Universität Stuttgart

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Open Science at the University of Stuttgart: Position Statement*

Preamble

Open Science refers to research that enables free and sustainable access at all steps of the research process, including current knowledge, methodology, and results. Research outputs and processes that are findable, accessible, interoperable, and reusable [1] lead to more transparent and reliable research results. Open Science can strengthen trust in science, increase the potential for innovation, and help researchers respond to societal changes. It is important to note, however, that it may be beneficial or even necessary to also preserve protected spaces for scientific processes and discourse [2].

Open Science has become a global movement. UNESCO views Open Science as a new paradigm of scientific practice [3] that contributes to the United Nations' Sustainable Development Goals (SDGs) [4]. Open Science is also given high priority in the EU and serves as the standard underlying the current Framework Programme for Research and Technological Development [5, 6]. The DFG focuses on the "enabling impact" of Open Science – primarily on research and scholarship, but also for other stakeholders [2].

At the University of Stuttgart, Open Science forms part of the foundation for our vision of a sustainable society. The university therefore promotes scientific transformation towards Open Science.

1 Target Group

The University of Stuttgart's position statement on Open Science is aimed at all individuals and institutions that participate in and support the university's activities in research, teaching, and knowledge transfer. This also includes all those who are impacted by research outcomes or who wish to follow, understand, or utilize such outcomes. These stakeholders might be decision-makers from politics and business, interested members of the public, or school teachers.

When implementing Open Science, subject-specific research norms, the Code of Conduct for Good Research Practice [7], and all relevant legal requirements must be observed. These include, in particular, privacy rights, regulations on data protection and intellectual property,

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contractual obligations, export control regulations, and ethical principles. Researchers are responsible for all decisions relating to the scope and specific implementation of Open Science principles in their projects[1].

2 Values and principles

In the context of Open Science, the University of Stuttgart is guided by the following values and principles, based on the UNESCO recommendations [3]:

2.1 Integrity

Integrity improves the quality, transparency, and trustworthiness of research. Open Science sets up comprehensible and transparent processes that strengthen the quality of scientific work. Research results should be made findable, accessible, interoperable and reusable in accordance with the FAIR principles [1]. Transparent research processes make it possible to review and evaluate methodologies and results and to responsibly reuse outside sources of knowledge in accordance with the principles of good research practice [7]. Academic freedom, scientific honesty, and respect for human rights form the basis of responsible research practice.

2.2 Respect for diversity

Respect for diversity means respect for different subject cultures, perspectives, and epistemologies. Open Science recognizes the diversity of scientific disciplines, methods, and forms of communication. Different subject cultures and diverse forms of knowledge production are included on an equal footing.

2.3 Equity and inclusiveness

Equity and inclusiveness are strengthened through open access to knowledge and active involvement in research. Open Science contributes to the common good by providing fair and barrier-free access to scientific knowledge and opening up research to diverse participants, for example in the context of citizen science. Academic discourse is made accessible for all those with a legitimate interest, regardless of origin, gender, age, social status, and other diversity characteristics.

2.4 Cooperation and openness

Cooperation and openness promote efficient scientific knowledge creation. Scientific cooperation across geographical, institutional, and disciplinary boundaries is central to moving research forward. Open Science promotes the exchange of diverse perspectives and thus strengthens the quality and societal relevance of scientific findings.

[1] Editorial note: Support is provided by the relevant departments and divisions within the University of Stuttgart responsible for the respective legal areas.

2.5 Sustainability and responsibility

Sustainability and responsibility require long-term structures, ethical action, and the ability to adapt to new situations. Open Science is oriented towards long-term, non-commercial structures and contributes to sustainable development and the implementation of the University of Stuttgart's sustainability goals. At the same time, Open Science requires those involved to be able to adapt to differences within the scientific world and to constantly and often rapidly evolving knowledge creation processes. Opening up scientific processes goes hand in hand with the obligation to take responsibility for social, political, and ecological consequences, to reflect on conflicts of interest, and to uphold ethical standards.

3 Support offers and focus areas

Based on the values and principles presented in Section 2, the University of Stuttgart provides its researchers with numerous support services which have been actively expanded for many years. The following topics and offers reflect current focus areas, which the university will continue to develop and expand in line with the above-mentioned ability to adapt to new circumstances.

3.1 Open Access

Open Access (OA), referring to publication pathways that maximize access to research results, is a core component of Open Science that has been promoted in the scientific world and at the University of Stuttgart for many years. The first Open Access policy of the University of Stuttgart was published in 2011. The university took this opportunity to emphasize its duty to „*make the knowledge and collective achievements of university researchers available to society*". Researchers are encouraged to follow frameworks such as the Berlin Declaration [8] when publishing their results. Since publishing this policy, the University of Stuttgart has built up a comprehensive range of advisory and support services in the areas of Green, Gold, and Diamond Open Access. This includes, for example, maintaining the publication server OPUS as well as repeatedly acquiring funds from the DFG that are available to researchers as part of an open access fund for Gold OA publications (DFG project *Open Access Publication Costs*). In addition, the university offers support for researchers wishing to publish a book or to establish and host a journal. The Open Access website of the University of Stuttgart provides an overview of the activities and achievements in this focus area.

3.2 Open Research Data and Open Research Software

The open and responsible handling of research data and research software is an essential aspect of Open Science. Established several years ago, the Code of Good Research Practice [7] provides clear guidelines on the handling of research data and software which mirror the relevant DFG guidelines [9]. The European Union also provides guidelines [5] on the storage and

management of research data and software. In 2017, the University of Stuttgart adopted a Research Data Management Policy, which expressly advocates open access to research data. The University of Stuttgart provides a wide range of related offers: The Competence Center for Research Data Management (FoKUS) offers advisory services and training, and maintains infrastructure.

The data repository DaRUS was established in 2019 and offers the opportunity to publish data and software based on the FAIR principles [1], quality-assured by data curators and connected to the German National Research Data Infrastructure (NFDI) and the European Open Science Cloud (EOSC). The university is currently working on establishing an Electronic Lab Book Service (ELBUS) and a service for managing large-scale research data (bwSFS2) to support the documentation of processes and data during the research process. A license checker is available to suggest suitable software licenses and the JupyterHub supports the creation of reproducible analysis workflows. The university is also in the planning stages for a Center for Research Software Engineering.

The university's Digital Collections are an archive of cultural assets tracing the university's history and identity. They form a central component of the university as a cultural institution. The digital catalog of analog artifacts by the University Library makes these contents easy to find and usable for research, teaching, and learning at any time and from any location. In addition to scanning or photographing 2D objects (e.g. object images, archive documents, books) and creating 3D models (e.g. scans or digital models), the process of digitizing cultural assets also involves indexing the objects using descriptive data. The content is made available to the public via the portal digibus.

3.3 Open Research Hardware and Infrastructure

In line with the values and principles of Open Science, the University of Stuttgart does not restrict the use of research infrastructure to its members, but may also grant access to a wider circle of users, such as industry representatives or members of other universities and research institutions. In addition to one of the world's leading supercomputing centers, the HLRS, which provides access to supercomputers and supports the implementation of high-performance computing simulation projects, external partners can also make use of other large-scale research infrastructures such as wind tunnels and the Porous Media Lab. The University of Stuttgart provides further support for the storage, management, and transfer of data in line with Open Science principles. The Makerspace at the University of Stuttgart aims to provide a fully accessible and inclusive space for creative projects in research and teaching.

3.4 Open Educational Resources

Similarly to open publication practices in research, such as Open Access and Open Data, Open Educational Resources (OER) are made accessible via repositories such as the Central Repository for universities in Baden-Württemberg (ZOERR). Enabling open access to educational resources is in line with the United Nations Sustainable Development Goals, in particular SDG 4, and the OER strategy of the Federal Ministry of Research [10]. Open educational resources are

free from legal and technological restrictions, meaning that materials can be reused and integrated into other materials. Teaching staff can also create new teaching materials and publish these without legal restrictions.

At the University of Stuttgart, the University Library (UB), the Technical Information and Communications Services (TIK) and the Center for Higher Education and Lifelong Learning (ZLW) share responsibility for developing OER through projects such as MakEd_digital and digit@L. Support on OER is available at all project stages, from proposal submission to publication and dissemination, regarding questions on organization, licensing, university didactics, and media didactics. The OER stakeholders at the University of Stuttgart cooperate with partners throughout Germany via the BW community and actively pursue new developments, e.g. on issues of quality assurance and open media production.

3.5 Open Transfer and Innovation

Openly communicating scientific findings to the public promotes knowledge and technology transfer, which is an important goal for the University of Stuttgart as laid out in its Transfer Strategy. The Transfer Center TRACES of the University of Stuttgart manages numerous activities in cooperation with the Institute of Entrepreneurship and Innovation Science (ENI) and the Technology Transfer Initiative (TTI GmbH). It serves as a contact point for members of the university and for external stakeholders in business or society, offering support for spin-offs, career planning, business networking and technology scouting. At the ARENA2036 research campus, various institutes at the University of Stuttgart are working with numerous external companies to develop innovative concepts in the field of mobility and production technology. ARENA2036 is also home to the STARTUP AUTOBAHN, which establishes and promotes contacts between start-ups and technology companies.

3.6 Science communication and citizen participation

Open Science includes involving the public in knowledge creation and science communication. In addition to offering numerous event formats that appeal to a broad audience, the University of Stuttgart has been involved for many years in various real-world laboratories that bring science and civil society together in real-world experiments in order to initiate societal transformations and find sustainable solutions [11]. The Stuttgart Change Labs support innovative projects that promote sustainable education and development at the University of Stuttgart and in society. These projects harness the power of cooperation between different disciplines and strive to find responsible solutions in dialog with various stakeholders from society. The university's International Center for Cultural and Technological Studies (IZKT) promotes exchange between the university and the public, especially at the interfaces between culture and technology. The IZKT works in close cooperation with partners such as the Stuttgart City Library in order to maximize societal reach. The Center for Interdisciplinary Risk and Innovation Studies (ZIRIUS) conducts research on topics such as methods for involving the general public in studies on socio-technical transformations in society. In addition to interdisciplinary cross-faculty research examining intelligent systems and their impact on society, the Interchange Forum for Reflecting on Intelligent Systems (IRIS) also focuses on public engagement: The forum organizes events

and discussions to raise awareness of how intelligent systems influence our society and to promote dialog between researchers and society.

3.7 Open Assessment

Open Assessment means giving preference to qualitative methods over quantitative indicators when evaluating research. This is intended to counteract efforts at misrepresentation, such as splitting related research results into a large number of publications. The San Francisco Declaration on Research Assessment DORA [12] published in 2012 is one of the first declarations on this subject to attract worldwide attention. The University of Stuttgart was one of the first universities in Germany to sign this declaration in September 2023. The Code of Good Research Practice [7] and the University of Stuttgart's related Statute for Ensuring Good Scientific Practice also recommend alternative ways of evaluating research. The appointment guidelines of the University of Stuttgart also contain suggestions for how to assess academic performance in new ways.

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