized, state in the research data managing plan and later in the scientific publication the following:

- **an explanation of why or how data falls under personal data protection legislation**,
- **the opinion of the relevant ethics committee, authorized person for the protection of personal data or other competent authority on the sharing of these data**, where appropriate, **all necessary information required for readers and reviewers to apply for access to the data, or the persistent identifier of the open and FAIR metadata record containing that information**.

Data Under a Third-Party License

If you have obtained data from third parties and access to the data is subject to restrictions, explain this in the research data management plan.

Your scientific publication must contain:

- **all necessary information required for readers and reviewers to apply for access to the data by the same means as the authors,**
- **publicly available data that are representative of the analysed dataset and can be used to apply the methodology described in the publication.**

Large Data

There is also the possibility that data can be opened, but the files cannot be uploaded to repositories because they exceed their size limits.

In this case, in the research data management plan and the scientific publication, provide all the necessary information required for readers and reviewers to apply for access to the data, or the persistent identifier of the open and FAIR metadata record that contains this information.

Restricting Access to Data

Time Lock (Embargo)
Embargo is most often enforced for the protection of intellectual property, for the confidentiality of information and data, or for other legitimate interests. A typical example would be a patent process, where data would be kept closed until a patent was granted, and then opened up. You should pay attention to the choice of repository if you decide to use an embargo, because this feature is not universally available. Among general repositories, embargoes are enabled in, e.g., Zenodo, Figshare and Dryad, among others.

Time Limit ("Right to be Forgotten")
The time limit is most often enforced in the case of personal data that cannot be satisfactorily anonymized, as the GDPR stipulates the so-called "right to be forgotten". When enforcing a time limit, the data is deleted after the expiry of the contractual obligations, unless it is necessary to keep them in accordance with the law. However, even after deletion, metadata proving the existence and origin of the data must remain available to interested parties.

Physical or Electronic Restriction of Access
Physical or electronic restriction of access to data is appropriate in the case of confidential or sensitive data and the protection of intellectual property. In this case, only certain persons can gain access and only under certain conditions, e.g., in a secure room or through a secure connection.

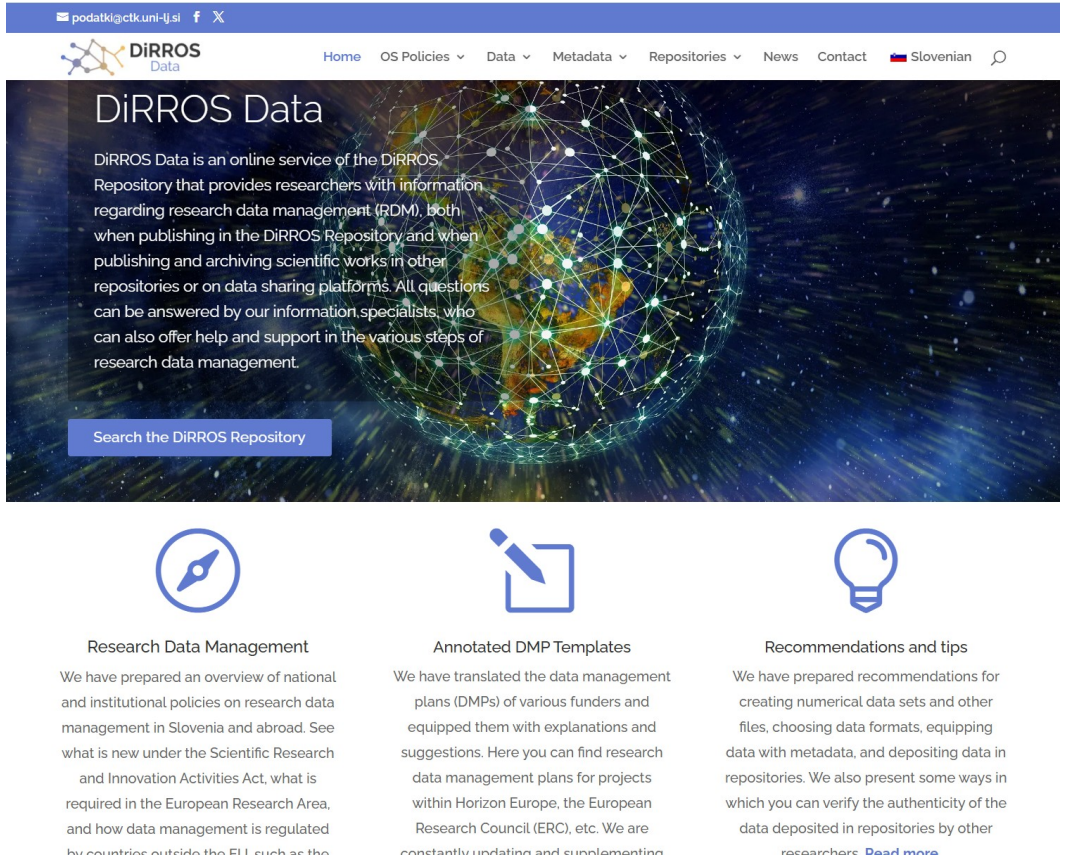
Action plan for Open Science

A6.2.1/4.1: Organization of a network of information support for Open Science to provide coordinated training of researchers in support to FAIR and Open Science in Slovenia.

UNG, UP, UM and CTK

Support for sharing research results according to FAIR principles.

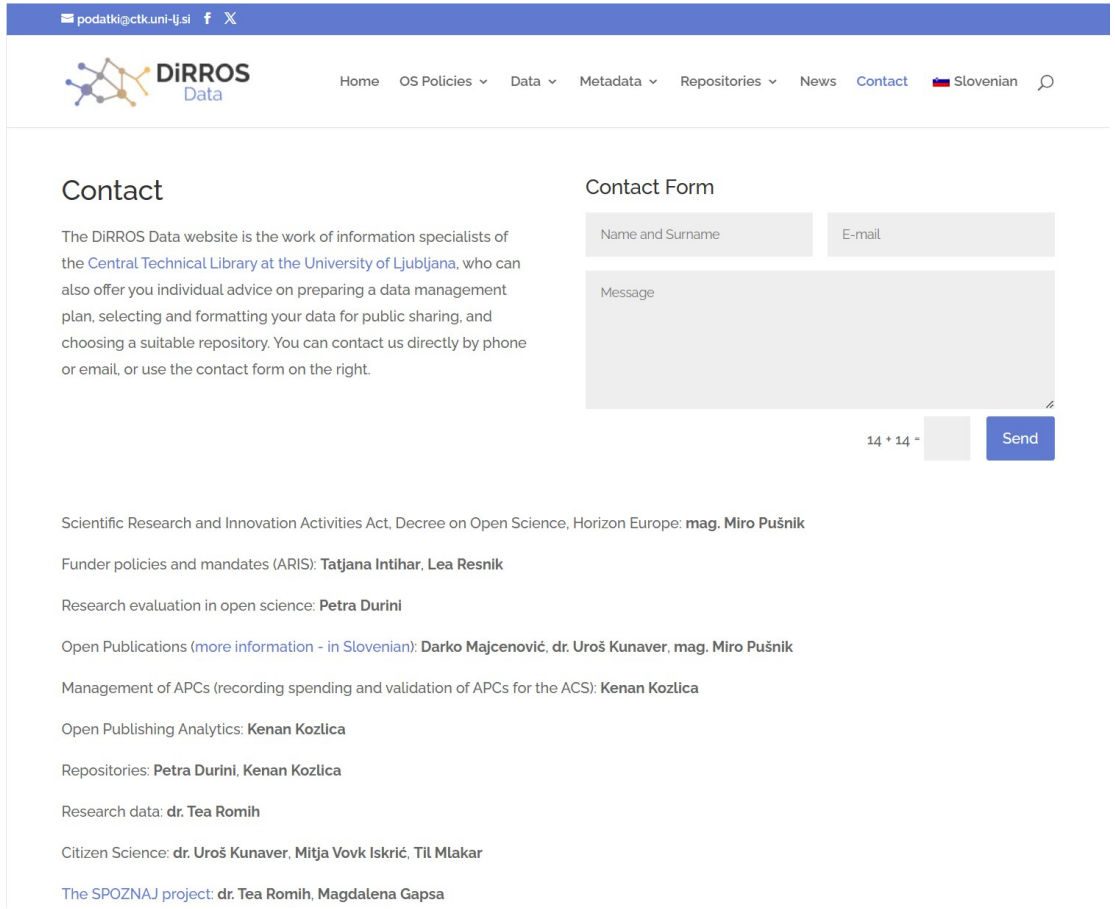
DiRROS Data



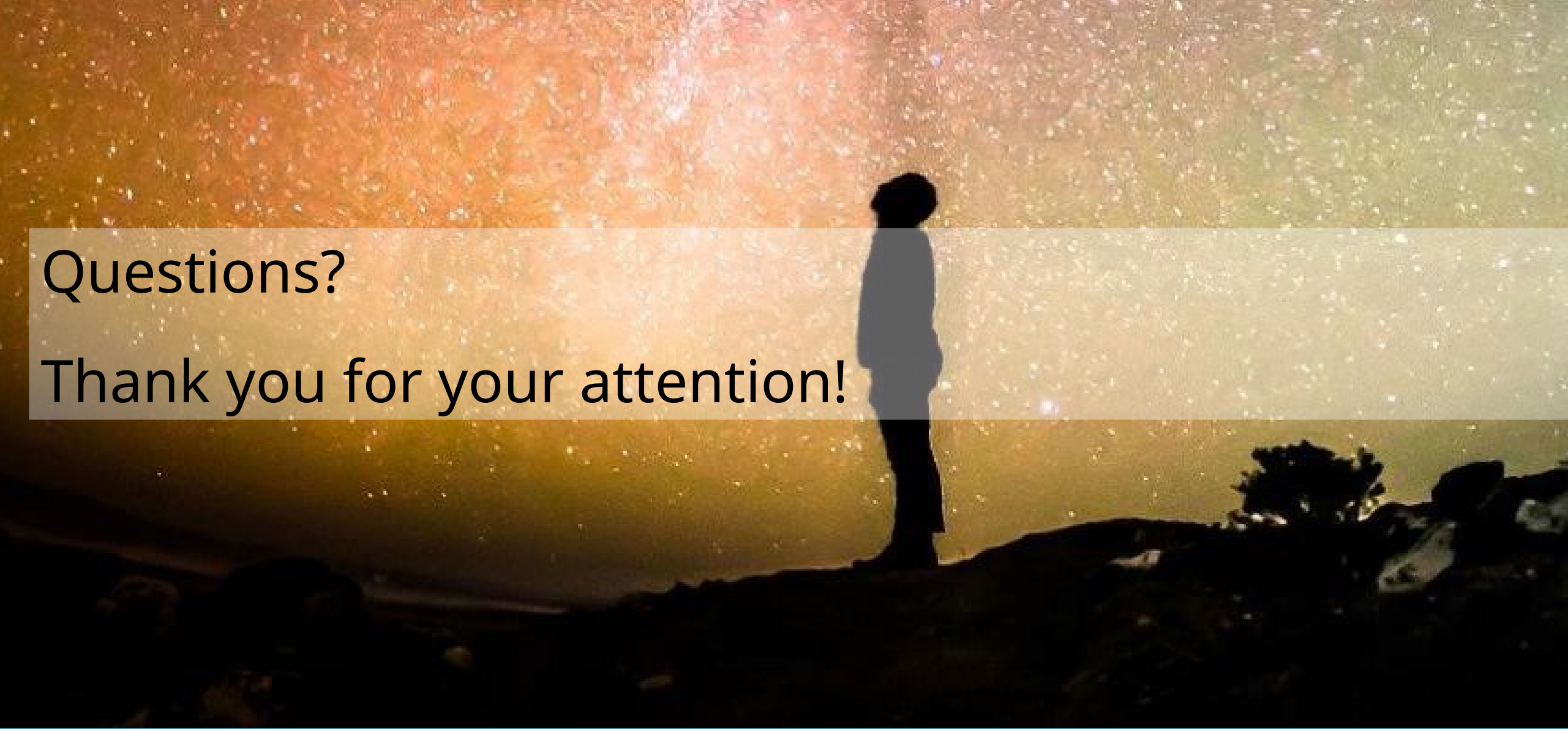
DiRROS Data is an online service of the DiRROS Repository that provides researchers with information regarding research data management (RDM), both when publishing in the DiRROS Repository and when publishing and archiving scientific works in other repositories or on data sharing platforms. All questions can be answered by our information specialists, who can also offer help and support in the various steps of research data management.

https://dirrosdata.ctk.uni-lj.si/en/

DiRROS Data Contacts



https://dirrosdata.ctk.uni-lj.si/en/kontakt/



Questions?

Thank you for your attention!