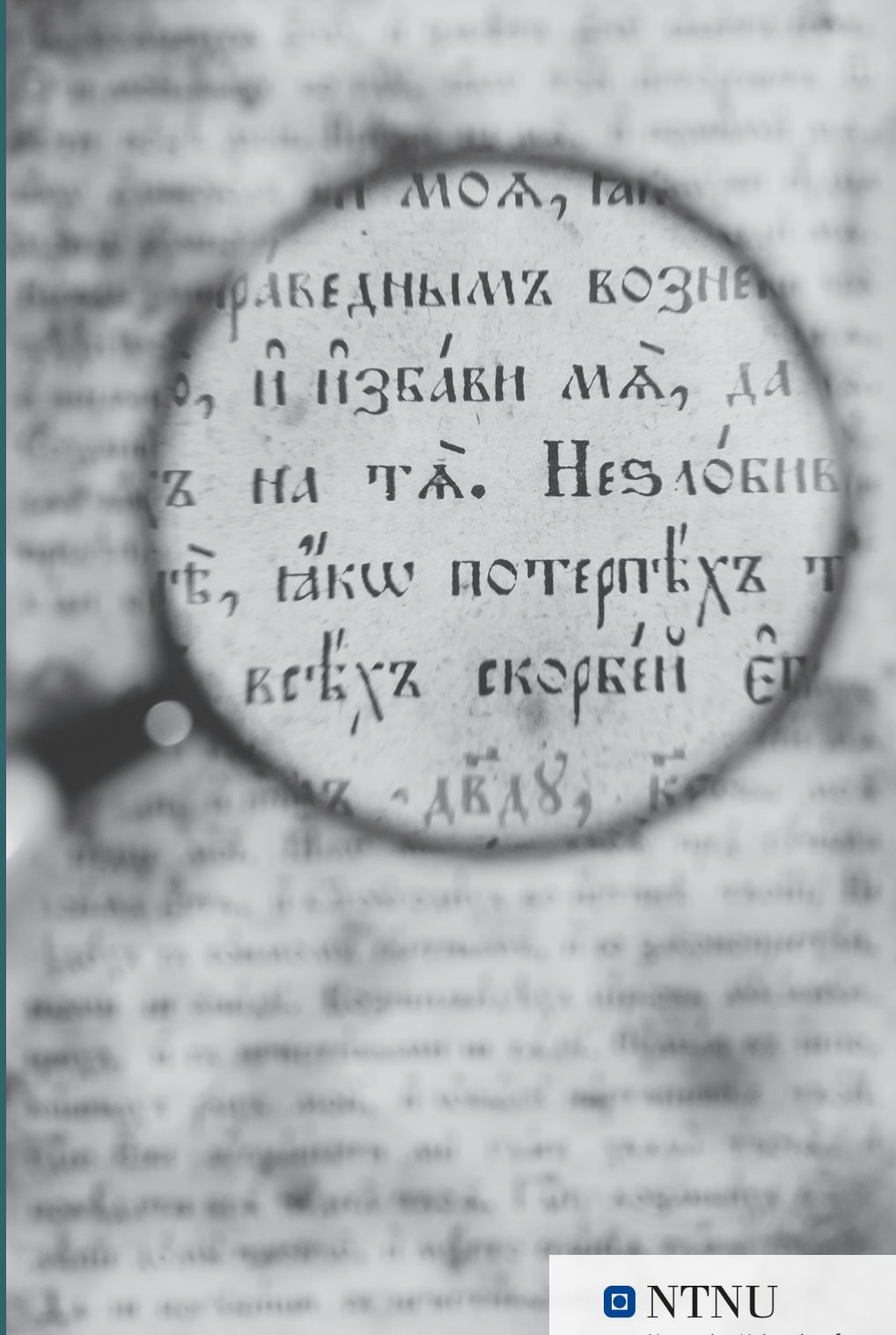


Development Plan for Open Science NTNU 2023–2025

Approved by 20.12.2022. Norwegian University of Science and Technology



NTNU

Norwegian University of
Science and Technology

Coverphoto: Colourbox
Graphic design: NTNU Grafisk senter



Development Plan for Open Science 2023–2025

The Development Plan for Open Science aims to promote open research practices and applies to all NTNU's activities. The development plan will make research results accessible to society, and increase the transparency and verifiability of the research process. Open science involves the whole research cycle, from preregistration via open methods and analyses to open access and peer review. Open research practices contribute to research that is reproducible, conducted with due care, and of high quality. The plan will contribute to ensuring that we are in line with those at the forefront of national and international development, and that research at NTNU is "as open as possible, as closed as necessary". Considerations related to aspects such as security, privacy, rights, and research ethics provide principles for what can be shared openly. The development plan aims to contribute to a desired culture change and focuses on open access to publications, open data and open source code, as well as implementation of open science principles in the assessment of research competence.

Governing documents

The Development Plan for Open Science is grounded in NTNU's development contract with the Ministry of Education and Research 2023–2026¹ and the Policy for Open Science.² Other governing documents and guidelines are NTNU's strategy, the IPR policy³, the San Francisco Declaration on Research Assessment (DORA), [the Coalition for Advancing Research Assessment \(CoARA\)](#)⁴ and the NOR-CAM toolbox from Universities Norway (UHR) for recognition and rewards in academic careers⁵.

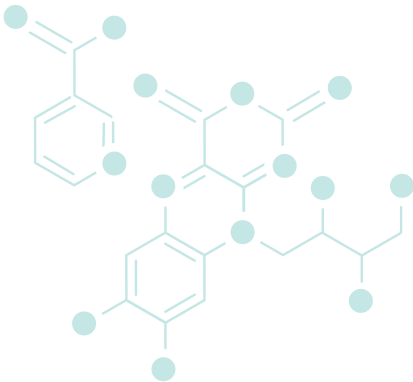
¹ "Through open science, academic freedom, participation in public debate and a knowledge-based foundation for decisions, NTNU will contribute to promoting development in line with the sustainability goals of the UN". Development contract with the Ministry, version November 2022.

² <https://www.ntnu.edu/policy-for-open-science>

³ Intellectual Property Rights (IPR)

⁴ NTNU joined CoARA on 17 November 2022.

⁵ The Norwegian Career Assessment Matrix (NOR-CAM) is a toolbox that Universities Norway has developed for assessment of research, based on the same principles as CoARA, but describing more areas of competence.





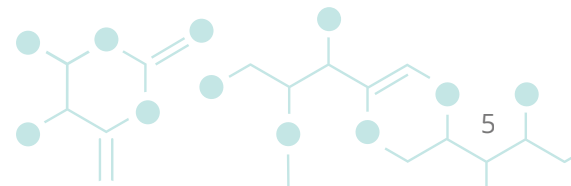
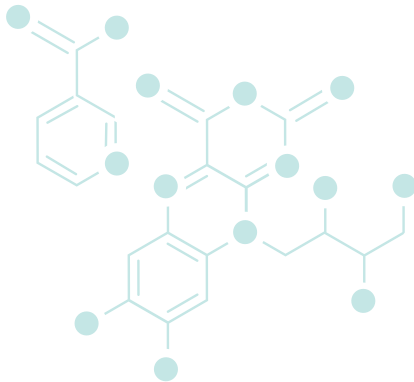


Implementation of the development plan

The plan is in effect from January 2023 through December 2025. The Pro-Rector for Research has the overall responsibility, and the development plan will be followed up by the Division of Research, Innovation and External Relations and the University Library as well as the IT Division and the HR and HSE Division, in cooperation with the faculties and departments. The most important development work will take place in the research communities within NTNU.

Several of the actions apply to the whole period and are of an overall nature. These must be specified in concrete terms by the level responsible for them in the first phase of the planning period. Open educational resources are not covered by the development plan and by the end of the period we will not have achieved our goals in all the areas included in open science. We recognize that this development requires culture change, competence, new systems and new routines that must take shape gradually over time. A shift towards open science can largely be achieved within the existing budgetary conditions, both in the faculties and in the units of the Joint Administration, including the University Library. Strategy and restructuring funds through the digitalization programme will support the implementation of parts of the development plan.

Indicators that are already available for open access to publications, open data and open source code will be used to monitor the achievement of goals in the development plan. Initiatives carried out under the auspices of the Research Data Project will be considered with regard to costs and benefits, and can also be used in this development plan. Some of the actions are activities that can be measured in terms of the number of participants, the number of courses and similar measures. For the goals relating to knowledge and culture, it is more difficult to establish indicators. The competence goals depend on positions and roles (employees and students), and must be adapted to the various groups and levels. Achievement of open science goals is included in the annual report on the quality of research at NTNU, and progress must be followed up regularly by the management at the units.



1. Open research results (open access, open data and open source code)

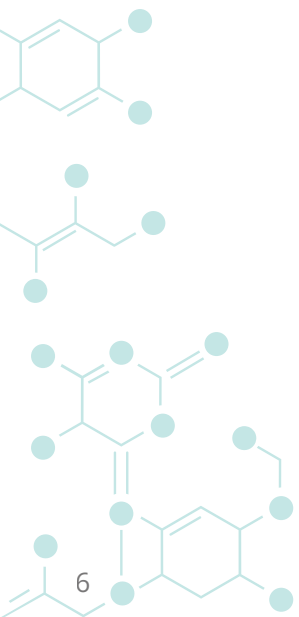
All publicly funded research articles are to be openly accessible by 2024. The research communities are especially expected to use their national and international networks to promote open access in recognized academic publishing channels that have adequate peer review processes, and to promote a shift from closed to open access among important journals in their disciplines. The Research Council of Norway and the EU have increasing demands and expectations for open science, including requirements for sharing data and source code. Good systems for openness and sharing of research data are essential to ensure that research data are as open as possible, and as closed as necessary. *Research results* include results from artistic research. The development plan also applies to generated research data that are regarded as an input factor.

Legitimate restrictions on the openness and sharing of data may be based on concerns related to sensitive data, privacy, data security and rights to data. Best practice for data management also applies to a great extent to versioning, licensing, documentation and metadata that ensure that research results are as FAIR⁶ as possible and as open as possible.

Open science is closely linked to innovation. Integrated assessments and balancing openness, protection and the potential for commercialization are essential for good stewardship of IPR and other assets created at NTNU (see also [NTNU's IPR policy](#)).

NTNU's policy for open science from 2021 is a continuation, expansion and consolidation of the publication policy from 2014 and the policy for open data from 2018. In the report from the e-Infrastructure Committee at NTNU from

⁶ FAIR stands for *Findable, Accessible, Interoperable and Reusable*. Interoperable means that both data and metadata must be as standardized as possible so they are as compatible as possible, and can be processed by machines. FAIR does not necessarily mean open. Even when data and source code must and should be fully or partially closed, they should be organized according to the FAIR principles.





February 2022, “Status and goals for e-infrastructure at NTNU”, one of the main goals is to ensure that infrastructure and tools at NTNU facilitate FAIR and open science. The University Library has a variety of resources⁷ to provide faculties and departments with support for open science.

DEVELOPMENT GOALS WITH ACTIONS AND RESPONSIBILITIES

1. NTNU is a driving force for knowledge sharing through open dissemination of results from research and artistic research.

- a. NTNU's academic staff will be familiar with NTNU's policy for open science.

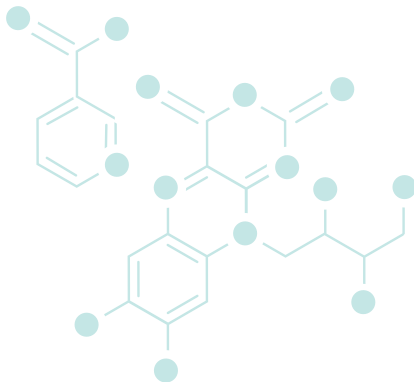
Main responsibility: The faculties and departments, with support from the University Library.

- b. NTNU will investigate the division of work, needs for resources, and collaborative interfaces across the organization and develop support functions including data curators and similar roles, adapted to the needs of the research communities.

Main responsibility: The Joint Administration

- c. NTNU will adopt common routines and processes for good stewardship of research results, including commercialization, sharing, data security, IPR and export control, adapted to the characteristics and needs of each research community, so that research ethics considerations are taken into account at all times.

Main responsibility: The faculties and departments, with support from the University Library.



⁷ Resource pages supporting open science include [publications](#) and [research data](#) (including source code).

2. NTNU will fulfil the requirements from the Ministry of Education and Research for full open access to publications by 2024.

- a. NTNU's employees and students will be familiar with different routes to open access, including the Rights Retention Strategy (RRS)⁸, tools for green open access⁹ and funding for gold open access¹⁰.

Main responsibility: The faculties and departments, with support from the University Library.

- b. NTNU will ensure predictable funding of open access.

Main responsibility: Rector, with support from the University Library.

- c. NTNU will support initiatives related to diamond open access publishing¹¹.

Main responsibility: Rector, with support from the University Library.

- d. NTNU will regularly follow up self-archiving.

Main responsibility: The faculties and departments, with support from the University Library.

3. NTNU facilitates open dissemination of data and source code.

- a. NTNU will strengthen its efforts within NORRN¹² 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 organization, for example through

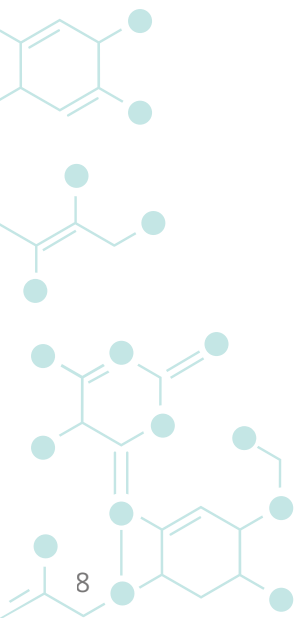
⁸ Introducing a Rights Retention Strategy enables immediate open access to full-text versions of all academic publications in an institutional repository without embargo, regardless of the place of publication and the funder.

⁹ Green open access is the publication of research results online in open repositories, often called self-archiving.

¹⁰ Gold open access is the publication of research results in OA journals, i.e. journals that are freely available to all readers.

¹¹ Diamond open access publishing means that the article is made available to everyone with no requirement for any form of payment from either the reader or the author.

¹² NORRN (the Norwegian Reproducibility Network) is a peer-led network that aims to promote and enable rigorous, robust and transparent research practices through initiatives such as training activities and sharing of experience.





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.

4. NTNU's employees and students are familiar with FAIR data and open science.

- a. NTNU will further develop courses and training adapted to different academic needs and levels for students, PhD candidates, supervisors, research managers and other employees.

Main responsibility: University Library.

- b. NTNU will provide information and advice on data management and the existing tools and support for this.

Main responsibility: University Library.

- c. NTNU will actively contribute to the reuse of available data sets and other results, including internally in research groups and in programmes of study.

Main responsibility: The faculties and departments.

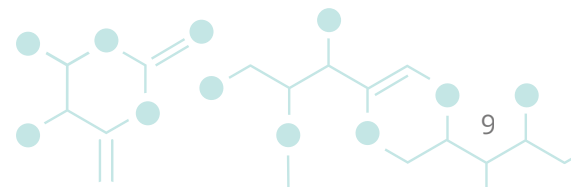
- d. NTNU's employees will use data management plans in their research as a tool for raising awareness and planning of good data stewardship, including sharing, closing or restricting access to data.

Main responsibility: The faculties and departments.

5. NTNU has the competence and systems to close or protect research results where there are legitimate reasons for doing so, and to patent and/or commercialize research results where there is a basis for this.

- a. NTNU will integrate open science and IPR/ copyright in commercialization, communication and competence development initiatives.

Main responsibility: The Joint Administration



- b. NTNU will strengthen employees' competence relating to contracts for research collaboration.

Main responsibility: The Joint Administration in cooperation with the faculties and departments.

- c. NTNU will increase employees' knowledge about clarification of rights, security and ownership as well as export control as a basis for sharing data, source code and other results from research.

Main responsibility: The Joint Administration in cooperation with the faculties and departments.

6. NTNU has user-friendly and efficient infrastructure, digital tools, expertise and support services for open science.

- a. NTNU will ensure that the tools from the Research Data Project are made visible and adopted.

Main responsibility: The University Library in cooperation with the faculties and departments.

- b. NTNU will emphasize the assessments and priorities of the e-Infrastructure Committee.

Main responsibility: The University Library and the IT Division.

- c. NTNU will adopt and contribute to the development of relevant national and international tools and services.

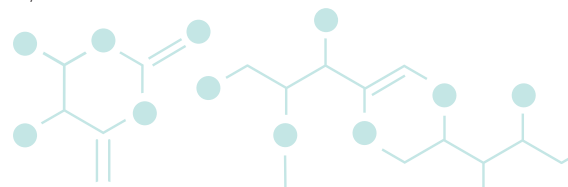
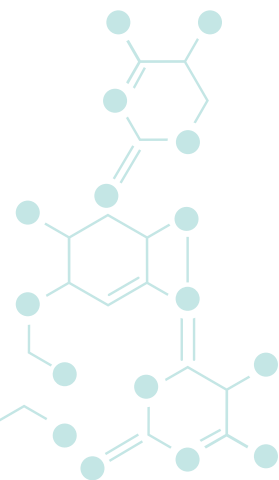
Main responsibility: The University Library and the IT Division.

- d. NTNU will further develop general and discipline-specific solutions for storing, securing and sharing of research data where needs are not met through national and international infrastructure.

Main responsibility: The University Library and the IT Division.

- e. NTNU will ensure that cost-benefit analysis and prioritization in connection with long-term storage and big data storage are a natural part of data stewardship.

Main responsibility: The faculties and departments, with support from the Joint Administration.





2. Open science in the assessment of research competence

In recent years, a range of initiatives has been launched nationally and internationally to foster a culture change in research assessment which enhances the quality of the research and its benefits for society. Research results are primarily to be assessed by peers on a qualitative basis, regardless of the publication channel or form of publication. Quantitative indicators must be used responsibly. Employers and research funding institutions should also recognize a more diverse range of research activities for the benefit of science and in accordance with its societal mission.

Open science practices make the results of research more easily accessible within and outside academia and should therefore be recognized to a greater extent in the assessment of research competence. By joining CoARA, NTNU has committed to promoting this culture change in its own assessment practices. The NOR-CAM toolbox for assessment in academic careers will be a useful tool for implementing the principles in Norway. The EU and the Research Council of Norway will also apply the principles in their assessment of research applications. In particular, the development plan will contribute to ensuring that open science is acknowledged in NTNU's policies and processes for assessing research competence in connection with hiring and promoting academic staff as well as the distribution of research funding.

Open science practices will be particularly relevant in the assessment of research results, research management and other contributions to the research process. The main principle is that open research results should be recognized and assessed qualitatively, in line with other results, in accordance with the above principles. Open science should also be made visible in the list of the applicant's works and contributions to the research process, as well as in the applicant's self-reflection on the quality and benefits of the research. However, NTNU's assessment practice must not discriminate against applicants who have not had the same opportunities to practise open science. Experience with open science practices should therefore not be set as an absolute qualification requirement in connection with appointments to academic positions.



Photo: Colourbox



Open research practices involve not only research results and processes, but also attitudes and knowledge that academic staff are expected to acquire through doctoral education and other training, in their future career and in academic management roles. It will therefore be relevant to include open science in the overall competence assessment in hiring and promotion in academic positions, in the engagement of research managers and in the distribution of research funding.

Requirements and expectations regarding the applicant's experience, attitudes and competence in open science must be adapted to the type and level of the position as well as the discipline. It is also important to distinguish between the contributions of the individual and those of the research community, so as not to assess the system, but the research activity.

DEVELOPMENT GOALS WITH ACTIONS AND RESPONSIBILITIES

7. NTNU acknowledges open science in the assessment of research competence in connection with hiring, promotion and career development.

- a. NTNU will use committees, management meetings, and participation arenas to create awareness of the culture change in the assessment of research, including open science practices, and how NTNU can implement the changes in practice.

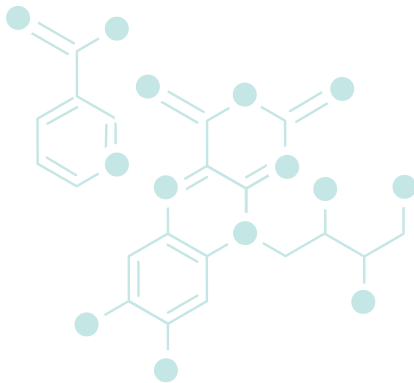
Main responsibility: Rector, faculties and departments.

- b. NTNU's managers and support staff will promote open science practices, responsible use of quantitative indicators and a more integrated assessment of competence when hiring and promoting academic staff.

Main responsibility: The faculties and departments.

- c. NTNU's incentive systems – financial as well as salary and career incentives – will be used to promote open research practices and recognize a greater breadth of academic contributions consistent with its societal mission.

Main responsibility: Rector, faculties and departments.



8. NTNU has policies, procedures and tools for recruitment, promotion and competence development that recognize and promote open research practice.

- a. NTNU's staff regulations, salary policy and procedures for appointment and promotion in teaching and research positions will be revised to recognize and promote open science practices and recognize a wider range of academic contributions in accordance with its societal mission.

Main responsibility: HR and HSE Division.

- b. NTNU's research communities will contribute to updating supplementary national discipline-specific guidelines for assessment in the disciplinary strategic units of Universities Norway.

Main responsibility: The faculties and departments.

- c. Academic evaluation committees adopt new criteria and practices for appointments and promotion of academic staff. NTNU will make procedures available and provide guidance to administrators and assessment committees.

Main responsibility: The faculties and departments.

- d. NTNU will develop good practices for including open science in recruitment processes, through training in new tools and sharing of experience between faculties.

Main responsibility: HR and HSE Division.

9. Open research practices are incorporated into NTNU's criteria for assessment of applications for internal resources and other initiatives.

- a. NTNU will recognize a wider range of research results beyond publications, such as open data and source code, as well as results from artistic research.

Main responsibility: Rector

- b. NTNU will ask applicants to mention open research practices in their CVs and lists of academic works as well as in project descriptions. Reflection on open science practices is emphasized in the process.

Main responsibility: Rector, faculties and departments.

