

OPEN SCIENCE PLATFORM 2.0

Team for Open Science in Serbia (TONuS)

In accordance with the principles of universal openness of science and knowledge and openness to the public and citizens (Article 6 of the Law on Science and Research), the Ministry of Science, Technological Development and Innovation, hereinafter referred to as the Ministry, adopts the Open Science Platform 2.0.

The Platform is based on:

- The Strategy of Scientific and Technological Development of the Republic of Serbia for the period from 2021 to 2025 "The Power of Knowledge", 2021. (<https://pravno-informacioni-sistem.rs/eli/rep/sgrs/vlada/strategija/2021/10/1/reg>)
- Open Science Platform, 2018. (<https://open.ac.rs/images/doc/Open-Science-Policy-Serbia.pdf>)
- UNESCO Recommendation on Open Science, 2021, <https://doi.org/10.54677/MNMH8546>)
- The basic principles of open science, defined by the European Commission in its documents, and in particular in Commission Recommendation (EU) 2018/790 of 25 April 2018 on open access and the preservation of scientific results No. 32018H0790 (<http://data.europa.eu/eli/reco/2018/790/oj>) and Programme Guide Horizon Europe (HORIZON), 2024 Chapter 16, https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/programme-guide_horizon_en.pdf)
- Strategic Research and Innovation Agenda (SRIA) of the European Open Science Cloud (EOSC), 2021, (https://www.eosc.eu/sites/default/files/EOSC-SRIA-V1.0_15Feb2021.pdf)
- Barcelona Declaration on Open Research Information, 2024, <https://barcelona-declaration.org/>

The Platform is intended for all participants in scientific research, and it applies to the outputs of research projects and programmes funded fully or in part by the public budget of the Republic of Serbia.

Open science involves the realization of five goals: (1) open access to scholarly publications; (2) availability of research data; (3) open and transparent access to research infrastructures; (4) transparency of scholarly communication and methodology, including the availability of software source code, design documentation of research hardware and other digital objects used in the analysis of research data, which ensure the sustainability, transparency and reproducibility of scholarly outputs, as well as (5) the development of the digital infrastructure and competencies that make it possible to achieve the above goals. Implementing these goals contributes to greater visibility of scholarly outputs, cost-effective use of public funds invested in research, stronger connections between science, industry, and society, enhanced research integrity, building trust in science, and developing new research and innovations.

The goals of open science are to be achieved with full protection of ethical norms, copyright, and moral and intellectual property rights in mind.

Open science is implemented through (1) open access to scholarly publications, (2) research data management, (3) open access to research software and research hardware design documentation, (4) open and transparent access to research infrastructures, (5) implementation of open persistent identifiers, (6) development of skills and competencies for open science, and (7) incentives and rewards for open science practices.

Open Access to Scholarly Publications

Open access to scholarly publications implies the right of every Internet user to read, download, store, print, and use the digital content of publications free of charge, provided that the source is duly cited and the content is used according to the licence terms and conditions. Scholarly publications include articles published in scholarly journals and proceedings, conference papers and abstracts, PhD theses, monographs, book chapters and edited volumes, etc.

The Ministry stipulates that electronic copies of all scholarly publications resulting from programmes and projects funded from the public budget of the Republic of Serbia fully or in part shall be archived in an institutional repository immediately upon publication, according to the requirements listed in Annex 1.

The full text of publications must be available in open access no later than upon publication, or, exceptionally, no later than three months after publication, in the case of natural and medical sciences and engineering, or no later than six months in the case of social sciences and humanities.

The Ministry primarily supports Diamond Open Access and recommends that when selecting a publication venue, priority be given to open access journals, monographs, and proceedings that do not charge any publication fees.

The Ministry supports Green Open Access, which involves archiving scholarly publications in digital repositories with full respect of intellectual property rights.

Publication charges in Gold Open Access journals, monographs, and proceedings that have transparent publication policies will be considered eligible if foreseen in the project or programme budget. Publication fees in Hybrid Open Access journals will not be considered eligible. The Ministry will not approve individual requests to pay or reimburse publication costs.

The Ministry stipulates that publishers of scholarly journals subsidized from the public budget of the Republic of Serbia shall align their publishing policies and practices with the principles of Diamond Open Access, i.e. they must charge neither subscription fees to access content nor fees to publish in open access, and the content must be published under a Creative Commons licence¹ (preferably CC BY).

¹ <https://creativecommons.org/share-your-work/>

The Ministry stipulates that publishers of monographs and conference proceedings subsidized from the public budget of the Republic of Serbia shall ensure open access to subsidized publications under a Creative Commons license (preferably CC BY) through appropriate publishing platforms or repositories.

Research Data Management

Research data includes data collected during research, e.g., in experiments, simulations, field research, analysis of archival materials, laboratory measurements, surveys, and using other research procedures.

The Ministry stipulates that research data collected during research that is fully or in part funded from the public budget of the Republic of Serbia shall be managed according to the FAIR principles.²

Institutions and research groups shall prepare and submit a research data management plan using the template provided by the Ministry or other institutions allocating public funds. Data management plans are subject to evaluation, and their implementation will be taken into consideration in the assessment of research programmes and projects. Research data management costs will be considered eligible if included in the data management plan.

The Ministry stipulates that research data and the metadata describing it shall be archived in an appropriate institutional or thematic repository according to the requirements listed in Annex 2.

Research data underlying publications shall be available in open access no later than upon the publication of the results derived from the data in a publication, shall contain machine-readable references to related publications and other research outputs (e.g. software code, instruments, etc.), and shall be protected by a standardized machine-readable license. Creative Commons (CC) license Public Domain (PDM³ and CC0⁴), Attribution (CC BY⁵), and Attribution-Share Alike (CC BY-SA)⁶ licenses are recommended.

The Ministry recommends releasing all research data in open access when there are no legal, contractual, ethical and/or other restrictions, according to the principle "as open as possible, as closed as necessary".⁷

The Ministry will define guidelines to govern the relationship between institutions, researchers, and research funders regarding intellectual property rights to data resulting from the research that is fully or in part funded from the public budget of the Republic of Serbia.

² "Findability, Accessibility, Interoperability, Reusability," Annex 4.

³ <https://creativecommons.org/publicdomain/mark/1.0/>

⁴ <https://creativecommons.org/publicdomain/zero/1.0/>

⁵ <https://creativecommons.org/licenses/by/4.0/>

⁶ <https://creativecommons.org/licenses/by-sa/4.0/>

⁷ From *Horizon Europe Program Guide*, v.4.1, 2024, https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/programme-guide_horizon_en.pdf.

The Ministry stipulates that publishers of scholarly publications subsidized by the public budget of the Republic of Serbia should address research data and software availability and sharing in their publishing policies.

Open Access to Research Software and Research Hardware Design Documentation

Access to software and hardware is essential for research reproducibility. The Ministry recommends that the source code and design documentation of research hardware created through research that is fully or in part funded from the public budget of the Republic of Serbia be publicly available and human- and machine-readable (according to best practices and FAIR principles), under open licenses that allow users to access, use, modify, share, study, and create new versions. More detailed guidelines are provided in Annex 3.

Open and Transparent Access to Research Infrastructures

Research infrastructures encompass the facilities, resources, and services owned by research institutions and used by research communities to conduct research and promote innovation in their field. They include research laboratories, major research equipment (capital equipment or sets of instruments), knowledge-based resources, including collections, archives, and research data, e-infrastructures, such as data repositories, other public data, computing systems, communication networks and other tools essential for achieving excellence in research and innovation. They can be "single-site," "virtual," or "distributed".

Open and transparent access to research infrastructures aims to enable and promote unhindered access to research infrastructures to advance research, development, and innovation, improve research methods, develop skills and knowledge through enhanced national and international cooperation, and integrate local infrastructures into the European Open Science Cloud.

The Ministry recommends that access to research infrastructures be legally regulated at the institutional level, containing general and specific conditions for infrastructure use. Institutions that have research infrastructures should provide clear and transparent information about the infrastructure at their disposal, related services, access terms and conditions, data management, etc.

Public funders will include in funding agreements for research programmes and projects a requirement for beneficiaries (research institutions) to make the capital equipment purchased with public funds available in accordance with the principles of open and transparent access to research infrastructure.

The degree of transparency and accessibility of research infrastructure, as well as its utilization, will be taken into consideration in the accreditation of research organizations.

Implementing Open Persistent Identifiers

The Ministry stipulates that all researchers participating in research funded from the public budget of the Republic of Serbia should have a unique personal persistent identifier, namely ORCID.⁸

The Ministry stipulates that all publications that are fully or in part funded from the public budget of the Republic of Serbia should have a valid DOI.⁹

The Ministry recommends that research institutions, publishers of scholarly publications, and researchers use open persistent identifiers, which are globally unique and permanently refer to the corresponding digital object, for all other research outputs, as well as for institutions (e.g. ROR¹⁰), projects (e.g. DOI), instruments (PIDINST¹¹), etc.

Developing Skills and Competencies for Open Science

To ensure the implementation of open science principles, the Ministry recommends the following measures:

- Introducing courses on open science into master's and doctoral academic study programmes at higher education institutions funded from the public budget of the Republic of Serbia, as well as integration of topics related to open science into library and information science curricula.
- Introducing accredited courses facilitating the development of skills and competencies to support open science into the continuing professional development programme for librarians.
- Introducing continuous professional development programmes in open science at the national and institutional levels to ensure continuous training and skills development for the staff directly or indirectly involved in research activities (researchers, librarians, technical and administrative staff, and management).
- Support for the development of competencies for open science through the establishment of open science competence centres and communities.
- Providing financial support for training programmes and skills development in open science at the national and institutional levels, including scholarships and grants for researchers, librarians, administrative staff, and management involved in these programs.
- Setting up mechanisms for regular evaluation and improvement of open science training programmes at the national and institutional levels.
- Cooperation with international organizations and networks involved in open science, such as the European Open Science Cloud (EOSC), UNESCO, and OpenAIRE, to exchange best practices and learn from the experiences of other countries.

Rewards for Open Science Practices

The Ministry will define mechanisms for rewarding researchers who consistently follow the principles of open science through publishing research data, software and hardware in open

⁸ Open Researcher and Contributor ID: <https://orcid.org/>

⁹ Digital Object Identifier <https://www.doi.org/>

¹⁰ Research Organization Registry <https://ror.org/>

¹¹ Persistent Identification of Instruments <https://www.pidinst.org/>

access, pre-registration of research, pre-prints, open peer review, citizen science projects, development of free and open-source software and open hardware, open materials, etc.

Institutions should encourage and reward open science practices as far as their resources allow.

Final Provisions

Universities and non-university research institutes shall update or draft and adopt open science policies in line with this Platform within six months.

Research institutions involved in scholarly publishing shall align their publishing regulations with this Platform.

The provisions relating to the retention of intellectual property rights necessary to enable Green Open Access will apply from 1 January 2026.

The Ministry will establish a body tasked with regularly monitoring compliance with the principles set out in this Platform. The monitoring results will be used in the assessment of the performance of research programmes and projects, future applications for funding, and other activities of the Ministry aimed at improving research in Serbia. Institutions are required to appoint individuals or bodies to supervise the implementation of this Platform at the institutional level.

The expressions in the masculine gender used in this Platform shall refer equally to masculine and feminine gender.

Annex 1. Archiving Scholarly Publications in Repositories

Participants in programmes and projects that are fully or in part funded from the public budget of the Republic of Serbia shall archive in a digital repository: (1) the Version of Record of the publication and associated metadata; public access to the full text will be enabled if this does not violate intellectual property rights; and/or (2) the peer-reviewed manuscript (accepted for publication) and associated metadata. Public access to the full text shall be enabled no later than upon publication or exceptionally after the expiration of the embargo period defined by this Platform.

Whenever possible, open access to the Version of Record of a publication should be enabled. If this is not possible, the peer-reviewed manuscript accepted for publication shall also be archived in the repository.

When signing publishing agreements, authors shall act in line with the provisions of the Law on Copyright and Related Rights that apply to work for hire and shall retain the intellectual property rights necessary to enable green open access.

The requirement to archive publications in a repository also applies to scholarly outputs published in open access journals, monographs, and edited volumes (gold and diamond open access).

The Ministry stipulates that all publicly available results archived in repositories be assigned machine-readable *Creative Commons Commons* (CC) licenses.¹²

All research outputs published in gold open access publications shall be assigned Creative Commons licenses. Scholarly publications for which the costs of publishing in open access have been paid for with public funds shall be published under an open license (preferably CC BY).

Annex 2. Guidelines for Research Data Management

Research data management involves a set of activities that researchers mutually agree upon and adopt to make sure that their datasets are most effectively collected, organized, and saved for future use, which may include sharing with other researchers. Research data management also includes the supporting documentation necessary for data interpretation and understanding, compliance with *FAIR* principles, adequate preparation for long-term storage, and public availability, except in cases involving legal, contractual, ethical, or other restrictions.

Research Data Management Plan

A research data management plan should specify the following:

- Methods and procedures for collecting research data (measurements, assessments, surveys, field research, etc.).
- Expected data types and subtypes and a rough estimate of data scope and size.

¹² <https://creativecommons.org/share-your-work/>

- Information about the archiving of research data (where it will be stored, formats, how it will be described, etc.).
- Data availability, i.e. who are the individuals, institutions, or groups that can access and use it, and under what terms and conditions.
- Roles and responsibilities (ownership, archiving, storage, enabling access, etc.).
- Measures to protect data against damage or unauthorized access during and after the research.
- Persistent identifiers assigned to datasets.
- Costs of data management and long-term data storage, etc.

The Ministry or the relevant funding institution shall prepare a template for data management plans, with clearly defined criteria for evaluating data management plans and checking compliance with the FAIR principles.

Data Repositories

Research data should be stored in appropriate digital repositories according to the FAIR principles, ensuring long-term data preservation and protection.

The repository where research data is deposited shall offer a standardized and open method of metadata exchange (e.g. a method compliant with the international protocol for metadata harvesting and exchange OAI-PMH¹³), make it possible to describe deposited data using structured metadata, support the assignment of unique permanent identifiers, define terms of use using machine-readable licenses, and enable linking data with other research outputs and infrastructures using standard metadata.

Open Access to Research Data

Open access to research data implies the right of every Internet user to download, store, distribute, use, modify, and build upon data without cost, without seeking permission from the author or owner, and according to the license assigned to data.

Open access to research data does not apply to data designated as confidential or to data considered a trade secret or involved in an ongoing intellectual property protection process. If there are objective reasons why research data, research software, or other documentation and materials should not be publicly available, researchers and research groups must state these reasons in the data management plan, as well as in the repository where the research data is permanently archived.

Appendix 3. Research Software and Research Hardware Design Documentation

The Ministry recommends that open access be provided to research software and research hardware design documentation upon the publication of the results in a publication unless there are legal, contractual, ethical, or other restrictions. Priority shall be given to licensing free and

¹³ Open Archive Initiative Protocol for Metadata Harvesting

open source software¹⁴ under an open license recognized by the Free Software Foundation¹⁵ and the Open Source Initiative,¹⁶ as well as licensing research hardware design documentation under a license recognized by the Open Hardware Association,¹⁷ to enable reuse and development, while protecting the author and origin. The Ministry recommends that research software be made available under the GNU GPL license¹⁸ and that research hardware design documentation be made available under the CERN-OHL-S license.¹⁹ The GNU Lesser GPL²⁰ is recommended for licensing program libraries, and the GNU Affero GPL²¹ is recommended for network applications.

Open source code and research hardware design documentation should be made available in an appropriate repository according to the FAIR principles and recommendations of internationally recognized bodies, such as the European Commission, Software Heritage, EOSC Software Working Group, RDA FAIR for Research Software Working Group, FORCE11, Research Software Alliance – ReSA, OSHWA, GOSH and RDA FAIR Principles for Research Hardware Interest Group.

Research Software Management Plan

It is recommended that the Research Software Management Plan, which can be updated throughout the project, contain the following elements.²²

1. The purpose of the software (direct application, limitations, benefits, and target users);
2. Version control.
3. Repository – the repository where it is planned to host the software in line with the FAIR principles.
4. User documentation (a detailed description of what the software does and how to use it);
5. Licence and compatibility – the selected license for sharing the software, which must be compatible with all elements of the software (e.g. with the free software used as an integral part of the research software);
6. Instructions for citing software and related scholarly publications.
7. Support and maintenance – detailed instructions on how the software will be maintained during and after the project (if planned) and how and to whom software errors can be reported.
8. Additional/optional notes – further information about the application (e.g. if the software is intended for medical data processing, whether or not it is certified by national and international bodies), how developers can further develop the software, instructions for evaluating it, and other information.

¹⁴ Free and Open-Source Software, FOSS

¹⁵ Free Software Foundation, FSF, <https://www.fsf.org/>

¹⁶ Open Source Initiative, OSI, <https://opensource.org/>

¹⁷ Open Source Hardware Association, OSHWA, <https://www.oshwa.org>

¹⁸ GNU General Public License <https://www.gnu.org/licenses/gpl-3.0.en.html>

¹⁹ <https://opensource.org/license/cern-ohl-s>

²⁰ <https://www.gnu.org/licenses/lgpl-3.0.en.html>

²¹ <https://www.gnu.org/licenses/agpl-3.0.en.html>

²² Elements of a Software Management Plan are selected and explained from Martinez-Ortiz, C., Martinez Lavanchy, P., Sesink, L., Olivier, BG, Meakin, J., de Jong, M., & Cruz, M, 2023, Practical guide to Software Management Plans (1.1). Zenodo. <https://doi.org/10.5281/zenodo.7589725>

Appendix 4. Glossary

A digital repository is a system of electronic services that enables archiving, permanent storage, public presentation, and dissemination of various research outputs. The system rests on a digital database containing integral documents of research outputs (monographs, journal articles, chapters in edited volumes, research data, audio and video materials, etc.) and metadata that describe them. Metadata is publicly available, and access to integral documents may be limited due to intellectual property rights or other legal restrictions. The digital Platform for the repository must meet at least a minimum of technical standards that ensure interoperability, namely integrating the repository with the existing international infrastructures. These are: compliance with the international protocol for metadata harvesting and exchange OAI-PMH²³ and structured metadata aligned with the Dublin Core standard.²⁴ A digital repository must have clearly defined and publicly available policies (addressing deposit, access and use, privacy, etc.).

Diamond open access is the practice of publishing research publications in open access by publishers without charging publication costs to authors, their institutions, or research funders.

Green open access is the practice of depositing a peer-reviewed (*post-print*) or non-peer-reviewed (*pre-print*) version of the manuscript of a published work in a repository, enabling open access. Commercial publishers who require a subscription to access their published content generally do not allow the Version of Record to be publicly available. Still, they allow open access with or without an embargo period to peer-reviewed and/or non-peer-reviewed manuscripts of published works through an institutional or other repository.

Gold Open Access is the practice of publishing research publications in open access by the publisher where the publisher charges a fee from the author or, more often, from the author's institution or the funder of the project in which the author is involved to cover the publication costs.

Research software includes source code files, algorithms, scripts, computer workflows, and executable files created during or for the purpose of research. Software components (e.g. operating systems, libraries, and packages) used for research but not made during or with a clear research intent should be considered software in research, not research software).²⁵

Research hardware is a physical object created during or for the purpose of research.

Metadata is structured data that describes a source of information, other data, objects, or people. Bibliographic metadata (titles, author names, editor names, place and year of publication, volume, issue, pagination, project code, standard international numbers, such as ISBN and ISSN, persistent identifiers, such as DOI, ORCID, etc.) describes publications.

Open Lab Notebooks are publicly available records of laboratory research containing primary experimental data and the researcher's interpretation in a format that can be reanalyzed, interpreted, and reused.

²³ Open Archive Initiative Protocol for Metadata Harvesting

²⁴ <https://www.dublincore.org/specifications/>

²⁵ Gruenpeter, M., et al. Defining Research Software: A Controversial Discussion. 1, Zenodo, 2021, doi: <https://doi.org/10.5281/zenodo.5504015>

Open materials generally include physical objects used in research or resulting from it, which are necessary for the reproducibility of procedures, experiments, or analyses. In some cases, they can be digitized. Open materials vary across disciplines – reagents, additives, biological and geological samples, cadaveric bones, tissue samples obtained by biopsy, new materials, or new metal alloys. There are specialized repositories for different types of open materials, where persistent identifiers are assigned.

Open data are data that are freely available to anyone to access, use, modify, and share without restriction, subject to conditions such as attribution or sharing on the same terms. To achieve greater sustainability, it is recommended that open datasets be compatible with the FAIR principles. Note: In some cases, open access to research data may not be possible due to legal, ethical, contractual, or other reasons.

Open hardware is a physical object whose design documentation (software design documentation) is publicly available so anyone can study, create, modify, distribute, or sell the design and/or hardware based on the available design. Open hardware usually includes the parts that constitute the functional structure of the physical object, the software enabling that functionality, documentation that includes instructions, schemes, etc., and branding, including the logo and design of the product. Open Science Hardware (OSCH)²⁶ is any hardware used in scientific research that anyone can obtain, assemble, use, study, modify, share, and sell. It includes standard laboratory equipment and supporting materials, such as sensors, biological reagents, and analogue and digital electrical components.

The recommended format for long-term preservation is a non-commercial file format suitable for long-term preservation, which supports interoperability and has a publicly available specification or standard. Examples of recommended formats and references are available at: <https://dans.knaw.nl/en/file-formats/>

Free and open source software (*Free and Open- Source Software, FOSS*) provides users with the following four freedoms: (1) the freedom to run the code for any purpose, (2) the freedom to study how the program works and change it as desired, (3) the freedom to distribute copies to help others, and (4) the freedom to distribute modified versions. A necessary condition for open software is access to the source code. Software that does not meet these four freedoms is called *proprietary* software. **Freeware software** can be used free of charge, but the software code is not publicly available, and users cannot change it. Researchers can share scripts written in proprietary programming languages and software tools under free licenses.

Hybrid open-access journals charge a subscription fee to download articles while at the same time offering authors the opportunity to publish their work in open access for a fee.

Creative Commons licenses (<https://creativecommons.org/share-your-work/>) are standardized free licenses by which authors grant others the right to use their work. These licenses define the terms and conditions under which a published work may be used without infringing copyright. By choosing one of seven licenses, authors determine the mode and scope of use. This licensing system was developed by the non-profit organization Creative Commons, and it is now used as a standard in digital repositories and open-access publishing.

²⁶ <https://openhardware.science/wp-content/uploads/2017/12/GOSH-roadmap-smll.pdf>

FAIR principles are a set of guidelines that define *FAIR* research data as data that is Findable, Accessible, Interoperable, and Reusable. The FAIR principles emphasize machine readability – the ability of computer systems to find, access, and reuse data without any or minimal human intervention. The acronym and principles were defined in 2016 (Wilkinson et al., *Scientific Data* 2016)²⁷. For more information, see these sources: [GO-FAIR | FAIR principles](#),²⁸ [OpenAIRE | How to make your data FAIR?](#)²⁹, or <https://www.howtofair.dk/>.

²⁷Wilkinson, MD, Dumontier, M., Aalbersberg, IJ, Appleton, G., Axton, M., Baak, A.,... & Mons, B. (2016). The FAIR Guiding Principles for scientific data management and stewardship. *Scientific data*, 3(1), 1-9. <https://doi.org/10.1038/sdata.2016.18>

²⁸ <https://www.go-fair.org/fair-principles/>

²⁹ <https://www.openaire.eu/how-to-make-your-data-fair>