

SND:s ansökan till Vetenskapsrådet om bidrag till forskningsinfrastruktur av nationellt intresse 2023-2026

Vetenskaplig plan och
beskrivning av infrastrukturen

Beskrivande information

Medverkande Organisationer

The consortium will be formed by:

1. University of Gothenburg (host)
2. Chalmers University of Technology
3. Karolinska Institutet
4. KTH Royal Institute of Technology
5. Lund University
6. Stockholm University
7. Swedish University of Agricultural Sciences
8. Umeå University
9. Uppsala University

Infrastrukturens namn (svenska)

Svensk nationell datatjänst (SND)

Infrastrukturens namn (engelska)

Swedish National Data Service (SND)

Abstract och Populärvetenskaplig beskrivning

Notera att abstract kan användas vid fördelning av ansökan till de sakkunniga som ska göra den vetenskapliga bedömningen.

Abstract (engelska)

Sweden needs a well-functioning infrastructure that supports the sharing and reuse of research data. Policymakers and funders of research are beginning to require that research output they are funding is made public. Advocates of open access to research data point to advantages in terms of research transparency, impact, and cumulative science. Other benefits include sustainability, efficient use of public funds, and more equitable access to high-quality data. However, technical solutions, community practices, legal requirements, and ethical standards all pose challenges to researchers who try to share data in a way that makes them FAIR: findable, accessible, interoperable, and reusable.

The Swedish National Data Service (SND) supports and promotes efforts to make research data produced in Sweden open and FAIR. SND is a knowledge hub for research data management at the centre of a system for knowledge exchange and dissemination. SND initiates, creates, and participates in networks and collaborations with stakeholders from the national and international research data community. Through SND, users gain access to technical tools and services that facilitate describing, sharing, and reusing FAIR data. The goals that outline SND's role in the Swedish research community are: to facilitate the sharing of research data; to provide data visibility and usage metrics; and to facilitate trustworthy data access.

SND is a consortium of nine of Sweden's largest research universities, with data management expertise distributed across all partners and with a main office at the administrating university. The infrastructure's closest partners are the data support functions at the thirty-five universities and research organisations that make up the SND Network. Together, we will provide means for researchers and universities to achieve the Swedish objective of open access to research information by 2026.

Populärvetenskaplig beskrivning (svenska)

Allt fler vill ha öppen tillgång till forskningsdata. Det gäller inte bara forskare, finansärer och vetenskapliga tidskrifter, utan även politiker, näringsliv och en alltmer intresserad allmänhet. Öppen tillgång till vetenskapliga resultat, som till exempel forskningsdata och publikationer, bidrar till högkvalitativ forskning och innovation. Öppen tillgång ger också goda förutsättningar för medborgerligt inflytande och effektiv användning av offentliga medel. Men för att leva upp till förväntningarna på öppen tillgång behövs välfungerande infrastrukturer med god förankring i forskarsamhället.

Svensk nationell datatjänst (SND) är en infrastruktur för all forskning och alla forskare i Sverige. Huvudsyftet med SND är att underlätta beskrivning, delning och återanvändning av alla typer av forskningsdata. SND bygger på samverkan mellan olika aktörer för att ta fram gemensamma lösningar och minska dubbelarbete. Syftet är ytterst att främja kumulativ forskning, innovation och effektiv resursfördelning. SND:s konsortium och nätverk, som idag utgörs av nio stora universitet och tjugosex lärosäten och forskande organisationer, ger mycket goda förutsättningar att snabbt öka tillgången till väldokumenterade och välbevarade forskningsdata.

SND har tre övergripande mål för verksamheten:

1. **Att underlätta delning av forskningsdata** på ett enkelt, säkert och pålitligt sätt, som samtidigt uppfyller kraven för bevarande, åtkomst och delning.
2. **Att göra data synliga och erbjuda användarstatistik** genom att visa upp forskningsdata nationellt och internationellt och ge information om hur data delas och citeras.
3. **Att underlätta tillförlitlig åtkomst** till sökbara, högkvalitativa och väldokumenterade forskningsdata, tillsammans med information om hur dessa data kan nås och återanvändas.

SND:s arbete bedrivs inom tre huvudområden: kunskap, kompetens och omvärldsbevakning; nätverk och samarbeten; och verktyg och tjänster.

SND kommer att vidareutvecklas som kunskapscenter. Här samlas, sammanställs, skapas och sprids kunskap om att göra forskningsdata tillgängliga och om att hantera, bevara och återanvända dem på bästa sätt. En mycket viktig del i verksamheten är det kunskaps- och erfarenhetsutbyte som sker inom SND:s nätverk för de lokala stödfunktioner för forskningsdata som finns vid trettiofem svenska lärosäten och forskande organisationer. Personalen vid dessa funktioner arbetar direkt med forskare och bidrar på så sätt till att forskare runt om i Sverige erbjuds ett likvärdigt stöd.

SND kommer att fortsätta att initiera, skapa och delta i nätverk och samarbeten med både nationella och internationella aktörer som arbetar med forskningsdata. Ett väl utvecklat samarbete på olika nivåer behövs för att skapa praxis gällande till exempel hantering och förmedling av data. Det garanterar också god tillgång till internationella data för forskare vid svenska lärosäten och forskande organisationer, och gör att data från forskare i Sverige blir synliga och tillgängliga internationellt. Det mest centrala nätverket som SND verkar inom är det nära samarbete som bedrivs med de lokala stödfunktionerna för forskningsdata.

Genom SND:s utvecklingsarbete får forskare och andra som arbetar med forskningsdata fortsatt tillgång till nya tekniska verktyg och tjänster som underlättar beskrivning, delning och återanvändning av data. I SND:s katalog finns detaljerade beskrivningar av forskningsdata som gör dem möjliga att hitta och återanvända. Data som görs tillgängliga via SND kan användas för exempelvis nya analyser, förberedelser för nya studier eller för att skapa nya datamängder tillsammans med andra data. För närvarande innehåller SND:s katalog 1 656 poster, men antalet ökar kontinuerligt.

Område/Infrastruktur

SND

Infrastrukturens mål och verksamhet

Redogörelse för etiska överväganden

SND's mission is to help researchers share data. The basic argument for sharing data is to make the most of collected data. Data sharing can enable faster research progress (e.g. for development of vaccines), increase research transparency, and decrease the risk of research fraud. In studies on humans and animals, sharing data can also limit the burden of over-researched, vulnerable groups, and can enable the best use of hard-to-obtain data from e.g. small populations and marginalised groups.

The vast majority of the research data that are described by using the SND systems are never handled by SND staff. The data are stored under the control of the data owner, typically a university, in a physical storage that could either be in SUNET STaaS (under a bilateral contract between the university and SUNET) or in a local repository at the university or research organisation. The main responsibility for confidentiality assessment lies with the data owner.

In a small number of cases, data are handled in the SND CARE repository. SND CARE acts as a repository for researchers from research organisations that have not yet established a dedicated data support function (referred to here as DAU) to share data simply, securely, and in compliance with data access requirements. In these cases, data are stored either under the data owner's control or on SND-controlled servers. In the case of restricted data in SND CARE, SND will take appropriate measures in accordance with the General Data Protection Regulation (GDPR) and other applicable legislation.

For a large share of Swedish research data, there will be no ethical and/or legal obstacles to making them openly accessible. Examples include environmental data, most archaeological data, and anonymised survey data. Some data, however, require ethical and/or legal considerations. This is the case with datasets that contain personal data about research subjects, in particular sensitive data (see GDPR). Such datasets will be subject to special routines for curation and dissemination:

- The DAU of the data owning organisation assesses each dataset before uploading it to their repository. Datasets with personal data will be labelled to ensure correct handling when access is requested. Data for which anonymisation is possible (direct and indirect identifiers can be removed) will be anonymised by the DAU before they upload them to the repository. DAUs that are not fully operational will receive support from SND staff in doing this, for instance through double checking or assessment workflows.
- Restricted data will only be available on request. When somebody requests a dataset labelled as restricted data, SND will ask the data owner to assess the request based on the legal framework, e.g. Freedom of the Press Act (Tryckfrihetsförordningen [1949:105]), Public Access to Information and Secrecy Act (Offentlighets- och sekretesslagen [2009:400]), GDPR, and Ethical Review Act (Lag [2003:460] om etikprövning av forskning som avser människor).

Note that metadata searchable within *researchdata.se* will never contain personal data about research subjects.

Data sharing may also give rise to other ethical issues. Examples include

- protection of informants who cannot be anonymised without ruining the informative content of the data (e.g. small groups of publicly known informants);
- informants who would like to have their contributions to the study acknowledged (e.g. contributors to language description studies);
- data which contain information that could lead to destruction of part of the cultural heritage (e.g. geospatial coordinates for archaeological coin finds);
- research subjects experiencing a violation of personal integrity despite anonymous data;
- field notes perceived to be too personal for sharing by the primary researcher.

The conditions for dealing with and informing about such ethical considerations are good, given the legal and research domain experience and expertise available to SND.

I projektet ingår hantering av persondata

Ja

I projektet ingår djurförsök

Nej

I projektet ingår humanförsök

Nej

Infrastrukturens mål och verksamhet

Vetenskaplig plan

Se nästa sida för bilaga.

“... the future of science: a global data commons, a virtual science library spanning the globe.”

RDA Europe [1: p.5]¹

SCIENTIFIC PLAN: THE SWEDISH NATIONAL DATA SERVICE For Sharing and Reusing Research Data

Sweden needs a well-functioning infrastructure that support the sharing and reuse of research data. Policy makers and funders of research, both national and international, require that the research output they are funding is made public. Advocates of open access to research data point to advantages in terms of research transparency, impact, and cumulative science. Other benefits include sustainability, efficient use of public funds, and more equitable access to high-quality data. Nevertheless, there are significant barriers to sharing data. Technical solutions and community practices, as well as legal requirements and ethical standards, all pose different challenges to researchers who try to share their data in a way that makes these data findable, accessible, interoperable, and reusable (the FAIR principles) [3].

Since 2016, the Swedish National Data Service (SND)² has worked in collaboration with Swedish universities and research organisations to build the foundation for a nation-wide system that can support researchers in providing access to their data. By prompting the establishment of local research data support functions (in this application referred to as DAUs [Data Access Units]), by providing their staff with training, and by introducing them into the *SND Network*, SND established a framework by which all researchers could have access to qualified support in research data management and sharing. In the next funding period (2023–26), SND will take the next steps to towards a well-functioning and qualitative infrastructure by ensuring that the Swedish research community can

- describe and preserve research data, including sensitive data;
- share research data with Swedish and international researchers; and
- find openly available research data to reuse.

The responsibility for handling and storing research data in accordance with Swedish law lies with the university where the data were created. The universities should also ensure that data align with the FAIR principles and that, by 2026, all publicly funded research data are made accessible as open as possible but as closed as necessary [4]. To achieve this, all universities need to provide their researchers with support and training in research data management, as well as with adequate data storage for the types of data that they produce. SND's role as a national infrastructure for supporting open research data is to be a knowledge hub for data management at the centre of a system for disseminating and exchanging know-how, expertise, and experience. The infrastructure also provides research data producers, research data users, and research data support functions in Sweden with technical tools and services that facilitate describing, sharing, and reusing FAIR data.

SND is an infrastructure that supports all kinds of research and for all researchers in Sweden. Unlike the type of research infrastructures implied in the instructions for this application, SND does not have a distinct focus on formal research groups, or research fields, but, rather, caters to all types of researchers and scientific fields. In order to give an accurate description of SND's goals and operations, we occasionally need to deviate from the instructions from the Swedish Research Council for this call.

¹ For references, see *Appendix E: Key References*.

² Link to the SND website: <https://snd.gu.se/en>.

1. MOTIVATION AND OVERVIEW

1.1. AN INFRASTRUCTURE FOR DIGITAL RESEARCH DATA

In the 2020/21 research and innovation bill, the Swedish government emphasised that results from all publicly funded research, publications as well as data, shall be made freely accessible from 2026. Open access shall be the norm, except when there are reasons to restrict data access, such as protecting privacy, national security, or intellectual property. The bill also indicates that universities should harmonise their principles for open access to publications and data as far as possible, and ensure that data align with the FAIR principles [4]. It could be impossible to achieve these ambitions efficiently without a national infrastructure for research data such as SND.

Swedish research initiatives and infrastructures have made some progress towards FAIR and open data in recent years. However, much remains to be done before Sweden reaches the national and European goal of making open access to data (created in whole or in part by public funds) the norm. Swedish official reports have observed a need for increased national coordination of e-infrastructures³ to the point where a new public agency for e-infrastructure is currently under inquiry [5]. Improved national coordination is a basic condition for being able to support the entire research process, from data collection to long-term preservation and access, and it is a necessity if Sweden wants to actively influence the European agenda on research data infrastructures [5–7]). As the most prominent Swedish organisation that promotes operational cooperation between universities' and research e-infrastructures' open-data efforts, SND is a key actor in making Sweden reach its open-access goals.

There is a clear and pressing need for all researchers to be able to practice sustainable, open science. Through open and transparent data sharing, research can become a truly cumulative knowledge-creating process. Scientific journals, public and private funding agencies, university policies, and legislators already require research data to be made accessible. In the future, researchers who do not comply with data access requirements may face difficulties funding projects or publishing results. SND aims to be a national infrastructure that enables researchers in Sweden to be forerunners in the dynamic and quickly developing landscape of FAIR data and open science. To achieve this, the infrastructure will provide coordinated and secure structures for describing, depositing, sharing, and finding high-quality, open research data that adhere to the FAIR principles.

The aim of the SND infrastructure translates into three overarching goals outlining the infrastructure's position within the Swedish research community:

Facilitate the sharing of research data. SND will further Swedish research by providing essential, first-rate support and systems for describing and sharing data in a way that is simple, secure, and trustworthy – and FAIR. Thus, compliance with journal, funder, university, and legislator requirements (current and future) will not place an unreasonable burden on the researcher. However, systems and processes will protect sensitive data and the privacy of research subjects, and data integrity will be ensured through certified curation and preservation workflows.

Provide data visibility and usage metrics. The infrastructure will be a core service for researchers in making data visible, nationally and internationally. Increasing the visibility of data is a key factor in furthering the impact of Swedish research. Tools for providing metrics on the sharing, reuse, and citation of datasets will be offered. In the future, the reuse of data might become an important factor in determining scientific impact, in the same way that for example journal impact factor and h-index are to certain disciplines today.

Facilitate trustworthy data access. The infrastructure will provide a national search portal for finding high-quality, well-documented data for use in research projects. Data provided in

³ Although SND is not formally an e-infrastructure, it is occasionally referred to as such (e.g. [5]).

the portal could be used, for instance, for new analysis, validation of previous studies, preparation of new studies, and creation of aggregated datasets. The portal will provide information on the conditions for access, use, and reuse of the accessible data. Thus, it will be the main discovery tool for accessing Swedish research data.

The objective of SND is to be the driving force in: building a system of technical solutions, creating organisational networks, fostering fruitful collaborations, developing reasonable and accurate metrics, and providing highly-skilled local and national support. In order to achieve this, SND needs to further develop and maintain cutting-edge expertise on data management and curation, provide high-quality training to data professionals and researchers, and spear-head the development of methods and best practices as the research data landscape evolves.

1.2. MAJOR CHALLENGES FOR SOCIETY AND THE RESEARCH COMMUNITY

Many of the challenges that our society faces today are global and require global research. To tackle major crises such as the COVID-19 pandemic or climate change, data from around the world need to be combined and shared, and therefore available for quick access. Funders are expected to increase demands for research data that can be reused in a way that contributes as much as possible to public good, therefore necessitating open access to data.

Not all research data are suited to such easy access, however. Large datasets, exceeding the technical limitations of web browsers or even FTP clients, is one example where restricted access is necessary. Some research centres even create such enormous datasets that moving them elsewhere for preservation and dissemination is inefficient; they must be disseminated from the point of creation. As each new generation of datasets tends to be larger than the previous, the future will place growing demands on data curation proficiency, dissemination resources, and the technical know-how required to provide access to these large datasets. The rapid changes of metadata standards and best practices in some fields may also require restricted access; in emerging or cutting-edge research areas, the development of standards is by necessity a constant process. The movement from static datasets to dynamic data (that expand and develop over time) adds additional challenges to open access. Finally, disseminating research data also involves considering limitations on when, with whom, or under what conditions data can be shared. Confidentiality provisions, contractual obligations, embargos, and/or sensitive personal information can all warrant restrictions.

In cases such as those exemplified above, curation, legal expertise, and technical systems are necessary in order to make correct decisions and to ensure that data are delivered safely and within limitations. Staying on top of all the changes and maintaining sufficient quality, in terms of documentation as well as file formats, is a highly resource-intensive activity, and requires both national and international collaboration and pooling of resources.

During the current funding period (2018–22), SND has created a coordinated, national infrastructure that can take on these various challenges. Training and knowledge exchange within the SND Network – currently DAUs at thirty-five universities and three public research organisations – will intensify during the next funding period. (How this work will develop is outlined in *Description of the Infrastructure and its Activities*.) In order to meet societal challenges more broadly, SND has initiated discussions with business organisations regarding participation in the SND Network. SND will also continue its active participation in the European Open Science Cloud (EOSC)⁴ and its related projects. (See also *Appendix C: Activities during the Current Funding Period*.) The challenges that society faces are best met with access to open, transparent research of highest quality; and the demands that this places on the research data community are best dealt with together.

⁴ For details about EOSC, visit <https://eosc-portal.eu/>

1.3. LONG-TERM VALUE

Since its inception as SSD (Swedish Social Science Data Service) forty years ago, SND has been working to safeguard, share, and preserve data created by researchers at Swedish universities. At the core of the consortium is a vision of allowing researchers to share well-structured, well-documented, and easy-to-find research data, now and in the future. To realise this vision, SND will continue to develop and share its expertise, skills, and knowledge about data management and curation through various training activities for data professionals. Close collaboration between SND and the DAUs at Swedish research organisations will in the future provide all researchers in Sweden with local access to trustworthy research data repositories (for details, see submodule 4.3 in *Description of the Infrastructure and its Activities*). National and international collaborations will intensify in order to accumulate technical knowledge and other know-how that will benefit research communities in Sweden. In this respect, SND will continue to serve as the national service provider for CESSDA ERIC⁵ as well as being the national node for the Research Data Alliance (RDA).⁶

1.3.1. Relations to Other Infrastructures

SND is the only national infrastructure in Sweden with the ambition to support sharing and preservation of research data across all research domains. There are areas in which domain-specific data infrastructures exist, but they are comparatively few and often with a narrow scope (areas include astronomy, archaeology, high-energy physics, endangered languages, corpus linguistics, climate research, and others). SND sees collaborations with such specialised infrastructures as the natural way forward, both in terms of metadata harvesting and knowledge exchange. Internationally, SND has long-standing collaborations with other national research data repositories, mainly in Europe and with particularly close ties with the national repositories in the other Nordic countries (for details, see submodule 3.2 in *Description of the Infrastructure and its Activities*).

As the only national data access infrastructure working across all scientific domains and in collaboration with nearly all Swedish higher education institutions, SND is uniquely positioned, experienced, and prepared to undertake coordination in this area. Such national coordination would for instance include work with EOSC, where SND could collaborate with SUHF (Association of Swedish Higher Education Institutions), VR (Swedish Research Council), and other Swedish EOSC members.

1.3.2. An Infrastructure Serving Researchers in Sweden

The current SND infrastructure is already an important resource for many research efforts. The SND research data catalogue⁷ enables disciplinary and interdisciplinary searches and contains high-quality data and metadata. In the catalogue, data are efficiently and securely disseminated, even when access is restricted; and data descriptions can be made visible in international data registries. SND's services and systems are continuously developed to permit metadata and data to adhere to the FAIR principles. The current infrastructure has developed from a centralised repository with restrictions to a new architecture with the ability to provide a repository solution that can host personal data as well as large-size data.⁸ Through its domain specialists and research data advisors, as well as with its support to the local DAUs, SND helps researchers comply with institutional (e.g. university, legislator) and professional (e.g. journals, funding agencies) requirements on data sharing and preservation.

⁵ For more information about CESSDA ERIC, visit <https://www.cessda.eu/About>. For details about SND's role as CESSDA service provider, see submodule 4.4 in *Description of the Infrastructure and its Activities*.

⁶ For more information about RDA, visit <https://www.rd-alliance.org/>

⁷ The SND catalogue can be found at: <https://snd.gu.se/en/catalogue>

⁸ For more details on sensitive data and data storage, see *Description of the Infrastructure and its Activities*.

Private and public research funders and scientific journals require accessible data, and many researchers thus need reliable and simple solutions. The SND infrastructure is listed among recommended repositories at e.g. PLOS One⁹ and Ubiquity Press,¹⁰ providing Swedish researchers with a national option for complying with journal requirements for data availability.

As the research data landscape evolves, SND's systems will continue to adapt to the specific needs of various disciplines in terms of metadata profiles, FAIRness, and tools, in preparation for a future where SND is a researcher's obvious first choice for describing and sharing important research data. SND is a Trusted Digital Repository, certified with the CoreTrustSeal,¹¹ a guarantee that data are documented, curated, and stored in a manner that safeguards their value as a reusable resource for future researchers. In accordance with the current model for research data support from DAUs at universities and research organisations, SND will continue to provide assistance and expertise to enable every DAU to become certified as a Trusted Digital Repository. More importantly, SND will continue to develop systems that make data documentation as quick and easy as possible. A significant step in that development will be strategies, workflows, and functionality to augment entry-level data descriptions to greater degrees of FAIRness (entry-level descriptions were introduced during the current funding period; see also submodule 4.2 in *Description of the Infrastructure and its Activities*).

In preparation for the national goal of open access to research data by 2026, SND will develop a new national research data portal, *researchdata.se/forskningsdata.se*. The goal is to make it easier to find, access, share, and reuse data. The portal will be developed to be an obvious first port of call for any researcher or organisation looking for Swedish research data, data-management-related information, or gateways to national and international resources (for details, see submodule 4.1 in *Description of the Infrastructure and its Activities*).

As researchers' data become more visible through the new national research data portal, SND will develop analysis tools that can provide researchers with metrics for usage and scientific impact. Examples include data citation and data download metrics. The national portal will also allow us to collect nation-wide statistics about data usage, for instance number of citations and number of orders and downloads.

1.3.3. An Infrastructure of National Interest

When researchers have to comply with increasing requirements on data access and preservation, compliance must be easy. Most researchers may not need to describe data very often, and encountering a new interface each time would serve as a disincentive to doing a good job. By building and maintaining a national system for describing and providing access to research data, SND offers the same interface to all researchers at Swedish universities, regardless of where they are currently employed. Researchers can create data descriptions using their existing university login credentials. The same metadata schemas and tools are accessible to everyone. Describing data should be as easy as possible.

Simplicity and equal conditions go beyond describing and sharing research data. Through the SND Network, researchers will also encounter similar research data support, regardless of where they work. The network will ensure that all DAUs have access to the same kind of support from SND, that expertise is disseminated across all network members, and that collaborations drive improvements in data management and curation on a national rather than local level. SND's networks of university lawyers, archivists, and IT specialists strive to offer similar assistance with regard to data-related issues, and the consortium will develop guidelines and best practices to provide uniform advice to all researchers in Sweden.

⁹ The PLOS One list can be found at: <https://journals.plos.org/plosone/s/recommended-repositories>.

¹⁰ The link to Ubiquity Press is <https://www.ubiquitypress.com/site/>. See for example Journal of Open Archaeology Data; Journal of Open Humanities Data; Journal of Open Psychology Data.

¹¹ More about the CoreTrustSeal on the following link: <https://www.coretrustseal.org/>

As a national infrastructure, SND develops tools and processes meant to be used nationally. Through collaborations between consortium partners, SND works to identify what researchers in particular domains or research fields need in regards to providing data access. Such initiatives will then result in tools, resources, and services (e.g. support, training, review assistance) based on those needs. Because SND is a multi-disciplinary national infrastructure, the benefits of improvements made by addressing the needs of a certain group become available to all researchers in Sweden, or even internationally. Although much research is international in nature, and even more will be so in the future, there are some domains in which Swedish data are of particular interest. They may concern specifically Swedish issues, make use of particular Swedish advantages, or be regulated by Swedish legislation.

Without national coordination, the implementation of free access to research data risks resulting in a fragmented system that is inequitable, inefficient, unequal, and lacks interoperability. It would use up valuable resources when multiple players solve the same problem in different ways. It would also create unnecessary work, and ultimately lead to less data reuse and be an impediment to world-class research. The SND consortium is uniquely positioned to provide a national infrastructure of benefit to researchers in Sweden and research in general.

1.4. CURRENT AND FUTURE USERS OF THE INFRASTRUCTURE

Since 1981, SND and its predecessor SSD have accumulated considerable expertise in making data accessible for various users in accordance with the OAIS reference model.¹² SND provides access to social science data since nearly four decades, works with data from the humanities and health sciences since 2008, and hosts Environmental Climate Data Sweden (ECDS) since 2016. Starting at the beginning of the current funding period, SND expanded to provide support for an increasing amount of research domains by shifting to an organisational model in which expertise is distributed over a consortium of major Swedish universities (for details, see *Appendix C: Activities during the Current Funding Period*). The long-term objective is to establish a nation-wide system that allows researchers to share well-structured, well-documented, and easy-to-find research data from all scientific disciplines.

Currently, SND has three main categories of users: **research data producers** (mainly researchers), **research data users** (researchers, businesses, public authorities, etc.), and **research data support** (local DAU staff and other data professionals). The next funding period will see an increase in activities towards the first two categories and a clearer separation of tools, services, and resources aimed at the respective categories. This separation is prompted by an expected increase in the number of users, a greater number of collaborative initiatives to meet the needs of these users, and a rising complexity of research data issues (for details, see section 3.3 in *Description of the Infrastructure and its Activities*).

The SND catalogue with research data descriptions will provide the core of the future *researchdata.se* portal (for details, see submodule 4.1 in *Description of the Infrastructure and its Activities*). Over the first three years of the current funding period, 325 data descriptions were added to the catalogue (73 in 2018, 86 in 2019, and 166 in 2020). The catalogue currently (12 February 2021) contains 1,656 data descriptions from a variety of research areas. A large share of the studies are available for direct download. The total number of downloads from the SND website in 2020 was 26,447.¹³ The series with the most downloads in 2020 were International Social Survey Programme (ISSP), Institutional Trust, the Swedish part of the European Social Survey (ESS), and Arctic Ocean 2016.

¹² The OAIS reference model includes: Ingest, Storage, Data Management, Administration, Preservation Planning and Access. <https://public.ccsds.org/pubs/650x0m2.pdf>.

¹³ Downloads from catalogue posts with accessibility level "Access to data through SND – Data are freely accessible". Other posts may have documentation available to download (even if the data have to be ordered). Organisation is not registered for users that download directly from the catalogue.

Material that is not available for direct download from the SND website can be ordered upon request, followed by a brief assessment before delivery. In 2020, SND received 438 orders, 406 from academic users and 32 from non-academics.¹⁴ These orders comprised 1,682 datasets.¹⁵ Academics from the University of Gothenburg dominate, followed by users at Uppsala University, Stockholm University, Lund University and Mid Sweden University. Due to legal restrictions, SND has limited statistics concerning orders from non-academic users. These users represent a variety of organisations, such as private companies, media, schools, local and regional public administrations, government authorities, political parties, NGOs, research organisations, labour market organisations, think tanks, libraries, and archives. Studies that are part of a series were among the most popular. The series with the most orders in 2020 were the National Society Opinion Media (SOM) Survey and the Swedish National Election Studies, followed by SVT Exit Poll Survey and Swedish Electoral Data.

Several research groups with internationally renowned scholars use the current SND services to provide access to their primary data and to use secondary data for new analyses. (The publications are listed in *Appendix E: Key References*.) These include the top ordered and downloaded datasets from: several Swedish *electoral studies*¹⁶ [8–10]; the *SOM surveys* [9, 11–12]; the *Media Barometer* [11, 13]; *Census of the population* [14]; *Arctic Ocean 2016* [15–16]; *Oden Southern Ocean 2007/2008* [17]; *Reflection seismic study of the Siljan Ring impact structure: Mora* [18]; *Brexit Blog Corpus* [19]; *NordChild* [20–21]; *Swedish Contextual Database for The Swedish Generations and Gender Survey and The International Generations and Gender Programme* [22–23]; *Noise exposure files for a polysomnographic study of ground-borne noise from railway tunnels and sleep* [24]; *Observations of Noctilucent Clouds from Denmark during 2011* [25–26], and the *DREAM Dataset: Behavioural data from robot enhanced therapies for children with autism spectrum disorder* [27].

1.5. BUILDING NATIONAL DATA MANAGEMENT EXPERTISE

A crucial part of the SND infrastructure will be the knowledge exchange that it facilitates. In the rapidly-changing landscape of open data, there must be a way to quickly disseminate new skills, experiences, and expertise. Even though SND implements strategic measures to keep abreast of new developments in research data management and curation, the task is too big for SND staff alone. Instead, SND will be organised to enable effective knowledge exchange between the various partners in the SND networks. Trainings will be arranged for network members. There will also be seminars and workshops to allow members to exchange new knowledge and data management experience with others, including SND staff.

Joint learning resources will be developed within the various networks. Professional development courses will be maintained, and SND will expand collaboration with partners in developing courses for doctoral programmes and for data professionals on a national and local level. The focus for these resources and training initiatives will shift during the course of the funding period, with a relatively smaller focus on DAU staff as the DAUs reach maturity.

The Open Data Flagships and other targeted Open Data initiatives that will run at the consortium universities in the next funding period will also help contribute to a broader national knowledge about data management and related skills (more about this in section 2.1 in *Description of the Infrastructure and its Activities*). The Flagships in particular will include activities relevant to disseminating expertise in managing research data efficiently, securely, legally, and FAIRly among researchers in Sweden.

SND's training and knowledge exchange strategy will contribute to data professionals and researchers at Swedish universities and research organisations having gained skills and

¹⁴ SND currently does not collect statistics on users' academic disciplines.

¹⁵ SND does not collect information on the gender of its users.

¹⁶ Including Swedish National Election Studies; European Parliament Election Studies; SVT Exit Poll Survey; Swedish Electoral Data.

knowledge in how to manage their data well. As a result, they will be able to share and preserve well-documented research data that can be used by future researchers.

2. AN INFRASTRUCTURE TO PROMOTE RESEARCH, INNOVATION AND PUBLIC GOOD

2.1. BENEFITS FOR SWEDISH INNOVATION AND EFFICIENT USE OF PUBLIC RESOURCES

Research output is of interest to private enterprises and the public sector, as well as to the academy. Access to publications and data from the universities have proved to be an expensive, time-consuming, and piecemeal affair for actors outside of academia. Similar to how open access to publications offers non-academic actors much better access to research findings, the SND infrastructure will offer companies and public agencies vastly improved access to the related research data.

SND provides a system through which digital research data can be found and accessed by private and public actors. Well-documented data include clear information about how data can be reused and how to gain access to the data if they cannot be downloaded immediately. Because research data are collected from all disciplines, it is not possible to offer a succinct description of which particular innovations or innovators can benefit from SND, nor what social or public utility the data can create.

A notable contribution to society of the SND infrastructure is the advancement of FAIR data. FAIRness promotes efficient use of public resources by ensuring that research data are documented and preserved for long-term, future use, thus maximising the value of research funding. According to a report published by the EU Directorate-General for Research and Innovation [28], a comprehensive cost-benefit analysis estimates the total annual loss of not having FAIR research data to more than ten billion euros in Europe alone, or about four fifths of the annual Horizon 2020 budget. The report associates similar costs to not having open access to data. From this perspective, the Swedish goal of FAIR and open research data by 2026 has a distinct economic dimension that goes beyond the economies of scale associated with a national research infrastructure.

2.2. CONTRIBUTING TO THE GLOBAL SUSTAINABLE DEVELOPMENT GOALS

The United Nations' Global Sustainable Development Goals 2030¹⁷ (SDGs) offer a roadmap for a better tomorrow for humanity, and research is key to getting us there. Through research, challenges and conflicting objectives can be identified, solutions found, dialogue between different societal stakeholders initiated, and the goals themselves analysed. The SND infrastructure does not contribute to specific goals, targets, or activities as much as to the entire system of research – in a wide range of areas – that help us progress in the right direction.

A research infrastructure that provides researchers with the possibility to make their data FAIR is ultimately essential if we are to efficiently meet the SDGs. The challenges encompassed by the seventeen goals are global in nature, requiring an equally open research effort. Some research fields are already leading the way in terms of openness and data sharing, such as the environmental and climate research required to combat climate change and its effects (Goal 13). Through the SND infrastructure, other areas can now follow suit.

An example of how SND has contributed specifically is the collaboration with Environment for Development (EfD), a global network of research centres solving environmental and developmental challenges. Within the framework of the collaboration, EfD have gained expertise and developed processes necessary for sharing well-documented data. This has included training data managers and curators at Policy Studies Institute in Addis Ababa, to improve data preservation and sharing within the network. Similar collaborations that contribute to research that further the work towards the SDGs will occur over the next decade.

¹⁷ For more information about the UN Sustainable Development Goals, see <https://www.un.org/sustainabledevelopment/>

DESCRIPTION OF THE INFRASTRUCTURE AND ITS ACTIVITIES

The Swedish National Data Service (SND) supports and promotes efforts to make research data produced in Sweden open and FAIR (findable, accessible, interoperable, reusable). The infrastructure is a knowledge hub for research data management at the centre of a system for disseminating and exchanging know-how, expertise, and experience. We initiate, create, and participate in networks and collaborations with stakeholders from the national and international research data community. Through SND, users gain access to technical tools and services that facilitate describing, sharing, and reusing FAIR data.

1. A SWEDISH SYSTEM FOR FAIR AND OPEN DATA

In collaboration with Swedish research organisations, SND will be the leading national provider of FAIR and open research data to the scientific community. Achieving the national goal of free access to publicly funded research data, as set by the Swedish government, requires local research data support functions at Swedish research organisations. These functions, referred to in this application as Data Access Units (DAUs), have been established with SND support during the current funding period (2018–22). Over the next period (2023–26) the majority of DAUs are expected to reach maturity, and SND will continue to support their further development and collaboration.

Although not an organisational part of SND, the DAUs are our closest partners in supporting researchers in data-related issues. The DAUs have joined the SND Network, a central part of the national system that promotes and facilitates research data sharing and preservation, as well as collaboration and mutual assistance. This system will give Swedish researchers access to the tools and services they need to describe data and make them findable and accessible, as well as to information and training resources. The collaboration between DAUs and SND in reviewing data and metadata before publication is unparalleled internationally and builds on a tradition of using distributed competence and federation, as well as forming national consortia. Technical and procedural solutions within the collaboration allow for handling of personal data and data with other restrictions. Through the SND Network, DAUs and other research infrastructures will continue to be able to exchange knowledge and receive training. Together, the SND consortium and the DAUs in the SND Network will constitute an essential data access service for the Swedish research community.

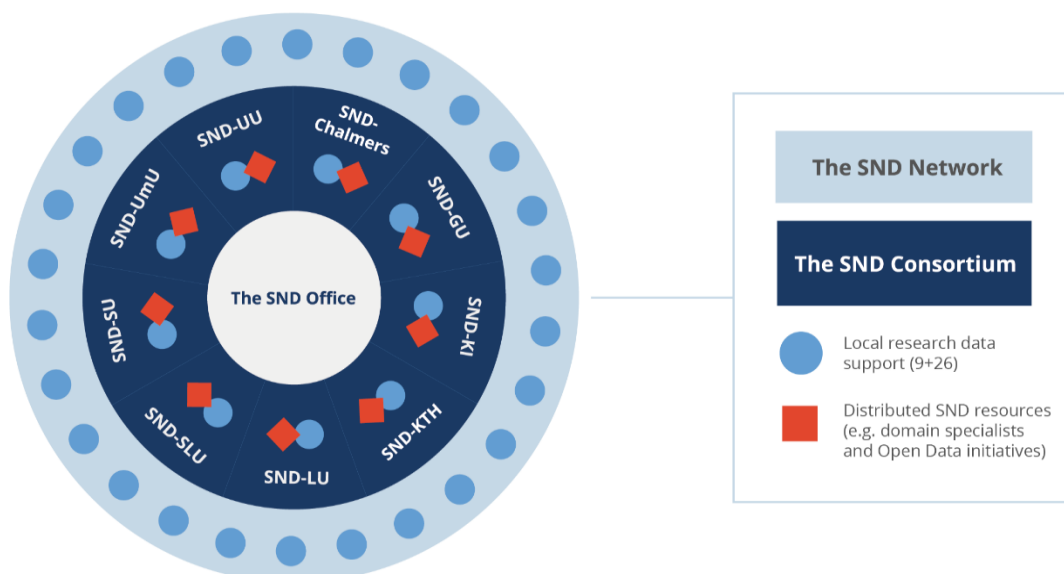


Figure 1.1: Overview of the SND Consortium and the SND Network.

2. ORGANISATION AND LEADERSHIP OF THE INFRASTRUCTURE

2.1. THE SND CONSORTIUM: A MODEL OF DISTRIBUTED EXPERTISE

The partners of the SND consortium are University of Gothenburg, Chalmers University of Technology, Karolinska Institutet, KTH Royal Institute of Technology, Lund University, Stockholm University, Swedish University of Agricultural Sciences, Umeå University, and Uppsala University. During the current funding period, the partners provided experts in a range of scientific domains as their co-financing of the infrastructure. These *domain specialists* are a national resource for Swedish universities and offer expertise on specialised aspects of research data and Open Science for the research community. They widen the scope of SND's expertise and address the "lack of attention to the specificity of research practice, processes and data collection" [30: p.3]¹ that had been identified as a key overarching issue in achieving open access to research data.

In order to address the rapidly changing landscape of Open Science in general and access to research data in particular, the SND domain specialist model will be further developed. While some research domains move rapidly toward data sharing, other domains face technical or legal obstacles due to the types of data they use. Support and solutions need to be adapted to the particular challenges that each research field faces as the national 2026 deadline for free access to research data "as a rule" approaches. The domain specialist model will be augmented with a greater possibility for targeted, time-limited, *Open Data* initiatives. Such initiatives can involve the development of national guidelines, best practices, or processes necessary to provide access to particular data types, for example for interview data, video material, or data with sensitive information. They can assist a particular research group, centre, or other research environment, national or local, to progress toward producing FAIR and open data, and use their experience as a template for similar research communities on a national level. This kind of strategic initiative will be called *Open Data Flagship*, and will provide a way for researchers to set good examples on how to make data FAIR and open. The need for necessary metadata schema and other tools and services can be communicated directly to SND from the Flagships, and the Swedish research community will benefit from their experiences. The Open Data Flagships will be managed locally or across universities and will receive data management support from the SND office and from local DAUs.

The activities of this augmented domain specialist model will be divided over all modules but with a particular focus in the *Knowledge Hub* and *Networks and Collaborations* modules (described in sections 3.4.1 and 3.4.2). The distributed SND organisation will maintain close ties to the various domains and to scientific communities of practice.

2.2. CONSORTIUM ORGANISATION AND LEADERSHIP (MODULE 1)

Operational management, administration, IT and technical development, and expertise in data curation are mainly located at the SND office at the University of Gothenburg. Another office, staffed by local domain specialists, may be established in the Stockholm–Uppsala region during the next funding period, to promote closer cooperation between domain specialists.

2.2.1. Strategic Management

Strategic management is the purview of the steering committee, constituted by one representative from each consortium partner and the director of SND. The steering committee is chaired by the host university representative. It is guided by an annual general assembly, representing the leadership of the consortium universities. The general assembly provides input on matters such as the strategic plan, annual budgets, and significant changes to operations (see figure 2.1 for an organisational overview).

Two further groups advise the steering committee. The Research Data Support Council links the steering committee to the national activities at the DAUs. The council strengthens the collaboration in the consortium and advises on data curation requirements at a local level. An

¹ For references, see *Appendix E: Key References*.

Infrastructure Advisory Group will be established, with the main purpose of advising the steering committee on data requirements for the research community. The group will consist of representatives from publically funded, national research infrastructures. This stakeholder representation will ensure that functions, tools, and standards developed within SND are apposite to researchers who use such infrastructures in Sweden.

The consortium structure puts SND at great advantage, as nine of Sweden’s top ten research universities are part of it. In 2019, the consortium universities accounted for more than 80 per cent of the total revenues for research and postgraduate education, and almost 80 per cent of the doctoral students were active at these universities (full-time equivalents).

SND consortium members are driving forces in several national collaborations on research data and Open Science, and belong to the consortia behind URFI (the Universities’ Reference Group for Research Infrastructures) and SNIC (Swedish National Infrastructure for Computing). Through the SND consortium, we are able to share and learn from each other’s top-level expertise, research, personnel, and technical skills. We have a close-knit, tight cooperation and are able to speak with one voice through SND. Members of the consortium pool resources and work together to more efficiently meet the needs of their faculties and research staff with regards to Open Data and data management issues.

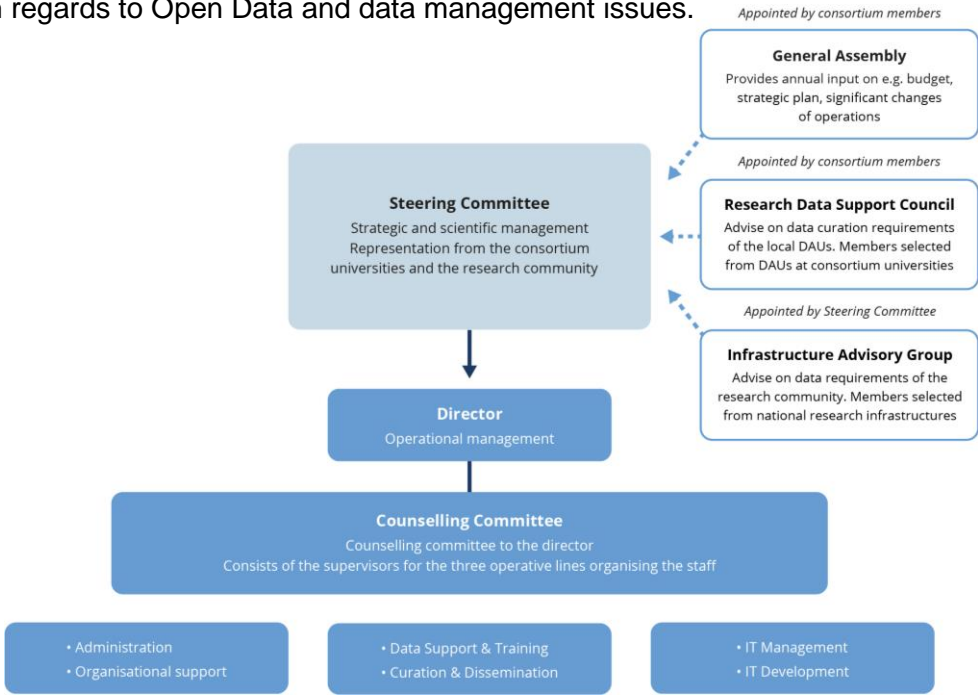


Figure 2.1: Operative Organisational Structure for SND.

2.2.2. Operative Management

The operative management of SND is arranged into a line and staff organisation, under the executive management of the director. The consortium agreement will establish the procedure for how the director is appointed by the host university. The three lines, each with a staff supervisor, are (i) Administration and Organisational Support; (ii) Data Support and Training, Curation and Dissemination; and (iii) IT Management and Development (see figure 2.1).

The director appoints the staff supervisors, who supervise the daily work in the operation lines and provide specialist advice to the director as members of the counselling committee.

2.2.3. Administrative Support

Most administrative support in human resource management, finances, communication, legal issues, and project management is provided within the SND organisation.

Required Resources: A total of 100% director, 120% administrators, and 180% communication officers are allocated for the administration.

3. INFRASTRUCTURE OPERATIONS

3.1. GRAPHIC OVERVIEW

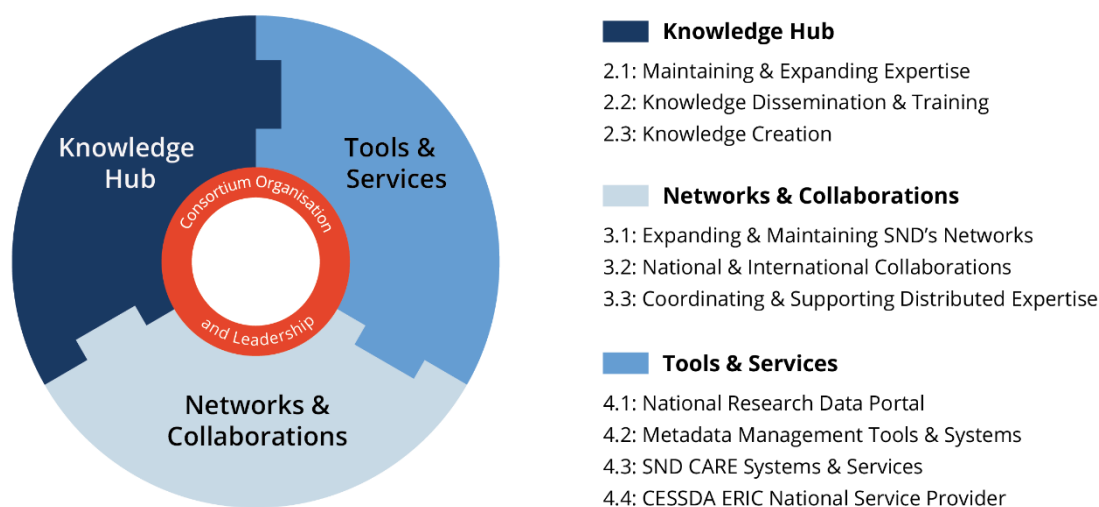


Figure 3.1: Graphic Overview: SND Modules and Submodules.

3.2. TIME SCHEDULE

Please see attached Gantt chart in Appendix A: Time Plan.

3.3. USERS

SND has three main categories of users: **research data producers** (mainly researchers), **research data users** (researchers, businesses, public authorities, etc.), and **research data support** (DAU staff and other data professionals). The next funding period will see an increase in activities towards the first two categories and a clearer separation of tools, services, and resources. The separation is prompted by the expected increase in the number of users, the greater number of collaborative initiatives to meet the needs of these users, and the rising complexity of research data issues. The transition to two websites will be the most obvious outward sign of this separation (see 3.3.1: Communication and submodule 4.1).

SND's relation with research data producers centres on the tools, training, and support they need in order to produce well-documented data that can be shared in a FAIR and open manner. This includes measures that tie in with the mandated work of funders and universities to create incentives for Open Science [4]. Certain SND resources for the producer category are also valuable to research data users, such as training in research data management and data management plans. SND will further meet the needs of research data users through the various functions and tools incorporated in the *researchdata.se* (*forskningsdata.se*) portal, including instructions on how to use them. Research data support will continue to receive assistance through the tools, training, and coordinated networks that also facilitate exchange of experience and expertise, and which provides SND with information about user needs. More SND resources will be dedicated to work with data support staff in data-producing research infrastructures, with the goal of making their data FAIR and open.

Some infrastructures have already contacted SND for assistance, support, and collaborations. They require different services, but there are certain tools (e.g. a search function for

survey variables or questions) that SND can develop cost-efficiently for several of these small research infrastructures that are in contact with us, such as (by February 2021):²

- NEAR (National E-Infrastructure for Aging Research)
- The Oden Research Platform
- REWARD (RELations, Work and Health across the life-course – A Research Data infrastructure)
- ETF (Evaluation Through Follow-up)³
- SITES (Swedish Infrastructure for Ecosystem Science)
- CORS (Comparative Research Center Sweden)

3.3.1. Communication

The main communication portals for SND users will be *researchdata.se* and *snd.gu.se*. The *researchdata.se* (starting in 2023) portal will contain information, training resources, specific search tools, and search functionality for the SND data catalogue, as well as for a number of other research infrastructures with data repositories. Its primary users will be research data users and producers. The current *snd.gu.se* site will become a website focused on information, resources, and tools for research data support users and the SND consortium. It will also include links to platforms for interactive collaboration, such as the internal communication platform Basecamp and the “DAU Handbook,” a wiki (a community-edited web platform) for knowledge exchange in the SND Network.⁴ Through these, research data support staff can find, and contribute to, resources on, for example, data review processes and guides to establishing a DAU.

SND will also continue to use social media (Twitter and LinkedIn), newsletters, network meetings, and national and international conferences to communicate with its user categories, other stakeholders in the research data community, and with the public. Other forms of communication are included in DORIS (the SND Data ORganisation and Information System), support activities (via online drop-in sessions, e-mail, and phone calls), and teaching and training (e.g. courses, webinars, hands-on training) (see submodules 4.1 and 4.2 for details).

3.3.2. Training and User Support

SND currently provides training and user support to both researchers and DAU staff through workshops on data management plans, instruction videos, drop-in support webinars on using DORIS and other systems, and presentations covering a range of aspects on research data management and related information. Online resources for basic data management for researchers⁵ have been developed, as well as an introduction to research data management and curation for DAU staff.⁶ Together with University of Borås, SND offers a 120-hour professional development course for DAU staff.⁷

During the next funding period, SND will intensify collaborations with DAUs from the consortium universities to create training and education in data management for junior researchers and PhD students. These pedagogical resources will then be shared within the SND Network. Another aim for the next funding period is to provide training resources for all of the tools and services that SND will develop during the period, including a comprehensive training guide for DORIS and *researchdata.se* (see submodule 2.3).

² NEAR <https://www.near-aging.se/>, Oden <https://polar.se/en/about-polar-research/icebreaker-oden/>, REWARD <https://www.su.se/rewhard/>, ETF <https://www.gu.se/utvardering-genom-uppfoljning-ugu/>, SITES <https://www.fieldsites.se/>, CORS <https://cors.se/en/widget-en/>

³ They use their Swedish acronym, UGU (Utvärdering Genom Uppföljning), for their application to the Swedish Research Council.

⁴ The SND Wiki Handbook is at <https://dwb.snd.gu.se/>

⁵ Our online resources on data management can be found at <https://snd.gu.se/en/manage-data>

⁶ The BAS Online learning material is on <https://snd.gu.se/sv/hantera-data/utbildning/bas-online>

⁷ For details: <https://www.hb.se/Bibliotekshogskolan/Utbildning/Uppdragsutbildning/Forskningsdatahantering/>

3.3.3. User Fees

Researchers use the SND tools and services free of charge. Universities with DAUs that are members of the SND Network pay an annual user fee to SND. In return, SND offers e-systems (DORIS), meetings, training and information on data management and curation. Additional services, such as data curation, will be charged at cost. Infrastructures and other parties that use SND, including universities which have not yet established a DAU, will be charged hourly fees for the specific services that they require (see attached budget for figures).

3.4. CONSTRUCTION, DEVELOPMENT, AND OPERATION OF THE INFRASTRUCTURE

SND works to allow researchers in Sweden to share and reuse FAIR and open data. Our goals (detailed in the *Scientific Plan*, section 1.1) are to

1. **facilitate the sharing of research data** in a way that is simple, secure, and trustworthy, and that complies with requirements for data preservation, access, and sharing;
2. **provide data visibility and usage metrics** by exposing research data both nationally and internationally, and offering information on sharing and citation;
3. **facilitate trustworthy data access** to findable, high-quality, well-documented data, along with information on how those data can be accessed and reused.

SND's objective is to be a driving force in building a system that enables these goals, using our data management experience and expertise.

SND is described through four modules. Module 1 was addressed under section 2.2: Consortium Organisation and Leadership, above. Below (under sections 3.4.1–3.4.3) are addressed the other three, highly interdependent, modules, divided into ten submodules. The submodules in each module describe the activities related to a particular aspect of SND's operations.

Module 2 *Knowledge Hub* includes activities that cover the building, maintenance, creation, sharing, and dissemination of expertise concerning research data management and curation generally and within particular scientific domains. Module 3 *Networks and Collaborations* comprises coordination and initiation of professional networks related to data management support and research infrastructures, participation in national and international collaborations, and project support and management. Finally, Module 4 *Tools and Services* includes development and maintenance of tools and services related to the new national research data portal, to metadata management, to the SND certified repository systems (SND CARE), and to SND's role as the national CESSDA ERIC Service Provider.

As the modules are activities-based, they are largely interdependent – the activities in one module often presupposes activities in the other two, or activities from two or all modules intermesh. The modules thus represent a high-level overview of the activities in SND, not a division of these activities into independent work packages. For example, creating a webinar for SND Network members on how to use new DORIS functionality involves activities from all three modules: it requires network activities (submodule 3.1), knowledge dissemination (submodule 2.2), and DORIS development (submodule 4.2). And DORIS development, for example adding new controlled vocabularies, is in itself a result of knowledge created in collaboration with, for example, the DDI Alliance (submodules 2.3 and 3.2), and technical skills acquired through professional development (submodule 2.1). Most SND activities are the result of similar chains of activities connecting the modules.

3.4.1. Module 2: Knowledge Hub

To be able to continue to offer solutions to the many challenges of data accessibility, SND will maintain a high level of expertise and know-how within areas such as research data management, data curation, and data management planning. By gathering and analysing information about the multitude of factors and actors in the research data ecosystem, SND will be able to anticipate and deal with potential problems, in the same way that we foresaw the need for a distributed curation model and a national storage solution for the current funding period. The

networks established during the current period will remain important venues for stakeholders to bring pressing questions and issues within research data management to SND's attention, as will the two reference groups presented in this application (see section 2.2.1: Strategic Management). Open Data Flagships, initiatives that are part of the consortium's in-kind contributions (see section 2.1: The SND Consortium), will provide an additional channel for researcher communities to communicate their data management and sharing concerns to SND.

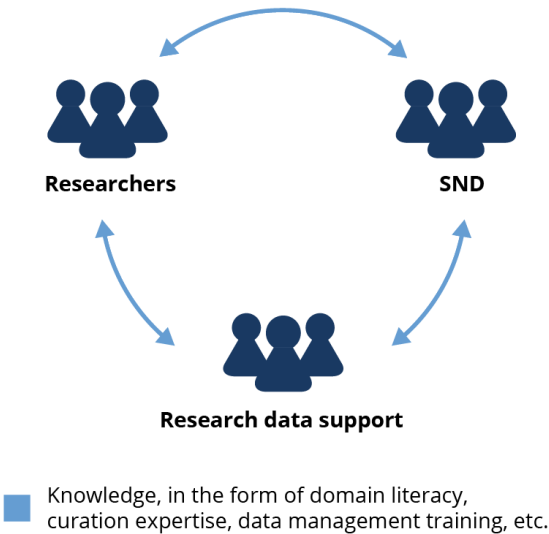
The submodules under the *Knowledge Hub* module capture activities related to (1) the maintaining and building of expertise and know-how; (2) the sharing and dissemination of such knowledge; and (3) the creation of new knowledge.

Required Resources: A total of 500% research data advisors, 40% legal officer, 200% IT, and 300% domain specialists are allocated to the Knowledge Hub.

Submodule 2.1: Maintaining and Expanding Expertise

The landscape of research data management, curation, and sharing will continue to evolve rapidly. New data types, metadata requirements, means of access, and new technologies will require continuous activities aimed to maintain and increase relevant expertise and know-how.

Contribution to goals: By maintaining and expanding expertise, the activities in this submodule contribute to *facilitating the sharing of research data*. To provide a system and services that make data sharing as simple and secure as possible, while in compliance with stakeholders' requirements, requires maintaining appropriate expertise.



For SND, efforts will include professional development through courses, seminars, and conferences, as well as literature reviews of reports, articles, guidelines, best practices, and other publications on administrative methods of data management and curation, and discipline-specific data management methodology. Collaborations with other organisations, such as DAUs and other national and international research infrastructures, will provide opportunities for hands-on experience and knowledge exchange through visits and projects. Such collaborations can offer new perspectives and ideas on how to improve processes and workflows in an SND or Swedish context. In-house development, not least of methods for managing data types previously not encountered, will provide valuable experience.

Figure 3.2: Knowledge Exchange. *SND operates in a context where all actors learn from each other's experience and expertise. Knowledge flows are always bidirectional.*

Submodule 2.2: Knowledge Dissemination and Training

SND is a repository of know-how related to data management, curation, and sharing. Crucially, this role involves coordinating the sharing of expertise within SND's various networks, in particular, the SND Network of DAUs, and among researchers and data professionals.

Contribution to goals: By knowledge dissemination and training, the activities in this submodule contribute to *providing visibility* of, and *facilitating trustworthy access* to, shared data. The collaboration and sharing of expertise enables a common and equal service for all

researchers when describing, depositing, sharing, and finding quality research data. The SND Network plays a key role in the day-to-day support for researchers across Sweden.

SND will carry out a broader dissemination of knowledge through physical and virtual courses, seminars/webinars, workshops, and learning material. User training of DAU staff will continue as we also increase activities aimed at other data professionals, junior researchers, and doctoral students. SND will also offer advice and curation support for DAUs and other research infrastructures.

Submodule 2.3: Knowledge Creation

In order to fulfil the role as a Swedish Knowledge Hub, SND will initiate and participate in activities that aim to contribute with new knowledge regarding data curation and management. This engagement is necessary in order to develop solutions to future challenges in the rapidly changing research data environment.

Contribution to goals: By knowledge creation, the activities in this submodule contribute to *facilitate the sharing of research data*. To make it possible for researchers at Swedish universities to comply with the requirements of access to FAIR data, it will not be enough just to follow developments in research data management. SND must be active in creating solutions, especially solutions that are compliant with Swedish regulations.

Collaborations, networks, and projects with national as well as international partners will yield new knowledge regarding data curation and management. SND will, for example, contribute to the development of guidelines, best practices, standards, and relevant terminology and controlled vocabularies; and thus, help create the necessary knowledge for managing, curating, and sharing FAIR high-quality research data in an uncertain future.

3.4.2. Module 3: Networks and Collaborations

Through a long history of collaborations and project participations as well as through its consortium partners, SND is a solid part of a national and global research infrastructure. Active in the Swedish research data community, SND has a central role in several national networks. The *Networks and Collaborations* module covers many current and future activities necessary to manage memberships in, and collaborations with, national and international organisations, authorities, and infrastructures. The submodules aim to ensure that Swedish research data practices are developed in a wide national framework and in an international context. At the same time, these methods and processes will contribute to the national aim of making Sweden one of the leading countries in research quality, with access to research data that promotes greater scientific transparency.

A vast majority of the *national cooperation* is connected to the SND networks. SND's *international commitments*, on the other hand, are dominated by other forms of collaborations, e.g. EOSC and organisations that facilitate FAIR research data. The *Networks and Collaborations* module captures activities related to (1) maintaining the existing networks that make up the Swedish research data infrastructure, and initiating and building new networks as required; (2) the collaborations required to provide a national and international context and the essential services required for FAIR data sharing; and (3) the coordination and support of collaborative activities, targeted initiatives, and domain expertise distributed across the consortium partners.

Required Resources: A total of 500% research data advisors, 100% IT, 300% domain specialists, and 50% domain specialist coordinator are allocated to Networks and Collaborations.

Submodule 3.1: Expanding and Maintaining SND's Networks

SND's vision is to be part of a global network through which researchers can easily share, find, access, and reuse high-quality research data. To realise this vision requires several networks on different levels and with different purposes and types of expertise.

Contribution to goals: By expanding and maintaining SND's networks, the activities in this submodule contribute to *facilitating the sharing of, and trustworthy access to, research data*. They also help *providing data visibility*. Through the various SND networks and the SND consortium, a frictionless and high-performing national research data infrastructure can enable researchers to preserve, share, and reuse data in a simple and secure way.

At the heart of the SND networks is the SND consortium, a partnership of nine major research universities dedicated to facilitating the Swedish objective to make all publicly funded research data accessible from 2026. During the current funding period, SND has initiated networks on archival, legal, and IT issues, as well as networks dedicated to establishing a common terminology and controlled vocabularies, and to develop training programs and material related to data management and data sharing. These networks will be expanded and developed further in the next funding period, and new will be added.

The SND Network of DAUs is vital to the SND operations. By 2023 this network is expected to have over forty members at Swedish universities and research organisations, trained in research data management and curation, as well as in data management plans and metadata review. During the next funding period, SND will intensify support for the network by additional training and professional development, researcher training, and knowledge exchange among the members. Through the Research Data Support Council, the SND Network members provide input to SND on a strategic level; on an operational level, contacts with SND are already well-established through SND's research data advisors.

New networks are planned for the next funding period. A network for research infrastructures that receive funding from the Swedish Research Council is part of SND's strategy to broaden its domain expertise. This network will provide strategic input to SND through the Infrastructure Advisory Group (see 2.2.1: Strategic Management), and regular contacts within various domains will be established to facilitate knowledge exchange. To support individual data professionals (managers, curators, and stewards of research data) who work in projects and infrastructures, a national forum and network will be initiated for exchange of experience and expertise, including SND-run workshops and training sessions. This network will be slotted in with the SND Network in order to bring DAU staff and other data professionals together for the advancement of data-management work.

Submodule 3.2: National and International Collaborations

In the next funding period, SND will continue its wide-ranging collaborations and maintain its close connections to other research data infrastructures and e-infrastructures. While the Infrastructure Advisory Group will advise the consortium management on matters of strategic importance, national and international cooperation is necessary for solving practical problems.

Contribution to goals: By national and international collaboration, the activities in this submodule contribute to *facilitating the sharing of, and trustworthy access to, research data*. They also help with *providing data visibility*. These relationships will ensure that Swedish researchers have access to national and international datasets for reuse, and their research data will gain international exposure, leading to a broader awareness of Swedish research.

SND's cooperation with SUNET and SNIC is essential to providing secure and efficient storage solutions for research data. These three national infrastructures aim to provide Swedish researchers with accessible, trustworthy, and easy-to-use tools and services regarding

research data. With DiVA (the Academic Archive Online)⁸ and RUT (Register Utiliser Tool),⁹ SND maintains important collaborations to make research data findable (see submodule 3.1: *Expanding and Maintaining SND's Networks.*) SND's domain expertise will increase by intensifying our contacts with Swedish ERIC (European Research Infrastructure Consortia) nodes and other similar consortia.

SND will continue to facilitate easy access to international data for Swedish researchers, as well as to promote the use and citation of Swedish research data internationally. The partners needed for these tasks are mainly the large-scale EU initiative the European Open Science Cloud (EOSC) and related initiatives funded by the EU; and various organisations that provide essential services or expertise related to data management and repositories.

In 2020, with the University of Gothenburg as host university, SND was accepted as member of the **EOSC Association** along with eight other Swedish organisations. EOSC was created to promote access to European and global research data. SND's major contributions to EOSC have been through participation in the projects *EOSC-Nordic* (focus on the Nordic and Baltic countries) and *SSHOC* (Social Sciences and Humanities Open Cloud). SND communicates a Nordic-Swedish perspective on data management, e.g. the implications of Swedish personal identification numbers. In the next funding period, SND will also provide a national entry point to the distributed research data system through the *researchdata.se* portal.

Additional international collaborations will be organisations central to providing trustworthy FAIR data or necessary for data publication. Developers of metadata standards, international promoters of data-sharing, and contributors to findable and citable data will remain essential to SND's international network, adding a global context for Swedish research data.

- Membership in **DataCite** allows SND and members of the SND Network to issue research data with Digital Object Identifiers (DOIs), a type of persistent identifier for finding, reusing, and correctly citing data.
- Membership in **World Data Systems** means that data shared through the SND research data catalogue can attain greater international impact. Their standards and guidelines concern sustainable and secure data storage, management, and access.
- **The Inter-university Consortium for Political and Social Research (ICPSR)** is a research infrastructure with almost sixty years' experience in curating and providing access to research data. SND's membership allows Swedish researchers free access to the ICPSR data collections and the opportunity to take part in their summer school for a reduced fee.
- The global, member-driven **Research Data Alliance (RDA)** promotes easy sharing and reuse of data for researchers and innovators. RDA Sweden, the Swedish node, is coordinated by SND, and promotes common solutions and the FAIR principles.
- By collaborating with **the DDI Alliance**, SND contributes to the Data Documentation Initiative (DDI), an international standard for describing data produced, for example, in the social, behavioural, and health sciences.

Submodule 3.3: Coordinating and Supporting Distributed Expertise

The collaborative activities, targeted initiatives, and domain expertise distributed across the consortium partners will need national coordination to provide maximum benefit to the infrastructure, and these various activities will also require support from the SND office.

Contribution to goals: By coordinating and supporting the distributed expertise of the SND consortium, the activities in this submodule contribute to *facilitating the sharing of research data*. The products and distributed expertise will help establish a research data system that is simple to use, secure, and trustworthy for all disciplines, and this submodule is essential in maximising, facilitating, and directing the outcomes from that work. Some contributions will also be made to the other goals, for example by products that enhance visibility of data for

⁸ To visit the DiVA website, follow this link: <https://info.diva-portal.org/>

⁹ Learn more about RUT at <https://rut.registerforskning.se/>

particular domains and by the Open Data Flagships that lead to tools that will improve access to data.

As detailed under section 2.1: The SND Consortium, the consortium partners will contribute resources to a distributed organisation. While most of their activities, including the Open Data Flagships, will fall under other submodules, this submodule contains the activities necessary to coordinate the many people involved in activities, locally or as collaborations with consortium partners. Such coordination will ensure that initiatives do not duplicate each other's efforts, and that the results from activities are of national relevance. This submodule also encompasses support activities from the SND office, as resources and expertise are contributed to the distributed activities. This includes a national coordinator for the distributed initiative.

3.4.3. Module 4: Tools and Services

An important part of SND's support to universities and researchers in their creation, management, and sharing of data is the development of tools and provision of services for various data management tasks. Such tasks range from creating data management plans at the beginning of a project to documenting and describing datasets for future use. The support also includes e.g. means to track how much data are shared, discovery and searchability assistance, and tools and best practices for data curation and review.

Required Resources: A total of 500% research data advisors, 600% IT, and 200% domain specialists are allocated to Tools and Services.

Submodule 4.1: National Research Data Portal

The main SND service aimed directly at researchers will be a national research data portal, *researchdata.se*.

Contribution to goals: By the national research data portal, the activities in this submodule contribute to *facilitating trustworthy data access*. In the portal, researchers can find high-quality, well-documented data for secondary use and research validation. The portal will also include clear instructions on how data can be accessed and reused.

The *researchdata.se* portal will contain tools, services, and information primarily designated for researchers (see section 3.3.1: Communication). The use of a new web address for this portal will be part of establishing a "neutral" space, not tied specifically to a given university, infrastructure, or consortium, where the focus instead lies with research data and the researchers who use it. At the heart of the portal will be its search functionality. It will be possible to search for research data from the SND research data catalogue, but also from many other research infrastructures. The SND catalogue contains metadata that describe data produced by researchers who work at universities or research organisations in the SND Network. These metadata are created through DORIS (see submodule 4.2) or harvested via a metadata ingest platform and harmonised. A steering group for *researchdata.se* will include representation from SND, the SND Network, and the Infrastructure Advisory Group.

Other tools will be added to the platform. A public search API will allow other organisations to build applications based on the existing metadata, thus maximising exposure for Swedish research. A public harvesting service will permit external services to harvest metadata. One example of an external service is *dataportal.se*, the national metadata portal for public data run by DIGG, the agency for digital government. Specialised search tools will also be developed, beginning with a survey question bank and a database with variables from quantitative studies. (Tools development will be based on the needs arising in the Open Data initiatives, in particular the Open Data Flagships; see section 2.1: The SND Consortium).

The *researchdata.se* platform will also contain data management training material and instruction material for how to use the various tools.

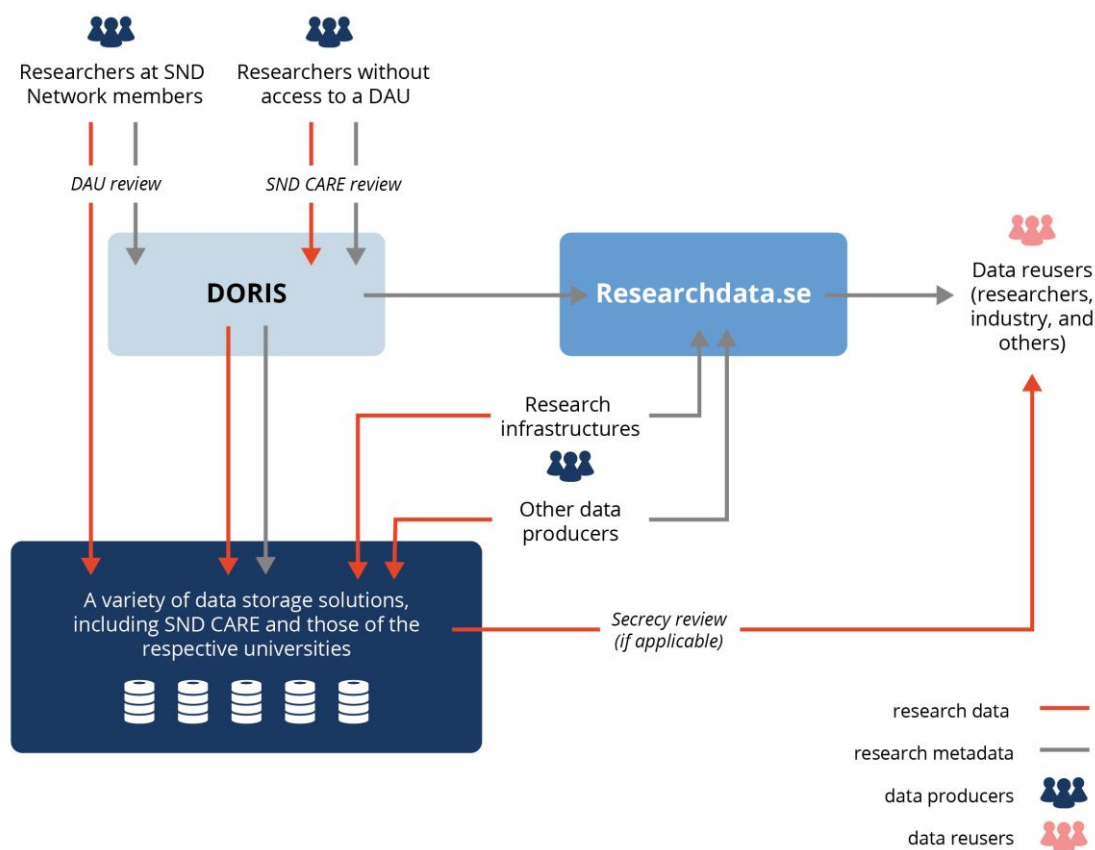


Figure 3.3: Key Services for Sharing Research Data. Data are kept on a storage solution controlled by a university, infrastructure, or research organisation. Researchers describe data in DORIS. Data descriptions from DORIS and other infrastructures can be found through researchdata.se, and data can be downloaded directly or ordered. For sensitive data, the data owner performs a secrecy review before granting access.

Submodule 4.2: Metadata Management Tools and Services

During the next funding period, SND will continue to develop user-friendly and interoperable tools and services for research data management, and maintain the tools developed during the current period. Foremost among these tools is *DORIS*, a national workspace for researchers, DAUs, and SND staff.

Contribution to goals: By metadata management tools and services, the activities in this submodule contribute to *providing data visibility and usage metrics*. The system for metadata management enables researchers to make their data visible, and allow their data to be used by others. The system will also provide tools for data-sharing and -citation metrics.

DORIS is used for creating, editing, and reviewing research data descriptions before they are added to the data catalogue, and it will be augmented with a metadata extraction service. This service, which will be developed by SND but run where the data are stored, will extract metadata directly from compatible data files in order to make data description quicker and easier for researchers. DORIS also contains SND's entry-level, DataCite-compliant, metadata profile for registration of research data, along with functionality to improve the FAIRness of entry-level data descriptions. This profile allows rapid descriptions of data as a means to provide data owners with an overview of their data, and it is made available to researchers as requested by their university. Entry-level data descriptions are clearly marked as such until sufficiently augmented. (This process was introduced to meet researcher and university

demand for quick initial data registration and to maximise access to research data, while promoting FAIR data.)

Other tools that will be added include:

- a research impact service with connection to citation databases;
- a restricted write API to allow machine-actionable updating of metadata in DORIS (for example, to support continuous publication of metadata from scientific instruments);
- a controlled vocabulary management tool that enables a more effective handling of pre-defined lists of terms used in the services provided by SND.

Integration with other external resources has been proposed, e.g. with storage providers, RUT, DiVA, publication databases, SweCRIS, and local services at universities. How such integrations will be prioritised will depend on the forthcoming SND evaluation (2021) and will ultimately be decided by the SND steering committee under the advice of stakeholders, advisory groups, and consortium members. The development of the services will be coordinated on a national level, and with an international connection to EOSC.

Submodule 4.3: SND CARE Systems and Services

SND CARE (CentrAl REpository) is an OAIS-compliant and certified repository with support for FAIR data and metadata, including the systems and services connected to SND's repository function.

Contribution to goals: By the SND CARE systems and services, the activities in this submodule contribute to *facilitating the sharing of research data*. SND CARE enables researchers from research organisations that have not yet established a DAU to share data simply, securely, and in compliance with data access requirements.

SND will continue to develop its repository function with the aim to preserve research data, and to facilitate their reuse. The repository has secure research data storage (currently contracted from SNIC) and includes a dissemination service for datasets deposited with SND. Such datasets can be stored in SND CARE for legacy reasons, or can be deposited with SND from research organisations that do not yet have their own research data support function. For such organisations, SND CARE functions as a “default DAU,” offering advice and support to individual researchers for a fee (see also 3.3.3: User fees). It will serve as an example for other repositories in the SND Network, and provide assistance as research organisations certify their own repository functions. The aim is to create a nation-wide network of the certified repositories in the SND Network.

Submodule 4.4: CESSDA ERIC National Service Provider

SND will remain a Service Provider for the Swedish membership in CESSDA ERIC in the next funding period. CESSDA is a European Research Infrastructure Consortium with some 20 European data archives that work together to improve access to social science research data.

Contribution to goals: By the activities as a CESSDA ERIC National Service Provider, this submodule contributes to *facilitating the sharing of, and trustworthy access to, research data*. It also helps *providing data visibility*. The CESSDA membership grants Swedish researchers access to well-documented and high-quality European research data, expert knowledge on data preservation and access, and training resources in several fields. The CESSDA data catalogue and the vocabulary service allow researchers to make their data visible and reused internationally.

The CESSDA Statutes call upon its Service Providers to fulfil a number of obligations listed in Annex 2 of the Statutes [29]. This includes enabling metadata harvesting for inclusion in the CESSDA data portal; contributing to cross-national data and metadata harmonisation activities; sharing of data repository tools and expertise with other CESSDA members and

prospective members, especially in countries with immature or fragile national infrastructures; and adaptation to the DDI metadata standard.

SND is active in many of the CESSDA areas, and at present involved in the work with certification of repositories, a guide to data archiving, the creation of a common technological platform, and in providing support to aspiring and new CESSDA members. SND will also play a crucial role in the further development of the European Question Bank. Previous involvement has been in, for instance, the work with persistent identifiers and the development of a common metadata profile for CESSDA. SND is also responsible for the Swedish language translations of the multilingual ELSST thesaurus and the common controlled vocabularies in CESSDA.

3.5. COOPERATION WITH OTHER INFRASTRUCTURES

SND is the only Swedish infrastructure dedicated to providing access to research data from all scientific domains, along with a broad expertise in data management and curation. Some Swedish research infrastructures provide access to research data but only in specific disciplines. Examples include Nationella Språkbanken Text (for mainly Swedish text corpora), SEAD (environmental archaeological data), and ICOS-Sweden (data related to the carbon-balance). Such infrastructures are natural partners for SND, rather than competitors, and there are long-established collaborations in place. At present (January 2021), SND harvests metadata from Språkbanken Text in order to make their data findable in the SND catalogue. For the next funding period, metadata will also be harvested from other Swedish research data infrastructures, including ICOS, SEAD, and Bolin Centre for Climate Research.¹⁰

But far from all scientific disciplines have dedicated data infrastructures, nationally or internationally. Nor are there any other Swedish research infrastructures that take a comprehensive approach to the research-data landscape in the way that the SND consortium does together with the members of the SND Network. There are, however, international infrastructures similar to SND. For example, SND has a well-established relationship with national data repositories in the Netherlands (DANS), Germany (GESIS), and the UK (UKDS).¹¹ Our collaborations with national data repositories in the Nordic countries have been of particular value due to the similarities in research-data-related legislation. European national data repositories have much to learn from each other and are very important partners to SND. Being national repositories, however, they do not, as a rule, accept Swedish research data and are not alternatives for most researchers in Sweden.

Other international options include digital, open-access repositories such as Figshare and Zenodo, which are accessible to data producers worldwide. While many of these appear to function well on a technical level and their depositing process is fairly swift, SND has a globally recognised trust seal, superior metadata schemas through domain-specific metadata profiles, and, importantly, functionality to describe and share datasets containing personal data. The personal data issue is complex, and from a legal and institutional perspective, certified Swedish data repositories would always be required. The fact that SND can offer domain-specific support for researchers and DAU users, including data and metadata review, will remain important as Sweden moves towards its 2026 target.

3.6. RISK ANALYSIS

The overall risk level in SND is estimated as low. The consortium partners have substantial scientific and economic interests in a long-term commitment to a national multidisciplinary research data infrastructure. The possibilities for a financially sustainable expansion during the funding period and beyond are also considered favourable, thanks to the dedication of the universities and research organisations in the SND Network. SND will systematically analyse risk areas during the funding period in order to detect possible problems early on.

¹⁰ Visit <https://spraakbanken.gu.se/>; <https://www.icos-sweden.se/>; <https://www.sead.se/>; <https://bolin.su.se/>

¹¹DANS <https://dans.knaw.nl/en>, GESIS <https://www.gesis.org/home>, UKDS <https://ukdataservice.ac.uk/>

Table 3.2: Risk Analysis

Risk description	Likelihood (1–5)	Impact (1–5)	Risk* (1–25)	Risk management actions
Difficulties in recruiting personnel with relevant expertise	4	4	16	Strategic human resource management; development of training programmes; active recruitment through established contacts
Loss of key personnel	3	4	12	Strategic human resource management; well-defined and documented workflows not dependent on single staff members; improved career opportunities within the organisation
Difficulties in ensuring access to data in case of terminated funding from 2026	2	4	8	Strategic plan for sustainable funding; succession plan including actions for access and preservation of research data
Problems related to the implementation of a distributed organisation	2	3	6	Well-defined and documented workflows and structures for collaboration; short and well-defined decision-making processes on all levels of the organisation
Underestimation of necessary resources	2	3	6	Options for additional funding will be explored; resource allocation will be reviewed
Delays of deliverables and milestones	2	3	6	Regular monitoring of time plan; rescheduling and revision of time plan if necessary
Management failure (unfortunate decisions)	1	5	5	Well-defined organisational structures; reporting lines and responsibilities will be reconsidered; problems will be referred upwards in the management chain
Conflicts of interest between consortium member organisations	2	2	4	Steering committee actively resolves potential conflicts of interest among the consortium members
Changes in the legal framework	1	3	3	Monitoring of legal framework development; cooperation with other stakeholders to adapt to changes

* Risk is estimated by multiplying likelihood by impact. Low risk = 1–8; Medium risk = 9–15; High risk = 16–25.

4. DATA MANAGEMENT AND THE NEED FOR A SUPPORTIVE E-INFRASTRUCTURE

The SND infrastructure facilitates the describing, sharing, and preserving of research data. Within the framework of these core activities, no data are currently generated, only metadata. Were data to be generated within collaborations and projects, they would be managed in accordance with appropriate best practices and the FAIR principles, with data management plans in place. Unless prevented by legal or ethical reasons, data to which SND will contribute will be made openly accessible in the SND CARE repository (see submodule 4.3).

In 2020, SND introduced DORIS, an integrated online service for describing and reviewing data (see *Appendix C: Activities during the Current Funding Period*). SND's previous data submission infrastructure allowed any researcher to submit data, but metadata were reviewed using separate offline software with data files uploaded to SND servers. However, DORIS provides functionality that permits both the DAU and SND to review metadata and data, as well as functionality for university-specific data storage. For researchers, DORIS provides multiple metadata schema to enable detailed, domain-specific data descriptions. For users searching for data, tools will be added that make it possible to, for example, find the same variables in several datasets, or to search for particular questions in multiple surveys.

Although SND can manage large amounts of data of various types, mainly metadata will be stored in the SND systems. Normal office equipment and existing data networks will suffice for the majority of SND's activities. SND services are hosted on virtual servers or as individual containers run on an Openshift cluster, both rented from and managed by the University of Gothenburg. SND CARE requires storage space, which will be provided by either SNIC Swestore or SUNET STaaS. Data stored as part of SND CARE will not include any personal data, nor will SND manage any personal or other sensitive data.

The SND data system requires vast data storage for its operations. Members of the SND Network need to be able to store data that their researchers describe and deposit using DORIS. With SUNET, SND has developed an API that allows users to publish data, stored at a university-controlled storage allocation, for instance SUNET STaaS, via DORIS. Where applicable, a link to the file location will be added to the metadata record to enable direct download. Should a research organisation prefer another storage solution, they can connect that storage to the API.

APPENDIX A: TIME PLAN

The Gantt chart below captures the central initiatives, milestones, and deliverables for SND during the funding period 2023–26. It also includes some of the tasks planned for the current period that impact or are related to future activities. It does not include day-to-day operations established in the current period or earlier, nor does it include activities after implementation of a strategy, plan, or process, or after the launch of a particular tool or service.

The time schedule comes with the caveat that the field of research data management and sharing is rapidly developing and requires research infrastructures to be flexible. Some future SND activities depend on the recommendations from the forthcoming evaluation of the infrastructure, planned for 2021.

Module	Task	2021	2022	2023	2024	2025	2026
2.2	Create framework for developing user training resources to match new tools, services, and user demands			█			
2.3	Review framework for determining need for and production of new RDM knowledge			█			
3.3	Establish framework for national coordination of distributed expertise and Open Data initiatives			█			
4.1	Develop <i>researchdata.se</i> platform		█	█			
2.1	Update plans and processes for RDM intelligence, professional development, and internal knowledge dissemination	█		█		█	
3.1	Review DAU status and develop plan for systematic support to help DAUs to maturity by 2026 [1]			█	█		
4.1	Develop public search API to metadata for research data described in <i>researchdata.se</i>		█	█			
4.2	Develop DORIS API for external actors to programmatically submit and update metadata			█	█		
3.3	Conduct pilot for Open Data Flagships	█	█				
3.3	Run first generation of Open Data Flagships [2]		█	█	█		
4.2	Build integrations with RUT, CRIS systems, and national DMP tools [3]		█	█	█	█	
3.1	Establish network and forum for data professionals (other than DAU staff)			█	█		
4.3	Renew the CoreTrustSeal certification for SND CARE	█			█		
1	Develop strategic plan for sustainable funding from 2027				█		
4.2	Develop questionnaire metadata extraction module				█		
4.2	Develop automatic metadata extraction from data files				█		
2.2	Analyse and assess channels for knowledge exchange		█		█		█
3.2	Create 2-year plans for RDA Sweden		█		█		
2.2	Run education in collaboration with university departments	█	█		█	█	
4.2	Develop new metadata profiles for DORIS and data catalogue [4]	█	█		█	█	
4.1	Survey Question and Variable Bank				█	█	
3.2	Establish National Competence Centre (within EOSC)					█	
4.1	Research impact service connected to citation databases					█	█
1	Create succession plan for access and preservation from 2027					█	█
4.3	Obtain Nestor certification for SND CARE [5]						█
3.3	Run second generation of Open Data Flagships [6]				█	█	█

[1] Mature DAUs only require spot checks from the SND office for Quality Assurance. Target is a majority of mature DAUs in the SND Network by 2026.

[2] Flagships include a preparation phase and report/dissemination.

[3] Will begin with integration with SweCRIS in 2022. The order of integration will depend on external actors.

[4] Profiles planned for current funding period: entry-level descriptions, natural sciences, engineering & technology, and agricultural sciences. Future profiles will depend on user needs.

[5] Will work in tandem with the CoreTrustSeal certification for 2027.

[6] Including preparation phase and report/dissemination.

APPENDIX E: KEY REFERENCES

* Key references in the “Scientific Plan” and the “Description of the Infrastructure and its Activities”

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