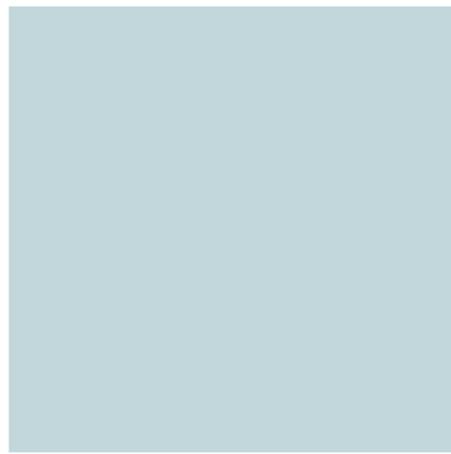


ANNUAL
REPORT

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A lot of exciting new developments took place during 2018, which will help shape the way the Nordic e-Infrastructure Collaboration (NeIC) works in the years to come.



CONTENTS

01 SUMMARY _____	4	Nordic Language Processing Laboratory (NLPL) _____	19
		Status Report 2018 _____	19
02 PRESENTING NEIC _____	6	Nordic Tier-1 (NT1) _____	19
Organisation _____	7	Status Report 2018 _____	19
Our Vision _____	8	Ratatosk _____	20
Our Values _____	8	Status Report 2018 _____	20
03 STRATEGY _____	9	Tryggve _____	21
Strategy 2020 + Planning Process _____	10	Status Report 2018 _____	21
2018 Strategy Implementation _____	11	05 EVENTS AND WORKSHOPS _____	22
Pool Competencies _____	11	All Hands Meeting 2018 _____	23
Share Resources _____	12	FAIR Awareness Day _____	23
Secure Long-Term Funding _____	12	Topical Workshops _____	23
Strengthen Stakeholder Dialogue _____	12	06 SOCIAL RESPONSIBILITY _____	24
04 PROJECT UPDATES _____	14	Openness and Transparency _____	25
Code Refinery _____	15	Equality and Diversity _____	25
Status Report 2018 _____	15	Staff _____	26
DeepDive _____	16	Environmental Sustainability _____	26
Status Report 2018 _____	16	07 2018 ACCOUNTS _____	27
Dellingr _____	16	08 ORGANISATION _____	31
Status Report 2018 _____	16	NeIC Organisational Chart _____	32
EISCAT_3D Data Support (E3DDS) _____	17	Staff _____	32
Status Report 2018 _____	17	Partners _____	32
Glenna _____	17	Board _____	33
Status Report 2018 _____	17	Executive Team _____	33
iOBS _____	18	Endnotes _____	34
Status Report 2018 _____	18		
NICEST _____	18		
Status Report 2018 _____	19		

01

SUMMARY

01

A lot of exciting new developments took place during 2018, which will help shape the way the Nordic e-Infrastructure Collaboration (NeIC) works in the years to come. NeIC put a lot of effort into developing its new strategy, which will come into effect in 2020. Much work has gone into collecting input, experience and thoughts from a wide range of our stakeholders: from the NeIC staff, the executive team and board, the project steering committees, the project partners and the national providers. We look forward to implementing our new strategy, which we hope will be well anchored in who we are as an organisation and the people we work with. You can read more about the current status and thinking around our next generation strategy in the strategy section of this report.

Facilitating strong and well-established collaborations within the Nordic setting is our main emphasis. However, whilst being firmly grounded in the Nordic context, 2018 also provided us with opportunities to broaden our horizon beyond the Nordic region: NeIC developed closer collaborations in the Baltic region. The NeIC board welcomed Estonia as an observer to the board and Estonian partners joined the Dellinger and CodeRefinery projects as official partners. In addition, NeIC was asked to coordinate a Nordic-Baltic proposal worth 6 M€ to a European Commission (EC) call on Support to the European Open Science Cloud (EOSC) Governance. The project proposal, named 'EOSC-Nordic', was submitted by NeIC on behalf of a consortium of 24 partners from Finland, Sweden, Norway, Denmark, Iceland, Estonia, Latvia, Lithuania, Netherlands and Germany. We are delighted to announce that the EOSC-Nordic proposal has been

awarded funding from the EC. NeIC will be the coordinator of the EOSC-Nordic project and also lead a Work Package on FAIR data.¹

During 2018, we strengthened our capacity in the area of FAIR and data management, which resulted in a report mapping Open Science in the Nordics and a FAIR Awareness Day among other things. The report, 'The State of Open Science in the Nordic Countries: Enabling Data Science in the Nordic Region',² was written by Andreas Jaunsen on behalf NeIC, and sought to identify activities that can help improve the conditions and means for enabling data-driven science in the Nordic region. We also welcomed two new members to the NeIC executive team, strengthening our capabilities in the areas of Open Science (Lene Krøl Andersen) and monitoring impacts (Johanna Törnroos).

A new project was set up, iOBS, dedicated to improved observation usage in numerical weather prediction (NWP). The project will contribute to improved weather forecast quality by improved use of existing and emerging observation types in world-leading operational NWP combined with future generation e-infrastructure.

While being very excited about these new developments, most of all we celebrate the everyday, ongoing efforts of all our projects and the work carried out in order to advance the e-infrastructure field in the Nordic region. You can read more about what each of the projects has worked on and achieved in 2018 throughout this report. We hope you will enjoy the read.

Gudmund Høst, Director of NeIC

02

PRESENTING
NEIC

02

NeIC is hosted by NordForsk, which provides for and facilitates cooperation on research and research infrastructure across the Nordic region. NeIC is NordForsk's main tool to implement the Nordic eScience Action Plan 2.0³. NeIC has two major roles: the first role is to assume operational responsibility for the Nordic distributed Tier-1 facility (part of the Worldwide LHC Computing Grid or WLCG) that provides computing and storage for CERN and is used by high energy physicists worldwide; the second is to collaboratively explore, evaluate, develop and deploy innovative infrastructure services in response to the strategic priorities in the area of e-infrastructure and the needs of the national e-infrastructure providers, their users and selected ESFRI projects of joint Nordic interest.

As a result of our activities, Nordic researchers have more open avenues for resources, advanced support, collaborations and scientific advancement. Some of the specific benefits for researchers include:

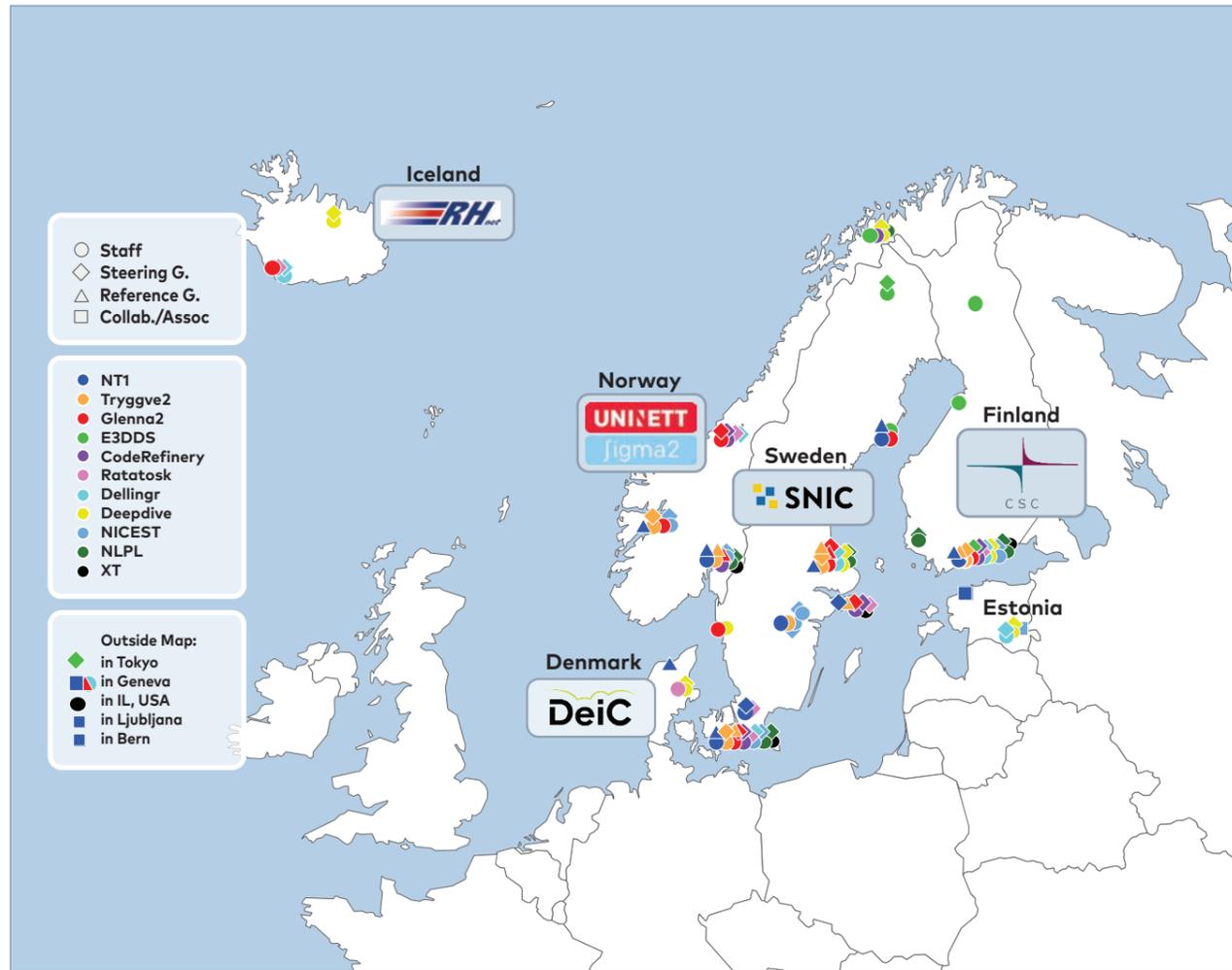
- access to a common Nordic support centre and common tools for data sharing and analysis for biodiversity researchers
- sharing mechanisms for high-performance computing resources
- workshops for researchers to improve scientific software development
- maximising national investments in EISCAT_3D
- stimulating collaboration on earth system modelling
- boosting Nordic natural language processing research
- offering national hardware resources to the worldwide high-energy physics community that reciprocates access for national researchers
- stimulating the development of leading-edge, secure national e-Infrastructure for biomedical data through Nordic collaboration.

ORGANISATION

NordForsk appoints the NeIC Board based on nominations by the national e-infrastructure provider organisations. These strategic partner organisations are CSC (Finland), SNIC (Sweden), UNINETT Sigma2 (Norway), DeIC (Denmark) and RHnet (Iceland). The NeIC board consists of one representative from each partner organisation. ETAIS (Estonia) is an observer to the board.

NeIC is managed by an executive team chaired by the NeIC Director. The executive team coordinates the activities and participates in project steering groups as project owners.

NeIC is at an intersection point between national, Nordic and international strategies. NeIC has worked to increase collaboration through a set of projects that include the national providers (CSC, DeIC, RHnet, SNIC, UNINETT Sigma2), partners in ESFRI projects, and other institutions in the Nordic region and Europe. NeIC projects are in place in the areas of Physics and Engineering Sciences, Environmental Sciences, Humanities, Culture and Society, Life Science and e-Sciences. Below you can find the overview over NeIC engagement across the Nordic region and beyond.



03

STRATEGY

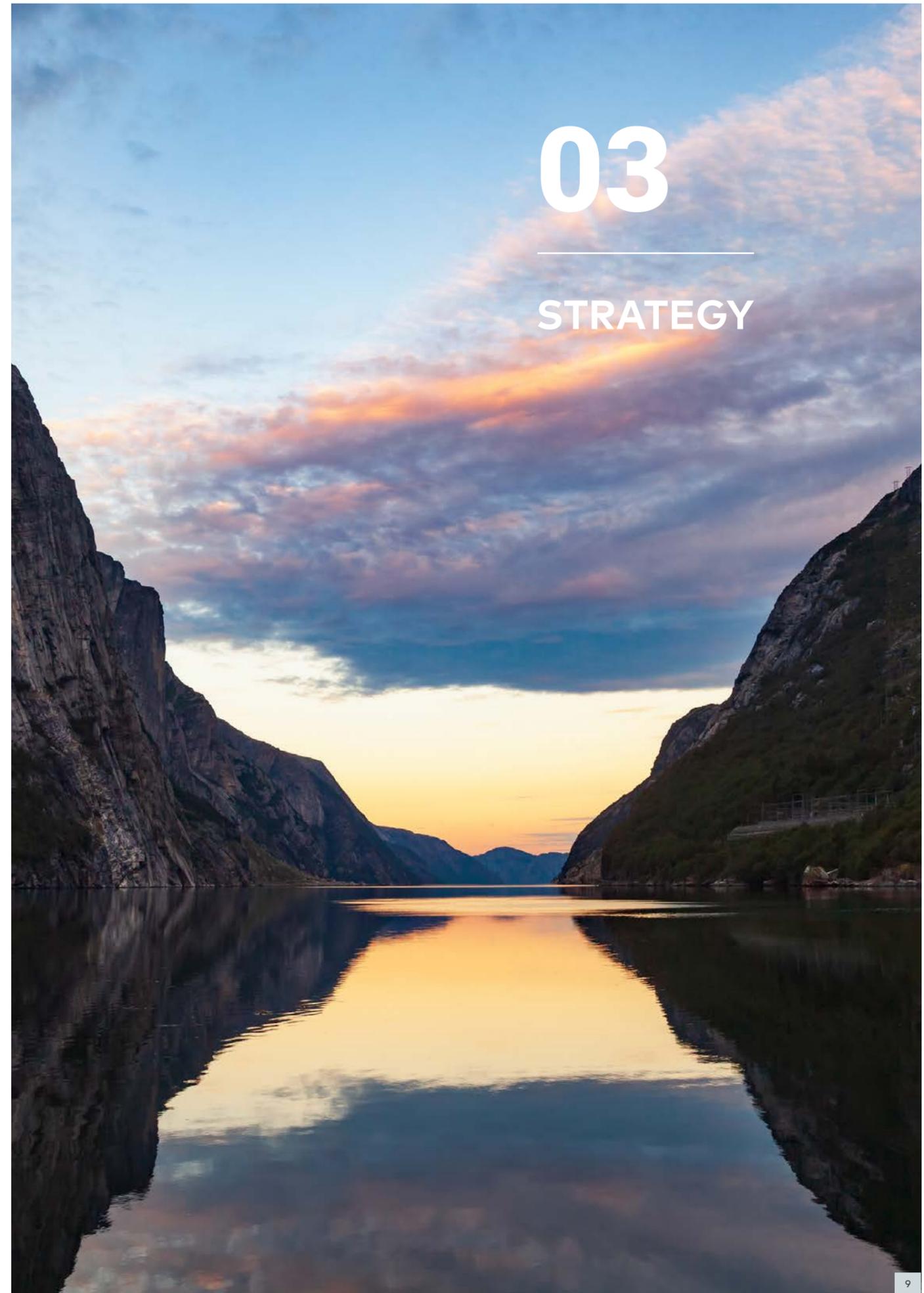
OUR VISION

The NeIC vision is to become a global role model for cross-border sustainable e-infrastructure services.

OUR VALUES

The core values governing all of NeIC activities are:

- The services and development of NeIC will be motivated by providing added value to researchers.
- NeIC will be a reliable partner displaying integrity, transparency, and accountability in all processes.
- NeIC will strive to be open to new ideas and opportunities, and to its outputs in terms of knowledge, tools and services.
- NeIC will strive for continuous improvement in all aspects of its operation.
- NeIC will give priority to stakeholder engagement.



03

STRATEGY 2020+ PLANNING PROCESS**BACKGROUND**

The mission of NeIC is to accelerate development and provisioning of cost-effective, best-in-class e-infrastructure services beyond national capabilities. The initial strategy for NeIC to fulfill this mission was put in place in 2013 and concentrated on HPC collaboration, Nordic opportunities in Horizon 2020 and how to influence Nordic participation, as well as the wide expectations of the users. This strategy was updated in 2015 and has four main focus areas for the 2016-2020 time period:

- to share resources
- to pool competencies
- to strengthen stakeholder dialogue
- to secure long-term funding.

The corresponding implementation plan has been updated on a yearly basis to reflect the accomplishments of the previous year and the plans and expectations for the remaining years in the 2016-2020 strategy.

UPDATE ON THE 2020+ PLANNING PROCESS

In 2017, a new process started that is to include a strategic plan for 2020-2025, the associated implementation plan and an impact analysis plan as a third component. The timeline that was established for the process is:

- 2017 - inform the relevant stakeholders
- 2018 - gather and evaluate input, and formulate the updated plan
- 2019 - approval and initiation of the updated strategic plan, including the implementation plan and impact analysis plan
- 2020 - fully updated strategy in place

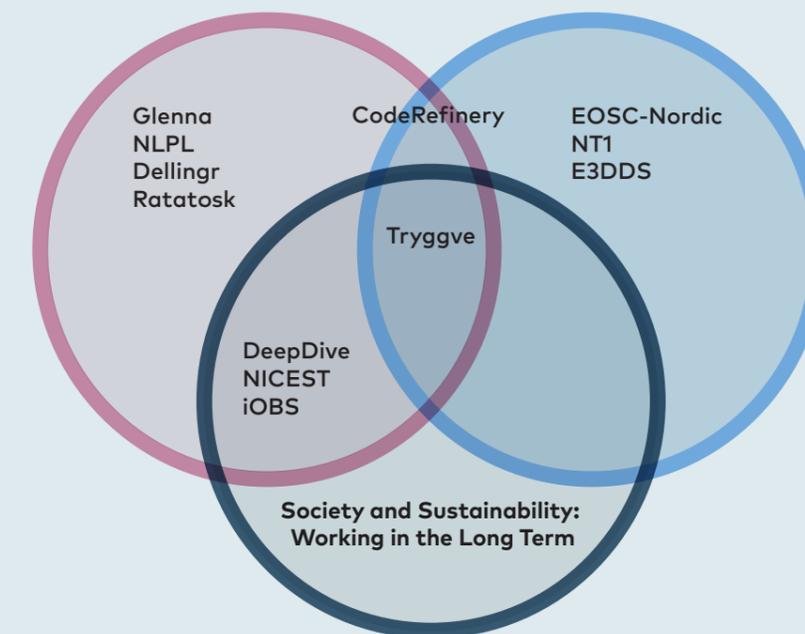
The first year, 2017, informed the NeIC stakeholders and culminated with an extended strategy session by the NeIC board in December 2017 to explore and consider a range of topics for further consideration in 2018. The major points of the discussions were communicated at the NeIC AHM2018 meeting to the NeIC staff to keep them informed on the progress and thoughts about the possible future directions for NeIC.

An open invitation to the Nordic research communities for Letters of Interest for Collaboration and for Requests for Information was issued in the spring of 2018 to gather information for intermediate and long term directions for NeIC and the responses are available⁴. A benefit of this effort that was not originally planned for was realized in the preparation of the EOSC-Nordic proposal.

In order to carry out the impacts analysis work, Johanna Törnroos (CSC, Finland), joined NeIC in mid-2018. The initial plan for monitoring, analysing and reporting outputs, outcomes and impacts of NeIC was formulated in 2018 and will be finalised in 2019.

As a result of the preparation work in 2018, the NeIC board approved an approach that combines three scenarios that NeIC will address as part of the next strategy:

- Deep
- Society, Ethics and Sustainability
- Wide

DEEP: LOCAL**DEEP: INTERNATIONAL**

The current descriptions for the three components are:

- Deep (Local/Nordic): NeIC is a Nordic organisation that places the highest priority on working with the national e-infrastructure providers and integrating with their goals and directions, while providing Nordic input and added value to them in return. There will be a continued emphasis on projects that pool, share and integrate efforts within the region.
- Society, Ethics and Sustainability: As a second priority, NeIC will focus on the long-term benefits to society from involvement in the different projects. The aim would be to have a positive effect on society and to have a stronger focus on open science, open data and equitable access.
- Wide (Global): As the third component, NeIC will actively work to project influence and capabilities of the Nordic region to Europe and globally. As part of this, it will include comparably scaled international projects.

2018 STRATEGY IMPLEMENTATION

Below you will find an overview of our strategy implementation in 2018 for each of our four focus areas. The milestones are separated into indicators (executed tasks) and effects (the impact resulting from these tasks).

POOL COMPETENCIES

The major points for the Pool Competencies Focus area are:

- Map skills, identify and prioritise needs
- Coordinate and support NeIC and cross-border training programmes
- Make NeIC more attractive to competent personnel
- Data management

The 2018 indicators and effects from the Pool Competencies area are provided below.

Indicators:

- NeIC employer survey conducted
- NeIC staff survey conducted
- Report ‘State of Open Science in the Nordics’³ published
- Co-organised with Swedish Research Council and NordForsk workshop on Good Data Management in the Nordic Countries, Stockholm, 3rd October 2018⁶
- FAIR Awareness day held in Stockholm, 14th November 2018⁷
- Nine three-day workshops with around 300 participants in 2018 within CodeRefinery
- Ratatosk workshops on Nordic HPC & Applications (Reykjavik), Digital Humanities (Copenhagen), and Software Carpentry using Course Mobility grants
- Five travel grants awarded through the Ratatosk project.

Effects:

- 300 PhDs and postdocs have been trained in software development tools
- 130 participants have been trained in essential basic computing skills
- 36 participants were introduced to how the FAIR principles promote Open Science
- two more Carpentries trainers have been certified in the Nordic region.

SHARE RESOURCES

The Share Resources Focus areas are to:

- create a framework agreement
- establish enabling processes and technologies
- add new services

The 2018 indicators and effects of the Share Resources area provided below.

Indicators:

- Cross-border resource sharing allocations mechanism in place through the Dellingr project
- Collaboration on resource sharing between the Dellingr, Glenna2 and Tryggve2 projects
- Glenna2 collaboration with Nordic Met Offices strengthened through the establishment of the new iOBS project
- Pioneering work on interoperable distributed data archive for human data (so-called Local EGA) acknowledged by ELIXIR.

Effects:

- Our first list of accessible NeIC services indicate roughly ten new services launched in 2018.

SECURE LONG-TERM FUNDING

The Secure Long-Term Funding focus areas are to:

- secure long-term funding from remaining principal partners
- mapping of other partner funding
- strengthen capacity to secure long-term funding
- develop 2020+ strategy

The 2018 indicators and effects of the Secure Long-Term Funding area are provided below.

Indicators:

- Funding commitment from the Swedish Research Council for 2018-2022 was received in 2018
- A funding application was submitted to the Academy of Finland
- The EOSC-Nordic proposal was submitted for the INFRAEOSC-5b call
- Icelandic dialogue meeting included discussions on the planned Icelandic e-infrastructure roadmap.

Effects:

- The funding ratio of 1:1:1 remains in place between NordForsk (20 MNOK for 2018), fees from national providers and project partners for NeIC core activities
- The E3DDS project was initiated
- A new project, iOBS, was initiated with additional funding from NordForsk
- Johanna Törnroos joined the NeIC executive team to work on long-term funding and impacts analysis
- Lene Krøl Andersen joined the NeIC executive team and coordinated the EOSC-Nordic proposal
- The strategy 2020+ process was presented at the NeIC AHM2018 meeting.

STRENGTHEN STAKEHOLDER DIALOGUE

The Strengthen Stakeholder Dialogue Focus areas are to:

- monitor stakeholders and partnerships
- engage with prospective partners
- engage with international stakeholders
- create and implement a communication plan that supports the vision

The 2018 indicators and effects of the Strengthen Stakeholder Dialogue area are provided below.

Indicators:

- Two open calls were launched: ‘Letters of Interest for Collaboration’ and ‘Request for Information’ and received a total of 15 responses. Of these, 6 were responses to the RfI, and 9 were to the LoI
- NeIC is on the research infrastructure roadmap of the Estonian Research Council.

Effects:

- Engagement with NordNWP (Nordic Met Offices) resulted in a new project on Improved Observation Usage in Numerical Weather Prediction (iOBS).
- NeIC was asked to coordinate a proposal to the EC on the Nordic Open Science Cloud, EOSC-Nordic
- NeIC published its first annual report and the (above-mentioned) report on Open Science in the Nordic countries.
- NeIC was invited to the European Plan-E meeting and was asked to present our collaboration model for a South-East Asian collaboration initiative.



04

PROJECT
UPDATES

04

CODE REFINERY

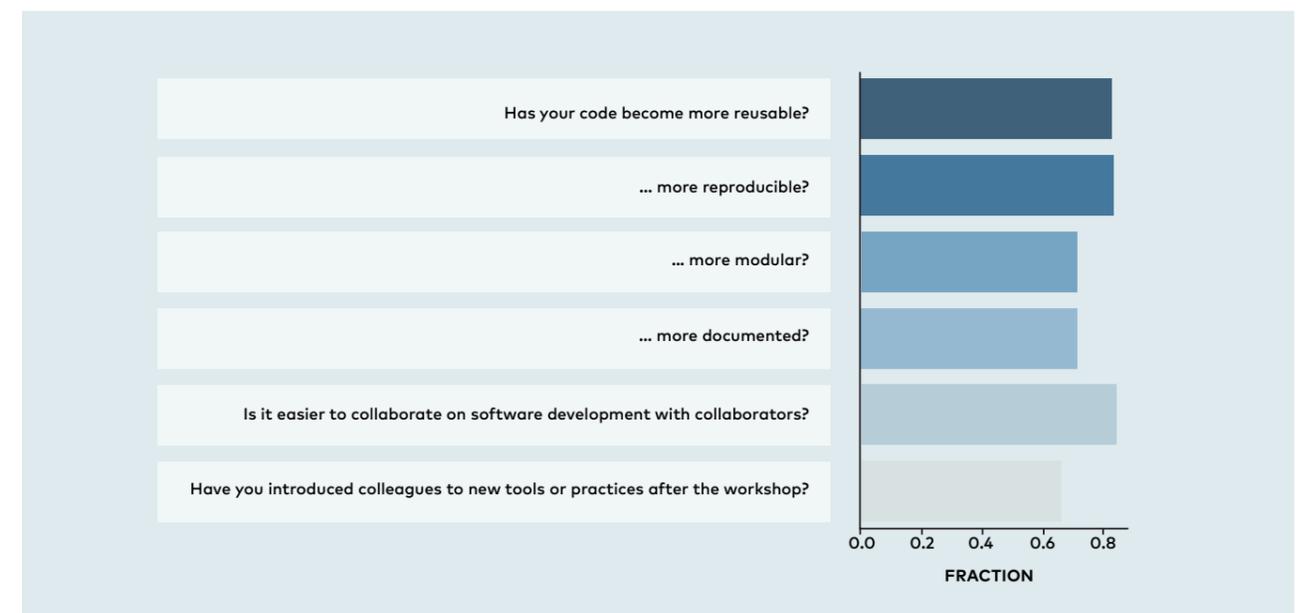
The goal of the CodeRefinery project⁸ is to teach students and researchers how to write better code and provide research groups with software development e-infrastructure tools to collaboratively develop, review, discuss, test, and share their code. The training addresses students and researchers who already write code within all academic disciplines. The project also provides infrastructure for collaborative source code repository hosting⁹. In October 2018, the project entered phase 2 which will run until the autumn of 2021. Phase 2 of the CodeRefinery project has had a shift toward four new goals:

- to build a community of research software engineers
- to establish sustainability of the project, workshops, and services, beyond phase 2 of the project
- to better include social sciences and humanities and include data management into the lesson material
- to increase openness and transparency with an open chat¹⁰ and public progress tracking¹¹.

STATUS REPORT 2018

Indicators: A significant result of the project is the lesson material created (<https://github.com/coderefinery/>), which is open, reusable, and continuously improved upon. Based on this lesson material, CodeRefinery held nine 3-day long workshops during 2018 across the Nordic region for about 300 participants. In addition, Code Refinery was presented at the CarpentryCon 2018¹² (May 30 - June 1, 2018 in Dublin) and WSSSPE 6.1¹³ (October 29 in Amsterdam).

As of November 2018, NeIC is a Platinum Partner to The Carpentries¹⁴, an international, successful project that comprises Software Carpentry and Data Carpentry, communities of instructors, trainers, maintainers, helpers, and supporters who share a mission to teach foundational computational and data science skills to researchers. With this partnership, CodeRefinery aims at catalyzing more Carpentries workshops and a growing community of Carpentries instructors in the Nordics.



Effects: Until these workshops become part of university curriculum, students and researchers who write software to produce or analyze data are in critical need of CodeRefinery's training portfolio on software management. Currently, only NeIC has the scale, network, and expertise to fill this need in the Nordics. CodeRefinery has been able to match this need of the research community exceptionally well as shown by almost always fully booked workshops and the resulting surveys (see overview of survey results here¹³). About 300 students and researchers attended the workshops in 2018. A large share of the participants who received the workshop training will integrate learning outcomes in the work of their research groups and thereby amplify the result as shown by survey results represented in the above figure.

In 2018, the GitLab source code hosting platform <https://source.coderefinery.org> grew to 150 users, over 300 projects, and 41 groups.

DEEPDIVE

The vision for the Nordic-Baltic Collaboration on e-infrastructures for Biodiversity Informatics (DeepDive) is to develop a distributed, user-driven and service-oriented regional e-infrastructure, where the individual countries host their national e-infrastructure components and data, but collaborate to provide consistent regional services, tools, virtual laboratories and education. The aim is to enhance the Nordic-Baltic collaboration within biodiversity informatics to coordinate common efforts, reduce redundant investments and efforts and increase the regional scientific achievements and global competitiveness. This will in turn provide educational support for e-Science and strengthen the Nordic-Baltic science policy interface.

STATUS REPORT 2018

Indicators: Direct outcomes of the DeepDive activities included three workshops with overall 54 participants. The training program provides half-day modules, which are afterwards packaged as e-material and promoted online through a support center.

The current phase of DeepDive is coming to an end by the end of 2019. To facilitate sustainability, one of the DeepDive cases was included in a H2020 proposal (INFRAEOSC 5b), and the Nordic collaboration is also included in two national funding proposals in Norway and Sweden.

DeepDive is currently in the process of applying for an observer status in the LifeWatch ERIC. If successful, this will allow Nordic countries to have a stronger say in the development of European e-infrastructure.

Effects: DeepDive supports use cases in the fields of Machine Learning, Virtual Research Environments (VRE), Linked Open Data and Atlas Technology. In addition, three system development projects were initiated in 2018 and will lead to common operations with the Atlas of Living Australia Technology (ALA), a cloud-based VRE, and a Linked Open Data System for species concepts (LOD) among the Nordic countries.

In 2018, the DeepDive project reached the maturity of a firm network of major Nordic biodiversity data providers (including Estonia) with stable work routines for communication, co-development, and documentation, as well as a culture of trust. A support center was established, which has processed 16 issues, including consultations, data queries, ICT-support, and training requests.

DELLINGR

The approach of the Dellinger project is to work with national e-infrastructure providers to define a functional framework for High Performance Computing resource sharing. The framework recognises and builds upon the unique strengths of each provider to advance research in each of the respective countries as well as within the Nordic region. The Dellinger project is working to create the appropriate mechanisms for researchers to cross national boundaries for access to the full range of computing environments, and for national e-infrastructure providers to share competencies and capabilities. This should help national researchers to have access to the newest systems in other countries, as they come online in the future.

STATUS REPORT 2018

Indicators: A document was created covering the possibilities and issues related to sharing High Performance Computing resources within the participating countries in the Dellinger project. The document describes the expected benefits of exchanging resources, gives examples of proposed resource exchange models, describes the considerations for the cross-border resource accounting, and contains a description of the approaches taken to compare resources committed to the common pool and the expected functionality of a one-stop-shop. The purpose

of this document is to describe a model for exchanging HPC resources across the Nordic region.

Effects: The first Dellinger pilot was successfully implemented and came to an end in June 2018. Through this resource sharing pilot, researchers within the participating countries could apply for a limited amount of computing. During the pilot phase, the pilot received 23 applications, and supported 20 of these. Overall, the pilot served these 20 users with 2.4M core hours granted over a time period of 9 months. There were five publications that credit the Dellinger pilot for usage of computing resources.

EISCAT_3D DATA SUPPORT (E3DDS)

EISCAT_3D¹⁶ is an environmental research infrastructure on the European ESFRI roadmap. It is proposed as an international research infrastructure using the incoherent scatter technique to study the upper atmosphere above the Arctic in order to investigate how the Earth's atmosphere is coupled to space. The E3DDS project will design, simulate and prototype the data flow and computing workflow from the antenna arrays of the upcoming EISCAT_3D radar sites to the central storage and computing site. The project will produce a set of requirements for the amount and type of resources needed for the EISCAT_3D site and online computing. In addition, E3DDS explores the possibilities for EISCAT_3D computing to be handled by national providers of e-infrastructure through collaboration such as NT1.

STATUS REPORT 2018

Indicators: E3DS, which was the predecessor to E3DDS, ended in January 2018, giving the E3DDS a foundation of experience, community building and know-how on how to consult EISCAT further in how to set up its research infrastructure.

Effects: The E3DDS project kicked off in May 2018, and the project has since then conducted several activities with the aim of consulting EISCAT on on-site computing software and hardware architectures for EISCAT_3D. These consultations have been based on iterative discussions between the EISCAT_3D software engineers and scientists and national provider deployment experts. During this work, E3DDS discovered important issues regarding the configuration of the online computing and the wide-area network connections.

E3DDS has supported EISCAT with on-site data processing formulation. The online software has been tested on National Provider hardware and NT1 partner hardware (Slovenia). Through NeIC NT1, testing time has been obtained for EISCAT_3D on an IBM GPU cluster in the US. The simulation of the site and online computing and data flow provide a practical view and experience of the software and hardware requirements. The simulations, additionally, give a clearer view of the effort required for the production of EISCAT_3D online computing. This will aid in the work to provide pricing levels for effort required for the EISCAT_3D online e-infrastructure.

GLENNA

The aim of Glenna is to create a Nordic federated cloud service, driven by the needs of Nordic researchers. Glenna²¹⁷ builds on the work and successes of the initial Glenna project (2014-2016), and focuses on supporting Nordic national cloud initiatives to sustain affordable IaaS cloud resources, establishing an internationally leading collaboration on data intensive computing and assessing future hybrid cloud technology. The project additionally aims at pooling national cloud application expert support, in order to establish a Nordic support channel for cloud and big data. An immediate benefit of Glenna2 is that the project provides an environment that allows "rapid time to market" for scientific software and a flexible set of resources for both developing and delivering software as service.

STATUS REPORT 2018

Indicators: The Glenna team is supporting the DeepDive project in establishing a Nordic platform, which will include machine learning capabilities and the H2020 funded PhenoMeNal¹⁸ initiative. Glenna is here providing an interface for Nordic users to execute PhenoMeNal workflows on the Glenna infrastructure in addition to the commercial options available.

Effects: There are several benefits generated by Glenna's work to combine skills and competencies in the field of cloud development. This is primarily through joint development of technologies, e.g. tools for OpenStack, coordination of OpenStack upgrades and security issues, the Kubenow framework, Kubernetes appstore infrastructure and app-provisioning. In 2018, the Glenna team succeeded in cloudifying Harmonie Arome numerical weather prediction (NWP) code on the Azure cloud. In addition, Glenna conducted a successful test-case on

cross border federated access to OpenShift (Kubernetes) resources using UNINETT's Dataporten and Elixir AAI for authenticating users from both identity brokers on Rahti (the Finnish container cloud environment). UNINETT AppStore went live with significant contributions from Glenna2, in particular, it demonstrated capability for an "app store" Kubernetes environment.

iOBS

The project, Improved Observation Usage in Numerical Weather Prediction, or iOBS, will accommodate an increasing amount and diversity of observation data, and provide a system of harmonised data pooling and merging. Observations from the "Internet of Things" (IoT), such as intelligent cars, phones, buildings and personal weather stations (PWS), including commodity weather sensors, provide detailed information on local to hyper-local meteorological phenomena. The aim of iOBS is the effective assimilation of diverse observations in regional high-resolution NWP models for the delivery

of reliable and accurate weather forecasts and warnings for the benefit of operations, business and society.

STATUS REPORT 2018

Indicators: The iOBS project was initiated towards the end of 2018 as a joint collaboration between meteorological offices in Finland, Sweden and Norway, as well as CSC (Finland). NeIC has great expectations of what will come out of this new Nordic collaboration.

NICEST

The Nordic Infrastructure Collaboration on Earth System Tools (NICEST) strengthens the Nordic Earth System Modelling (ESM) community by efficiently using various e-infrastructures through competence building, as well as sharing and exchanging knowledge. The desired results are increased efficiency of ESM teams, and open doors for future scientific and technical collaborations.

STATUS REPORT 2018

Indicators: NICEST has organised/supported several workshops namely NICEST ESGF workshop, Linköping¹⁹, ESMValTool training at CMIP workshop, Bergen²⁰, ESMValTool session in EC-EARTH meeting, Lisbon²¹, ESMValTool workshop, FinESM meeting, Helsinki²².

It has also published several useful materials, e.g., ESGF node admin manual²³, Documentation & best practice guides²⁴, Report on existing knowledge in data quality control²⁵, Competence requirements and gap analysis²⁶, ESM training calendar²⁷ etc. Lastly, NICEST has formed a Nordic ESGF data node admin team.

Effects: NICEST has mapped the existing knowledge and the gaps in that knowledge within the Nordic region. Based on this mapping, several workshops were arranged. NICEST workshops have imparted hands-on training to Nordic partners and have benefited the Nordic ESC scientists. The training has been carried out by Nordic experts. The NICEST workshop was also highly appreciated at the international EC-EARTH meeting in Lisbon.

The Nordic ESGF admin team created through NICEST is running a very effective collaboration among the Nordic centres. A typical collaboration example is where an expert from one centre is helping another centre to set up a ESGF node.

Lastly, the NICEST calendar and document collection is helping researchers gain access to updated information and new expertise.

NORDIC LANGUAGE PROCESSING LABORATORY (NLPL)

Natural Language Processing (NLP) is the interdisciplinary branch of Computer Science and Linguistics that enables everyday technologies and services, for example, automated translation (e.g. Google or Bing Translate), human-machine interaction in spoken language (e.g. Apple's Siri or Microsoft's Cortana), or content recommendation and contextual advertisement (e.g. on online news sites). As such, language-enabled technologies are rapidly growing in societal and commercial relevance. The aim of NLPL is to implement a Nordic virtual laboratory for Natural Language Processing. The virtual laboratory will create new ways to enable data- and compute-intensive research in Natural Language Processing

by sharing a uniform software and data stack in multiple Nordic HPC centres.

STATUS REPORT 2018

Indicators: NLPL arranged a Winter School in January 2018 with 25 participants, including instructors from the internationally renowned Lisbon Machine Learning Summer School (LxMLS).

The project established an associate program, opening the resources up for other NLP groups outside of the project. Computational Linguistics groups in the Nordic region, who are not project members are invited to use NLPL resources (compute time, software and data collections). Interest has been shown by two groups in Sweden and Estonia at this point of the project.

Effects: NLPL has contributed to the Dellinger project by providing experience on sharing computing resources across borders, with two systems available for NLPL users (Abel, UiO/Sigma2) and Taito (CSC). The external NLPL web services, like the Open Source Parallel Corpus ([OPUS](#)) and the word vector repository ([NLPL Word Embeddings](#)) experience increasing use.

NORDIC TIER-1 (NT1)

The Nordic Tier-1 (NT1) is one of the 13 Tier-1 regional computing centres of the Worldwide Large Hadron Collider (LHC) Computing Grid – the large international e-infrastructure built to provide computing and storage for CERN (The European Organisation for Nuclear Research). The NT1 computing centre is unique in being distributed across four countries: Denmark, Finland, Norway and Sweden. The purpose is to coordinate and run a common Nordic Tier-1 site, with funding provided both from national sources (for computing and storage resources) and from NeIC (for the infrastructure in the form of people, network and software needed to support a coherent service). The Nordic Tier-1 activity is an operating production service, which focuses, in addition, on continually improving the software and services important to the user communities served.

STATUS REPORT 2018

Indicators: In 2018, NT1 switched to internal 24/7 service provision, and this is now a well-working system. This means that from now on, NT1 is itself fully in charge of the service provision on a 24 hour basis, 7 days a week.



Previously diminished service provision outside of office working hours was handled by an external organisation.

During NeIC AHM18, NT1 organised an internal meeting where activity improvements were discussed and prioritized. The focus of the meeting was streamlining operations while also handling GDPR demands. Further NT1 AHM meetings together with the site administrators of the 6 linked sites were held on April 24th to 25th, 2018 in Copenhagen, as well as in Umeå on November 6th, 2018²⁸.

Altogether 15 presentations on NT1 were held during 2018 and 25 events were attended by NT1 staff. The most prominent ones were during ISGC'18²⁹, at the 12th international dCache workshop³⁰ (on Endit³¹, as well as on dCache and Rucio³²) and a set of talks to the 4th Asia Tier Center Forum in Bangkok³³ (on Coordinating distributed resources³⁴, Distributed storage operations³⁵ and Computing with distributed storage³⁶) to present the NT1 solution as a global role model. NT1 also was represented at the Annual ALICE workshop³⁷, at CHEP 2018³⁸, at the ATLAS Software & Computing week³⁹, and gave an NDGF site report at HEPiX fall 2018⁴⁰.

Effects: The NT1 stood for about 10% of total WLCG computing time for the ALICE and ATLAS experiments and thereby enabled 145 papers by ALICE and 408 by ATLAS. The NT1 acts as an inspiration to other WLCG sites and is a confirmed role model for a future Asian Tier-1 and Tier-2 joint distributed site. The future Asian Tier-1 will likely outscale any other Tier-1. Skills and competence exchange through regular AHM meetings between NeIC staff and local site administrators and an active presence at international conferences ensure that the NT1 stays a sustainable success model for an international high-profile infrastructure.

The Nordic born ARC middleware will help replace all competing CREAM-CE instances, around 370 in total, by the latest in early 2020. The transition started in 2018. During 2018, the Nordic Tier-1 still had the second largest ATLASDATADISK among Tier-1 sites. High-availability routines introduced at the end of 2016 have further matured, meaning that for regular Linux security updates or dCache upgrades, no downtimes have to be scheduled while no restrictions for the perceived user experience apply. Recent 1 Gbyte/s restore rates from tape show that the NT1 continues to be at the forefront of used technologies and will be well suited for future tape carousels.

RATATOSK

The aim of the Ratatosk programme is to raise competence, and to help the e-infrastructure community do more effective and productive work. The benefits include more efficient operations and use of resources, as well as an improved capability for researchers when conducting research. Ratatosk coordinates a Nordic mobility enhancement programme with the aim of increasing the opportunities for trainees in two ways. First, the mobility travel grants enable trainees to attend Nordic training courses which are not available locally. Second, mobility is encouraged for training courses to bring the training closer to the trainees.

STATUS REPORT 2018

Indicators: During 2018, Ratatosk hosted three workshops in the Nordic region. The Nordic High Performance Computing & Applications Workshop in Iceland was a three-day long event featuring HPC experts and domain scientists from Iceland, the U.S. and Germany. During the workshop, participants discussed topics ranging from project experiences to technology tutorials. Two workshops on Digital Humanities were held in Denmark. Course Mobility Grants were approved for 5 workshops to take place in the Nordics on Software Carpentry Trainings. Four of these were held during 2018.

Phase one of the Digital Humanities project was completed in 2018, which was a project focused on stimulating the uptake of research within Digital Humanities by ensuring easy access to well planned and well documented course material. The objective of phase one was to identify research areas and existing competences within Digital Humanities and thus identify relevant areas for competence development. A Nordic survey was sent out to relevant faculties in Finland, Norway, Sweden and Denmark, and a report was written summarising the findings.

Effects: Two additional trainers were certified by the Carpentries in the Nordic region. Ratatosk awarded five travel grants through its mobility programme enabling people to move around in the Nordics to acquire new skills and expertise. Four Ratatosk supported Software Carpentry workshops were carried out with 108 participants receiving training.

TRYGGVE

The Tryggve project is offering a Nordic platform for collaboration on sensitive data by utilising and connecting existing capabilities and services in the Nordic countries. The project is funded by NeIC and the ELIXIR nodes in Denmark, Finland, Norway and Sweden. Tryggve develops state-of-the-art scalable infrastructure for safe, efficient, ethical, and legal storage, analysis and sharing of sensitive personal data for biomedical research between countries. The aim is for the Tryggve project to enable research involving sensitive data to be performed in secure settings and thus facilitating Nordic collaboration in biomedical research. The work is conducted in close collaboration with the user communities and Nordic e-infrastructure providers. Tryggve operates a use case programme for supporting the use of the secure e-infrastructure. The user requirements coming out of the use cases feed into the development work. Use cases receive support⁴¹ from Tryggve in accessing and moving research data, meeting legal and ethical requirements, accessing secure data analysis platforms, sharing data with colleagues, installing software and accessing data archives.

STATUS REPORT 2018

Indicators: The Tryggve team supports Nordic research in the area of ethical, legal and social issues and in this respect published a news article⁴² advising and answering common questions related to GDPR and sensitive data. In 2018, Tryggve also participated in two European GDPR workshops organised by ELIXIR (presentation⁴³).

The Tryggve project presented at several conferences during 2018, including a presentation at the EUDAT Conference in January⁴⁴, active participation (including a poster⁴⁵ and two flash talks) at the ELIXIR all-hands meeting in Berlin, a joint presentation at the ECCB 2018 conference⁴⁶ with use case researchers, and lastly a presentation at the NorPEN meeting⁴⁷, Oslo. Tryggve's main annual event Tryggve all-hands⁴⁸ was organised November 20th - 21st in Copenhagen with 42 participants.

Effects: In 2018, Tryggve facilitated scientific research in the Nordic countries through direct support of nine use

cases (with four additional use cases in preparation phase). Use cases aim to solve real-life issues in data management and/or to provide state-of-the-art research environments for sensitive research data. Examples of use cases supported in 2018 include:

- Gene environment interaction for schizophrenia, PI Prof. Patrick Sullivan, Karolinska Institutet
- I-SCAN, Scandinavian cancer in IBD study, PI Lise Helsingen, Institute of Health and Society, University of Oslo
- PhenoMeNal project, Dr. Ola Spjuth, University of Uppsala
- Nordic Twin Cancer study consortium, PI Prof. Jaakko Kaprio, University of Helsinki.

Tryggve developed capabilities for portable software installations by container technologies, and improved the containers suitability for secure environments by reducing their access to the underlying infrastructure. This work builds towards a Nordic federated setup in which users will be able to work with a set of interoperable secure environments within the Nordic countries. This resulted in a peer review publication⁴⁹ at the IEEE Big Data conference.

The sensitive data archiving team developed software components needed for establishing repositories for sensitive data. These include data submission, data access and storage solutions. This work is aiming to produce technology that is connected to the European Genome-phenome Archive (EGA) infrastructure as federated nodes. The work is carried out in close collaboration with other ELIXIR partners. As an important milestone, the Tryggve team made a public demonstration of Local EGA core functionality, which was later made available through a youtube video⁵⁰. A report on the activity⁵¹ gives a good overview of the results.

Tryggve supported several applicants to the NordForsk call within the Nordic Programme on Health and Welfare on Innovations in Personalised Medicine with their e-infrastructure needs related to sensitive data.

05

EVENTS AND
WORKSHOPS

05

ALL HANDS MEETING 2018

January 28th to February 1st, NeIC organized its annual All Hands Meeting (AHM). NeIC staff gathered at Skeikampen, Norway, for four days to collaborate within and across NeIC's ten projects. The event brought together 69 NeIC staff from the Nordic countries. The keynote speaker was the WLCG Security Manager from CERN, Romain Wartel, who gave an overview of the current computer security landscape. Wartel described the main vectors of intrusions, and revealed inner mechanisms of the underground economy to expose how our resources are exploited by organised crime groups.

The participants had several opportunities for cross-team sharing of ideas, expertise and experiences in workshops, tutorials and hands-on sessions throughout the event. One result of the discussions during AHM18 was the establishment of a Nordic Research Software Engineers (RSE) Initiative. The initiative will work to raise awareness of the importance of the role of the RSEs for research and to bring the RSE community together across the Nordic countries by organising conferences, workshops and online forums. See more information in this blogpost⁵² written by one of the founders or at <http://nordic-rse.org/join>.

FAIR AWARENESS DAY

FAIR Data is data that is Findable, Accessible, Interoperable and Reusable by computers. New requirements from national and international funders are driving the need for training of competent, professional data stewards and data managers with knowledge of the FAIR principles and their application. This drives FAIR Data Stewardship as a new profession, and is rapidly gaining momentum throughout the Nordic states and Europe. Dedicated to this, NeIC organised a full day seminar⁵³ to provide an introduction to what the FAIRification of

(research) data entails, how it promotes Open Science (open by default, closed as necessary) and why this is part of good practice in Data Stewardship. The seminar was given by Albert Mons and Erik Schultes (GO-FAIR⁵⁴) and was attended by 36 participants.

TOPICAL WORKSHOPS**RATATOSK WORKSHOPS**

- Iceland, The Nordic High Performance Computing & Applications Workshop, June 13-15, 2018⁵⁵
- Course Mobility Grants were approved for 5 workshops to take place in the Nordics on Software Carpentry Trainings. Four of these were held during 2018 (25 participants in Gothenburg, June 11-12⁵⁶; 39 participants in Umeå, Oct 9-10⁵⁷; 16 participants in Uppsala, October 11-12⁵⁸; 28 participants in Tromsø, November 8-9⁵⁹).
- Two workshops were held within Digital Humanities: The first May 8-9 in Middelfart, the second on November 15-16 in Kastrup/Copenhagen.

CODEREFINERY WORKSHOPS

During 2018, CodeRefinery held these workshops across the Nordics to teach students and researchers how to write better code and provide research groups with software development e-infrastructure tools:

- Espoo, December 11-13, 2018
- Uppsala, December 3-5, 2018
- Kiruna, November 21-23, 2018
- Reykjavik, August 21-23, 2018
- Oslo, June 12-14, 2018
- Espoo, May 29-31, 2018
- Lund, May 15-17, 2018
- Turku, March 20-22, 2018
- Trondheim, February 27 - March 1, 2018

06

SOCIAL
RESPONSIBILITY

06

OPENNESS AND TRANSPARENCY

One of NeIC's key tasks is to remove friction from distributed work and cross-border collaborations. We do so in many different ways. One of them is by striving to be as open and transparent as possible. This means that most information produced by NeIC is freely available on the NeIC wiki⁶⁰. Here you can find minutes from project team meetings, steering group meetings, reference group meetings, board meetings and provider forum meetings. You can also continually stay updated on project progress, achieved milestones or read NeIC policy documents, annual accounts and self-assessment reports. The NeIC policy is to openly share as much information as possible. However, examples of items unsuitable for public disclosure can, for example, be management of personnel issues, preliminary budget figures, or early details of potential new projects.

EQUALITY AND DIVERSITY

Utilizing a wide range of experiences and perspectives is of great value to NeIC. The NeIC HR Policy states that it believes in equal opportunity in employment practices without discrimination on the grounds of race, religious beliefs, colour, gender, sexual orientation, disability, place of origin, age, marital status, or family status. NeIC promotes equality, equal terms and diversity and strives for gender-balanced compositions amongst our staff. NeIC also encourages diversity in skills, background and gender in our governance structure, including the composition of advisory groups, steering groups, and board.

NeIC implemented a new policy in 2018 to annually collect and publish statistics showing the gender ratio within NeIC projects, project leadership, project steering and additional advisory or reference groups. You can find an overview over NeIC gender statistics here:

GENDER BALANCE STATISTICS

	♀ count	of	% of ♀
Functions including board, working groups, steering groups, programme committee and reference groups	31	117	26,5%
NeIC project staff (including Executive Team)	23	158 ⁶¹	15,6%

STAFF

Overall staff number: 149 as of June 14th, 2018.

- Head count of females out of total: 23 as of June 14th, 2018, ⇒ 15,4% of NeIC staff is female.
- FTE-weighted females out of total: 17,20%
 - FTE-weighted count per country of home institution/residence:
 - DK: 21% FTEw
 - FI: 6% FTEw
 - IS: 14% FTEw
 - NO: 8% FTEw
 - SE: 13% FTEw
 - (other): 0% FTEw

In addition to the gender statistics, NeIC also set up an annual staff survey to collect information about wellbeing and motivation among its staff. The survey results will be used to learn about and how NeIC can continually improve as an organisation in order to be attractive to competent staff.

ENVIRONMENTAL SUSTAINABILITY

NeIC is an organisation distributed across various locations within the five Nordic countries. Several considerations are connected to this way of working that are not relevant for the more traditional face-to-face type project teams. Perhaps most important is the need for good communication and collaboration within the regional teams. We, therefore, put much emphasis on regular meetings at all levels of the organisation. We have invested in environmentally friendly technological communication tools to increase the quantity and quality of NeIC collaboration without causing harm to the environment. In 2018, NeIC management participated in more than 450 video meetings in order to reduce travel (the same number as in 2017). In addition to this, NeIC internal communication/interactions happen through emails, video conferences and a community chat tool. The NeIC community chat has 225 users (up from 208 users in 2017) that sent a total of 72,500 messages in 2018. By utilising these technological tools, we are reducing our environmental footprint, while still facilitating a collaborative environment.

07

2018 ACCOUNTS



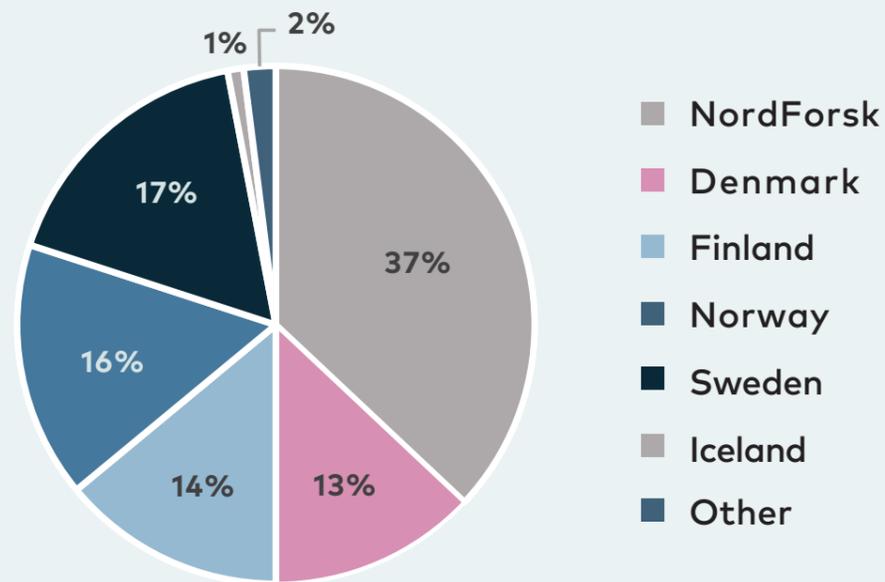
	NeIC (NOK)	Partner (FTE)
NordForsk	20,000,000 kr	2
NordForsk-Other (Open Science)	5,000,000 kr	
DK-DelC/DASTI	3,600,000 kr	0.83
DK-Other		3.61
FI-CSC/AKA	3,600,000 kr	4.41
FI-Other		0.95
NO-Sigma2/RCN	3,600,000 kr	1.07
NO-Other		4.81
SE-SNIC/SRC	3,600,000 kr	1.63
SE-Other		5.35
IS-Rhnet	200,000 kr	0.45
IS-Other		0.08
Other Partners/Unallocated		0.81
Transferred from last year	7,986,411 kr	
Provisions (2012- 2017)	5,751,742 kr	
Total income	53,338,153 kr	26
NeIC Coordination	5,290,208 kr	2
NeIC XT	3,560,649 kr	2
Travel	341,711 kr	
Communication	197,106 kr	
Representation, meetings	20,706 kr	
NeIC board meetings	103,963 kr	
NeIC XT meeting costs	82,628 kr	
Miscellaneous	37,060 kr	
NeIC events	689,521 kr	
Project management training	256,864 kr	
Strategy development	0 kr	
Community engagement		
Operations and Development	39,745,894 kr	24
Nordic Tier-1	13,591,263 kr	5.61
Operations (staff)	8,090,916 kr	5.61
Travel and meeting costs	384,904 kr	
NT1 24/7 service	251,221 kr	
WLCG NORDUnet cost	3,530,887 kr	
ARC4 eInfrastructures	1,333,336 kr	

2018 ACCOUNTS

	NeIC (NOK)	Partner (FTE)
Sensitive Data	11,368,258 kr	8
Tryggve and Tryggve2	10,969,671 kr	8
Travel and meeting costs	398,587 kr	
Use case support, h&w	0 kr	
Prospects	0 kr	0
Federated Cloud	3,434,575 kr	3.58
Glenna and Glenna2	3,354,460 kr	3.58
Travel and meeting costs	80,114 kr	
Prospects	0 kr	
Software	1,103,651 kr	1
CodeRefinery	1,083,128 kr	1
Travel and meeting costs	20,523 kr	
Infrastructure	0 kr	
Prospects	0 kr	
Sharing and Exchange	4,170,614 kr	2.56
Dellingr phase 1 & 2	3,587,705 kr	1.56
Travel and meeting costs, services	96,410 kr	
NLPL use case	328,336 kr	1
NLP travel and meeting costs	158,162 kr	
NordNWP Open Science		
Prospects	0 kr	
Stakeholder Engagement	4,343,284 kr	3.25
E3DS staff	420,776 kr	0.5
Travel and meeting costs	1,718 kr	
NICEST staff	1,175,357 kr	1.87
Travel and meeting costs	63,603 kr	
DeepDive staff	2,593,593 kr	0.88
Travel and meeting costs	56,010 kr	
Provider forum	32,227 kr	
Community engagement		
Pool Competencies	1,734,250 kr	
Training Coordinator	1,249,344 kr	
Training events	467,000 kr	
Working groups	17,906 kr	
NeIC Total	45,036,102 kr	26.00
Transfer to next year	8,302,051 kr	
Provisions from 2018	4,363,469.87 kr	
Funds available after provisions	3,938,581 kr	

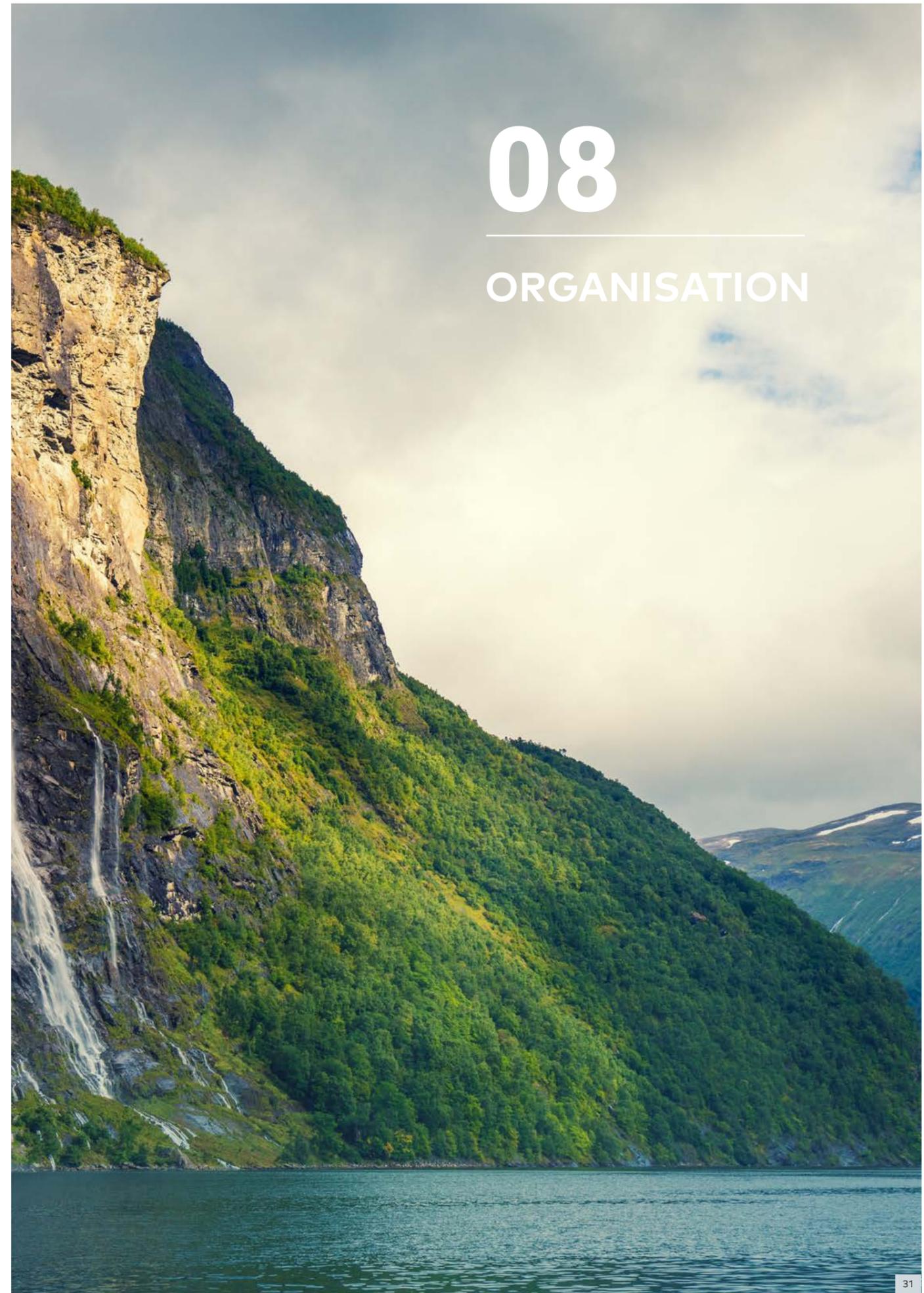
Funding of NeIC activities is provided through national funding agencies, NordForsk and participating project partners. In 2018, national contributions of 16.6 MNOK (13.2 MNOK in 2017) released NordForsk co-funding of 20 MNOK (15 MNOK in 2017) and partner co-funding of 27.6 MNOK (24 MNOK in 2017), which was spent on

activities carried out by national e-infrastructure provider organisations and university partners. In the chart below you can find an overview of the funding of NeIC activities for each country as well as NordForsk. 'Other' include funding from Estonia and from EISCAT.



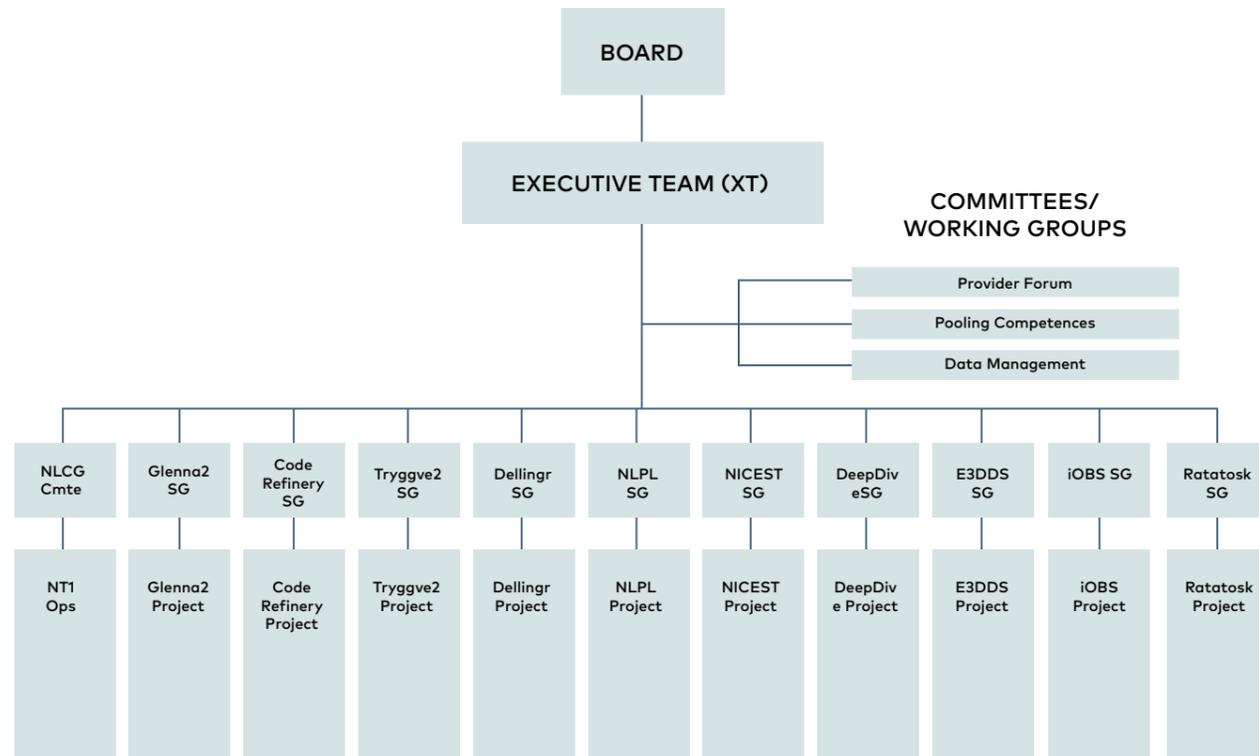
08

ORGANISATION



08

NEIC ORGANISATIONAL CHART



STAFF

NeIC had 151 members of staff as of December 2018 (148 in December 2017).

PARTNERS

On next page you can find an overview of the 42 partners we worked with throughout 2018 (41 in 2017).

Denmark

- Aarhus University
- Danish Meteorological Institute
- Danish e-infrastructure Cooperation (DeiC)
- IT University of Copenhagen
- Statens Særum Institut
- Technical University of Denmark
- University of Copenhagen
- University of Southern Denmark

Finland

- CSC - IT Center for Science Ltd
- Finnish Meteorological Institute
- Finnish Museum of Natural History
- Institute for Molecular Medicine Finland
- University of Helsinki
- University of Turku

Iceland

- Icelandic Institute of Natural History
- RHNet
- University of Iceland

Norway

- Arctic University of Norway
- Met Norway
- Nansen Environmental and Remote Sensing Center
- NordForsk
- Norwegian Institute for Nature Research
- Norwegian University of Science and Technology
- Uni Research Klima
- UNINETT Sigma2
- University of Bergen
- University of Oslo

Sweden

- ArtDatabanken, Swedish University of Agriculture
- Göteborg University
- HPC2N, University of Umeå
- Lund University
- National Bioinformatics Infrastructure Sweden
- National Supercomputing Centre (NSC), University of Linköping
- Royal Institute of Technology (KTH)
- Swedish National Infrastructure for Computing (SNIC)
- Swedish Meteorological and Hydrological Institute
- Uppsala University

Other

- EISCAT
- ETAIS (Estonia)
- National Institute of Polar Research (Japan)
- SixSq (Switzerland)
- Tartu University (Estonia)

Board

The board is the governance body of NeIC and includes the Nordic e-infrastructure provider organizations.
 Chair: Steen Pedersen, DeiC, DK
 Hans Eide, Sigma2, NO
 Hans Karlsson, SNIC, SE
 Jon Ingi Einarsson, RHnet Iceland, IS
 Pekka Lehtovuori, CSC, FI
 Ivar Koppel, ETAIS, EE (observer to the Board)

Executive Team

The executive team is the management body of NeIC and includes project office and strategy implementation.
 Gudmund Høst, NordForsk, NO, Director
 Johanna Törnroos, CSC, FI, Senior Advisor
 Kine Bugge Halvorsen, NordForsk, NO, Administrative Area Coordinator
 Lene Krøl Andersen, DeiC, DK, Executive Manager
 Michaela Barth, KTH, SE, Executive Manager
 Rob Pennington, US, Special Advisor
 Tomasz Malkiewicz, CSC, FI, Executive Manager

ENDNOTES

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61. Total number of staff as of June 14th, 2018 was 149. Some staff members are engaged in several projects and are in these instances counted once per project.



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