APPROVED BY THE ACADEMIC SENATE, MEETING 23.7. 2024 (DECISION N 106/24S)
APPROVED BY THE BOARD OF DIRECTORS, MEETING 25.07. 2024 (DECISION N 142/24C)
UPDATED AND REVISED BY THE ACADEMIC SENATE, MEETING 28.01.2025 (DECISION 01/2025S) AND BY THE BOARD OF DIRECTORS, MEETING 30.01.2025 (DECISION 04/2025C)

# UNIVERSITY OF CAGLIARI
# UNIVERSITY POLICIES ON OPEN SCIENCE

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## 1. Principles and context

The University of Cagliari (hereafter UniCa) recognises the importance of Open Science (OS) and, starting from the 2022-2027 strategic plan, intends to develop effective action for its promotion and implementation, with reference to national and European legislation.
More specifically:

- The National Programme for Open Science (PNSA) 2021-2027[1] defines Open Science as "an approach to the scientific process based on collaboration, open and opportune sharing of results, networked digital-based ways of disseminating knowledge, and transparent methods of validating and evaluating research results and outcomes. Open Science enhances the effectiveness of collaboration and the duplicability of research results, increasing the collaborative potential with the possibility of access to and re-use of data for new analyses, including interdisciplinary ones, and for scientific teaching, as well as the usability of scientific knowledge, in a transparent manner, for the benefit of society".

- The European Commission identifies eight pillars for the promotion of Open Science[2]:

    1. FAIR Data or data organised according to the FAIR paradigm
    2. Research Integrity
    3. European Open Science Cloud (EOSC) or European Open Science Environment
    4. Research Indicators and Next Generation Metrics
    5. Citizen Science
    6. Future of Scholarly Communication
    7. Skills and Education
    8. Rewards and Incentives

[1] DM 268 of 28.02.2022, the Ministry of University and Research
[2] https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/our-digital-future/open- science_en#ref-8-ambitions-of-the-eus-open-science-policy

The aim of Open Science is to produce and share scientific knowledge in the most general sense (research products, protocols, data, publications, metadata, tools), considering the involvement of different stakeholders, including academia, industry, public authorities and citizens. Through these policies, the processes of production, validation, dissemination and evaluation of publicly funded research are made transparent and accessible to the public with the aim of increasing trust in the science and education system.

**2. Definitions**

**Open Access** (OA): According to the Budapest Open Access Initiative, 'open access' to academic and scientific literature means its public and free availability on the Internet and the possibility for any user to read, download, copy, disseminate, print, search, or *link to* the full text of articles, as well as to analyse and index them, to transfer their data into software, or to use them for any other legal use, without any further (legal, technical or financial) barriers.

**ANVUR**: the Agency for the Evaluation of the University and Research System is the body that oversees the national public system of quality evaluation of universities and research institutions.

**APC**: Article Processing Charge. An economic model of OA funding in which the costs of publishing an article are borne by the author.

**Citizen Science**: the involvement of volunteers and scientists in collaborative research activities to generate new evidence-based knowledge. It represents one of the pillars of the Open Science approach.

**CoARA**: is a European Coalition for Advancing Research Assessment consisting of research funding organisations, research performing organisations, national/regional evaluation authorities and agencies, as well as associations of these organisations, scientific societies and other relevant organisations.

**Research data**: information, in any digital and/or paper, numerical, descriptive, audio or video format), collected during a specific research activity and necessary to validate the results of that research. By way of example only: results (positive or negative) of all experiments, facts, observations, experiences, published and unpublished sources, bibliographic references, software and code, texts, objects, in raw or processed format.

**DMP**: Data Management Plan. It is a document defining how data will be managed during the course of the research to ensure their valorisation and preservation over time.

**EOSC**: stands for European Open Science Cloud or European Open Science Environment. It is a secure and open virtual environment promoted by the European Union in which the scientific community can store and share data, access and computing infrastructure and scientific results.

**ESFRI**: acronym of the European Strategy Forum on Research Infrastructures, composed of representatives of the EU Member States appointed by the Research Ministers and a representative of the European Commission.

**FAIR**: an acronym referring to research data for Findable (findable by the academic community and the public), Accessible (accessible through the use of persistent identifiers, metadata and a clear language understandable by people and machines), Interoperable (interoperable through the application of standards and protocols enabling data exchange), Reusable (reusable).

**Integrity of research**: principles and values in line with the University's code of ethics and conduct, on which responsible and correct conduct by those who carry out, finance or evaluate scientific research in all its phases, in its design, planning and execution, in the publication and dissemination of results, in evaluation, in projects and publications is based.

**IR**: Institutional repository. Institutional repository of research, information and communication infrastructure that brings together in one place all the scientific production of a university, which is given authority, while ensuring its persistence on the web and long-term preservation.

**Metadata**: the structured descriptive information of a research product relating, for example, to content, author, conditions of use, enabling the object described to be identified, interpreted and used.

**Open, Transparent, and Merit-based Recruitment** (OTM-R)**.** It is a set of practical and useful tools for implementing open, transparent and merit-based recruitment practices in research organisations.

**Open Archives Initiative Protocol for Metadata Harvesting** (OAI-PMH) is a protocol developed to collect metadata descriptions of content deposited in an archive, so that services can be created using metadata from many archives.

**Research output:** the set of materials developed in the course of the scientific research process and subsequently disseminated downstream. This encompasses both scientific literature (i.e. publications, grey literature and doctoral theses) and all other forms of research results.

**Publications**: any text validated and disseminated in the scientific community following publication channels. It includes, but is not limited to, scientific journal articles, conference proceedings, monographs, collections of essays and miscellanies.

**Public Engagement** (PE) or citizen involvement: the set of non-profit activities organised institutionally by the University and its various structures (Departments, Centres, Museums), aimed at a non-specialist public and characterised by an impact on the social, cultural and economic development of society.

**Research results**: any tangible or intangible outcome created as part of a scientific activity.

**Research Assessment** (RA) or research evaluation: the process of evaluating research products, research projects and academic careers at any level.

**Research infrastructure** (RI) or research infrastructure: as defined by ESFRI[3], RIs are ‘‘facilities, resources and related services used by the scientific community to conduct high quality research in their respective fields, without institutional or national affiliation’.

## 3. University Committee for Open Science

**3.1** In order to ensure interdisciplinarity, the Committee is composed of:

- The Deputy Vice-rector for Research as President;
- for scientific support: three Faculties experts on Open Science topics (data for research, scientific evaluation and publications, research infrastructure, public engagement and Citizen Science);
- the Director of the service centre UNICApress, publishing house of the University;
- by a lecturer with high expertise in the field of research ethics, including medico-legal issues and the handling of data from research/experimentation activities on human subjects.
- for administrative support: up to three representatives of technical-administrative and library personnel from the various Directorates.

**3.2** The Committee, in consultation with the competent statutory bodies of the University:

- defines policies for the implementation of Open Science principles;
- revises and updates this document as necessary to keep the University’s Open Science policies in line with national and international regulatory conventions;

[3] https://str-esfri.eu/esfri-roadmap

- initiates and develops relationships with institutions outside the University that promote Open Science;
- promotes participation in national and international initiatives on Open Science topics;
- settles any disputes on the interpretation of these policies;
- can draw on the input of experts in the fields of IT, law, privacy as well as economics;
- produces monitoring reports and documents aimed at raising the University's awareness of Open Science issues.

## 4. Open Science Actions

The University is committed to promoting cultural change in the direction of Open Science to foster awareness of it within the University mainly through the following actions:

**4.1 Open access to scientific literature**: as stipulated in the relevant University Policies, UniCa pursues the aims of open access by means of the green road (by depositing any production in its own UNICA IRIS repository) and through the diamond and gold road (through the publishing services of its own UNICApress publishing house and through support or publication with fully open- access publishers). The publications of UniCa researchers must be 'as open as possible and closed only if strictly necessary'. To this end, UniCa promotes the University Fund for APCs, giving priority to those in the early stages of their careers.

**4.2 Open access to data and other research output**: data produced by scientific research conducted at UniCa must be ''as open as possible, closed only if strictly necessary'' and comply with the FAIR principles, as well as with current regulations on the protection of personal data, commercial interests, intellectual and industrial property rights, and the rules of specific research funding agreements with third parties.

It is therefore necessary to document in a detailed and coordinated manner how the data were collected, their technical characteristics, and the processing steps they underwent. This information is necessary in order both to replicate the experiments and to enable further research activities employing the same data.

The document containing this information is called DMP; the drafting of this data management plan is strongly recommended for any research activity, when it is not mandatory as in the case of European projects. The plan must be drafted as an evolving tool whose updating must follow the evolution of the research activities, since in many cases it is not possible to fully define *a priori* the set of data needed to produce research results that are relevant to the specific research area. The document is a necessary tool for structuring and planning the way in which experiments connected with research activities are to be carried out, and for enabling the verification of results and their reproducibility. The plan must detail the different steps for data management: the methods used to collect data or reuse previously collected data; metadata describing the data collected and their quality; the technologies and systems used for data storage, including tools for creating back-up copies, and for managing data security and confidentiality where relevant; verification of compliance with the law and any ethical aspects; arrangements for any data sharing, specifying how data will be accessed and used; a list of persons involved in data management and any financial resources dedicated to data management and sharing.

The decision to share data, or the way in which data is collected and processed, requires the use of appropriate IT tools to ensure data availability, access traceability, integrity and confidentiality of stored data. For each research activity, it will be necessary to specify and establish the degree of confidentiality of the data and how they are to be opened and accessed. In some cases, data may be made publicly available; in others only upon request and with the specific signing of a confidentiality agreement. Occasionally it will be necessary to carry out a procedure of anonymisation or pseudo-anonymisation of the data that protects confidential information but allows the consistency of the results with what has been stated to be verified. Finally, in other cases it will be possible for third parties to process data without having direct access to it but mediated through Application Programming Interfaces (APIs).

The *cloud computing* paradigm automatically provides tools for data sharing, management and access control, as well as mechanisms that allow applications to access data without disclosing it to third parties, except for the results of processing. To this end, the EOSC Association (European Open Science Cloud) has been created to provide a federated structure for the sharing and re-use of data, tools and services for research and innovation. The association is committed to defining specific guidelines for different research areas and different ways of sharing data, both methodologically and technically. Research computing centres in Italy, together with commercial cloud service providers, are engaged in the study and implementation of services that comply with the guidelines. It is essential that any data sharing initiative, especially when required by the rules of the funding received, is adequately documented, in compliance with the EOSC guidelines, and implemented using platforms federated with EOSC or, alternatively, using other platforms in compliance with the requirements and guidelines defined in EOSC.
The University of Cagliari is committed to joining EOSC in order to contribute to the drafting of the guidelines, provide researchers with operational guidance, and take care of updating a catalogue of platforms and services for sharing research data.

**4.3 Citizen science:** UniCa promotes and implements actions to open up the results of scientific research in a variety of ways:

- disseminating knowledge understood as the set of collaborative processes by which scientific, economic and social value is created, linking different areas, knowledge and sectors and transforming data, technical skills and research results into products, services, solutions and policies that generate benefits to society, also strengthening the process of technological and organisational knowledge exchange within local ecosystems of innovation, in connection with international knowledge dissemination networks;
- Public Engagement initiatives organised by the University or its department structures, as well as in connection with the network of Universities and Research Centres for Public Engagement (APEnet), aimed at a non-academic public with cultural, educational and social development purposes, such as, for example, cultural activities of public utility, scientific communication and dissemination, initiatives to involve citizenship in research, involvement and interaction with the world of education. The main objectives of these initiatives are to reduce the distance between research and society and to cultivate dialogue with local areas and communities, respecting and enhancing their peculiarities, and being mindful to involve people and contexts that often risk exclusion or marginalisation;
- initiatives to involve the non-academic public in the scientific research process, whether it is research based on a specific community demand or global research. This mode of Citizen Science is at the same time a purpose and a tool of Open Science; it can include citizens who actively and openly participate in the actual research process, as well as consist of a greater public understanding of science, fostered by a broader access to information related to research processes, including the ability to manage open research data and access to openly available articles.
- - On the whole, the intentions of citizen science can be divided, according to the peculiarities of the function of the different bodies and in relation to the different fields of knowledge, into activities promoted by the university as a whole, but also into those carried out by the departments or by members of the university community, in individual or organised form.

Citizen science activities include:

- organisation of public interest events open to the community aimed at consulting, sharing and enhancing research and health protection;
- activities to engage and interact with local schools;
- participation in the formulation of public interest programmes (policy-making actions), urban development or land-use and knowledge co-production projects.

UniCa is committed to strengthening:

- the creation of exhibitions and events open to local citizens, encouraging their active involvement and collaboration with local associations and groups;
- participation in local, national and international PE projects, association in networks active in PE and collaboration with associations whose main purpose is to disseminate, promote and develop

Citizen science experiences;
- the identification of tools for effective planning of wide-ranging activities, with assessment and monitoring of their results.

4.4 **Research Assessment**: in 2022 the University signed the Agreement on Reforming Research Assessment (ARRA), thus becoming a member of CoARA[4] and its Italian Chapter, and in 2023 the Declaration on Research Assessment[5]. In these areas, UniCa has recognised the importance of an open approach to assessment and, therefore, is committed to adopting new criteria for the assessment of research activities and careers, within the limits of the relevant legislation. In addition, in view of the fact that it has obtained the Human Resource Excellence in research qualification, UniCa is committed to the implementation of the Human Resources Strategy for Researchers (HRS4R), through a series of actions aimed at considering not only quantitative, but also qualitative parameters in the selection procedures of researchers at the various career levels, as well as the preparation of a University policy for the OTM-R (Open, Transparent and Merit-based Recruitment).

4.5 **Open science training**: UniCa is committed to organising training events on the theoretical principles, design and implementation of open science events, involving university departments and collaborating with other national and international institutions and stakeholders. The strategic objective is to raise the awareness of all research, library, administrative and technical staff in the adoption of open science practices, by aiding their adoption. In particular, in the framework of the HRS4R strategy UniCa intends to organise training activities for doctoral and post-doctoral students and researchers on Open Science issues, specifically dedicated to Open Access publication, FAIR treatment of data, their security, archiving and exploitation, principles of ethics and integrity, respect for privacy, as well as providing support activities for the preparation of DMPs of European projects. Furthermore, through its research infrastructures, UniCa intends to promote continuous training, both of researchers and technical staff, in the use and sharing of advanced scientific and technological equipment.

## 5. Tools

### Research infrastructure

The National Research Infrastructure Plan (PNIR) 2021- 2027[6] was adopted with Ministerial Decree 1082 of 10.09.2021 and aims to provide technical-strategic details of the Research Infrastructure, defining and updating the national priorities in this area.
RIs are decisive for their ability to foster scientific progress and promote innovation: for UniCa they represent an asset for the entire scientific community, which recognises their value not only for its own researchers, but also for national and international researchers.
RIs must ensure open access to services and expertise by contributing to the implementation of the Open Science Strategy promoted by the European Commission.
Through its RI UniCa intends to:

- support basic and applied research;
- consolidate its role within national and international networks, including through participation in European and non-European projects, thereby promoting the internationalisation of the University;
- provide high-level specialised support for cutting-edge research, conducted for example, as part of degree or doctoral theses;
- offer a service to its departments, as well as to institutions, public or private bodies, companies operating at regional, national and international level.

The following open science RIs are currently available at UniCa:

[4] https://coara.eu
[5] https://sfdora.org
[6] https://www.mur.gov.it/it/atti-e-normativa/decreto-ministeriale-n1082-del-10-09-2021

- **CeSAR**: University Research Service Centre (https://web.unica.it/unica/it/cesar.page )
- **CeSASt**: University Service Centre for Stabulars (https://web.unica.it/unica/it/cesast.page )
- **DH/UniCA**: Interdepartmental Centre for Digital Humanities of the University of Cagliari (https://dh.unica.it/il-centro-dh-unica )
- **POLILAB**: University Service Centre for Engineering Sciences (currently being set up)
- **IRIS**: UniCa institutional research information system (https://iris.unica.it )

**CeSAR** supports research in the fields of biology, medicine, physics, chemistry and earth sciences with a modern high-tech laboratory set-up inspired by international best practices.
In this context CeSAR carries out actions aimed at fostering:

- the multidisciplinary, interdisciplinary and transdisciplinary approach, which is increasingly essential to tackle the challenges facing today's scientific community in a systemic manner, requires complex knowledge that goes beyond traditional fields of knowledge;
- access for private sector users, particularly from knowledge- and technology-intensive manufacturing activities, so as to take full advantage of opportunities for innovation and technology transfer.

The mission of the CeSAR is to be a competitive and highly respected RI, representing the physical/virtual place open to anyone wishing to conduct cutting-edge research, to experiment, grow and modernise. The access offered by this facility will make it possible to use different data, equipment, services and expertise to conduct state-of-the-art scientific studies and experiments and to create innovative experimental approaches and methods.
Through open access to research results and instrumentation, CeSAR is committed to playing a relevant role in the implementation of the university's Open Science policies.
The **CeSASt** supports preclinical research in the biomedical field. The CeSASt is equipped with enclosures suitable for keeping various animal models used for research in neuroscience, physiology and pathology, in accordance with national and international regulations. In addition, the CeSASt has several laboratories equipped with state-of-the-art instrumentation for carrying out experimental activities in various areas of preclinical biomedical research, both basic and applied. The experimental activities carried out at the CeSASt are fully in line with programmes aimed at supporting the scientific and technological development of the university and the region in which it is located, with the aim of increasing competitiveness at national and international level.
In this context, CeSASt carries out actions aimed to

- Encourage the application of multi-/inter/trans-disciplinary approaches to pre-clinical biomedical research by providing users with the possibility of making use of appropriate instrumentation and a variety of expertise;
- Stimulate participation in the Centre's activities by users from outside the University in order to foster collaboration between different research groups and to promote mutual innovation and the potential transfer of expertise.

The CeSASt aims to be an innovative infrastructure where researchers working in the various fields of pre-clinical biomedical research can operate safely and efficiently and thus enhance the quality and competitiveness of their research. Through open access policies for research support services, CeSASt also aims to play an active role in the implementation of Open Science strategies.

The **DH/UniCA** is UniCA's Digital Humanities lab; it was set up as a facility to enable researchers, students and scholars to experiment with the integration of humanities research methodologies and digital technologies, with the involvement of local communities.
Within it, digital applications are developed so as to order, construct metadatabases, and spatialise data from archival, bibliographical and multimedia research, conducted on current case studies; trans-media objects are conceived and published for research and the dissemination of results, both in the professional scientific and public spheres.
dh/UniCA develops citizen research and education programmes, involving associations, schools, municipalities and entire communities in the generation of information platforms for the study and shared knowledge of history on various spatial and time scales.
In this context, dh/uniCA carries out actions aimed at fostering:

- the development of technological solutions designed according to the needs of humanistic

research;
- the generation and publication of new digital and public transmedia sources;
- innovation by sharing durable, reusable and open tools and resources for research, teaching and learning;
- building relationships and synergies with other national and international research centres, organisations and associations in the area.

The **POLILAB**, currently being set up, will have the task of supporting research in the field of engineering science and technology through the provision of large equipment and high-tech instrumentation managed in an interdisciplinary service environment. POLILAB will consist of a central core (where the Centre's strategic, operational and administrative management will be located) and a network of satellite laboratories hosted by the Departments belonging to the Faculty of Engineering and Architecture. The laboratories will be made usable, operationally, by the presence of expert technicians with adequate professional skills and, administratively, by means of special agreements that will regulate access to the instruments, their management, maintenance, updating, adaptation and constant improvement, to allow access to cutting-edge services not only for the Departments, but also for external users.
In this context, POLILAB will carry out actions aimed at fostering:
- the use of existing advanced equipment, positioning itself in a competitive scenario in line with the market;
- the management and promotion of cutting-edge research activities, both fundamental and applied, by providing equipment, human resources and facilities, as well as providing new tools and resources to realise research objectives and the implementation of scientific projects;
- encourage and promote cooperation and technology transfer between the university research environment and industry through public engagement activities and shared initiatives with the territory aimed at enhancing and using knowledge to contribute to the social, cultural and economic development of society.

The multi-faceted nature of POLILAB will also be made available to the university for actions to exploit research results and encourage public engagement.
**IRIS,** the Institutional Research Archive of the University of Cagliari, aims to document and make freely accessible the scientific and research production of authors who, in any capacity, are associated with the University of Cagliari, whether as authors or co-authors together with one or more internal or external subjects.
The archive is intended to receive the descriptive, administrative and management bibliographical metadata of the contributions and the same in digital version, in the version authorised by the publisher for open access dissemination.
The Archive:
- meets international best practices and technical standards on Open Access, in particular the OAI-PMH standard for interoperability;
- meets best practices and international technical standards for the preservation of scientific research products over time;
- is indexed by the main generalist and specialised search engines, which guarantee maximum dissemination and visibility to the materials deposited.

## 6. Monitoring Open Science Policies

The Committee shall regularly monitor the state of implementation of this Open Science policy, including through ad hoc indicators, and shall publish the institutional documents and initiatives promoting Open Science.
The Committee will prepare an annual report on the state of implementation of the Open Science policy, analysing the strengths and weaknesses of the actions undertaken with a view to continuous improvement