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# The Library of the Norwegian University of Science and Technology (NTNU) and its work with Open Science

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## Abstract

The article describes the library of the Norwegian University of Science and Technology and its work with Open Science. It gives a brief overview over the university and the library and presents the new organisational structure of the library. Afterwards, important strategy documents and guidelines for Open Science, Open Access, and Research Data Management at NTNU are introduced and the practical work with it is described. In the end, a selection of other projects and focus areas are mentioned.

**Schlagwörter:** Norway, NTNU, Open Science

## Die Bibliothek der Norwegischen Technisch-Naturwissenschaftlichen Universität (NTNU) und ihre Arbeit mit Open Science

### Zusammenfassung

Der Artikel beschreibt die Bibliothek der Norwegischen Technisch-Naturwissenschaftlichen Universität (NTNU) und ihren Umgang mit Open Science. Er gibt eine kurze Übersicht über die Universität und Bibliothek und präsentiert die neue Organisationsstruktur der Bibliothek. Danach werden wichtige Strategiedokumente und Richtlinien für Open Science, Open Access und Forschungsdatenmanagement der NTNU vorgestellt und die praktische Arbeit damit beschrieben. Eine kleine Auswahl an anderen Projekten und Schwerpunkten wird abschließend erwähnt.

**Keywords:** Norwegen, NTNU, Open Science

## 1 The Norwegian University of Science and Technology (NTNU) in a nutshell

NTNU is a public university in Norway, with its headquarter campus in Trondheim and two regional campuses in Gjøvik and Ålesund. NTNU was inaugurated by the King-in-Council in 1996 as a result of the merger of several higher education institutions, but its roots go back to 1760 with the foundation of The Royal Norwegian Society of Sciences and Letters. In 2016, three former university colleges were incorporated as well. Now, the university is the largest one in Norway in terms of enrolment. As of November 2022, the university had 43,422 registered students, and almost 10 per cent are international students, coming from 122 countries. NTNU comprises eight faculties, 55 departments and the University Museum. About 9,000 employees were working at the university in the end of 2022. NTNU has the main national responsibility for education and research in engineering and technology. In addition, a broad selection of study programmes (398 altogether) is offered in the natural sciences, humanities, social sciences, economics, medicine, health sciences, education, architecture, entrepreneurship, and fine and performing arts. The university is very proud of its two professors Edvard Moser and May-Britt Moser who received the Nobel prize in physiology or medicine in 2014. More information about NTNU can be found on its homepage at [www.ntnu.no](http://www.ntnu.no).

## 2 The Library of the Norwegian University of Science and Technology

NTNU University Library is the official English name of the library. It is a public scientific library, established in 1996 with the establishment of NTNU. However, it has its roots back in 1768 when the library of the Royal Norwegian Society of Sciences and Letters was founded. Thus, it is the oldest scientific library in Norway. With 15 branch libraries in Trondheim, Ålesund and Gjøvik the main mission of the library and its 120 employees is to support research and education at NTNU. Naturally, primary users of the library are NTNU students and employees, but all citizens can borrow from the library collection. The library collection consists of 1,9 million printed books, 1,2 million e-books, 275 databases, in addition to about 105,000 journals, 6,400 manuscripts, more than 30,000 maps, 35,500 music notebooks, and about 1,000,000 photographs (from the 1840s to the present). In 2022, we had 1,35 million visits at the libraries, and more than 4,6 million full-text article downloads. In addition to our 15 branch libraries a Virtual Library was developed during the pandemic. The Virtual Library is open every weekday between 10:00 am and 2:00 pm and can be accessed via Zoom. Users can get help with academic writing, reference management, literature searches, loans, and much more. 101 courses were executed via the Virtual Library in 2022, as well as 405 guidances. The library's discovery tool and catalogue is called Oria and is based on Primo from ExLibris. We use Alma as our library management system.

For many years the library has been transforming some of its spaces into innovative learning areas and informal meeting places. The students love to use those spaces (See figure 1).

In 2010, 2012 and 2015, the so-called Emtacl conference was organised by our library. Emtacl stands for Emerging Technologies in Academic Libraries and was a technology-oriented conference for information professionals working in higher education. Unfortunately, the library was not able to continue organising this conference. In June 2023, the library will be the host for the EAHIL conference/workshop (EAHIL=European Association for Health Information and Libraries).<sup>1</sup>



Fig. 1 Innovative learning spaces (NTNU 2016b)

### 3 New organisational structure of NTNU University Library

Academic and research libraries are facing lots of challenges. Open Access publishing, research data management and artificial intelligence are only a few topics that the libraries should take responsibility for and help shape. Against this background it became apparent that the organisational structure of our library did not meet the requirements for a future-oriented university library anymore. In particular, necessary new services could not be developed or implemented. Thus, in collaboration with the university management it was decided to reorganise the library. The new organisational structure became effective in June 2022 (See figure 2). The library council and literature selection committee were established in 2023. The library council advises NTNU's rector and pro-rector for research on strategies, objectives, and priorities for the library. It consists of pro-deans, head of departments, one student representative and one external member from another university or research library and is chaired by the pro-rector for research and dissemination. Seven professors/research staff are members of the literature selection committee that is chaired by the chief librarian. The committee advises the library on which online library resources (mainly journals and databases) should be prioritised and which could be cancelled.

<sup>1</sup> See <https://eahil2023.org/> [Online, Accessed 12 June 2023].

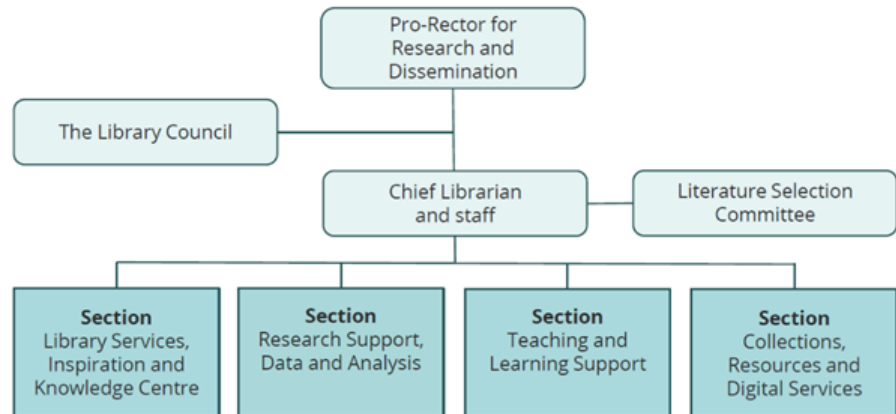


Fig. 2 Organisational structure NTNU University Library (NTNU n.d.)

## 4 Open Science at NTNU

The Policy for Open Science at NTNU was approved by the university’s rector on 2 October 2020, and is effective from this date (NTNU 2020). The policy states that “Open science refers to a set of principles for greater openness and transparency in the research process, as well as open access to the results of research and teaching activities.” (NTNU 2020). That means, Open Science involves the whole research cycle, from preregistration via open methods and analyses to open access and peer review. The policy document describes goals, requirements, definitions, general guidelines, and principles for NTNU’s Policy for Open Science. Details related to the implementation of those are described in the “Guidelines for the Policy for Open Science” (NTNU 2021).

*The Policy for Open Science applies to all activities at NTNU, including research, artistic research, teaching and dissemination of scientific and artistic work, as well as to all employees who use the University’s resources to carry out their work. That includes:*

- Academic publications
- Research data and databases
- Computer programmes and associated documentation and source code
- Teaching methods and materials
- Results of artistic research
- Image and video material
- Digital learning resources
- Open peer reviews (NTNU 2020).

“The concept of open science rests on principles that underpin all the University’s activities: collaboration, transparency, verifiability, and accessibility. In practice, this means providing access to research results and learning resources, openness about methods and underlying data, and dissemination of disciplines to students and the public.” (NTNU 2020). NTNU’s slogan is “Knowledge for a Better World”. That implies making teaching activities and research results openly available to the public. Of course, to achieve these goals, the university has to offer an adequate infrastructure,

including an institutional repository for scientific publications of research results, activities, and research data. NTNU's repository for publications is called NTNU Open<sup>2</sup>, while the one for research data is called NTNU Open Research Data<sup>3</sup>. An adequate infrastructure also means offering storage capacities for research data, secure management of sensitive research data and learning resource repositories. More about that in the following chapters. NTNU University Library is the point of contact and coordination of Open Science at our university, in collaboration with other administrative departments, the faculties and institutes.

In the beginning of 2023, a so-called "Development Plan for Open Science 2023–2025" was implemented ([NTNU 2023](#)). The Pro-Rector for Research has the overall responsibility, but the library was and is very much involved in promoting open research practices at NTNU. There are two main chapters in this plan: 1. Open research results (open access, open data, and open source code) and 2. Open science in the assessment of research competence.

Each of the chapters contain development goals with actions and responsibilities. One example for a development goal is "NTNU facilitates open dissemination of data and source code". There are two actions for this goal, including the responsible stakeholder(s): a. NTNU will strengthen its efforts within NORRN (Norwegian Reproducibility Network)<sup>4</sup>, and similar peer-led networks for best practice and experience sharing. Main responsibility: The University Library in cooperation with the faculties and departments. b. NTNU will strengthen data management competencies at different levels of the organisation, for example through roles as data curators, data managers or research software engineers embedded in the research communities. Main responsibility: The Joint Administration in cooperation with the faculties and departments.

There are a few other important documents concerning Open Science in Norway, if you are interested in reading more.<sup>5</sup> In the following sections there is more about Open Access and Research Data Management at NTNU.

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2 See <https://ntnuopen.ntnu.no> [Online, Accessed 12 June 2023].

3 See <https://dataverse.no/dataverse/ntnu> [Online, Accessed 12 June 2023].

4 See <https://www.norrn.no/> [Online, Accessed 12 June 2023].

5 See the Ministry of Education and Research's "National goals and guidelines for open access to research articles" (<https://www.regjeringen.no/en/dokumenter/national-goals-and-guidelines-for-open-access-to-research-articles/id2567591> [Online, Accessed 12 June 2023]), the Ministry of Education and Research's "National strategy on access to and sharing of research data" (<https://www.regjeringen.no/en/dokumenter/national-strategy-on-access-to-and-sharing-of-research-data/id2582412/?ch=1>. [Online, Accessed 12 June 2023]), the Research Council of Norway's Policy for Open Science (<https://www.forskingsradet.no/siteassets/forskningpolitisk-radgivning/apen-forskning/nfr-policy-open-science-eng.pdf> [Online, Accessed 12 June 2023]).

## 5 Open Access Publishing at NTNU

The beginning of Open Access (OA) at NTNU can be dated back to 2007 when a working group at the university recommended establishing an institutional repository. The first Publishing Policy was finalised in 2014 ([NTNU 2014](#)). In 2016, an Action Plan for Open Access to NTNU's Research Publications was adopted ([NTNU 2016a](#)), as well as a new OA policy endorsed. More details about OA publishing until 2018 at NTNU can be found in an article that was published in the proceedings after the Austrian Library Congress 2019 ([Gastinger 2020](#)). NTNU does not have its own publishing policy anymore, it is embedded in the Open Science policy. The university library is the administrator of NTNU Open, our institutional repository.

Researchers can publish a paper in a peer-reviewed journal and make a copy of the publication available in our repository NTNU Open (Green OA). They can also publish directly in an open, peer-reviewed journal (Gold OA). Then, an article publishing charge (APC) is usually applicable. NTNU has a publication funding arrangement that covers APCs. It is recommended that researchers publish in journals that are approved for level 1 or 2 in the Norwegian Register for Scientific Journals, Series and Publishers and that also are registered in the Directory of Open Access Journals, DOAJ. Another way of publishing OA is "Hybrid Open Access". That means, subscription journals offer you to pay a fee to make your article Open Access. However, this often leads to double costs for the institution, because it pays both a subscription fee and the fee to make articles Open Access. To ensure that NTNU covers most of the authors' costs for publishing and to avoid hybrid OA, agreements with publishers were negotiated. Some agreements cover the total APC, while other agreements give a discount on the APC. NTNU has agreements with the biggest four publishers, Elsevier, Taylor & Francis, Springer Nature, and Wiley, but also with several other publishing companies. The agreement with Wiley was cancelled in the beginning of 2023 because of unacceptable conditions, but it was renewed a few months later when Wiley suddenly met our requests and reduced the price considerably.

The following diagramme shows the numbers for OA publications at NTNU in 2020, 2021 and 2022. The blue bars show the numbers for hybrid and/or green OA publications and the orange bars represent the numbers of gold OA publications. The grey bars show the percentage of publications that are not openly accessible.

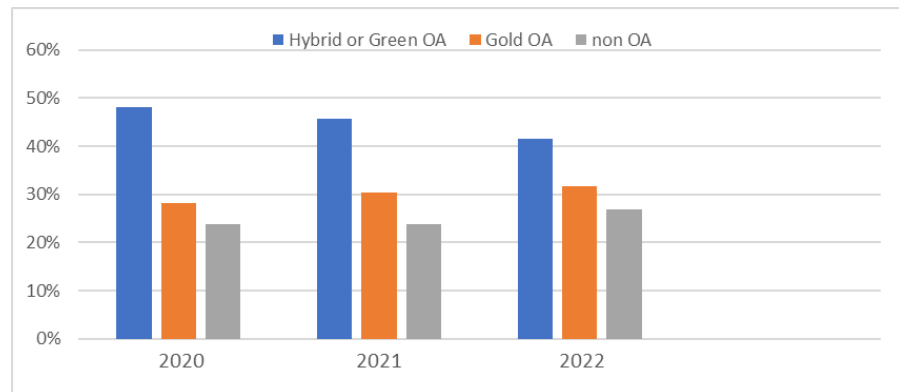


Fig. 3: Numbers of OA publishing 2020-2022

The Norwegian government's goal is that all publicly funded Norwegian research articles should be made openly available by 2024.<sup>6</sup>

In line with the Policy for Open Science at NTNU, a Rights Retention Strategy was implemented on 1 October 2022. Such a strategy “makes it possible to realise the principles that form the basis for NTNU’s open science policy; research and teaching results are made widely available and provide opportunities for collaboration, transparency, verifiability and accessibility.” (NTNU 2022). Introducing a Rights Retention Strategy enables immediate open access to full-text versions of academic publications without an embargo. That means, researchers retain the rights to distribute and use material they have produced themselves. They can publish freely where they want and upload their works in repositories. There is no risk for the researchers because NTNU assumes legal responsibility. This strategy is also in line with the requirements from research funders such as the Research Council of Norway and the EU (Plan S).

## 6 Open Research Data at NTNU

Norway got its first national strategy on research data in 2017 when the Ministry of Education and Research published the “National strategy on access to and sharing of research data” (Ministry of Education and Research 2017). NTNU’s first (and only) policy for open research data was adopted in 2018 (NTNU 2018). This document is not used anymore because the policy is included in the university’s Policy of Open Science now.

NTNU requires that all staff manage their research data properly. Research data at NTNU should be as open as possible and as closed as necessary. Data containing personal information must be processed according to General Data Protection Rules (GDPR) and NTNU guidelines. All research projects at NTNU should develop a Data Management Plan describing how the research data will be managed. Research data at NTNU can be published and shared openly in our institutional repository for

<sup>6</sup> See the above mentioned “National goals and guidelines for open access to research articles”.



research data, NTNU Open Research Data. This repository is for open data from all fields and disciplines, and it is part of DataverseNO, which is operated by UiT - The Arctic University of Norway. DataverseNO is a Core Trust Certified repository and assigns DOIs (Digital Object Identifiers) to data sets. All data sets will be curated before publication. The central support service for research data management at NTNU is called “Research Data @NTNU”. The University Library and the IT department collaborate to support NTNU’s researchers and students with their research data management, and Research Data @NTNU is the contact point for faculties and institutes at the university. The university library provides regular courses on all aspects of research data management, both in the Virtual Library and on request from university institutes and research groups. NTNU also provides a Data Storage Guide that helps to select the correct solution for storage and processing of information, including research data. Last but not least, there is a project that is supported by the National Library of Norway for one year and will start in September 2023. It is called “Data Management Plans: a Support Package for Norwegian Higher Education Libraries”. Several institutions in Norway, among other NTNU University Library, will collaborate on developing resources, tools and guidance that support preparing and writing data management plans.

## 7 A selection of other projects and focus areas at NTNU University Library

### 7.1 Systematic literature reviews

After having changed our organisational structure, the new section for research support, data and analysis established a “systematic review team”. The colleagues are responsible for giving support to researchers and PhD candidates who need to perform systematic literature reviews. During the last years the number of requests for help has increased, and more and more researchers appreciate the support of the library. At the moment, the library is thinking about offering courses on how to perform systematic literature reviews.

### 7.2 StimuLab

This project is a collaboration between three university libraries and two other institutions. It wants to explore how new services from the first line need to be arranged in a new hybrid everyday life. Libraries’ services should be easily found and accessed, and it should be easy for users to contact their library.<sup>7</sup>

### 7.3 Integrated Learning Support

This project is about an evaluation and further development of our Virtual Library.

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<sup>7</sup> You can read more about this project (only in Norwegian) at <https://result.uit.no/stimulab/> [Online, Accessed 12 June 2023]).



#### 7.4 Collection development and management in transition

Many academic libraries have to reduce their physical collections and merge their branch libraries. Thus, the libraries of four universities (in Oslo, Tromsø, Bergen and Trondheim) decided to collaborate on exploring possibilities for digital access to physical collections and on establishing a common preservation and selection plan. The project will start in September 2023 and gets funding from the National Library of Norway for two years.

I hope this introduction to the NTNU University Library and its work with Open Science was interesting and useful. Do not hesitate to contact me for questions or feedback.

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