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## NEW AREAS AND CURRENTLY FUNDED INFRASTRUCTURES ELIGIBLE TO APPLY IN THE CALL FOR INFRASTRUCTURE OF NATIONAL INTEREST 2023

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## New areas

### **Large-scale infrastructure for experimental ICT system research**

Digital infrastructure and modern communications technology are important building blocks for the digital transformation of society. To enable experiments in design, operation and automation of advanced linked digital systems, there is a need for underlying infrastructure.

#### Description of the area

In modern digital infrastructures, communication, data processing and storage are integrated with sensors, instruments and other equipment that generate large amounts of data. Data is processed in real time, often with the help of models developed through machine learning and large-scale computation. These distributed heterogenous systems are characterised by a high degree of complexity, which means that there is a need for research, stretching from design and architecture to algorithms, effectiveness and security issues.

#### Development/need

Currently, Sweden only has small test environments operated by individual research teams, while at European level work is in progress to create a linked environment of experimental resources within the area (Scientific Large-Scale Infrastructure for Computing/Communication Experimental Studies, SLICES RI). By creating a Swedish research infrastructure for dynamic test environments, coordinated with the development of SLICES RI, Swedish research will be strengthened.

### **Infrastructure for laboratory archaeology**

In laboratory archaeology, a number of analysis methods are used to study archaeological material. There is currently a consortium consisting of existing archaeological laboratories with the potential to develop a national infrastructure, which would provide coordinated and innovative support for interdisciplinary research within rapidly expanding laboratory research fields.

#### Description of the area

Together, archaeological research laboratories in Sweden have high capacity and competence within a broad spectrum of analysis methods, such as archaeobotanics, paleoentomology, land chemistry, archaeometallurgy, dendrochronology, ceramic studies, lipid analysis, etc. Current and potential users of a national infrastructure for laboratory archaeology are researchers at Swedish higher education institutions, but also researchers and other personnel at governmental and private organisations, such as museums, county administrative boards and archaeological consultancy companies. In addition to national users, another large user group consists of international researchers and personnel at other types of organisations.



### Development/need

An infrastructure that gathers together archaeological laboratories into a national resource would strengthen Swedish research in this field. Laboratory archaeology is an interdisciplinary field. Over the last few years, development within the area has been comprehensive, and Swedish research is ground-breaking in several areas. To safeguard continued successful research within the field, access to knowledge, quality-assured analysis methods and support needs to be improved. If existing laboratories were to expand their activities and integrate with each other, they can create a research infrastructure of national relevance. Such an infrastructure would be able to offer powerful and extensive analysis opportunities of great strategic importance for Swedish research. The dividing lines against other existing infrastructures, such as SweDigArch, NordSIMS/VegaCenter, and the Ancient DNA unit within SciLifeLab, would then have to be clarified.

### **Infrastructure for Electoral Democracy in Europe (MEDem)**

The purpose of MEDem (Monitor for Electoral Democracy in Europe) is to establish, operate and develop a pan-European distributed research infrastructure for voting behaviour and democracy development using Sweden as one of the central nodes. An overall goal is to be included in the next ESFRI Roadmap (2025).

### Description of the area

Many democracies in Europe and the rest of the world are facing major challenges, not least in those democratic countries that have been moving towards more authoritarian governance. Knowledge of how citizens, persons in power, parliaments, governments and media interact and relate to each other, for example in the fight for votes, is central for understanding modern democracies. Over time, the national election surveys that are carried out in practically all European countries have been broadened from covering voter behaviour to also include the parties and candidates that voters vote for. How media reports on party politics is also sometimes included in the surveys. At the same time, the collection and analysis of election survey data between countries has intensified. In addition, there are summaries with contextual data about the economic and political circumstances that have surrounded the democratic elections. Swedish election research is world-leading, and research into voting behaviour and democracy development is being done at several Swedish higher education institutions.

### Development/need

Even though election research is a well-established research field, the lack of coordination between election surveys in different countries acts as a drag on research. Coordination of databases with long time series that enable comparisons between countries would be of great importance for Swedish and international social sciences research. MEDem shall offer integrated and harmonised data for researchers and other stakeholders by gathering together existing research initiatives and infrastructures under a joint umbrella. There are also plans to develop a visualisation tool for access to data. Here, already existing software



should be able to be used, for example the national infrastructure InfraVis, which is under development.

### **Swedish participation in Generations and Gender Programme (GGP)**

GGP is a distributed social sciences research infrastructure for research into areas such as family dynamics and fertility. GGP has been included in the ESFRI roadmap since 2021.

#### Description of the area

Falling birth rates, increasing social inequality in the birth rates of persons with low and high educational attainments, differences in the conditions of life between persons born in Sweden and abroad, and behavioural changes in terms of relationships, family life and family constellations – all these factors and changes are assumed to entail long-term consequences for Swedish society, the welfare state, and social equality. To understand these factors and consequences in depth, an infrastructure is needed that combines data about individuals, via surveys, with register data. This is done in Sweden today via the Swedish section of GGP, which is part of GGP-ESFRI. The latter enables comparisons between Sweden and other countries. Swedish participation in the programme began in 2010, and today fulfils a central comparative function of GGP.

#### Development/need

GGP can provide combined data for research into changes in fertility and family dynamics, and how different factors in the surrounding environment contribute to differences between European countries. GGP offers open and free-of-charge access to harmonised data for studying causes and consequences of birth rates and family changes. GGP collaborates with other leading European research infrastructures, such as ESS, SHARE, EVS and CESSDA, for the purpose of creating synergies between them. To enable continued comparisons between countries within the research fields in questions, the Swedish section of GGP needs to maintain the current and future versions of the survey as part of GGP-ESFRI. Against the background of the similarities that exist between infrastructures such as ESS, SHARE and GGP, and the collaboration that goes on at European level, the opportunities for coordination between Swedish GGP and CORS (Comparative Research Center Sweden) should continue to be investigated and discussed.

### **National infrastructure for research vessels**

Sweden has a number of research vessels or ships equipped for research assignments. The vessels are owned and operated by higher education institutions and public agencies. A national infrastructure for research ships would coordinate the access to research time and contribute to harmonising data.

#### Description of the area

Research vessels are used for observations, process studies and experiments, primarily within the field of natural sciences, such as oceanography, marine



biology, marine geology, atmospheric research and natural resources management. The Swedish research vessels operate nationally or regionally, and in addition to research assignments they also participate to a varying degree in the national environmental monitoring programmes.

#### Development/need

As a knowledge nation, and with a long coastline and many lakes, Sweden has a rich tradition of research carried out with the help of research vessels. Data collection may be done through instrumentation onboard the vessels, instrumentation located in the water that is visited by the ships, or by using the ships to launch UAVs (Underwater Autonomous Vehicles) and other autonomous vessels. Sweden today has five large and around ten smaller research vessels, owned and operated by the various higher education institutions or public agencies. A national coordinating infrastructure would be able to ensure that Swedish researchers have the option of accessing all research vessels included, irrespective of their organisational affiliation, and that the ship most suited to the task is used. The infrastructure could also contribute to developing harmonised and best practice in terms of methods, data collection and data storage.

### **Infrastructure for astroparticle physics with neutrinos**

IceCube South Pole Neutrino Observatory is a neutrino telescope for astroparticle physics, and is built up from light-sensitive detectors embedded in a cubic kilometre volume of ice at the South Pole. IceCube was started by Sweden, Belgium, Germany and USA, and today has twelve member countries.

#### Description of the area

The primary goal of the observatory is to investigate high-energy neutrinos and their cosmic origin. Neutrinos are a type of elementary particle that are difficult to observe, as they rarely interact. However, water offers the opportunity to observe neutrinos indirectly, and at IceCube this feature is used by locating detectors buried in Antarctic ice. Discoveries helped by IceCube include flows of high-energy neutrinos originating from beyond our solar system, and the identification of the first probable source of such neutrinos. Through its observations, the telescope cannot just help to answer questions about high-energy processes in the universe, but also increase our understanding of the smallest building blocks of matter and their interactions.

Swedish participation means, in addition to participating researchers building up their competences and taking part in measurements and publications, that leading Swedish technology, for example in the form of highly specialised cabling and wind turbines specifically developed for polar areas, can be developed and used.

#### Development/need

IceCube was built in 2004–2010, and has since then mapped neutrinos within a given energy interval, which has led to a number of discoveries. However, to allow more effective study of neutrinos with ultra-high energy, IceCube needs to be increased considerably in size. An upgrade of the observatory will lead to more



precise determination of the direction and energy of the individual neutrinos, and by extension their characteristics. This can be done through increasing the number of optical readings and by using radio technology to measure radio signals from neutrino interactions in the ice. There is a trial area in Greenland for evaluating hardware for IceCube before the final step of upgrades at the South Pole is taken.

### **Infrastructure for solar physics – European Solar Telescope**

European researchers in solar physics are planning the next generation solar telescope – the European Solar Telescope (EST). The telescope will be built on the island of La Palma in the Canaries, and is expected to become operational in 2029.

#### Description of the area

Research in solar physics focuses on understanding the structure and dynamics of the solar atmosphere. Increasing the understanding of these processes, as well as the impact the Sun has on Earth, is important for research areas such as astrophysics, geophysics, climate research, space physics and biology. Knowledge about the sun and its changeability is significant also for our everyday lives, where factors such as space weather is a major challenge for a high-technology society. Research within solar physics requires access to either ground-based telescopes or space probes and satellites.

#### Development/need

EST is planning to study the following overarching questions: What can the Sun teach us about fundamental astrophysical processes? What drives solar variability on different scales? What impact does solar activity have on life on Earth? The aim is to build the world's largest solar telescope, with a primary mirror with a 4.2 metre diameter, which entails an increase of a factor of 4 in spatial resolution and an increase of a factor of 15 in light collection ability, compared to today's largest European solar telescope. EST and the American DKIST, which became operational in 2021, will be the only ones of their kind in 2029. The two telescopes have partly differing technical specifications, and as they are located on different continents, new discoveries may be made from observing the same phenomena from two directions. However, it would be desirable for EST to also define its own niche in conjunction with the design being completed.

As the Swedish solar telescope SST also functions as a testbed for instrumentation for EST, it is important that the Swedish expertise can be transferred to EST. The Swedish Research Council is funding Swedish participation in the planning ahead of EST and parts of SST.

### **Currently funded research infrastructures**

#### **ALICE and ATLAS**

The Large Hadron Collider (LHC) accelerator and the LHC experiments are the highest priority projects at CERN, which is the world's largest particle physics



laboratory outside Geneva, on the border between Switzerland and France. A major upgrade of the LHC to a High Luminosity LHC is now in progress. Particle physicists from all over the world work with the experiments at LHC, and Swedish researchers, supported by the Swedish Research Council, are active in two of these: ATLAS and ALICE. ATLAS (A Toroidal LHC Apparatus) is a broad experiment, constructed to test the predictions of the standard model (SM) in particle physics and to explore physics beyond the limits of the model, in the hope of discoveries that can change our understanding of matter and energy. ALICE (A Large Ion Collider Experiment) studies matter at such extreme energy densities and temperatures that nucleons melt, which generates a plasma of quarks and gluons. This makes it possible to study matter in conditions that prevailed in the early universe, micro-seconds after the Big Bang.

In recent years, several activities have been linked to ATLAS and ALICE, but the current application relates to the operation for the Swedish participation. This includes items such as costs for implementing the operational shifts required for each experiment, and costs for maintenance and local operation costs (M&O) for each experiment. The operation of the experiments also funds Sweden's computer resources in WLCG (Worldwide LHC Computing Grid), which is a distributed computational infrastructure supplying storage, distribution and analysis environments for Large Hadron Collider experiments.

### **Biobank Sweden (BIS)**

The national biobank infrastructure Biobank Sweden, BIS, includes all universities with a medical faculty and associated university hospital principals (regions). BIS, which was established in 2018, coordinates and works towards efficient use of biobanks at national and international level. A specific goal for the infrastructure is to improve access to samples and associated data for researchers in academia, health and medical care and industry.

The coordination involves joint standards, quality measures, ethical rules, networks and operational compatibility of data. The biobanks constitute a platform for effective healthcare services, high-quality research and the development of new medical therapies within the biosciences industry. Samples collected within healthcare and in conjunction with research studies, for example, are accumulated in biobanks and can then be used both for healthcare and therapy, and also for medical research.

Since 2013, Sweden has been a member of the European infrastructure Biobanking and Biomolecular Resources Research Infrastructure (BBMRI-ERIC). BIS is the Swedish node in BBMRI-ERIC, and Sweden holds a leading role in the development of ethical, legal and societal issues (ELSI) within the European infrastructure, which creates collaborations and other opportunities at international level.





## **BioMS - National Infrastructure for Biological Mass Spectrometry**

BioMS is a national distributed infrastructure for biological mass spectrometry and proteomics. Each of the nodes at the universities in Lund, Gothenburg and Stockholm is specialised in various techniques for fulfilling the needs of the Swedish research community. Using the technologies on offer, such as chemical proteomics, glycomics and proteogenomics, biologically interesting proteins can be identified and studied qualitatively and quantitatively. Furthermore, different modifications, such as glycosylation and phosphorylation can be analysed, and interactions between molecules studied. The nodes included in BioMS collaborate in order to provide adequate support for users and to organise training within advanced mass spectrometry.

The purpose of the operation is to provide advanced infrastructure for mass spectrometry, including equipment, methodology development and competence, for research within life sciences, biology, medicine and health.

## **DEMSCORE**

DEMSCORE, Research infrastructure for Democracy, Environment, Migration, Social policy, CONflict, and REpresentation, is a research infrastructure facility partly under construction, aimed at fulfilling research needs for various types of social sciences context data.

Via advanced e-infrastructure, users are offered free access to harmonised and quality-controlled data plus full documentation across a large number of data sources.

DEMSCORE includes several large and well-known social sciences databases, creating major synergies and increasing the opportunities for research into complex societal connections relating to areas such as politics, public opinion, economics, conflicts around the world, climate and environment, social circumstances, and migration.

## **DESIREE**

DESIREE (Double ElectroStatic Ion Ring ExpEriment) is a facility for studying atomic and molecular ions at Stockholm University. DESIREE consists of two ion storage rings, with a joint straight section, where two ion beams overlap and where reactions between individual pairs of ions can be studied in detail. Beams of atomic and also molecular ions can be stored; the latter can for example consist of single molecules, complex bio-molecules or clusters of atoms or molecules. In addition to studying reactions between different types of ions, inherent characteristics of these systems can also be studied with the help of advanced lasers.

Using DESIREE, processes within fundamental atomic and molecular physics can be studied, with applications in areas such as astrophysics, atmospheric physics and biomolecular physics. The research is focused on stability issues and slow decay of positive or negative ions of atoms, molecules or atom clusters, photo-absorption





spectroscopy of cold ions, reactions between individual pairs of positive and negative ions, fragmentation and reaction dynamics and studies of the characteristics of biomolecular systems in vacuum and in solution.

### **European Extremely Large Telescope – instrumentation**

The Extremely Large Telescope (ELT) is being developed by the European Southern Observatory (ESO), where Sweden is one of the member countries. The telescope is being constructed in Chile and will be the world's largest optical/infrared telescope. The Swedish Research Council contributes to funding two instruments at ELT – MOSAIC and ANDES (formerly HIRES).

ELT is being constructed in Chile, and will have a light collection capacity and angle resolution that is several times greater than that of the current largest optical telescope. Using ELT, researchers will be able to study features such as exoplanets, the birth and death of stars, super-massive black holes and our early universe. The telescope is planned to become operational in 2027, with a first set of instruments. ANDES and MOSAIC are part of the second generation, and will be installed at ELT slightly later. The ANDES instrument will make it possible to study astronomical objects with very great sensitivity. Using ANDES, researchers will, for example, search for signs of life on Earth-like exo-planets, find the first stars of the universe, test for possible variations of the fundamental constants of physics, and measure the acceleration of the universe's expansion. The Swedish ELT consortium (SELTIC) is operated from Stockholm University with participation from the universities in Uppsala and Lund.

The potential of ELT is entirely dependent on the instruments the telescope will be equipped with. The opportunities for Swedish researchers to conduct ground-breaking research is largely dependent on their participation in the design of the instruments, but as the construction of ELT is delayed, the time plan for the instruments is also affected. The Swedish researchers, together with the other participants, are currently planning to be part of the international instrument collaboration for the development of ANDES. Once the instrument is completed, it will be transferred into ESO's ownership, and participating countries will get a share of the observation time in exchange.

### **Fusion research and EUROfusion**

Swedish fusion research activities are nationally coordinated and are focused on the unified European research collaboration EUROfusion under Horizon Europe.

Fusion research aims to produce sustainable electricity with the help of the energy released when atomic nuclei are fused. EUROfusion is a European Joint Co-Fund Project, with a co-funding requirement for the member states to participate in the work packages. The Swedish operation is largely university-based, with Chalmers University of Technology, KTH Royal Institute of Technology and Uppsala University as the largest participants. Recently, RISE and Lund/ESS have also begun engaging in EUROfusion. The infrastructure promotes high-quality research



in areas such as plasma diagnostics, analysis of the components that are to withstand the plasma, plasma control and integrated modelling.

EUROfusion's purpose is the long-term realisation of fusion as a global energy source. Swedish fusion researchers form a research unit within the Euratom-funded consortium, where researchers get access to Europe's most important facilities through the membership. EUROfusion allocates research and development tasks to its members, and is expected to play an important role in the utilisation of the fusion research reactor ITER, which is being constructed in southern France, and also the development of the next generation's planned demonstration facility, DEMO. The formats for this and collaboration with the related European procurement and support organisation Fusion for Energy (F4E) are expected to become more clearly structured.

## **HUMINFRA**

HUMINFRA combines highly specialised expertise from twelve higher education institutions and organisations, both within digital humanities focusing on e-science/digital material, tools and critical interpretation perspectives, and also within broader fields that work with experimental and quantitative methods, sensor-based data and real-time analyses.

One of purposes of HUMINFRA is to create a 'WIP', a web-based information platform, that summarises and links to existing digital/e-science resources and educational opportunities in Sweden. Based on a national survey among researchers into what tools and educational courses are lacking, HUMINFRA will develop new tools and national educational opportunities that will be publicly accessible.

The aim is for HUMINFRA to strengthen research in the areas of particular interest to Swedish research, such as heritage research, but also to create new opportunities for innovation and interaction with societal actors in areas such as the cultural sector, the education sector, industry, and health and medical care.

## **IceCube Neutrino Observatory**

*See corresponding text under header 'New areas'.*

## **Infrastructure for solar physics – European Solar Telescope**

*See corresponding text under header 'New areas'.*

## **Integrated Carbon Observation System (ICOS)**

The Integrated Carbon Observation System (ICOS) is a distributed European infrastructure that measures and quantifies greenhouse gas uptake and emissions between land/water and atmosphere. ICOS has been operated as an ERIC since 2015, and has been an ESFRI landmark since 2016.



Sweden hosts the European portal function, ICOS Carbon Portal, which stores and delivers openly accessible and quality-controlled observation data for the entire ICOS. Within the framework for ICOS, the Swedish Research Council also funds a number of national operations for carbon dioxide flow measurements over land and sea, collected within ICOS Sweden.

The purpose of ICOS is both to understand local variations in the carbon dioxide exchange, and also to enable quantification of greenhouse gas exchanges across the whole of Europe. To answer questions on subjects such as sources and mechanisms for greenhouse gases in the atmosphere, and any effects of measures aimed at reducing these, cross-border collaboration and comparable high-quality data are necessary. Production of high-quality and easily accessible data is therefore a priority task for the infrastructure. ICOS Carbon Portal and the coordination function of Swedish ICOS are both located at Lund University.

### **Ion Technology Centre (AB-ITC)**

The infrastructure provides and develops competence within ion beam-based materials analysis and materials modification.

The parties to the consortium formed within the infrastructure are Uppsala University, KTH Royal Institute of Technology and Linköping University.

There are a total of three accelerators within the infrastructure which are used in many different ways in the three core activity areas of mass spectrometry, materials analysis and materials modification. There is also considerable support activities in the form of sample preparation and handling in separate laboratory premises.

The infrastructure uses beams of energetic ions in various ways to analyse the composition of different materials with a high level of sensitivity. This can be used, for example, to determine the age of various organic and inorganic samples using C-14 dating. It is also possible to use ion beams to measure the composition of very small amounts of a material, or to produce depth profiles on the nanometre scale without destroying the sample. This is an important prerequisite for enabling research aimed at developing new and better materials within many different subject areas, such as archaeology, climate research, biomedicine, thin film electronics, materials science and fusion research. The ion beams can also be used to tailor material characteristics, or to test and improve electronics components.

### **Myfab**

A national distributed research infrastructure consisting of the four largest Swedish academic cleanroom-based nanotechnology laboratories.

Myfab is a national distributed research infrastructure consisting of the four largest Swedish academic cleanroom-based nanotechnology laboratories at:

Chalmers University of Technology (MC2 Nanotechnology Laboratory – NFL)

- KTH Royal Institute of Technology (Electrumlab)



- Lund University (Lund Nano Lab – LNL)
- Uppsala University (Ångström Microstructure Laboratory – MSL).

The research carried out at the infrastructure is in fields such as materials science, nanotechnology, information and communication technology, bio-nanotechnology, life sciences, energy research and micro-nanosystems.

Myfab offers open access, training and process services to academia, institutes and companies through more than 700 of the best available sets of equipment for micro and nano manufacture and specialised manufacturing processes. Myfab's various laboratories are in part specialised in different application areas and their associated processes and materials systems.

### **National Bioinformatics Infrastructure Sweden (NBIS) and Elixir**

National Bioinformatics Infrastructure Sweden, NBIS, is a distributed research infrastructure providing bioinformatics support to Swedish life sciences research. A large part of the operation focuses on bioinformatics support within DNA and RNA sequencing projects, but NBIS also offers support within areas such as proteomics, metabolomics and system biology. The infrastructure provides access to a large number of tools (software, algorithms) and associated user support and training.

NBIS is the Swedish contact point for the European bioinformatics infrastructure Elixir. Elixir is a distributed infrastructure for bioinformatics and biological information, with nodes in 21 countries currently, including leading bioinformatics centres in Europe. The operation is coordinated from a central hub located at the European Bioinformatics Institute (EMBL-EBI) in Cambridge. Elixir coordinates and integrates resources that the nodes then make accessible to users in the member countries. Elixir thereby provides services such as biological data, tools for analysing biological data, resources for data storage and calculation, and development of methods and standards for this, as well as associated training. Sweden contributes to Elixir, for example via the project Human Protein Atlas, which aims to map the human proteome.

### **National Genomics Infrastructure (NGI)**

The National Genomics Infrastructure (NGI) has been funded as a national infrastructure since January 2010. The operation aims to give Swedish researchers access to the latest technology for large-scale DNA sequencing and SNP genotyping. Large-scale analyses of DNA and RNA sequences play a central role in biomedical research. Access to a broad range of different sequencing technologies makes it possible to select the combination that is best suited to a specific project.

Today, NGI is one of the three largest genomics centres in Europe, and via its location at SciLifeLab in Stockholm and Uppsala, it can co-use equipment and competence. NGI also collaborates with other initiatives of a national character – within



bioinformatics with the national research infrastructure NBIS.. NGI offers expertise within bioinformatics and statistics that ensures the experimental design is optimal and the project is scientifically productive. The consultative role played by NGI is one of the main tasks of the infrastructure.

### **National infrastructure for microscopy within life sciences (NMI)**

National Microscopy Infrastructure, NMI, is a distributed infrastructure for advanced microscopy for research within life sciences. Nodes are located at KTH Royal Institute of Technology, Stockholm University, Umeå University, University of Gothenburg and Chalmers University of Technology. Each of the nodes has a combination of leading-edge equipment and competence within different microscopy techniques.

The infrastructure provides services such as super-resolution microscopy, intravital microscopy, multimodal imaging, cryo-electron microscopy, STED (stimulated emission depletion) and correlative electron microscopy. NMI also provides user support and access to highly specialised equipment and leading-edge competence within the area. The infrastructure also coordinates national and international knowledge exchange within the area.

### **Nationella språkbanken and Swe-CLARIN (SWE-CLARIN)**

Nationella språkbanken (Eng. 'National Language Bank') aims to provide access to digital language data and advanced tools for using these data. This research infrastructure helps to promote research in language technology, linguistics, digital humanities and social sciences, social robotics and artificial intelligence.

The National Language Bank has three departments: Language Bank Text makes large amounts of modern and historical Swedish texts accessible in digital format, intended for research, Language Bank Tal develops, manages and distributes speech technology resources for Swedish speech research and Swedish speech technology research, and Language Bank Sam makes the archive material held by the Institute for Language and Folklore more accessible for both researchers and the general public.

The National Language Bank administrates the SWE-CLARIN network, which is aimed at researchers and others interested in digital methods and materials in humanities and social sciences. SWE-CLARIN forms the Swedish node of the European infrastructure CLARIN-ERIC (Common Language Resources and Technology Infrastructure), a national and European infrastructure for speech-based and text-based e-science, which offers comprehensive digitised material and advanced language technology tools, user support, workshops and collaboration on research applications.



### **Swedish Biodiversity Data Infrastructure (SBDI)**

Swedish Biodiversity Data Infrastructure (SBDI) is a portal for biodiversity data, with information about populations of plants, animals and other life forms. SBDI also provides analysis tools and updated taxonomies.

The purpose of the infrastructure is to make biodiversity data accessible, by linking together information from lots of different databases into a joint, easily accessible and user-friendly environment. Many millions of observations and registrations relating to biological diversity are made accessible here; everything from museum collections to data from citizen science and inventories. All are incorporated in standardised formats into a central database and made freely accessible to both researchers and the general public. Using the analysis tools, users can link together data on biological diversity with variables such as satellite and climate data, and also analyse the data collections in time and space.

The database and analysis tools are based on open source code, which leads to free development of analysis tools that can be shared with users across the whole world. Together, this type of infrastructure enables analyses, models and predictions, and thus increased and broadened knowledge about biodiversity, both in Sweden and internationally. SBDI also forms the Swedish node for the international infrastructure Global Biodiversity Information Facility (GBIF).

### **Swedish Membership in Nordic e-Infrastructure Collaboration**

Nordic e-Infrastructure Collaboration, NeIC, is a Nordic collaboration for development and operation of e-infrastructure for research. e-infrastructure includes systems and services for analysing, storing and transferring data and making it accessible, and is a precondition for research in nearly all subject areas. An important component of functioning e-infrastructure is also access to knowledge and competence, so that it can be used in the best possible way.

NeIC was established in 2012 and is responsible for operating the Nordic Tier 1 facility in the Worldwide LHC Computing Grid (WLCG), which analyses data from the Large Hadron Collider (LHC), which is part of CERN. In addition, NeIC operates development projects based on open calls to fulfil the needs of the research community. Among ongoing and completed projects can be mentioned Tryggve, with the follow-up project Heilsa Tryggvedottir, for developing services for access to sensitive data for research. Another example is Puhuuri, a project for developing services for user management and resource allocation of super-computers. Puhuuri is used at the EuroHPC system LUMI, among others. In addition to this, NeIC has development and collaboration projects in areas such as climate modelling European Open Science Cloud (EOSC) and training courses for software development.

The call relates to the Swedish membership of NeIC.



## Supplementary grant

Apart from the infrastructures listed above, grants can also be applied for to fund increased Swedish involvement in international infrastructures in which Sweden already is a formal member. Supplementary grant should cover costs for clearly defined Swedish scientific activities such as calls for in-kind contributions or similar, where Swedish scientists intend to contribute and require additional funding to do so.

### Conditions for the supplementary grant

- The infrastructure has initiated or will initiate a call or similar process in which researchers or organisations in the member states can apply to participate with scientific equipment and/or competence to the infrastructure.
- Only one university have to apply.

The instructions for the call are adjusted when applying for Supplementary grants, in the following ways:

**Scientific plan:** The instructions for the call should be followed. When information is asked for concerning an *infrastructure* this information should be given for the *specific scientific activities included in the Supplementary grant*. It should be clearly stated which scientific advantages for Sweden that the grant will entail, for example access to equipment or possibilities to participate for Swedish industry.

**Description of the infrastructure and its activities (maximum 5 pages):** The description should only be given for the *specific scientific activities included in the Supplementary grant* and only for the following topics:

- time schedule,
  - construction, development and operations of the infrastructure,
  - risk analysis,
- and when applicable
- data handling and requirement for supporting e-infrastructure.

It should be clearly stated which economic and strategic advantages the grant will entail, for example a lower Swedish membership fee to the infrastructure.

**Budget:** In the budget-template only one section corresponding to one module should be used. The budget should only be presented for *specific scientific activities included in the Supplementary grant*. The budget should also describe how the in-kind contribution is counted in to the Swedish membership.

**Key references:** Present references that support the participating scientist's scientific merits (CV with a selection, maximum 20, scientific publications).

**Support letters:** The infrastructure's call for in-kind contributions or similar and a support letter from the infrastructure concerning the Swedish application should be attached in the appendix "Support letters". The support letter should indicate how the in-kind contribution is counted in to the Swedish membership, when applicable.