



Open Science Strategy

at the Brno University of Technology
for the period 2022–2025

Background

Open science is a new approach to science that aims to use digital technologies to disseminate knowledge and provide education for all citizens. The main tools of this approach are the increased accessibility of research results, promotion of transparency of science, verifiability of results and the rapid dissemination of results and progress.

In line with the UNESCO Recommendation on Open Science¹ and in line with the Open Science 2025 Agenda of the European University Association² (EUA), this document understands open science as “an inclusive construct that combines various movements and practices aiming to make multilingual scientific knowledge openly available, accessible and reusable for everyone, to increase scientific collaborations and sharing of information for the benefits of science and society, and to open the processes of scientific knowledge creation, evaluation and communication to societal actors beyond the traditional scientific community.” It comprises all scientific disciplines and aspects of scholarly practices, including basic and applied sciences, natural and social sciences and the humanities, and it builds on the following key pillars: open scientific knowledge, open science infrastructures, science communication, open engagement of societal actors and open dialogue with other knowledge systems.”

The implementation of open science for the post-2020 period is elaborated in the EU Research and Innovation Strategy 2020–2024 (EU RIS). To promote the principles of open science, the European Union is launching the European Open Science Cloud (EOSC), which is used to store, share, process and reuse digital scientific results such as publications, data and software. At the national level, the general objectives in the area of open science are defined in the Czech Republic National Strategy for Open Access to Scientific Information for 2017–2020 (hereinafter the “National Strategy 2017–2020”) and it is further anchored in the National Policy for Research, Development and Innovation of the Czech Republic 2021+ (hereinafter the “National Policy 2021+”) and its actions, in particular in Action 8: “Open access to R&D results and data that can be freely disseminated; upgrade and streamlining of the RDI IS”.

BUT understands open science as a fundamental basis for setting the policy of preservation and publication of scientific publications and other results and outputs of educational and research, development and creative activities, management of research data according to principles of FAIR Data, open access to research infrastructures and in the implementation of other activities in the area of educational and research, development and creative activities, including emphasis on adherence to ethical principles in this area. To this end, BUT will build a well-developed structure of services for its employees and the public.

This document aims to define the focus areas of BUT for 2022+ and measures to implement the principles of open science. BUT’s focus on open science is based on the EU RIS, the National Strategy 2017–2020 and the National Policy 2021+ and the Open Science Agenda 2025 of the European University Association.

¹ [UNESCO Recommendation on Open Science](https://en.unesco.org/science-sustainable-future/open-science/recommendation), <https://en.unesco.org/science-sustainable-future/open-science/recommendation> 2021, p.7

² The EUA Open Science Agenda 2025, <https://eua.eu/resources/publications/1003:the-eua-open-science-agenda-2025.html>, 2022

In the area of open science, BUT will focus on the following areas:

1. Preservation and publication of scientific publications (Open Access Publications) and university theses and dissertations;
2. Research data management according to FAIR Data principles;
3. Open access to research infrastructures.

Systemic support for open science for research, development and creative and teaching staff and students is also linked to each area. The prerequisites and obligations of BUT staff in terms of their research and scientific activities are enshrined in the BUT Code of Ethics. Its fundamental aspects, such as ethics of scientific work, publication ethics, reproducibility of research, data sharing, publication of results, will be newly defined or redefined to be aligned with open science principles. These changes will include the organisation of ongoing training sessions on citations, journal selection, predatory practices of publishers, copyright issues, etc. Individual counselling for authors will also form an essential part of the support.

The goals that BUT wants to achieve by 2025 and the basic measures for achieving these goals are defined for each by analysing the current state of affairs. Specific steps and quantified indicators are then contained in the Action Plan for the implementation of the Open Science Strategy, which forms an Annex to this document and which will be refined at least at two-year intervals. The implementation of the strategy will be monitored and evaluated on the basis of its annual assessment based on the following specific indicators. BUT will also regularly evaluate and appraise the social impact of scientific and other published outputs.

1. Preservation and publication of scientific publications

Open Access is a way of providing access to scientific information (articles, monographs, research data) at no additional cost to readers, which is licensed so that it can be reused by researchers, industry and citizens.

1.1 Preservation and publication of publishing results (Open Access Publications)

Open Access Publications is a way of presenting scientific results that serves as an alternative to the traditional way of publishing. It strives for barrier-free, i.e. open and free access to scientific results, which is ensured by publishing results in open journals and especially by publishing results in a digital repository.

In 2008, BUT started to build an institutional repository, the BUT Digital Library, for the purpose of publishing thesis and dissertations in a digital format. In 2013, BUT subscribed to the principles of Open Access by signing the Berlin Declaration (currently regulated by Guideline no. 11/2018 Institutional Policy on Open Access to Scientific Information). From the beginning, BUT has been urging authors to deposit their publications in the institutional repository and make them available to the public.

BUT is aware of the risks associated with open access to publishing R&D results; therefore, it will continuously pay attention to activities aimed at monitoring the quality of publication outputs and education of scientists and academic staff. BUT appeals to the personal responsibility of each researcher to conduct and publish their research in accordance with the principles of scientific integrity (scepticism, communication and repeatability).

1.1.1 BUT Digital Library

Current state

The Brno University of Technology operates the BUT Digital Library as its institutional repository. The repository contains full texts of university theses and dissertations, study materials and research results. Each record published in the repository is tagged with a persistent Handle identifier that ensures the uniqueness and long-term functionality of the link.

BUT is also a member of CrossRef, an organisation that assigns Digital Object Identifiers (DOIs). Within this framework, the Central Library (CL) assigns DOIs to journals and proceedings uploaded to the Digital Library. This provides another unique identifier for individual digital objects and thus facilitates the availability of BUT scientific publications.

The Digital Library is built on the open source system DSpace and it is functionally connected with the information system of BUT (BUT IS).

Targets for 2025

The aim is to develop the repository as a central point for publishing R&D results and other results and outputs of educational and creative activities.

Planned measures

BUT will systematically support the development of the repository so that it corresponds to the current technological trends in terms of robustness, ease of administration, technologies used, speed of access, possibility of connection to the BUT IS and that it is connected to aggregation repositories (e.g. OpenAIRE, NUSL– national repository of grey literature, etc.). This will promote the availability of BUT results to the public.

1.1.2 Archiving of R&D results and their publication

Current state

The R&D Publications module in the BUT IS application is adapted for archiving full texts of published R&D results; their publication is enabled by linking the BUT IS with the BUT Digital Library. The share of publications by BUT authors published in the institutional repository currently reaches 20% of the total number of BUT publications reported in the BUT IS in 2020.

Targets for 2025

Increase the share of published full texts in the Digital Library to 75% of all reported results in the R&D Results module. For this purpose, BUT will establish a methodology and binding rules for storing R&D results and other outputs and creating a metadata record in the BUT IS. These publications will be entered into the results database for the purposes of plagiarism checking.

Planned measures

BUT will support the publication of publications mainly through the Green Open Access, i.e. storing the final version of published results in the institutional repository (or the most advanced version of the manuscript). The Gold Open Access will be maintained as a complementary method.

1.1.3 Author identifiers

Current state

Currently, BUT records ORCID, Scopus Author ID and ResearcherID author identifiers. The use of author identifiers is regulated by Directive no. 5/2018, which introduces the obligation to

establish an ORCID identifier. A total 2770 authors has an ORCID identifier entered in the IS. ORCID is integrated into the BUT IS thanks to its membership in ORCID. An author can create an ORCID or add an existing ORCID through the BUT IS. Therefore, BUT obtains an authenticated ORCID and the author of the linked account obtains the indication of the confirmed affiliation in the ORCID and can further send the metadata of the reported results in the BUT IS to the ORCID. Some of the ORCID's are still entered manually (historically; this is no longer possible).

Targets for 2025

The aim is that all authors from BUT have an ORCID identifier established and linked to keep their profile up to date and use it as much as possible in the publication process. The aim is also to promote the use of other relevant author identifiers, especially Scopus Author ID and ResearcherID.

Planned measures

Raise awareness of the opportunities and benefits of using author identifiers by actively supporting academic and scientific staff over the long term. Updating internal regulations and standards governing this area. Use of author identifiers to support and automate the recording and reporting of results within the BUT IS.

1.1.4 Indicators of the strategy for preservation and publication of publishing results

The implementation of the strategy in the area of preservation and publication of publishing results will be monitored and evaluated on the basis of the number and structure of documents stored in the Digital Library or in the BUT IS, specifically the following:

- the number of university theses or dissertations stored in the Digital Library, structured as bachelor's thesis, diploma thesis and doctoral dissertations and their share in the total number of stored documents;
- the number of study materials and their structure, and other documents published in the Digital Library;
- the share of scientific publications according to the journals categories (Jimp, Jsc), papers published in proceedings (D), books (B), chapters in books (C), published in the Digital Library on the reported publications in the R&D Results Module of the BUT IS;
- the share of publications stored in the BUT IS in the total number of reported publications.

1.2 Support for open publications

Current state

To support open publishing, the BUT established the Open Access (OA) Fund in 2013, which is intended to cover publication fees in the case of articles published in fully open journals (Gold Open Access). Since the establishment of the OA Fund, 268 articles have been supported before the end of 2020, with a total amount of support of CZK 11.25 million. In 2020, 131 articles were published at BUT in the Gold Open Access, which is 12% of all articles in journals in the WoS database reported in the BUT IS. The OA Fund contributed 44% of the funding.

Six scientific journals indexed in the institutional repository are currently published at BUT; five journals (*Kvaternion*, *Mathematics for Application*, *Mendel*, *Radioengineering*, *Trends Economics and Management*) are fully open access (i.e. published articles are available in the institutional repository immediately after publication). The *Journal of Forensic Engineering* allows articles to be made available 18 months after publication.

Targets for 2025

Continue to support open access publishing with funding from the Open Access Fund and project sources. Maintain at least the current level of financial support from the Open Access Fund, and seek and support appropriate sources of dedicated funding.

BUT will support the publication of scientific books and study texts (scripts, methodological materials, case studies, etc.) in the form of OA and their publication in the institutional repository. In the case of study texts, this may involve individual access, i.e. the publication will be available to the user only after logging in.

Planned measures

Increase the number of openly published articles funded by project funding.

The level of the OA Fund allocation will be maintained at least at the 2021 level. These funds will be used to pay for publication fees in top quality journals. Currently, this is regulated by Resolution no. 22/2021 Open Access Fund, which allows payment of publication fees for articles published in journals ranked in the 1st quartile according to the *Article Influence Score (AIS)* of the Web of Science database.

Publication of scientific books will be provided by VUTIUM Press, which already publishes 1 to 2 books in electronic form per year. In the future, this will be the preferred form of publishing scientific and educational books and texts.

1.2.1 Indicators of the strategy to support Open Access publishing

The implementation of the Strategy in the area of open publications will be monitored through the following indicators:

- the number of articles (Jsc, Jimp) and their share in the total number of articles published in the Digital Library in the Green Open Access;
- the number of articles published in the Gold Open Access and their share in the total number of Jimp articles;
- the cost of publication fees for the Gold Open Access;
- number of articles supported by the OA Fund (i.e. publication costs paid);
- the share of fees paid from the OA Fund in the total cost of publishing Golden Open Access articles in 2030 will not exceed 20%;
- the share of publications published by VUTIUM Press in the Open Access in the total number of publications;
- the share of conference proceedings from conferences organised by BUT published in the Digital Library (33 conference proceedings are currently uploaded).

2. Research data management

Current state

Systematic regulation of archiving and management of research data at BUT is still an underdeveloped area. The questionnaire survey carried out in spring 2021 showed that the vast majority of respondents are aware of the need to archive research data, and some of them are aware of the need to publish such data. They expect to have a comprehensive infrastructure in place to support their work, including information and legal support in the area of data management (*Infrastructure as a Service, IaaS*).

The archiving and management of research data is mainly handled in projects that include research data in their conditions. BUT already has partial experience with the preparation of Data Management Plans (*DMPs*) for the preparation of project applications in public tenders and data management in the context of the management of large research infrastructures. BUT is currently implementing courses focused on the preparation of DMPs through the Central Library and it has ensured a trial of the *Data Stewardship Wizard* tool (available at <https://vutbr.ds-wizard.org/>);

Targets for 2025

BUT will establish rules and implement tools for Research Data Management (RDM), which means primarily the organisation, storage and long-term preservation of data obtained during a research project in all its phases, i.e. during its preparation and implementation, as well as after the end of the project.

Planned measures

BUT will lay down clear rules for working with data, i.e. defining research data, processing and preserving it in a way that meets the FAIR characteristics (i.e. data should be *Findable, Accessible, Interoperable* and *Reusable*). For this purpose, it will prepare an internal standard defining the basic aspects of working with research data and the rules to be followed by researchers and scientists. The standard will also include recommendations for the creation of *Data Management Plans (DMPs)* for staff preparing projects for participation in public tenders for research and innovation. In doing so, it will be necessary to distinguish the content of the DMP when the project proposal is submitted and after the decision on its financing has been taken (this section should also include information on the planned outputs in the form of OA and the form of their funding).

In accordance with the thesis (and forthcoming legislation) that research data is one of the forms of outputs of scientific work, BUT will introduce a register of research data generated at BUT. This will improve the *Findable* aspect of research data. The methodology and responsibilities within the research data registration will be regulated by a BUT internal standard.

The infrastructure for the implementation of research projects at BUT will include a system for storing research data, the BUT Data Repository. The aim is to provide a solution that will enable BUT researchers to securely store, manage and access data while respecting FAIR principles. The accessibility of research data to the public and the possibility of easy reuse and verification of results while protecting sensitive data (according to the *as open as possible* principle) will be monitored and pursued when creating the solution. Data creators and data owners will be able to decide which place to use for storing research data so that it is easily *accessible and interoperable* and *reusable*, i.e. in addition to the BUT Data Repository they will be able to use

external repositories (for example at <https://re3data.org>), CESNET repositories, etc. Due to the financial intensity of the preparation of the BUT data repository, a pilot version of the data repository will be launched in the first stage. After its verification and subsequent full launch, the BUT Data Repository will be connected to other aggregation repositories (*OpenAIRE*).

The link to the data repository will be provided in the data record in the R&D Results module of the BUT IS. At the same time, a link to the repository of the research data used to produce the publication result will be added to the publication record.

2.1 Strategy indicators in the area of research data management

The implementation of the strategy in the area of research data management will be monitored through the following indicators:

- the number of supported research projects for which a DMP was prepared and their share in the total number of supported research projects awarded in a given year;
- the number of reported results of the research data type in a given year.

3. Open access to research infrastructures

Current state

BUT is currently the host organisation of the large research infrastructure CzechNanoLab (consisting of CEITEC Nano and the Prague-based LNSM) and a partner organisation of the large research infrastructure CzechBioImaging. Access conditions are developed for each research infrastructure, including the definition of the user's responsibilities on the one hand and the host organisation's responsibilities for carrying out quality assessments of the services provided on the other.

Targets for 2025

As a host organisation, BUT will make the research infrastructure available to all potential users on an open access basis in accordance with the principles of the European Charter on Access to Research Infrastructures, which will be anchored in internal standards. BUT will continue to strive to expand open research infrastructures and increase the scope and quality of their services for users.

Planned measures

BUT will evaluate the possibilities to expand open research infrastructures and increasing the scope and quality of their services for users. This will be subsequently implemented with the support of project funding, especially through reflection of the calls of OP JAK and others.

3.1 Strategy indicators in the area of research data management

The implementation of the strategy in the area of providing access to research infrastructures will be monitored through the following indicators:

- the number of applicants from other institutions (outside BUT) for access to research infrastructure;
- the number of applicants outside BUT who were granted access to the research infrastructure;
- the number of publications produced with the support of users of the research infrastructure (internal and external users).

Annex 1: Action Plan for the Implementation of the Open Science Strategy 2022–2023

Area	Measure	Responsibility	Term
All areas	Strengthening the staffing of the Open Science Agenda at the Central Library workplace.	Central Library	from May 22
All areas	Redefine the code of academic and scientific staff in terms of the Open Science principles.	Creative Development Office, Central Library	December 22
All areas	Implement courses and seminars to support work with research data. The individual webinars will be linked to form a coherent structure of Open Science education. The option to award certificates to graduates of the complete education will be considered.	Central Library	on an ongoing basis
All areas	Prepare and implement an internal standard (directive) for data management that describes the responsibility for data files and addresses the risks associated with data storage. In connection with the internal standard regulating research data in 2022, modify the directive for reporting the results of research, development and innovation at BUT.	Creative Development Office, Central Library	December 23
1.1.1. BUT Digital Library	The open source DSpace system, used for the management of the BUT Digital, will be upgraded to a higher version, which will allow the use of possible new functions (e.g. transmission of information on authors' ORCIDs).	Central Library	December 22
1.1.2. Archiving of R&D results and their publication	Creation of an Open Science portal that will be used to inform the BUT staff and students and the public about all areas and services related to the implementation of Open Science at BUT.	Central Library, Computer and Information Services Centre	on an ongoing basis, October 22 – June 23
1.1.2. Archiving of R&D results and their publication	BUT will continue its promotional activities and reaching out to authors to deposit accepted versions of articles in the BUT Digital Library. BUT will prepare information materials and seminars to promote self-archiving and increased use of the possibility to upload full texts to the BUT IS and publication in the Digital Library.	Central Library	December 22, December 23
1.1.2. Archiving of R&D results and their publication	Prepare a strategy for archiving and publishing software created at BUT, or its dissemination using open licenses. At the same time, promote the use of open source software in research.	Creative Development Office, Computer and Information	December 23

		Services Centre	
1.1.3. Author identifiers	Deepening of ORCID integration – possibility of automatic ORCID synchronisation (in the IS -> ORCID direction). Increase the share of linked accounts in the total number of ORCID records through a targeted information campaign.	Central Library	December 23
1.2. Support for open publications	Needs and feasibility analysis of creating a single platform for publishing journals, which will comply with Open Science principles (e.g. <i>Open Journal System</i>).	Central Library, Computer and Information Services Centre	December 22
1.2. Support for open publications	According to the results of the analysis, the possible realisation and implementation of a unified platform for publishing journals in accordance with the Open Science principles.	Central Library, Computer and Information Services Centre	December 23
1.2. Support for open publications	The possibility of administering conferences and publishing conference proceedings in one place by installing a conference system (e.g. <i>Open Conference System</i>) will be analysed; such system would ensure easier transfer of metadata to the repository and assignment of DOIs for published outputs.	Central Library, Computer and Information Services Centre	December 22
1.2. Support for open publications	According to the results of the analysis, the possible realisation and implementation of a single platform for the administration of conferences and the publication of their outputs.	Central Library, Computer and Information Services Centre	December 23
2. Research data management	Implementation of a tool for <i>Data Management Plan</i> (DMP) creation for each research submitter of a project to a public tender.	Central Library, Computer and Information Services Centre	June 23 (pilot), December 23
2. Research data management	Creation of a tool for the recording of BUT-created research data in the BUT IS. The metadata record related to the research data will be recorded in the module for reporting R&D results in the BUT IS. The structure of the metadata record of research data will be designed by the Central Library; the modification of the BUT IS will be carried out by the Computer and Information Services Centre. The data record will include a link to the data repository.	Central Library, Computer and Information Services Centre	December 22
2. Research data management	Creation of a methodology and internal standards governing the recording of research data at BUT.	Creative Development Office, Central Library	December 22

2. Research data management	Analysis pursuing the creation of the BUT Data Repository, its structure and technical solution (in relation to centralised activities).	Computer and Information Services Centre	March 23
2. Research data management	Based on the results of the analysis, the realisation and implementation of the BUT Data Repository (in relation to the European Open Science Cloud (EOSC) and the outputs of the eInfra project).	Computer and Information Services Centre	December 23
3. Open access to research infrastructures.	Evaluation of the possibilities to expand open research infrastructures and increasing the scope and quality of their services for users. Anchoring in the BUT internal standards.	Creative Development Office	June 23