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Nordic Research Infrastructure Network

Interim report

1. Project year



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Short summary

This interim report is based on the work of the Nordic Research Infrastructure Network – NRIN. NRIN was established in September 2009 as a joint Nordic network amongst key actors involved in research infrastructure policy at national level. The network is funded by Nordforsk, that also assisted with secretariat functions.

The main purpose of this first leg of the project has been to increase the common understanding of the national policies and systems involved in the research infrastructure area in order to facilitate Nordic cooperation. Secondly, NRIN has begun work on identifying common Nordic action in relation to research infrastructure.

Understanding RI policy across the Nordics

An important part of NRIN's work in the first project year has been to get a better understanding of the organizational structure and institutional functionality of the research infrastructure policy across the Nordics. It goes without saying, that in order to facilitate a larger degree of collaboration on research infrastructure across the Nordics, it is vital to get a better understanding of each country's system.

Thematically this revolves around three general topics a) National roadmaps b) International involvements and c) Funding and organizing of RI. The pivotal point in this work is the national roadmaps on research infrastructure, which have dominated discussions on research infrastructure investments both at EU-level as well as national level in the Nordic countries for the last couple of years. Since ESFRI published its first roadmap in 2006, more and more countries have published their own roadmap – or are in the process of doing so – including most of the Nordic countries. On that basis it would seem logical to look at the outcome of the individual roadmaps and identify those research infrastructures which have been prioritized in all or most of the Nordic countries, and use those common priorities as the platform for increasing Nordic collaboration – however from the work NRIN has done it has become clear that doing so is not as easy as it would seem. One conclusion which can be drawn from NRIN's first project year is that national roadmaps on research infrastructure are not directly compatible.

When reading this report, the reader should be aware of an important aspect: There are basically two intermingled aims of a national research infrastructure roadmap: To allocate funding and to prioritize investments. The individual Nordic roadmaps reflect differences in the foci on these two issues. Differences that reflect differences in the RI policy, including organizational issues, funding levels and mechanisms, legal issues and to some extent the norms and values of the research funding system.

In general terms roadmaps that are very focused on allocating funding tends to be rather broad focusing on "the big picture" and the importance of making investments in RI. They are in a sense targeted towards funders – which also indicates that in these cases there is clear role-division between funders and decision makers on research infrastructure. Roadmaps focusing on allocation of funding are usually not very specific about which projects to fund, the level of funding and the timing of investments. The actual decision-making process is something that is left for the decision-makers to work out at a later stage in an incremental process. This allows for great flexibility as funding can be allocated when needed. This is a big advantage - particularly towards international engagements. To outsiders

however, this process will seem rather unclear – it is at least very difficult to get information on the priorities made, unless one very actively follows the process.

Roadmaps in which funding is already secured, will be much more focused on prioritization of actual projects. In those cases national funding agencies are usually involved in the process. Roadmaps focusing on prioritization tend to be much more formalized, focusing on criteria and procedures and they usually operate with calls for tenders. The advantage is that the decision-making process is very open and clear to outsiders. The disadvantage is the lack of flexibility, since decisions will have to follow the timing and procedures embedded in the process.

As the Nordic roadmaps have different weighting between allocation and prioritization, using them for identifying common actions across the Nordics is a challenge. But, one should clearly avoid the inclination to make a broader focus on areas of interest, in order to overcome the discrepancies between the roadmaps. It would be tempting to suggest a Nordic roadmap for Research Infrastructure. But NRIN has not discovered any need for a Nordic roadmap. A Nordic roadmap would only add complexity to what is already a very complex area, and in the end one would still have to identify relevant actions.

What is much more fruitful is to shortcut the process, and identify clearly stated and targeted actions. NRIN has sought to do this by focusing on specific activities that would be beneficial in a Nordic perspective.

A lot of this work however remains for the next project year.

Identifying Nordic research infrastructure actions

NRIN has scanned the ESFRI list in order to identify projects with a potential for Nordic collaboration. Based on an initial assessment the following ESFRI projects were identified as having a potential:

- **BBMRI – bio banking**
- **LIFEWATCH – Biodiversity**
- **ELIXIR - Bioinformatics**
- **EPOS – Plate tectonics**
- **CLARIN – Language**
- **ICOS – Carbon observatory**

The projects identified as having a potential will be further investigated in the next project year. Bio banking has however, already been identified as a project, in which further Nordic collaboration should be supported. This will be explained in the chapter "Interim findings – collaboration",

Please consult Annex 3 for a detailed list of progress on ESFRI projects across the Nordics.

Processes for developing national roadmaps on RI

The Nordics have all initiated a process for developing national roadmaps on RI. Intuitively most people would assume that the national roadmaps are relatively homogeneous, since they all revolve around national prioritization and funding of research infrastructure – but substantial differences can be detected in the different Nordic roadmaps, and it is clear that the notion of a national roadmap on research infrastructure differs across the Nordics.

The most important thing to be aware of, when one seeks to understand the differences amongst the national roadmaps, is the level of prioritization in the roadmap. The roadmaps differ significantly when it comes to actually making statements about national prioritizing of research infrastructures. This reflects the fact that the roadmaps are put in very different contexts in relation to the funding of research infrastructure in each country.

The explanation why there are so marked differences in timing of the roadmaps in relation to funding is that the roadmaps were initiated with quite different aims in mind in each country. This is one of the main findings of the NRIN, and the importance of understanding this is critical, since the differences reflects major differences in the decision-making-processes and the organization of research infrastructure policy in the different countries. In fact the aims of the different roadmaps is the first step to understanding the differences in the RI policy, including organizational issues, funding mechanisms, legal issues and to some extent the norms and values of the research funding system.

Aims of national roadmaps

As already mentioned there are basically two intermingled aims of a national research infrastructure roadmap

- To allocate funding. The purpose of all roadmaps is in some respect to ensure funding for the research infrastructure investments required. By publishing a national roadmap and by showing the need and potential as well as the estimated costs, the author wishes to draw attention to the area and address potential funders.
- To prioritize investments. This can be done in many different ways at different level, from making broad claims about the need for addressing societal challenges to focusing on specific scientific areas or to actually pinpointing actual projects eligible for funding.

The individual Nordic roadmaps reflect differences in the foci on these two issues. This is the case, even though there are not any significant differences in how RI is defined in the individual countries (see annex 1). Also, there seems to be a general common understanding about how to evaluate and decide on which RI's are actually national-level. See Annex 2.

In the following section the reader will be able to get a better understanding of the overall RI policy framework, as well as the processes for developing national roadmaps. This understanding will hopefully help anyone seeking to develop the Nordic cooperation on RI.

Denmark

In Denmark the purpose of the national roadmap process is mainly to have a means of prioritizing the funds available for the most important projects. One important aspect of the roadmap process in Denmark is that research councils play a much smaller part in the process, compared to the situation in

the other Nordic countries. The Danish research councils are governed by tight budgetary and legal restrictions, which means, that makes it difficult to engage in national-level research infrastructure investments. Because of this, the ministerial level (The Danish Agency for Science and Innovation) plays a significant role on research infrastructure policy in Denmark. This has been the case for a long time regarding Danish participation in international research infrastructures and increasingly so with the implementation of national roadmap processes.

At Nordic level the Danish roadmap process is unique in the sense that it is very broad and seeks to address much of the issues within the area. It involves all fields of research, the entire scientific community and the management level of the institutions. Of all the Nordic countries the Danish roadmap process is probably the most inclusive and bottom-up oriented of them all. This might seem a paradox, when one considers that of all the Nordic countries, Denmark has the largest degree of Ministerial involvement in the decision-making process. But it is actually because of the large role of the governmental level in research infrastructure policy that such care is taken in ensuring legitimacy within the scientific community on the decisions made. Since the roadmap will eventually be issued by the Minister of Science's roadmap it is very focused on clear and open procedures.

The main weakness of the decision-making process in Denmark, is the speed at which Denmark is able to make a decision on international and/or Nordic involvements. Most noticeable is the reluctance of Denmark to make any financial commitments towards projects on the ESFRI list. The Danish Agency for Science, Technology and Innovation (DASTI) has been approached by several ESFRI-projects, seeking clear national commitment from Denmark in joining the coming ERIC's and allocate resources for the project. In almost all cases, the Ministry has declined making a decision, stating that the decision on joining an ESFRI project needs to be addressed within the national roadmap process. This reflects the fact that the governmental level does not intend to make policy decisions without involving the scientific community. But since any decisions on joining international research infrastructure projects needs to feed into the formal Danish roadmap process, it has been difficult for Denmark to be proactive towards the ESFRI process.

The Danish roadmap will in the end be quite specific about its priorities. This is quite unique at both Nordic and European level. But even though the Danish roadmap is very much a tool for making prioritizations, allocation of new funds is still extremely important. Even though Denmark as well as Norway and Sweden have a pot for research infrastructure it has a limited budget and a short timeframe.

Timeline

Denmark started preparing its national strategy for research infrastructure around the time when the first ESFRI roadmap was to be published in 2006. As RI became an issue on the European agenda, there was a need to also put RI on the national agenda and prepare a national strategy, in order to document the need for increased funding for the area - for one thing – to ensure funding for ESFRI projects, but also to boost the national investments in research infrastructures in general.

The Ministry of Science asked the Danish Strategic Research Council to map Danish researchers' *use of, and need* for medium- to large-scale research infrastructure. Such an overview had not previously been established in Denmark a problem which to a certain extent earlier hampered the prioritization of funding for research infrastructure.

The findings were published in the report “*Future Research Infrastructures – Needs Survey and Strategy Proposal*” ” in December 2005. The main findings of the report showed that:

- There was an immediate need for investments in existing research infrastructure of approximately EUR 40 million.

- A need for investments in new national research infrastructure of at least EUR 134 million over the next 8-10 years
- A significantly increased contribution to Danish participation in new international research infrastructures over the next 8-10 years.

Partially based on the report, funding for RI was allocated from the government initiative “The Globalization pool”, as Parliament set aside a total of EUR 80.5 million for research infrastructure to be divided into three annual calls at EUR 26.8 million of which the first was launched in 2007 and the last in 2009. However, even though the mapping report was essential to legitimize the need for additional funds for research infrastructure, it did not contain any form of prioritization or delineation of the infrastructure projects mentioned and the estimates of expenditure for the various projects were not validated and thus not necessarily precise. For this reason it was not used as a strategic tool for the implementation of the funds.

Two other problems were identified in order to prioritize RI investments. First of all, a more strict definition of national RI was required, specifically in order to A) ensure a clear division of labor between institutional and national RI investments and B) make a distinction between research projects and research infrastructure. Secondly, funding- and organizational-wise there was an issue on how to handle infrastructure investments not exclusively based in the academic world - such as clinical facilities, bio banks, cultural heritage archives and ship vessels used both for research and monitoring tasks.

A Danish RI Roadmap, comparable to other countries’ roadmaps has not been produced yet – as of end 2010. It is not expected to be published before early 2011. To understand the process for developing the Danish national RI roadmap, it is important to distinguish between the National RI Pot (“Infrastrukturpuljen”) between 2007-2009, and the Roadmap process period between 2009- 2011.

When national funding was secured from 2007, the issue of how to prioritize between the different RI projects was not resolved, and a means of allocating funding was urgently needed. Work had already begun on a Danish roadmap, but due to requirement of getting the funding into circulation the roadmap process was postponed. Instead, an application procedure was set up, which had the advantage of being a much speedier and simplistic process. The funding scheme itself is described in the Funding Scheme chapter of this report.

Infrastrukturpuljen has ensured the establishment of much needed RI, which will be of substantial importance for the Danish research. Secondly, the application procedure proved its worth as a swift and effective tool of getting the funds out to the researchers. However, the application procedure chosen as the prioritization tool in Denmark has not been a complete success. Experience from the three rounds in 2007, 2008 and 2009 indicate that, in a number of areas it would be necessary to adjust practice, if the future challenges are to be met and resolved. The most important issues were related to 1) the handling of ESFRI projects, 2) Operational costs and 3) RI collaboration between institutions.

Handling of ESFRI project: One of the most important reasons for securing national funding for RI was the expected increase in investments related to Danish participation in ESFRI projects. However, the ESFRI projects proved very difficult to handle within the application procedure for Infrastrukturpuljen. The Danish scientists involved in ESFRI projects were required to seek funding through Infrastrukturpuljen, in direct competition with other projects, once the ESFRI preproject was finalized. Unfortunately many of the ESFRI related applications lacked precise cost calculations, timeframes and in some cases the link between science case and technical description was weak. This made it very difficult for the expert panel to prioritize the ESFRI related projects, in competition with other more solid proposals, and so in many cases it has been difficult to obtain any clear indication about the commitment from Denmark.



Operational costs: Most RI facilities have an initial investment cost and an operational cost. Funding from the Infrastrukturpuljen would not cover operational costs. The reason being, that as funding for national RI was restricted to a three-year funding period, long term operational funding had to come from the institutions themselves. This has proven to create problems: RI projects regarding databases and/or distributed RI are generally difficult to fund, as they typically have low investment costs and high operational costs. A tendency that operational costs (to be covered by the host institution) are under-emphasized or limited to in-kind contribution from existing budget items. This makes it difficult to fulfill the potentials of the RI, and tends to create projects which are introvert and not development oriented. ESFRI projects (and other international involvements) are frequently based on membership fees that require long-term commitment.

Collaboration between institutions: One of the goals of Infrastrukturpuljen was to support cooperation across institutions – and thus support the establishment of major national research facilities that for reasons of cost-effectiveness and scientific synergies, involve all relevant research communities across institutions. Experience gained show that the institutions did not work together on proposals to the extent that was expected. One reason is no doubt, that an application procedure is inherently competitive. Location of RI is an important issue for institutions and scientists. In a number of cases, that competition has resulted in similar applications coming from different institutions within the same scientific field. Another reason for the lack of collaboration between institutions probably has to do with the application procedure itself. Formulating applications is time-consuming and in many cases unrewarding work. There is probably a limit to how much time researchers are willing to spend writing proposals, and thus a limit to how well planned, organized and coordinated proposals can be.

Stage II - The Danish National Roadmap on Research Infrastructure

Based on the experiences gained from the first funding period, it was clear that a new prioritization- and funding model was needed, and so the idea of having an actual roadmap process was revitalized.

Infrastrukturpulje II consists of two main processes: A) *roadmap process*, in which the national needs for RI is mapped on the basis of input from the science community and B) *realization process*, under which the implementation issues regarding the prioritized projects are worked out.

The most important aspects of the model are outlined underneath:

RI pool II

R Roadmap-process	May 2010	1. Commissioning of six scientific panels For each scientific area the panels devise a mapping report, that point out the most important and urgent RI needs in the shorter and longer term
	October 2010	2. Debate on the findings in the panel's reports Discussion and dialogue with relevant stakeholders on the priorities suggested in the panel's reports.
	Primo 2011	3. Minister of Science publishes a Danish Roadmap On the basis of the panel reports and on the dialogue process with stakeholders the Ministry devise a complete RI roadmap, which lists the RI projects that the Ministry aims at realizing within the next three years.
	2. quarter 2011	4. Formulation of project plans



	Consortiums with representatives from relevant universities and other stakeholders are invited to devise exact project proposals for the realization of projects pointed out in the roadmap.
4. Quarter. 2011	5. Evaluation of project proposals The consortium's proposals are evaluated, with a specific focus on organizational, management and economic issues.
Ultimo. 2011	6. The Ministry of Science distributes funds for the projects

The roadmap process

Implementation of "Infrastrukturpulje II" will be based on a Danish RI roadmap, which designates the essential needs of national RIs in the short and medium-term. A Danish roadmap process ensures that the prioritization of funds for RI is based on an overall assessment of needs for research facilities in both Denmark and internationally. It will focus on both short term and long term needs.

Six roadmap panels, which shall assess and prioritize RI requirements within the various areas of research, are key players in the roadmap process. The panels are established within the following areas:

- **Biotech, Health and Life science**
- **Natural sciences – Particle Physics and Astronomy**
- **Energy, Climate and Environment**
- **Humanities and Social Sciences**
- **Material and Nanotechnologies**
- **e-Science**

Each panel consists of seven experts appointed by the Minister of Science. The Minister also appoints a chairman for each of the six panels. A reasonable distribution of representatives from the different scientific communities and universities has been sought. The panels' are supported by DASTI which functions as secretariat.

Each of the six roadmap panels will have the task of drawing up a mapping report, which forms the baseline for developing the final roadmap. The panels should identify those RI's which should be funded within the next 3-5 years (short term) as well as identify the longer term RI needs in 3-10' time. There are not a lot of criteria for the panels to use as guideline for the identification. Basically they should identify those RI's which A) are of broad national interests – meaning having an interest amongst the majority of the relevant scientific community and institutions, B) will bring Danish research to the cutting-edge internationally, and C) are sound to establish as national facilities regarding critical mass, economy of scale and accessibility.

The big challenge for the panels has not been to identify relevant infrastructure, but the fact that they are required to prioritize amongst the different RI needs within each panel's individual fields. Each panel can only suggest three RI projects for the list of investment in the short term. To qualify the panels' work, the Danish scientific community was asked to send in proposals for national RI. The request was posted on the web, and sent to all institutions at Dean and Head of Department level.

After the completion of the mapping reports by October 2010, a dialogue process is initiated. Each panel has by then presented the three RI projects which they believe should be established. The purpose of the dialog process is to collect as many views from relevant stakeholders on which RI projects in particular should be financed in the coming years. The priorities of the institutions will be very important in this part

of the process. Based on the roadmap panel's reports and the dialog process the Minister of Science decides which RI facilities are to be realized with resources from "Infrastrukturpulje II" within the coming three-year period, and publishes this in the Danish roadmap for RI.

Realization process

After publication of the Danish Road Map starts the actual realization process. For each of the designated projects relevant universities and other stakeholders are invited to set up a project team, with the task of formulating an implementation plan. Project teams shall draw up a comprehensive project plan, which describes in detail the technical, scientific, organizational and financial aspects of the individual RI project.

When the project plans are completed the plan is put through an evaluation / feasibility test both in relation to scientific quality as well as technical, organizational and financing characteristics. This is expected to increase project quality significantly. The evaluations will be carried out by a special task force in DASTI with the participation of external experts with specific knowledge within fields such as project management and construction of research facilities. The relevant research Council will be asked to carry out a scientific assessment of each project.

To sum up:

There is no doubt that the suggested prioritization of RI in "Infrastrukturpuljen II" is a much more elaborate and complicated process than the model chosen for the "Infrastrukturpuljen". However, it should also be clear, that the model has a much clearer strategic focus, and hopefully also a much more sound and well worked out process, compared to the weaknesses of the application procedure used previously:

- The prioritization is based on a medium term perspective, thus allowing for much more long-term planning than currently possible.
- The prioritization within a given research area is based on the priorities given by the actual research community.
- Both national and ESFRI projects are prioritized together, which also allows for a Danish decision to be made earlier on ESFRI projects.
- The Ministry maintains the final decision-making ability, allowing for strategic priorities to be considered with due considerations to scientific priorities
- The entire decision-making process is open, allowing for a constructive dialogue.
- The discontinuation of application procedure and the evaluation process will much likely improve project planning and thus implementation significantly.
- The demand for clear management and organizational structures and financing plans will enable true collaboration between the involved institutions.

Finland

In Finland, research infrastructure policy is an integral part of national research and innovation policy. To be able to perform successfully, researchers must have access to state-of-the-art research infrastructures. The creation, development and maintenance of a research infrastructure require long-term planning and financial commitments. National and international cooperation plays an increasingly important role in the funding and use of research infrastructures. Finnish research infrastructures must be viewed as a whole and actively developed.

The necessity of preparing a national-level roadmap arose from the European level: as new initiatives were launched on the ESFRI-roadmap it became necessary to know the current state and the future needs on research infrastructure for the Finnish research community. There was an acute need to find out which RIs Finland could join and what the costs of participation would be and the need for renewal or new national

research infrastructures. National RI roadmap was formulated in 2008 and published in the beginning of 2009.

In addition to proposals for the roadmap, recommendations for developing infrastructures in specific disciplines were made along with general recommendations concerning 1) the establishment of infrastructural entities and the improved utilization of infrastructures, 2) Finnish participation in international research infrastructures and ESFRI projects, 3) funding, and 4) research infrastructure policy. The report on the national-level roadmap reiterated the proposals of earlier working groups concerning the need for a body at the national level, a research infrastructure council, to prepare and implement research infrastructure policy and its funding. Presently there are preliminary discussions on updating the RI roadmap, but no decisions have been made, including the timetable.

Following the recommendation given in the Science and Technology Policy Council's report of 2006, the Finnish Ministry of Education in association with the Ministry of Trade and Industry appointed a Committee which was entrusted with the following tasks:

- To draw up a proposal for procedures for identifying and evaluating the need for establishing significant new research infrastructures at the national level or for developing existing infrastructures, and for the procedures of prioritizing projects
- To prepare a proposal for a system for funding research infrastructures and for a division of tasks among financing parties, taking particular note of significant common infrastructures of several organizations or different sectors of administration as well as international infrastructures; and
- To carry out a preliminary mapping in collaboration with the Research Councils of the Academy of Finland and Tekes (Finnish Funding Agency for Technology and Innovation) of significant national research infrastructures and to make proposals on their renewal and development.

The purpose was to prepare a so-called national roadmap to be updated at intervals of 2–3 years concerning the infrastructures that will be needed over following 10–15 years with regard to national needs and developments at the international level. The mapping work was noted to be such an extensive and time consuming task that the Committee felt that it could not carry it out with its own resources. In its report presented in 2007, the Committee proposed that the national-level infrastructures and participation in international infrastructures were to be mapped and a roadmap of new needs was to be drawn up. This proposal was widely supported in related comments. In January 2008, the mapping of national-level research infrastructures in Finland was launched, with funding from the Ministry of Education. On the 16th of January 2008, the Ministry appointed a Steering Group for this work, representing various sectors of administration, scientific and scholarly communities, funding parties, and the private sector. The mapping was carried out by the Federation of Finnish Learned Societies. Parties involved in the mapping were able to make proposals regarding participation in present or future international infrastructures or for renewal or new national research infrastructures.

Procedure and Criteria for Choosing Research Infrastructures

The mapping of national-level research infrastructure and new infrastructure needs was carried out with the aid of an open Internet-based survey. The survey was open to participants for over a month during the spring of 2008. A preliminary notification of the survey was sent to a large target group consisting of universities, polytechnics, archives and public and private institutions, among other bodies. It was also possible to respond to the survey without being separately invited. A total of 297 replies were received, 116 of which were proposals for the national roadmap.

The Steering Group invited an independent national group of experts to evaluate which projects met the minimum criteria of research projects at the national level. Based on the proposals of the Independent Expert

Group the Steering Group decided which project proposals could then be given to be evaluated by the three International Expert Panels appointed by the Steering Group:

- Life Sciences & Medicine and Environmental sciences, (LME),
- Physical Sciences, e-Science and Engineering, (PSE)
- Social Sciences and the Humanities, (SSH).

All thematic groups were elaborated separately and priorities were set within each thematic group. The Steering Group established the criteria for national-level infrastructures and the fulfillment of most of them was required for national-level infrastructure and plans for the roadmap:

- Demonstrable administrative structures and responsible personnel for the upkeep and services of the infrastructure;
- An annual report or similar account of the infrastructure's activities showing its degree of use and effectiveness, for example in the form of scientific output, new applications, patents, new products, or generated business activities;
- The infrastructure participates in the training of researchers or is utilized for these purposes;
- The research infrastructure is of scientific significance and its work provides added value at the national or international level;
- The infrastructure is continuously used by a significant number of Finnish or foreign researchers;
- The infrastructure provides its users with services for its utilization;
- In principle free access for utilization of the infrastructure. This, however, may require approval of a research plan and reasonable compensation for user fees, guidance and services;
- The investment costs of the infrastructure in question are relatively high in comparison with other infrastructures in the same field;
- The annual budget of the infrastructure is relatively high in comparison with other infrastructures in the same field;
- The infrastructure has added value in industrial-commercial terms or for the common good either in the short (e.g. construction stage) or long term (e.g. utilization of results).

In addition, the following points were to be elucidated with regard to participation in an existing international research infrastructure:

- The scientific significance of the infrastructure for Finland;
- Other utilization of the infrastructure in Finland;
- Annual membership fees payable by Finnish parties;
- User fees payable by Finnish researchers for the utilization of the infrastructure;
- The degree to which Finnish researchers utilize the infrastructure;
- The participation of Finnish doctoral students in courses and professional guidance provided by the infrastructure.

Project-specific peer evaluations by international experts in the disciplines concerned were a necessary stage in preparing decisions concerning the selection of projects for the roadmap and identifying existing national-level research infrastructures. Each panel spent three working days in Finland, during which a total of 61 hearings were held. The hearings were meant to clarify to panel members matters that had remained unclear in the Internet-based replies. Following a joint decision, a statement was drawn up on each project. In addition to statements on specific projects, each panel prepared a final report containing general recommendations and the results of evaluation. The recommendations of the International Expert Panels were addressed at an information and feedback seminar held in October 2008. The discussions in which the participants engaged and subsequent feedback were taken into account in drawing up the final proposals of the Steering Group.

Iceland

In accordance with work within ESFRind the interest of developing a national roadmap for RI, the Icelandic Science and Technology Policy Council appointed a committee in the fall of 2008 with the mandate of developing a roadmap for research infrastructures in Iceland.

The committee started working in the months following the collapse of the Icelandic financial system, and the roadmap that was developed reflects that fact clearly. The Icelandic government had to reduce the national budget dramatically, starting with the budget for the year 2009 through 2011. It is expected that reduced public expenditures will continue through 2012 at least. Having said that, it is obvious that allocation of funding will have to be prioritized with long-term objectives in mind.

Mapping of RI's started in 2007, and was an important basis for the work of the RI committee. The committee went a step further and sent out a questionnaire to the heads of universities and research institutions asking them to identify the major RIs at their institution and what would be considered the most vital RI both that they were using currently, or that was needed for scientific excellence.

The roadmap guidelines were approved by the STPC in May 2009. The roadmap identified the most important and prosperous facilities in the Icelandic research community. The aim was to ensure that these would be supported so that the Icelandic science community would not only pull through the financial crisis but continue to prosper. The focus was to support research infrastructures that would benefit the entire research and innovation community, with emphasis on eScience.

As an example of an RI that the RI committee deemed indispensable to the entire research community in Iceland is the Iceland Consortia for electronic subscriptions (www.hvar.is). It serves not only academic and research institutions but each and every computer in the country that is connected to the Internet through an Icelandic Internet Service Provider (ISP). Thus access to 8,000 journals in full-text, 2,000 journals in A&I and 12 databases are open in all of Iceland around the clock, irrespective of location or affiliation. This is a unique arrangement with publishers and vendors has been in use since 2002, and is based on the fact of the small Icelandic population. Negotiations with the publishers with the emphasis on the fact that in such a small market, the vendors would profit from having only one contact point for the whole country, thus lowering administration and marketing costs, became successful in this arrangement. With the financial crisis and the devaluation of the Icelandic currency the national access portal was in serious upheaval, and faced being shut down. The fact that the RI committee put emphasis on this indispensable infrastructure, in the roadmap made the authorities realize its importance and thus an action was taken in order for it to continue without interruption.

The STPC emphasised the following recommendations in the roadmap from 2009

1. To ensure future national access portal to databases and electronic journals.
2. To encourage Icelandic scientists to participate more actively in international research cooperation that uses eScience.
3. To form a task group to lead the "Future arrangement of databases in Iceland" project that will focus on database coordination, open access, intellectual property rights, accessible interface, security and usefulness, and administration and maintenance of databases.
4. To revise rules for refunding value added tax (VAT) for research supplies and equipment for publicly-funded scientific research.
5. To revise the legislation on the Equipment Fund to promote support for a variety of research infrastructures and to change the name of the fund to The Infrastructure Fund.
6. To target participation in international cooperation on research infrastructure, enabling Icelanders to participate more actively in international development of research infrastructures.
7. To promote the development of research infrastructures in high impact, well-established fields in Iceland

The science committee and the technology committee of the STPC have discussed the importance of research infrastructures at their recent meetings, with specific emphasis on a roadmap with more detailed national strategies and prioritization of funding. It has been proposed that a new committee or even a council on research infrastructures should be appointed by the end of 2010, with the mandate of revising the roadmap, and having a new roadmap by the end of 2012.

The committee/ council should further develop and streamline the national strategies, in close collaboration with universities and research institutions as well as the science and technology committees of the STPC. The national strategy should specifically identify which national infrastructures Iceland should plan to build up, as well as which ESFRI projects Iceland should participate in, including funding schemes.

Norway

The results of several surveys conducted in recent years prepared the Research Council well for the national strategy. A survey from 2004 indicated that investment needs for advanced scientific equipment in the university and university college sector already totaled an estimated EUR 325 million. The Research Council launched the strategy in 2008. One of the key objectives of "*Tools for research*", Norway's ambitious national strategy for research infrastructure, is to ensure that the Norwegian research community becomes internationally recognized for its provision of outstanding facilities for research activities.

Research will provide the key for dealing with many of the major knowledge challenges facing society today in areas such as health, climate and energy. World class research infrastructure will enable the research community to conduct high-quality research that in turn leads to effective solutions.

Increasingly, industrial competitiveness is founded on expertise and technology developed in collaboration with leading international academic environments with access to modern research infrastructure. The Norwegian research community must be in a position to offer a state of the art research infrastructure. This is important not only to ensure adequate recruitment of new researchers, but also to promote Norway as an attractive partner for international research cooperation and a desirable choice when domestic and international companies are considering where to conduct their research activities. Moreover, a high-quality research infrastructure promotes maximum utilization of the existing researcher resources, which is essential in times when researcher recruitment is insufficient.

The overall objective of the Norwegian strategy for research infrastructure is to:

- establish a research infrastructure that enables Norway to meet the challenges indicated above in a constructive, cost-effective manner;
- create a framework for effective assignment of roles and a transparent, strategic prioritization process that safeguards quality and ensures consistency in the procedures for awarding allocations;
- make Norwegian research groups known internationally for their ability to provide outstanding research infrastructure.

Targeted investment in advanced equipment will enhance the competitiveness of Norwegian trade and industry in the international arena. It will also help to promote Norway as an attractive partner for research cooperation with domestic and international companies, and will motivate top international researchers to come to Norway to conduct their research activities.

Moreover, a high-quality research infrastructure will encourage more young people to pursue a career in research and make it possible for Norway to get the most out of its existing researcher resources.

The strategy proposes a set of strategic priorities that cover the research and innovation areas expected to be of greatest importance in coming years, in addition to the introduction of an open competitive arena based on quality in research and innovation. Input from R&D institutions concerning large-scale nationally-oriented research infrastructure illustrates how the research community's own priorities support the selected strategic priorities.

The strategy proposes a prioritization and allocation process for investment in nationally-oriented infrastructure. This will provide added value in the form of an open, transparent competition for funds in accordance with strategic guidelines and principles set out in the individual funding announcement and will ensure that the allocating bodies take decisions that are in keeping with this strategy. It will also make it possible to assess investments in infrastructure and other research funding in an overall context and facilitate an optimal balance between infrastructure investments in Norway and abroad.

The strategy proposes that adequate and reliable long-term financing is ensured, through the establishment of a government fund for research infrastructure. With a start capital of EUR 2.5 billion, the fund would yield approximately EUR 100 million to be reserved for investment in new and existing research infrastructure and associated operational expenditures. The strategy further recommends that 25 per cent of the annual return is distributed as earmarked allocations over the budgets of the R&D institutions (universities, university colleges and independent research institutes), and the remaining 75 per cent is channeled through the Research Council.

The strategy proposes a practical model for provision of funding in which the R&D institutions would be given the general responsibility for procurement and maintenance of the infrastructure components needed to conduct and further refine their research activities. The Research Council would be made responsible for funding the components of nationally-oriented infrastructure that fall within a cost framework of EUR 250.000 to EUR 25 million. Investments that exceed EUR 25 million would be dealt with by the government ministries, as would the implementation of major, long-term commitments for international cooperation.

The Government white paper on research, *Climate for Research*, assigns the Research Council the responsibility for drawing up a Norwegian roadmap for investment in research infrastructure. The roadmap is to present national and international large-scale projects in which the Research Council recommends investing in the near future – within a realistic budget framework. The white paper stipulates that research infrastructure investments to be included on the roadmap must be selected on the basis of stringent criteria in terms of quality as well as relevance and benefit to society.

The roadmap published in 2010 is a direct follow-up of the white paper on research and is closely linked to the *National Financing Initiative for Research Infrastructure*. It also follows up the strategy *Tools for Research*. The Norwegian roadmap corresponds closely to similar national roadmaps that have been, or are being, drawn up in many other European countries. Together with the European Strategy Forum on Research Infrastructures' (ESFRI) European Roadmap for Research Infrastructures, the national roadmaps will help to clarify needs and interests when establishing common European priorities for important, large-scale, internationally-oriented infrastructures.

Projects submitted for the first funding round in 2009 under the *National Financing Initiative for Research Infrastructure* that fulfilled the criteria described below have been included on the roadmap. A total of 17 projects were qualified. The *National Financing Initiative for Research Infrastructure* only allocates funding to *nationally-oriented* projects. The establishment of the infrastructure must be of major interest to Norway as a whole. The Research Council incorporates considerations relating to the priorities set out in the white paper on research. As a general rule, only research infrastructures that will be available in only one or a few locations in Norway are granted funding and allocations are intended to support the activities of research groups that are already at the international forefront or demonstrate good potential realistically speaking to achieve that position. Access must be given to any groups outside the applicant institution that will need to utilize the infrastructure. Grant applications must include plans for user access.

The projects that have been included on the roadmap have received the mark of “Outstanding” after a thorough scientific review by international referees. They have also been reviewed by the Research Council and have been deemed to be of major strategic importance for Norwegian research.

Decisions regarding research infrastructure involving investments that exceed EUR 25 million will be taken at the ministerial level, based on recommendations from the Research Council. After consultation with the Ministry of Research and Education, research infrastructure of this magnitude may be included on the roadmap, provided that the project has been reviewed and assessed as having high scientific merit and strategic value. No projects of this type have been included on the initial version of the roadmap.

The Norwegian roadmap also includes projects on the European Roadmap for Research Infrastructures in which Norway has entered into binding agreements or has clearly signaled its desire to participate. Norwegian research groups are participating in the preparatory phase for these six projects. All the projects have undergone a thorough review by ESFRI and are also considered to be of major strategic importance for Norwegian research. None of the projects had come far enough in their planning process for the Norwegian research groups to seek funding from the Research Council in the first funding round under the National Financing Initiative for Research Infrastructure (in 2009).

Once the scope, orientation and international task-sharing have been specified for these projects, the Norwegian research groups that wish to participate must submit a proposal under the National Financing Initiative for Research Infrastructure. These proposals will be subject to the same assessment of scientific merit and strategic importance as a nationally-oriented project.

The roadmap thereby includes the following 3 most important elements:

1. An overview (“list”) of funded large scale research infrastructure projects under implementation
2. An overview (“list”) of mature (beyond planning phase and ready for implementation) research infrastructure projects of highest quality and priority, having passed both steps in the evaluation process (science case considered by international expert panels followed by strategic considerations by the Research Council).
3. Recommendations with respect to Norwegian participation in ESFRI projects

The white paper on research, *Climate for Research*, stipulates that the roadmap is to be updated in the wake of each major funding announcement for research infrastructure.

An updated roadmap will therefore be published in 2011. The Research Council is working to incorporate an update of the strategy *Tools for Research* in the roadmap at that time.

Due to the constraints of the financial framework and the rigorous prioritization process, the roadmap will only include a limited number of projects at any given time. An update of the roadmap subsequent to new funding announcements may result in the deletion of some of the projects listed there, to maintain a balance between national priority research areas, for example, or because they have been on the roadmap for a significant length of time without receiving funding.

In connection with new funding announcements issued under the National Financing Initiative for Research Infrastructure, projects on the roadmap may submit a revised proposal to update their project descriptions or make minor adjustments to their cost and funding plans or introduce administrative changes. A new grant proposal must be submitted if there have been major changes in scientific content or investment costs.

Projects that have been included on the roadmap but have not received funding will be given no intrinsic advantage over other projects during new funding rounds. Proposals for these projects must compete for funding on an equal footing with grant proposals for new projects. This will ensure that priority is always

given to the best projects when allocating grant awards and that adequate consideration is given to new needs and political priorities that may have emerged during the interval between funding announcements.

Sweden

In order to obtain a comprehensive view of Research Infrastructures (RI's) in the funding process and to avoid ad-hoc decisions, the Swedish Research Council established the Committee for Research Infrastructures (KFI) in 2005 which in 2009 became the Council for Research Infrastructures (RFI). From here on RFI will also denote KFI. RFI was charged with the responsibility for all RI's, national as well as memberships in international infrastructure organizations, which was considered instrumental to arrive at a well thought out RI strategy. RFI also has the mandate to handle RI's for applied research and in order to secure that applied aspects are covered, representatives for three agencies that fund applied research (FAS, FORMAS and Vinnova) are members of RFI. To produce a roadmap which would provide a long term strategic plan for the access to RI for Swedish scientists was one of the first missions for RFI. The first roadmap was published in 2006 and updated in late 2007. A second, comprehensive update is planned for 2011. The timing is such that a major update will be completed in due time before a new Government Bill on Research which is decided every fourth year.

The roadmap is essential for the Swedish strategy on RI's and has been a guideline in the prioritization process of the Council. The roadmap has, as planned, served as an input to the government when putting forward the Government Bill on Research to the parliament and also when deciding upon the yearly appropriation directions to the Research Council. The roadmap was probably necessary in order for the government to be able to increase the funding of RI's. The Wallenberg foundation has also consulted the roadmap by before funding decisions.

The process for the first roadmap 2006 started with an inventory of all existing and planned RI as well as the need for new investments in RI. A main part of the work was conducted by the four evaluation panels of RFI. Each evaluation panel covers one research field and typically consists of 6-8 active scientists of which the chair and vice chair are also members of the RFI.

The panels cover infrastructure for: Astronomy and Subatomic Research, Molecular, Cell, and Material Research, Earth and Environmental Sciences and eScience respectively. The panels were assisted by the secretariat at the Research Council. In addition to the inventory and needs analysis of RI's the panels wrote descriptions of their scientific fields elucidating the role of RI's. Finally the panels made recommendations, within their field, mainly regarding RI-projects with a very large potential for future research and research areas. The criteria guiding the panels when selecting the RI-projects include: they should offer the potential for world-leading research, be too extensive for single groups, include long-term planning, and be openly accessible to researchers. In the case of high demand for use of the RI, prioritization systems based on research quality should determine who should have access to the infrastructures. After being finalized by KFI, the roadmap was adopted by the Board of the Research Council.

As a part of the roadmap process RFI arranged hearings and seminars concerning e.g. XFEL, FAIR, ESS (neutron) and grid technology. The roadmap process was discussed with vice chancellors and deans at the universities and later they and the scientific councils were invited to comment a draft of the roadmap. Many opinions were also submitted through a Web-forum that was followed by an open seminar on the roadmap. It is also worth mentioning that the other funding agencies concerned (FAS, FORMAS and Vinnova) contributed to the roadmap have through their representatives in the RFI. This first roadmap was expected to guide decision makers in being the first document to give an overview, inventory and classification of RI in all areas. The roadmap did not rank the RI's but pointed out the importance to follow up the investments already made in RI's being in the construction phase with funding for operation and usage. The roadmap also lifted out RI-projects of major importance which were ready for a decision to start construction within a year.

The procedure for the 2007 update was similar with a major role given to the evaluation panels, opinions collected from the scientific councils, the universities, hearings and a web-forum. The update 2007 was completed in due time for the 2008 government bill on research and was expected serve as an input for the government. In the updated roadmap new RI projects judged to be the most urgent if Sweden was to maintain research of the highest were listed together with the estimated total cost of construction and annual operation and the projected timeframe for decisions.

Comments to the process. The process to produce the roadmap is multistep and has a rather long time span. This could be a problem but on the other hand the process needs time in order to result in a high quality document that is appreciated by the stakeholders. Another problem is the risk that some any area or infrastructure has been omitted. One reason for this could be that some research communities are not so well organized and therefore have not contributed in the process. However, in this case the field might not be mature enough for a national RI. The roadmap could create frustration if it is perceived that all RI's mentioned will be funded. It is therefore a task for RFI to properly market the roadmap.

The Funding of research infrastructure

Summary

All Nordic countries have funding schemes specific for infrastructures which have developed during the last five years. The decisions on RI funding are taken by the Research Councils in Norway and Sweden and by their correspondence in Finland, the Academy of Finland. In Denmark the funding decisions are taken by the ministry of Science, Technology and Innovation.

A funding scheme could be based on calls for applications or it could include a top-down process where strategic aspects and roadmaps play the most important role. The first Danish RI funding scheme to appear, "Infrastrukturpuljen", was based on applications whereas the new funding scheme, "Infrastrukturpuljen II", will be based on a national roadmap as is the funding scheme in Finland. Norway and Sweden publish calls for applications but their prioritization processes are guided by roadmaps.

When it comes to participating in international RI's in operation, the membership fees, at least for the convention bound RI's, are paid by the ministries in all countries except Sweden where the fees are taken from the budget of the research council. There are examples of Nordic collaboration concerning international RI's, through consortia as is case for ESRF or by operating a joint infrastructure like NOT.

The Nordic involvement in international RI's, shown in the table below, covers most research areas and are different in character: they include large experimental facilities (e.g. CERN), a database in social sciences (ESS) and research institutes (e.g. EUI). In some cases the involvement is indirect, through the membership in EU (JET, ITER) or OECD (Halden Reactor Project?).

Current International RI memberships across the Nordics

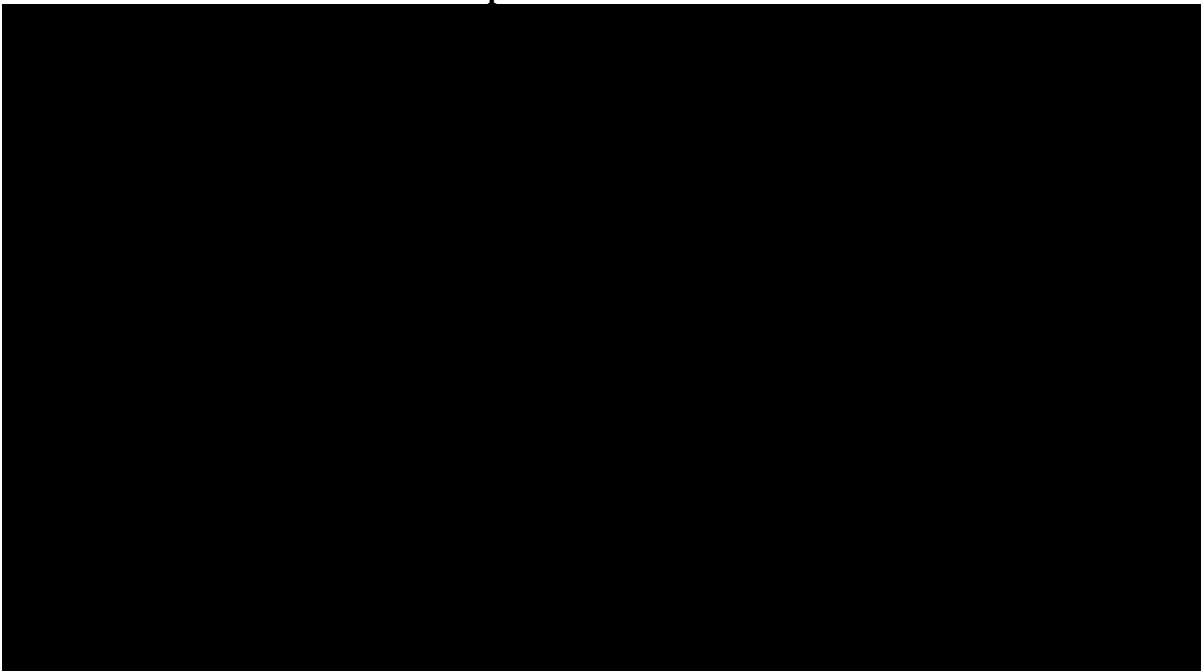


Table shows the involvement of the Nordic countries in international RI's where memberships are marked with green.

The Nordic countries collaborate concerning some of the RI. The membership of Denmark, Finland, Norway and Sweden in ESRF is through a consortium, Nordsync, where each country pays according to its use. The Nordic Optical Telescope (NOT) is a joint Nordic facility where all countries contribute according to a fixed distribution key (the key will most likely be changed to reflect the use of the experiment). EISCAT is a distributed RI with facilities in Finland, Norway and Sweden where also China, Germany, Japan and UK contributes.

Denmark

Funding and organization of research infrastructure policy in Denmark has developed incrementally. As a result of that, there have been an increasing number of arrangements and funding sources, which operates at different terms and with different application criteria, awarding mechanisms and aims (cf. table 5).

The division of labour in the Danish RI effort

actors Level	The Ministry of Science, Technology and Innovation	Research council	Universities	Private foundation
Equipment and minor research facilities	÷	+ < 500.000 Euro.	++	++
Establishment of large and medium-sized RI.	++ +2.7 M Euro	÷	++	+
Related research and access to RI	+ Ad hoc funding at Finance act.	+ Instrumentation center	(+)	÷
Members of the international RI	++ Conventional membership	+ Small memberships	÷	÷

++ Important actor, + Actor has some activities, ÷ Actor has a minor role

The funding of research infrastructure at Ministerial level

The Ministry of Science, Technology and Innovation has responsibility for those RI activities which are “national” - where the Danish researchers across institutions need access to modern research facilities either in Denmark or abroad. The national effort on RI has first and foremost been focused on the memberships of CERN, ESO, ESA, ESRF and EMBL and other major international research infrastructures, which are funded directly through an annual grant on the Finance bill.

The Ministry of Science, Technology and Innovation has in a number of years supported the availability of RI which demands a national level coordination: E-science, registry research and marine research. With the establishment of "Infrastrukturpuljen" in 2007 there has likewise been an opportunity to support the establishment of larger RI with national interest (typical projects bigger than 2.7 mill. Euro).

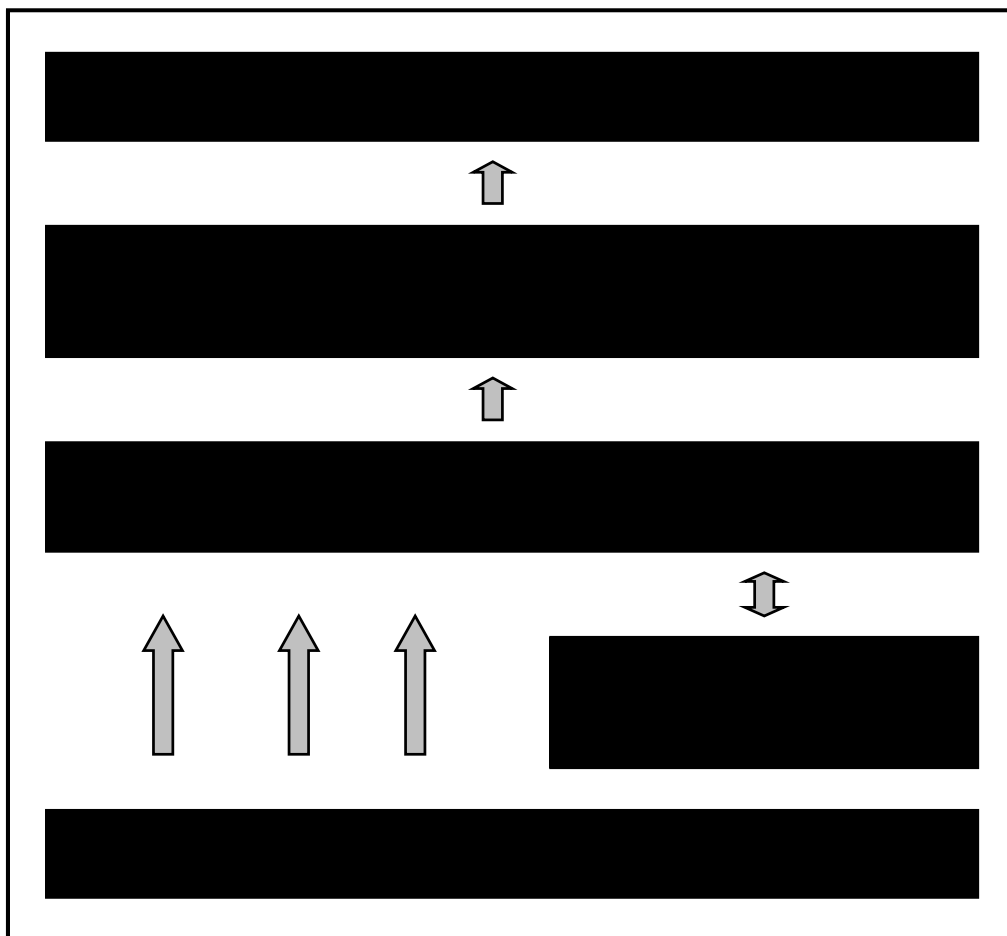
"Infrastrukturpuljen 1" – running from 2007-2009, had a total budget of approximately 80.5 M Euros divided into three annual calls at 26.8 million Euros. The aim was to ensure that Danish researchers have

access to modern and up-to-date research facilities – national as well as international. From the start it focused on supporting RI of national importance and RI of scale beyond that which the research institutions can be expected to finance. For this reason, projects eligible for the RI pot required an investment of no less than 2.7 million Euros.

The RI pot could finance up to 80 percent of the individual RI project investment. The research institutions were thus required to finance at least 20 percent of the initial investment and also for all operational costs – after the initial start-up period. Applicants were required to demonstrate that the proposed project was linked to the strategic priorities of the institutions and that the host institution had concrete plans for research activities connected to the RI. For these reasons only the Rector of the involved institutions could send in an application. All types of research infrastructure was eligible

The pool was executed by the Ministry of Science, Technology and Innovation on the basis of guidance from The Danish Research Coordination Committee – DRCC and the appointed Expert Committee for Research Infrastructure – EFI (fig. 2). The DRCC coordinates work in relation to issues of joint interest to the stakeholders and funders in regard to research policy, as well as advises the Danish Minister for Science, Technology and Innovation as well as the Danish Parliament and the Government on several research issues including Research infrastructure

Figure 2 Execution of Infrastrukturpuljen 2007-2009



The three-year funding was financed through the Globalization Initiative already mentioned. For the period 2010-2011 an additional funding of 32 mill Euros was set aside for research infrastructure through the

Globalization Initiative funding pool. These funds will be allocated through the roadmap process described elsewhere. Currently there has been no governmental decision on funding after 2011. This will most likely be part of the negotiations about the Globalization funds for 2012 and forward.

The RI activities of the research councils and the universities

The research councils have for a long time supported a range of national RI activities and obligations. The research councils have supported the memberships of CERN, ESO and ESRF, by providing funding for the “membership related” research. The research councils have also financed memberships of a number of smaller international RI’s including access to other synchrotron- and neutronsources, just as they have supported purchase of apparatus, survey data, registry access and the access to RI either as separate funding or as a part of funding for specific research projects. For one thing the Danish Research Council for Social Science is financing the Danish participation in European Social Survey. Finally the Danish Research councils also finances Ph.D. and postdocs at international RI facilities.

The universities and other research institutions play a crucial role when it comes to establishment, maintenance and operation of apparatus and research facilities at the individual institution. The universities have typically focused on apparatus and small and medium scale facilities. But in recent times there have been a number of cases in which universities have been financing the establishment of quite large RI (Most noticeable the Danchip cleanroom facility at DTU, with an investment cost of 80 mill Euro). Even though there is no clear picture of the level of RI investments by the universities it most likely exceeds the RI funding from the research councils considerably.

RI Related research – better access to research facilities in Denmark and abroad

One place in which a clear and precise division of labor is missing is in the area of RI related research where research councils and the Ministry of Science, Technology and Innovation have supported the researchers’ access to research facilities in Denmark and abroad.

Today, The Danish Council for Independent Research is supporting three RI related research centers for the utilization of the Danish memberships at CERN, ESO and ESRF and other international RI’s. Furthermore, there are a number of similar and/or related research activities, which are financed through different funds on the finance Bill (Danish Center for Scientific Computing, the Coordinating body of Register Research and Danish Center for scientific marine research). Overall, this amounts to around 6.7 million Euros a year.

At the same time, the need for further RI research centers is likely to increase in the near future. This is not at least because of the increasing number of international memberships Denmark is likely to become involved in henceforth. But this puts the current system under stress. Already the Danish Research Council for Natural Sciences uses around 10 % of its research funds on RI related research. Thus, within the existing setting there is no room for initiating more RI initiatives without tying up a significant portion of the councils funds. For this reason a longterm solution for the funding of activities related to the international RI memberships is required, as the current setup limits the councils ability to make its own priorities based solely on competition driven excellence. Since Denmark expects to join several international RI facilities this issue needs to be resolved, and is expected to be addressed in the roadmap process.

International RI. Membership fees for the existing international memberships (CERN, ESRF and ESO and others) are funded directly through an annual grant on the Finance bill. Research and other costs (travel, etc.) in relation to international memberships (følgeforskning) are financed through grants from the Natural Sciences Research Council or by the institutions themselves.

DASTI has recently made an organizational change, in which the Research Infrastructure Unit and the Unit handling memberships (CERN, ESA, ESO, EMBL and ESRF) have been merged into one unit, in order to

exploit the synergies between those handling ESFRI and national roadmap process, and those handling the existing RI memberships.

Also, the issue of upgrades on existing memberships is something that might need more attention nationally (ESRF, ILL, E-ELT). Since the upgrades are likely to increase existing membership fees, and in effect ties up an increasing part of the overall budgetary frame of all the research councils, including research councils that has no part in the upgrades, a broader attention and prioritization will probably be relevant.

Finland

The funding of existing and new national and international research infrastructures is coordinated between research funding agencies, universities and research institutes, taking into account the cooperation and possible funding contribution of different administrative sectors.

Proposals to include a centralized funding scheme for RI in the state budget have been made, but the government has not been able to make this decision due to economic difficulties. It was estimated in the national-level roadmap (2009) that the additional costs of implementing the roadmap will total approximately €30 million per year, while the costs of current national and international research infrastructures are around €160 million a year. In the performance target negotiations held between the Ministry of Education and the Academy of Finland, it was agreed that the Academy will implement a call for research infrastructures in 2009 and 2010.

The aim of the Academy of Finland's infrastructure calls is to enhance the quality of Finnish science and research, to improve its competitiveness and capacity for renewal, to promote interdisciplinarity, to increase the attractiveness of Finnish research environments and to promote both national and international cooperation between university research teams and individual researchers.

In 2009, the Academy of Finland has earmarked altogether € 2 million for the following ESFRI projects on the priority list of the Finnish RI Roadmap (2009): ICOS and the consortium of bioscience projects (BBMRI, ELIXIR and EATRIS).

The budget of the call in 2010 amounts to a total of EUR 20.8 million. In addition to the EUR 20.8 million, the Academy of Finland has in its 2010 call earmarked € 5 million for the following ESFRI projects on the priority list of the Finnish RI Roadmap (2009): ICOS and the consortium of bioscience projects (BBMRI, ELIXIR and EATRIS).

An individual funding decision will be a minimum of EUR 300,000 and a maximum of EUR 1.5 million. The Board of the Academy of Finland will decide on the infrastructures to be funded on the basis of the proposals by a broad-based sub-committee appointed by the Board and on the basis of national science policy aspects.

The applications will be reviewed based on:

- Scientific quality and innovativeness of the project (scientific review)
- Structure and cooperation of the project (structural maturity)
- Planning and implementation of the project (maturity of financial planning)
- Competence of principal investigator (coordinator) and key persons in terms of project implementation (management and administration)
- Services the infrastructure will offer to users and researchers' access to use the research infrastructure (service availability to users)
- Societal impact of the project (training, employment, links with Strategic Centers for Science, Technology and Innovation or with the business sector).

International RI. Membership fees for the existing international memberships (CERN, ESO, EMBO, EMBL, ESRF and ESO) are funded by Academy of Finland as well as research and other costs (travel, etc.) in relation to international memberships by the Research Councils. Others such as GBIF, ICDO, IODP, NOT and EISCAT.

Decisions regarding research infrastructure participation and financial commitments are always taken at the ministerial level. The Research Council monitors the international memberships. The Research Council is also responsible for the national coordination of several international science organizations and contributes to their operation by funding research projects and travels necessary for communication.

Iceland

Membership fees for international memberships are paid by the ministries. These include JRC, EMBO and EMBL that are funded through the Ministry of Education, Science and Culture. Memberships were initiated by the recommendation of the science committee and the technology committee of the STPC. There is also a working group, consisting of members of both committees, as well as the Ministry and Iceland Centre for Research (Rannis), that evaluates participation in smaller international research infrastructures. It has been acknowledged that the research community should be encouraged to participate more actively in these research infrastructures.

Memberships to JRC, EMBO and EMBL are included in the roadmap from 2009. Others such as GBIF, ICDO, IODP, NOT and GEANT were not included, and the listing is not complete.

Decisions regarding research infrastructure participation and financial commitments are always taken at the ministerial level, based on recommendations by the science committee and the technology committee of the STPC.

Norway

The Research Council has established a new funding scheme for research infrastructure. This has been made possible by an increase in funding for the Fund for Research and Innovation earmarked for research infrastructure and other funding allocated by the Government over the national budget for 2009. The funding scheme has an initial annual budget of EUR 17.5 million from 2010 and EUR 35 million from 2011.

The Research Council's funding scheme for national research infrastructure will initially run for a ten-year period from 2009 with a total budget of EUR 337.5 million. The funding scheme for national research infrastructure comprises all types of research infrastructure such as:

- advanced scientific equipment
- large-scale research facilities
- scientific databases and collections
- electronic infrastructure (eInfrastructure)
- support for Norwegian participation in establishing ESFRI projects.

Nationally-oriented infrastructure

Funding for research infrastructure allocated through the Research Council is targeted toward projects that are of national function, i.e. infrastructure components that:

- are of widespread national interest;
- lay a foundation for cutting-edge research;
- will be available in only one or a few locations in Norway;
- will be made accessible to relevant researchers and industries on a nationwide basis.

The investments in research infrastructure are intended to promote the national priority areas and technologies, support initiatives relating to innovation and basic research, and contribute to the coordination, further development and accessibility of national databases and eInfrastructure. The national priority areas and technologies are energy and the environment (including climate), oceans, food, health care, new materials and nanotechnology, ICT and biotechnology.

The initiative also provides funding for Norwegian participation in Nordic, European and other international cooperation on research infrastructure, including Norwegian participation in the construction phase of ESFRI projects. With regard to internationally distributed research infrastructures, the initiative may support the construction and operation of the Norwegian node of the infrastructure.

The Research Council has designed this scheme to ensure an adequate interface between the research infrastructure and other research funding and to facilitate assessment of the funding balance between national investment and participation in international research infrastructures.

The call for proposals encompasses universities and university colleges, research institutions that comply with the guidelines for government basic funding of research institutes, and publicly funded administrators of research infrastructure working in close cooperation with Norwegian research institutions.

Assessment procedure for grant applications

Grant applications are assessed in a step-by-step process. All grant proposals will initially be assessed by advisory committees comprised of external referees (called referee panels). This scientific assessment serves as a type of pre-qualification process. The “prequalified” grant proposals will then be submitted to the Research Council administration, which will carry out an overall assessment and prepare a recommendation to be submitted to a steering committee comprised of members of the Executive Board and the Division Research Boards who are not disqualified in relation to the applications. The assessment criteria employed by the various panels are described in greater detail in a separate attachment that may be downloaded via the call for proposals on the Research Council website. The makeup of the referee panels will be determined in relation to the scientific profile of the grant applications received. Almost all panel members will be international referees to ensure that they are not disqualified in relation to the applications.

Applications for “large-scale infrastructure” are also assessed in a two-phase process. All grant proposals are initially assessed by advisory committees comprised of external referees (called referee panels) before assessment by the Research Council administration.

The first part of the administrative review corresponds to the procedure for grant applications that are not for “large-scale infrastructure”. The administrative review panels draw up lists ranking “large-scale infrastructure” in specific thematic and/or technology areas. The assessment also incorporates all the projects included on the Norwegian Roadmap for Research Infrastructure. On the basis of the ranked lists from the administrative review panels, the infrastructure group will draw up a recommendation for which applicants to invite to dialogue meetings to discuss their large-scale infrastructure projects before being invited to submit a revised grant proposal. The recommendation will be submitted to the steering committee for approval. The applicants will revise their grant proposals on the basis of the various assessments and the dialogue meeting. Applicants may respond to the comments of the referee panels in a separate letter attached to the revised grant proposal. The Research Council administration will determine whether such letters should be presented to the referee panels. If they are, the referee panels, after a virtual meeting, will advise the Research Council administration on whether the comments have been dealt with in a satisfactory manner. Following this, a final overall administrative assessment will be conducted, culminating in a list recommending grant applications for funding. This recommendation will be submitted to the steering committee at a second meeting.

International RI. Membership fees for the convention bound research infrastructure organizations CERN, ESRF, IARC, EMBL and ESA are funded directly through an annual grant on the Finance bill. In addition the Research Council funds the memberships of NOT and EISCAT. The Research Council

monitors the international memberships by participating in councils, science policy committees, finance committees and working groups. The Research Council has research programs with rather limited budgets with open annual calls for ESRF, CERN and ESA, NOT and EISCAT to fund the obligations for Norway as partner and to enhance the national utilization of these research infrastructures.

The Norwegian Roadmap 2010 for research infrastructure is a result of the National Financing Initiative for Research Infrastructure (INFRASTRUKTUR)¹. The Roadmap does therefore not include the existing convention bound memberships for Norway. The National Financing Initiative provides funding for future Norwegian participation in Nordic, European and other international cooperation on research infrastructure, including Norwegian participation in the construction phase of ESFRI projects. With regard to internationally distributed research infrastructures, the initiative may support the construction and operation of the Norwegian node of the infrastructure.

The Norwegian roadmap 2010 includes the ESFRI-projects in which Norway has entered into binding agreements or has clearly signaled its desire to participate. These are CESSDA, SIOS, ECCSEL, EISCAT 3D, ESRF Upgrade and ESSNeutrons. Norwegian research groups are participating in the preparatory phase (or implementation phase) for these six projects. All the projects have undergone a thorough review by ESFRI and are also considered to be of major strategic importance for Norwegian research. None of the projects had come far enough in their planning process for the Norwegian research groups to seek funding from the Research Council in the first funding round under the National Financing Initiative for Research Infrastructure (in 2009). Once the scope, orientation and international task-sharing have been specified for these 6 projects, the Norwegian research groups that wish to participate must submit a proposal under the National Financing Initiative for Research Infrastructure. These proposals will be subject to the same assessment of scientific merit and strategic importance as any other RI- project.

Decisions regarding research infrastructure involving long-term international commitments will be taken at the ministerial level, based on recommendations from the Research Council.

Sweden

The funding schemes for RI's are based on the observation that the development of research infrastructures includes several phases. For example, an infrastructure's lifecycle might include the following phases: Idea, Concept development, Design studies, Planning of construction, Coordination of involved parties, Construction, Operation, Upgrading and Phase-out.

The need for funding differs by phase. The idea and concept development phases generally focus on research and fit within the framework of project grants. Design studies and construction planning have the specific objective of creating an infrastructure and usually require special financing. The construction phase involves major investment costs for a limited time. In the operational phase, the minimum level of financing needs to be assured for a longer period, and the accumulated total costs can be high. Generally, infrastructures need to be upgraded occasionally or gradually to maintain their competitiveness, which requires funding new investments. Finally, most infrastructures are eventually phased out, which is associated with substantial costs for decommissioning of technical equipment and phase-out of staff, etc. Hence, a phase-out plan should be established even before the decision is made to construct an infrastructure.

Meeting the long-term infrastructure needs of Swedish researchers thus requires a range of different funding options. Of the funding options available from the Swedish Research Council, the following are relevant from an infrastructure perspective:

- Project grants to generate ideas and concepts
- Planning grants for design studies and planning of construction or collaboration (approx. EUR 550.000/year 2009)
- Grants for expensive scientific equipment (approx. EUR 8.25 million/year 2009).

¹ The National Financing Initiative for Research Infrastructure (INFRASTRUKTUR) is a 10-year program (2008-2018) and is funded by allocations from the yield of the Fund for Research and Innovation.

- Grants for large databases to develop and maintain quality assured databases made accessible to researchers (approx. EUR 3.2 million/year)
- Operational grants to operate joint research infrastructures. (approx. EUR 19.7 million/year)

There is an annual call for all the infrastructure grants mentioned above in April and where the funding decisions are taken in November. The peer review process adopted is a three stage process. First the applications are reviewed by at least one evaluation panel from the scientific councils who evaluates the scientific merits of the application. Then the infrastructure aspects, e.g. how the criteria for infrastructures are met, of the applications are evaluated by one of the four evaluation panels of the RFI. In the third stage, a group with one representative from each of the four evaluation panels merges the ranking lists from the four evaluation panels into a single list. This ranking list is then put forward to the RFI for decision.

There has also been one special call in 2009 for extensive infrastructures ready for construction during 2010. The call was limited to RI listed in the roadmap and was evaluated with the help of an international panel. Almost all of the funded projects were related to ESFRI.

Other public research funding bodies also contribute to the research infrastructure. For instance, the Swedish Research Council for Working Life and Social Research (FAS) partly finances several international databases and also databases at the national level. The Swedish Research Council for Environment, Agricultural Sciences, and Spatial Planning (Formas) does not directly fund infrastructures, but like the Swedish Research Council provides support to research projects and medium cost scientific equipment (up to EUR 185.000) that can generate ideas and concepts. The same applies to the Swedish Governmental Agency for Innovation Systems' (VINNOVA) programs. The Swedish National Space Board finances various distributed projects, e.g. in astronomy and environmental and climate monitoring. Over the years, the Knut and Alice Wallenberg Foundation has been the dominating source of funds for investments in advanced equipment and infrastructures. Hence, the Foundation has played a decisive role in many of the infrastructures that Swedish researchers use and for advanced equipment at Swedish universities. The Bank of Sweden Tercentenary Foundation finances the preservation of cultural heritage and digitization of images and text material, among other things.

After consultation with the Ministry of Research and Education, membership in new international research infrastructures that are not already included in the National Roadmap 2010, may be funded and included on the roadmap, provided that the project has been reviewed and assessed as having high scientific merit and strategic value.

International RI. Memberships in international infrastructure organizations are handled by RFI in principally the same way as other RI's and are included in the roadmap process. In this process the costs and benefits of joining an international infrastructure organization are compared with other alternatives (e.g. building a national RI) to satisfy the RI needs in that research area, but is also compared with RI efforts in other areas. However, convention bound RI organizations like CERN, ESO, EMBL, XFEL and ESRF are initially negotiated by the government and any change in the convention or agreement has to involve the government. The government has handed over the administrative responsibility to VR for these organizations including payment of the membership contribution which are not, however, earmarked in the contributions in the appropriations directions. This means that cost increases in membership fees are not compensated by the ministry. Non convention bound RI's like ILL, where VR/RFI owns the agreement means that a change to the agreement can be handled through a decision at RFI. Administratively they are handled the same way as the convention bound RI's.

VR monitor the international memberships by participating in councils, science policy committees, finance committees and working groups. In general VR is represented by one scientist and one VR employee in the council, a scientist in the science policy committee and a VR employee in the finance and other administrative committees. Our experience is that in order to get good feedback and reporting it is preferable that the scientist is a member of the RFI or one of its working groups.



norden

NordForsk

Processes of national decisions on ESFRI-infrastructures

So far, most of the official commitments to implementation of research infrastructures on ESFRI Roadmap in the Nordic countries are results of clear political priorities and initiatives to ESFRI to host these infrastructures. This is the case for ESS in Sweden and Denmark, SIOS, ECCSEL and CESSDA in Norway and ICOS in Finland. . Iceland has made no commitments so far to host an infrastructure in the ESFRI Roadmap.

The Nordic countries have slightly different processes to decide on implementation of research infrastructures in ESFRI Roadmap. However, the general picture is that national decisions are results of the evaluation and prioritization processes of applications or proposals from open calls or calls restricted to “large-scale research infrastructures”. These proposals or applications are processed in competition with all other proposals or applications for research infrastructure funding. The prioritization processes are performed based on scientific and technical evaluations from international expert panels and strategic evaluations by the funding research councils or ministries. The national roadmap processes in the Nordic countries ensure that the prioritization of funds for RI, including ESFRI, is based on an overall assessment of needs for national research facilities in a European and international perspective.

A common issue that makes decisions on long-term commitments to ESFRI projects difficult, is the difficulty in estimating *when* a given project needs funding in combination with annual/short-term budgets from the governments. Norway is the only Nordic country that has solved this issue by setting up a research fund with a predictable annual budget for investments in research infrastructure for the period 2009-2018.

Denmark

For future RI projects, including ESFRI, the prioritization in Denmark will be based on a roadmap process, which prioritizes the most important RI investments to be made. The roadmap process can hopefully give a larger degree of financial flexibility, since the scientific prioritization has a longer timeframe than one year, and since DASTI has more control over the timing of funding of individual projects. This will allow DASTI to postpone funding of projects and/or to maintain funds in order to “save up” for a substantial commitment once that project is ready for funding.

All projects will be prioritized first, and then the actual level of funding needed will be worked out afterwards. Even though all projects will have to be prioritized with reflections to their expected costs, there is an inherent risk that once projects get prioritized (get on the go-ahead-list) the costs will increase. Perhaps, this is more of a risk regarding national RI projects, than ESFRI projects, since less preparatory work has been done on national RI before prioritization. (Any decision on Danish participation in ESFRI projects will be based on specific cost calculations). But since both ESFRI projects and national projects are going to be funded from the same pot, there is a risk that increased cost in one project affects the ability to fund other projects. DASTI will probably give some indicative figures for each of the prioritized projects, but apply that flexible, depending on the actual needs in the different projects. Most likely, some projects will not be able to finalize the preproject within the funding period, and would then be postponed, leaving more funds to be distributed to other projects.

Iceland

The Icelandic Science and Technology Policy council (STPC) has analyzed the challenges facing Iceland in science, technological development and innovation to the year 2020, identifying the areas that are strong in Iceland and encouraging further investment in these areas. These areas include health sciences, national heritage and sustainable utilization of natural resources on land, offshore and in the ocean. A committee on research infrastructures that was appointed in the fall of 2008, right before the collapse of the financial

system in Iceland, also put emphasis on these national priority areas, and the importance of ensuring that the most important and prosperous facilities in the Icelandic research community would continue to prosper.

In Iceland, the decisions on which ESFRI projects Iceland should participate in has mainly been based by the initiative by individual research groups. In the ESFRI preparatory phase the Ministry of Education, Science and Culture has provided support letters to the ESFRI consortium, for research groups to participate in the preparatory phase. These support letters have specifically stated that support does not include any legal or financial obligations by the Icelandic authorities. So far five groups have been supported.

The decisions for participation in ESFRI projects or other international collaboration have to be discussed and approved by the Science and Technology committees of the STPC, including the scientific value and whether the project is in line with national interests and priorities of the national science and technology policy. The final decision is made by the minister based on these recommendations.

Norway

The process in Norway for decisions on implementation of ESFRI-projects is strongly linked to the *National Financing Initiative for Research Infrastructure* which has regular open calls. The investments in research infrastructure are intended to promote the national priority areas and technologies, support initiatives relating to innovation and basic research, and contribute to the coordination, further development and accessibility of national databases and infrastructure.

ESFRI preparatory phase

The Research Council provides support for participation in the preparatory phase of ESFRI-projects based on applications. The Research Council may participate as a co-applicant in the projects which are given the highest priority, and provides a letter of support to the ESFRI-consortium. The support does not provide commitments from Norway to contribute to the construction phase of the ESFRI-infrastructure.

ESFRI construction phase

When it comes to funding the implementation of ESFRI-projects, the prioritization process does not differ from the prioritization process of other research infrastructure projects. National representatives for the ESFRI-projects apply for funding through the standard financial instrument in competition with each other, as well as with other projects.

All grants for investments in research infrastructure are based on scientific quality and strategic importance of the research infrastructure in the applications. First, proposals are ranked on their scientific merit by a panel of expert referees, and then reviewed by the Research Councils administration, which assesses proposals to ensure that investments comply with the other criteria in the call for proposals including the relevance for national strategic priorities. The national priority areas and technologies are energy and the environment (including climate), oceans, food, health care, new materials and nanotechnology, ICT and biotechnology.

The final framework for the Research Council's allocations to approved projects will be dealt with in contract negotiations, which will clarify the responsibilities and contributions of all relevant partners and funding sources.

Decisions regarding research infrastructure involving long-term international commitments and ESFRI-projects must be approved at the ministerial level, based on recommendations from the Research Council. After consultation with the Ministry of Research and Education, membership in new international research infrastructures that are not already included in the National Roadmap 2010, may be funded and included on

the roadmap, provided that the project has been reviewed and assessed as having high scientific merit and strategic value.

Monitoring the ESFRI-projects

The Research Council closely monitors the status and progress of all ESFRI-projects with Norwegian participation. Annual status reports are worked out to the Executive Board and the Ministry of Education and Research. These reports are available on the Research Council's web-site.

In ESFRI-projects for which Norway offers hosting, representatives from the Research Council or the Ministry of Education and Research participate in council and stakeholder meetings as well as in work packages.

Sweden

VR/RFI essentially provides two types of support for ESFRI-projects, funding and preparatory phase support. When it comes to funding, the prioritization process for ESFRI-projects in general does not differ from the prioritization process of other infrastructure projects. Representatives for the ESFRI-projects apply for funding through the standard financial instruments in competition with each other, as well as with other projects. The financial instruments include planning grants at an early stage of a project, and grants for expensive equipment and operation at later stages.

ESFRI preparatory phase support. VR can support projects that are in the process of applying for EU preparatory phase support. The process usually starts with a seminar for interested scientists arranged by RFI where the ESFRI concept is presented and where coordinators for ESFRI-projects already in the preparatory phase convey their experiences. The seminar is followed by a call for submitting expressions of interest. A hearing to evaluate the expressions of interest is arranged and plays an important role for selecting the projects to support. The main questions at the hearing have been:

- In what way is the participation in the infrastructure project expected to strengthen Swedish research and to give prerequisites for new discoveries within the research areas concerned?
- How will the conditions for the concerned areas change if Sweden participates in the ESFRI project in question?
- What is your idea of the Swedish participation; scientifically, organization and budget wise?
- How large is the interest for the project today among Swedish scientists and how are they organized?
- Are there established contacts with other European stake holders?
- How do the Swedish plans fit with regard to the European plans concerning schedule, effort, and organization?

At the hearing the secretary general of RFI, the chairpersons and relevant experts of the evaluation panels conduct the hearing and later put forward a recommendation for prioritization of the projects to RFI. RFI decides if to support a project as a co-applicant, or to provide a letter of support or to give no support at all. However, a project at the lower degree of involvement (a letter of support) may at a later stage reach a more mature level which makes VR to increase its degree of involvement. A very important aspect is that neither of the support levels means any financial commitments from VR.

ESFRI construction phase support. In order to obtain funding, representatives for ESFRI-projects have submitted applications to VR in response to regular, open calls but also to a call restricted to "large-scale research infrastructures mature enough to start construction in 2010". The prioritization of which ESFRI-projects to fund is done by the RFI and its four evaluation panels, sometimes assisted by international experts. One example is the international panel that provided an international perspective of the applications in "large-scale research infrastructures ..." by trying to answer questions like:

- Give an international perspective on the research made possible by the infrastructure? Trends, tendencies, etc.



- Are there similar or rivaling infrastructures (existing or planned in the field? If yes, how important is the proposed infrastructure for scientists in comparison to using competing infrastructures.
- Is the planning and building of the infrastructure timely in an international perspective?
- Is the proposed infrastructure technically and organizationally feasible?
- How well does the Swedish proposal correspond with the European/international plans for the project in question?
- What is the quality of the proposed Swedish infrastructure/Swedish node to an international infrastructure/the Swedish contribution or use of the international infrastructure in comparison to the international standard of existing or planned infrastructures in the field

A general finding of this panel was that several of the proposals focused only on the national part, presenting no plans for how to be organized in relation to the European infrastructure, or what the Swedish part will contribute or benefit from the European project. Another concern of the panel was that for several proposals it was not clear that the main issue of the proposal was to provide an advanced research infrastructure to serve a broader user community rather than only a collaborative project, an excellence center or service to the local researchers.

Monitoring the prioritized projects. For ESFRI-projects in the preparatory phase there are, as mentioned earlier, two degrees of the VR involvement: VR could be either co-applicant or providing a letter of support.

Concerning the lower degree of involvement (letter of support) VR maps the progress on the European level through its representatives in ESFRI and ESFRI's Roadmap Working Groups but does not participate in council or stake holders meetings. On the national level VR basically relies on reports from the scientists involved in the Swedish part of the project. It could be the case, however, that VR provides administrative support to facilitate the start-up of projects in an important area in order for the project to progress.

In the case of being a co-applicant, VR is more active. On the European level VR representatives participate in council and stakeholder meetings as well as in work packages. On the national level VR closely monitors the activities and could provide some assistance in the organizing the project.

When ESFRI projects have reached a construction phase and an agreement has been signed, the VR involvement starts to resemble the involvement in existing international infrastructure organizations. This means participating in councils or steering committees and financial committees. In addition VR could contribute to the administration of in kind contributions to the infrastructure, as is the case with XFEL and FAIR.

Finland

Following the recommendation given in the Science and Technology Policy Council's report of 2006, the Finnish Ministry of Education in association with the Ministry of Trade and Industry appointed a Committee which was entrusted with the following tasks:

- To draw up a proposal for procedures for identifying and evaluating the need for establishing significant new research infrastructures at the national level or for developing existing infrastructures, and for the procedures of prioritizing projects
- To prepare a proposal for a system for funding research infrastructures and for a division of tasks among financing parties, taking particular note of significant common infrastructures of several organizations or different sectors of administration as well as international infrastructures; and
- To carry out a preliminary mapping in collaboration with the Research Councils of the Academy of Finland and Tekes (Finnish Funding Agency for Technology and Innovation) of significant national research infrastructures and to make proposals on their renewal and development.

The purpose was to prepare a so-called national roadmap to be updated at intervals of 2–3 years concerning the infrastructures that will be needed over following 10–15 years with regard to national needs and developments at the international level. The mapping work was noted to be such an extensive and time consuming task that the Committee felt that it could not carry it out with its own resources. In its report presented in 2007, the Committee proposed that the national-level infrastructures and participation in international infrastructures were to be mapped and a roadmap of new needs was to be drawn up. This proposal was widely supported in related comments. In January 2008, the mapping of national-level research infrastructures in Finland was launched, with funding from the Ministry of Education. On the 16th of January 2008, the Ministry appointed a Steering Group for this work, representing various sectors of administration, scientific and scholarly communities, funding parties, and the private sector. The mapping was carried out by the Federation of Finnish Learned Societies. Parties involved in the mapping were able to make proposals regarding participation in present or future international infrastructures or for renewal or new national research infrastructures.

The report on the *National-level Research Infrastructures – Present State and Roadmap* was published in the beginning of 2009. The Steering Group listed 24 projects as significant national-level infrastructures in Finland, and accepted 20 proposals for the roadmap, thirteen of them are associated with ESFRI's roadmap projects. However, the projects that have been included on the roadmap will not be given any special status over other projects, as the roadmap is a consultative document. Potential funding for the projects must be applied separately from the funding organizations.

So far, governmental or ministerial level commitments have only been made on one ESFRI-project (FAIR). Nevertheless, a MoU or a letter of intent has been signed for many ESFRI-projects at the ministerial level. The negotiations take place between the Finnish applicant and the Ministry in question. The Academy of Finland is not responsible for the negotiations, but may be consulted about projects.

Initial findings - collaboration

NRIN has scanned the ESFRI list in order to identify those projects worth pursuing at Nordic level (see the table: Status of ESFRI projects across the Nordics)

However, NRIN has not scanned the entire Nordic research area, but have focused on identifying those key collaboration initiatives on research infrastructure projects that A) are of great scientific importance across the Nordics and B) in which Nordic collaboration is fruitful or cost-effective. What has been critical is that there should be an obvious added-value from a national perspective in increased Nordic collaboration, compared to the national OR European perspective.

The findings are limited to the information and time available. This means that this should in no way be considered a total scan of the potential for Nordic research infrastructure collaboration. Also, none of the recommendations are "cleared" at national level. The recommendations are suggestions for actions, but will need further investigation.

First of all, most or all of the Nordic countries should have expressed an interest in the ESFRI project. From this process it was clear, that the main areas of interest were within Environment and Health and a few other projects.

It should be noted, that the focus of the first project year has been on understanding national systems and roadmaps, not on proactively identifying projects for collaboration. The following should therefore be treated as indicative findings for further investigation.

It is important to notice, that the projects identified are those that were considered worth taking a second look at, after filtering out projects on the ESFRI list, that did not seem to have a potential for Nordic collaboration. In order to identify those projects that should be investigated further a multistep process has been used.

Step 1 criteria

- At least three Nordic countries must have expressed an interest in the ESFRI project?
- The ESFRI project must seem to have a potential for further Nordic collaboration that would add value
- Nordic collaboration on a particular ESFRI project should be feasible and/or desirable?

Based on those criteria, NRIN has scanned the ESFRI list.

In the table on the next page, those projects which the Nordics have an interest in are marked in green. An interest could mean anything: from someone at a university being involved in the preproject to an official signing of an ERIC. The table is only meant to indicate some level of interest in the project.

TABLE: Status of ESFRI projects across the Nordics

ESFRI projects		Denmark	Norway	Sweden	Finland	Iceland
Social Sciences and Humanities	CESSDA					
	CLARIN					
	DARIAH					
	ESSurvey					
	SHARE					
Environmental Sciences	AURORA BOREALIS					
	COPAL					
	EISCAT_3D					
	EMSO					
	EPOS					
	EURO ARGO					
	IAGOS					
	ICOS					
	LIFEWATCH					
SIOS						
Energy	ECCSEL					
	HIPER					
	IFMIF					
	JHR					
Biological and Medical Sciences	BBMRI					
	EATRIS					
	ECRIN					
	ELIXIR					
	EMBRC					
	EU-OPENSOURCE					
	EuroBioImaging					
	European BSL4					
	INFRAFRONTIER					
INSTRUCT						
Materials and Analytical Facilities	EMFL					
	ESRF UPGRADE					
	EUROFEL (IRUVX-FEL)					
	ESSneutrons					
	XFEL					
ILL 20/20						
Physical Sciences and Engineering	CTA					
	E-ELT					
	ELI					
	FAIR					
	KM3NeT					
	PRINS					
	SKA					
SPIRAL2						
ICT	PRACE (ex HPC)					

Based on the criteria of step 1, it was easy to identify potential projects, and those that had no short term potential:

- Within Physics and Engineering and Energy there were no common Nordic priorities on the ESFRI list.



- Within Materials Science, there were three projects of common interest: XFEL, ESS and ESRF upgrade. Both ESS and XFEL are far along in implementation that it was considered to be well outside the scope of NRIN to consider further Nordic collaboration at this point. The ESRF upgrade is handled within existing framework, including existing Nordic collaboration within Nordsync. That being the case, it seemed well outside the expertise of NRIN to consider further collaboration. Also, NRIN is aware that steps have already been taken to cooperate at Nordic/Baltic level on the new synchrotron facilities being build up in the near future.
- Within Environment three projects has been identified as having potential for further Nordic collaboration: LIFEWATCH, ICOS and EPOS.
- Within BMS the projects identified for further Nordic collaboration are BBMRI and ELIXIR.
- Within Social Sciences CLARIN has been identified as having a potential

After the initial identification, NRIN has had or plans to investigate further on the potential of the identified projects. At this point we have had only a limited number of meetings with national stakeholders on the individual ESFRI-projects, but meetings will be held in the upcoming projects year.

During this investigation NRIN have been using the following criteria

Step 2 criteria:

- Is there a willingness to cooperate at Nordic level amongst the scientific community
- Is there a clear added value of Nordic collaboration – specifically in relation to research infrastructure?
- Is there a targeted research infrastructure action to be taken?

Based on the meetings held until now, and the step 2 criteria, the NRIN has made the following *indicative* assessments:

BIOBANKING and BBMRI

NRIN considers population-based bio banks as one of the most important areas for Nordic collaboration, because of the huge scientific synergies increased Nordic collaboration will create.

The Nordic countries have all recently allocated significant funding for establishing national research infrastructure on bio banks. Research infrastructure which will allow scientist to share and couple data from different bio bank resources nationally. In the process of building up national research infrastructure, an effort to coordinate national initiatives will be hugely beneficial, for eventually allowing scientists to draw on population and bio bank data across the Nordics. Such an initiative would firmly ensure that the Nordic region maintains its position as the leading scientific hub of epidemiological research

Secondly, at European level the ESFRI project on bio banking BBMRI is currently in its preproject phase. The BBMRI project is a very important European research infrastructure project. However, the BBMRI project has its center of gravity on disease-based (clinical) bio banks and not on the main strength of the Nordics - population-based bio banks. This do not in itself constitute a problem. But since the BBMRI will become instrumental in harmonization efforts on standards and technical solutions across Europe, the BBMRI will de facto have a significant influence on both disease-based and population-based bio banks.

The Nordic bio bank community has expressed a strong willingness to coordinate efforts, and is currently establishing a framework for Nordic collaboration. It is the view of the NRIN network that establishing a Nordic Bio bank initiative is of very high importance. Secondly, a unified Nordic bio bank community will be able to influence the outcome of the BBMRI. Due to the Nordics' experience with standards and data management issues, the Nordics are in a favorable position to set the standards for the rest of Europe. However, it is also clear, that the Nordics stands a much greater chance of having an impact at European level, if the Nordics are able to harmonize national efforts on bio bank research infrastructure and coordinate efforts towards the BBMRI project.

It also seems that it is actually due to European BBMRI project, that further steps has been taken to increase collaboration at Nordic level. BBMRI has created a sense of urgency and forced new dynamics into the Nordic cooperation. Talks have been going on for many years on increasing research infrastructure collaboration on bio banking, but little have so far been achieved. What is also clear is that the Nordic bio banking community needs a more formalized collaboration structure, as well as political support and involvement.

A Nordic bio bank initiative has the potential of being widened to include registry data and include coupling of clinical bio bank data. This would require further efforts. In all circumstances there is a huge issue regarding privacy legislation that would need to be resolved. This would require the involvement of national authorities.

E-science

Because of the huge focus on the area within the Nordic context, NRIN has commented on the E-NORIA Escience action plan report which has laid the foundation for the Nordic E-science Globalization initiative. NRIN has only focused on the research infrastructure parts of the report.

From NRIN's perspective the Open access to national data repositories (Action 7) should be supported. But it should be a targeted initiative focusing on epidemiological bio banks first. The environmentally friendly HPC initiative (Action 10) should be supported. From a cost-benefit as well as an environmental viewpoint this project has potential.

As NDGF has embarked on a new project period and national funding is secured, there is a requirement that NDGF expands its activities to cover more than high-energy physics. One of the areas that should be investigated further is to use NDGF as the common Nordic grid facility in connection to specific ESFRI projects as they emerge. ELIXIR and ICOS seems at this point highly relevant. At a later stage CLARIN/DARIAH could be of relevance. In all cases NDGF has the potential for being service provider for a number of ESFRI-projects at Nordic level. In relation to this, it should be noted that at European level there is a focus on establishing cost-effective e-infrastructure solutions for the ESFRI-projects. The Commission wishes to cluster the ESFRI projects with regard to E-infrastructure needs and has made an action line (1.2.3) in the FP7 work program for 2011. An EU financial support will be provided, through a targeted approach, to clusters of ESFRI infrastructures for their implementation phase. This support is aiming at implementing common and efficient solutions on common e-infrastructure issues. A cluster is intended to include all the ESFRI projects in a given field.

LIFEWATCH:

The biodiversity project LIFEWATCH does seem to have a potential for Nordic collaboration. NRIN was unsuccessful in gathering the Nordic scientific community involved in LIFEWATCH for a meeting, but one representative from Norway. Further investigation is needed though.

The large geographical area of Nordic region as well as the cross-border characteristics of the area in question does make it relevant for Nordic collaboration. Secondly, the Nordics possesses strong research communities within the field and environmental science is high on the agenda in all the Nordic countries.

There are some reservations regarding the cost and the feasibility of the European LIFEWATCH project. It is extremely complex and very costly, and that might make the actual implementation of the project difficult both technically and politically. Also, Germany has not yet decided to join the project, which is a significant drawback.

The potential for collaboration on research infrastructure is to establish a Nordic node in the LIFEWATCH project. Such infrastructure would create a valuable contribution towards the pan-European project, and it would be a Nordic research infrastructure in its own right. From an investment point of view, this would mean ensuring scientific return of the investment.

But as mentioned in the beginning, further investigation is needed. NRIN suggests that a Nordic workshop on LIFEWATCH and perhaps other ESFRI projects within environmental sciences is held in order to activate the scientific community.

ANNEX 1: Formal definition of Research Infrastructure

Underneath is listed the formal definition of RI in the individual Nordic countries. Even though the definitions vary, they are quite similar. Basically what we are dealing with is facilities and resources that can be virtual, distributed or single sited.

Denmark: Facilities and resources, which delivers essential services to the public and private research community. RI can be a single resource at one location, or a network of distributed resources, including grid- or virtual-type RI, in which the service is delivered electronically.

Finland: Research infrastructures are resources of research facilities, equipment, materials and services permitting research and development at different stages of innovation, supporting organized research, and maintaining and developing research capacity. A single-sited research infrastructure is appropriate in fields requiring major investments in expensive research equipment. Single-sited infrastructure may include satellite units, and it may also permit remote use. A distributed research infrastructure is suited to fields in which the available resources are geographically dispersed. A distributed infrastructure may also produce shared, centralized services. Virtual research infrastructures are, for example, databases, archives etc. that can be used by researchers from their own workstations.

Iceland: Equipment, facilities, databases, services, system, computer-nets and other resources considered necessary or indispensable for conducting science. Research infrastructures can be in all fields of science and can serve all type of organizations such as universities, research institutions and industry. Research infrastructures may be organized in four categories: 1. systems and services, 2. formal and informal net of communication, 3. scientific institutions and 4. equipment, databases, facilities.

Norway: Distinction is made between basic equipment, equipment of national interest, and particularly costly national and international research infrastructure. The term research infrastructure refers to advanced scientific equipment, eInfrastructure, scientific databases and collections, and large-scale research facilities as described in the strategy "*Tools for Research*".

Sweden: The tools that provide essential services to the research community for basic or applied research. They may concern the whole range of scientific and technological fields, from social sciences to astronomy, going through genomics or nanotechnologies. Examples include libraries, databases, biological archives, laboratories, clean rooms, communication networks, research vessels, satellite and aircraft observation facilities, coastal observatories, telescopes, synchrotrons, and accelerators. They may be 'single-sited', 'distributed', or 'virtual'. What we are dealing with are the necessary tools for the future to do research in many areas at the cutting edge

ANNEX 2: The criteria for defining research infrastructures as national-level RI

Denmark

- **Organization of inter-institutional cooperation:** National RIs should ideally be established as inter-institutional cooperation projects. The assessment of the individual projects has therefore focused on how RIs are organized and how the inter-institutional cooperation is ensured.
- **Access to RI:** Danish Community must have equal access to national RIs. Nationally established RI must therefore have a transparent price structure and an open selection process, which provides fair and equal access opportunities to all Danish researchers
- **Operation and maintenance of RI:** A total financing plan for the operation and maintenance of a national RI for the lifetime of the facility must be prepared.
- **Management and leadership:** It is a prerequisite that there is a detailed plan for facility management and organization, which can ensure a professional and efficient management of the facility. As a general rule national RI must have their own board and manager independent of the hosting institution.
- **Economy and Finance:** The RI must operate on its own budget independently of the host institution. It must also have a controller function in order to ensure adherence to the budget.

Finland

- Demonstrable administrative structures and responsible personnel for the upkeep and services of the infrastructure
- An annual report or similar account of the infrastructure's activities showing its degree of use and effectiveness, for example in the form of scientific output, new applications, patents, new products, or generated business activities
- The infrastructure participates in the training of researchers or is utilized for these purposes
- The research infrastructure is of scientific significance and its work provides added value at the national or international level;
- The infrastructure is continuously used by a significant number of Finnish or foreign researchers;
- The infrastructure provides its users with services for its utilization;
- In principle free access for utilization of the infrastructure. This, however, may require approval of a research plan and reasonable compensation for user fees, guidance and services;
- The investment costs of the infrastructure in question are relatively high in comparison with other infrastructures in the same field;
- The annual budget of the infrastructure is relatively high in comparison with other infrastructures in the same field;
- The infrastructure has added value in industrial commercial terms or for the common good either in the short (e.g. construction stage) or long term (e.g. utilization of results).

Iceland

- The RI should be of national interest and benefit the entire nation
- The RI should provide opportunities for scientific excellence
- Several research groups use the RI

- That the RI is open and accessible for the entire scientific community.

Norway

The infrastructure must:

- be of major interest to Norway as a whole. The Research Council will incorporate considerations relating to the priorities set out in the white paper on research.
- be available in only one or a few locations in Norway, as a general rule
- lay a foundation for internationally cutting-edge research
- be made accessible to relevant researchers and industries (Grant applications must include plans for user access).

Sweden

- be of broad national interest
- provide scope for outstanding research
- be used by several research groups/users with highly advanced research projects
- be so extensive that individual groups cannot manage them on their own
- have a long-term plan addressing scientific goals, financing, and use
- be open and easily accessible for researchers
- have a plan for improving accessibility (concerns both use of the infrastructure, access to collected data, and presentation of results)



norden

NordForsk

ANNEX 3: List of progress on ESFRI projects

December 2010

Environmental Sciences

Project	Country code	RI Roadmap	PREPARATORY PHASE Dec. 2010			IMPLEMENTATION PHASE Dec. 2010				
			Official support letter	Participation level	Special funding allocated	Participation level	Ministry or funding agency commitment - MoU signed	Special funding allocated	Interest in national node	Funding for node allocated
AURORA BOREALIS	DK	no	no	no	no	no	no	no	no	no
	FI	no	yes	pp partner	no	user	no	no	no	no
	IC	no	no		no	no	no	no	no	no
	NO	no	yes	pp partner	no	no	no	no	no	no
	SE	no	no	no	no	no	no	no	no	no
COPAL	DK	no		no	no	no	no	no	no	no
	FI	no	no	inst.interest	no	user	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	no	no	no	no	no	no	no	no	no
EISCAT_3D	DK	no	no	inst. Interest	no	no	no	no	no	no
	FI	no	yes	pp partner	no	MS	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	yes	yes	pp partner	yes	MS	no	no	no	no
	SE	yes	yes	pp partner/ host	no					
EMSO	DK	no	no	no	no	no	no	no	no	no
	FI	no	no	no	no	no	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	yes	pp partner	yes	no	no	no	no	no
	SE	yes	yes		no					
EPOS	DK	yes	yes	pp partner	no	no	no	no	no	no
	FI	no	no	no	in kind	user interest	no	in kind	no	no
	IC	yes	yes	pp partner	no	interest	pending	no	no	no
	NO	no	yes	pp partner	yes	no	no	no	no	no
	SE	yes	yes		no					

Environmental Sciences										
			PREPARATORY PHASE Dec. 2010			IMPLEMENTATION PHASE Dec. 2010				
Project	Country code	RI Roadmap	Official support letter	Participation level	Special funding allocated	Participation level	Ministry or funding agency commitment - MoU signed	Special funding allocated	Interest in national node	Funding for node allocated
EURO ARGO	DK	no	no	no	no	no	no	no	no	no
	FI	no	no	no	no	no	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	yes	pp partner	yes	no	no	no	no	no
	SE	no	no	no	no	no	no	no	no	no
IAGOS	DK	no	no	no	no	no	no	no	no	no
	FI	no	no	no	no	no	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	no	no	no	no	no	no	no	no	no
ICOS	DK	yes	yes	pp partner	no	pending	no	no	yes	no
	FI	yes	yes	pp partner	yes	host candidate	yes	yes	yes	yes
	IC	no	no	no	no	no	no	no	no	no
	NO	no	yes	pp partner	yes	no	no	no	no	no
	SE	yes	yes		yes	high interest			yes	yes
LIFEWATCH	DK	yes	yes	pp partner	no	pending	no	no	no	no
	FI	yes	yes	pp partner	in kind	inst.interest	MoU	in kind	yes	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	yes	pp partner	yes	no	no	no	no	no
	SE	no	yes		yes	high interest	signed Mol			
SIOS	DK	no	no	inst. Interest	no	no	no	no	no	no
	FI	no	no	inst.interst	no	user interest	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	yes	yes	pp partner	yes	host candidate	yes	yes	yes	yes
	SE	yes	yes	inst.interst	no					

Energy										
Project	Country code	RI Roadmap	PREPARATORY PHASE Dec. 2010			IMPLEMENTATION PHASE Dec. 2010				
			Official support letter	Participation level	Special funding	Participation level	Ministry or funding agency commitment - MoU signed	Special funding allocated	Interest in national node	Funding for node allocated
ECCSEL	DK	no	no	inst. Interest	no	no	no	no	no	no
	FI	no	no	no	no	no	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	yes	yes	pp partner	yes	host	yes	yes	yes	yes
	SE	no	no	no	no	no	no	no	no	no
HIPER	DK	no	no	no	no	no	no	no	no	no
	FI	no	no	no	no	no	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	no	no	no	no	no	no	no	no	no
IFMIF	DK	no	no	no	no	no	no	no	no	no
	FI	no	no	no	no	no	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	no	no	no	no	no	no	no	no	no
JHR	DK	no	no	no	no	no	no	no	no	no
	FI	yes	yes	in kind	no	in kind	inst.Mou	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	no	no	no	no	no	no	no	no	no

Biological and Medical Sciences										
			PREPARATORY PHASE Dec. 2010			IMPLEMENTATION PHASE Dec. 2010				
Project	Country code	RI Roadmap	Official support letter	Participation level	Special funding	Participation level	Ministry or funding agency commitment - MoU signed	Special funding allocated	Interest in national node	Funding for node allocated
BBMRI	DK	yes	no	inst. Interest	no	no	no	no	no	no
	FI	yes	yes	pp.partner	yes	interest	no	yes	yes	yes
	IC	yes	yes	pp.partner	no	interest	pending	no	?	?
	NO	yes	yes	pp partner	yes	no				
	SE	yes	yes		yes	high interest			yes	yes
EATRIS	DK	yes	yes	pp partner	no	pending	no	no	yes	no
	FI	yes	yes	pp.partner	yes	interest	no	yes	yes	yes
	IC	no	no	no	no	no	no	no	no	no
	NO	no	yes	pp partner	yes	no	no	no	no	no
	SE	yes	yes	no	no	low interest				
ECRIN	DK	no	yes	no	no	no	no	no	no	no
	FI	no	no	no	no	no	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	no	no	no	no	no	no	no	yes	no
ELIXIR	DK	yes	yes	pp partner	yes (reserved)	yes	yes	yes	yes	yes
	FI	yes	yes	pp.partner	yes	interest	no	yes	yes	yes
	IC	yes	yes	pp.partner	no	interest	no	no	no	no
	NO	no	yes	pp partner	yes	no	no	no	no	no
	SE	yes		pp partner	yes	high interest				
EMBRC	DK	no	no	no	no	no	no	no	no	no
	FI	no	no	no	no	no	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	yes	pp partner	yes	no	no	no	no	no
	SE	yes	yes	lead.countr.	no	high interest			yes	no

Biological and Medical Sciences										
Project	Country code	RI Roadmap	PREPARATORY PHASE Dec. 2010			IMPLEMENTATION PHASE Dec. 2010				
			Official support letter	Participation level	Special funding	Participation level	Ministry or funding agency commitment - MoU signed	Special funding allocated	Interest in national node	Funding for node allocated
EU-OPENSREEN	DK	yes	no	inst. Interest	no	no	no	no	no	no
	FI	no	no	no	no	no	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	yes	pp partner	yes	no	no	no	no	no
	SE	yes	yes		yes				yes	yes
EuroBioImaging	DK	yes	yes	pp partner	no	no	no	no	no	no
	FI	no	yes	pp.partner	no	inst.interes	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	no	yes		yes				yes	yes
European BSL4	DK	no	no	no	no	no	no	no	no	no
	FI	no	no	no	no	no	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	no	yes							
INFRAFRONTIER	DK	yes	no	pp partner	no	inst.interes	no	no	no	no
	FI	yes	yes	pp.partner	in kind	inst.interes	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	yes		pp partner	yes					
INSTRUCT	DK	yes	yes	pp partner	no	no	no	no	no	no
	FI	yes	yes	pp.partner	in kind	inst.interes	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	no	yes		yes					

Materials and Analytical Facilities										
Project	Country code	RI Roadmap	PREPARATORY PHASE Dec. 2010			IMPLEMENTATION PHASE Dec. 2010				
			Official support letter	Participation level	Special funding	Participation level	Ministry or funding agency commitment - MoU signed	Special funding allocated	Interest in national node	Funding for node allocated
EUROFEL (IRUVX-FEL)	DK	no	no	no	no	no	no	no	no	no
	FI	no	no	no	no	no	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	yes	yes	no	no					
EMFL	DK	no	no	no	no	no	no	no	no	no
	FI	no	no	no	no	no	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	no	no	no	no	no	no	no	no	no
ESRF UPGRADE	DK	yes	yes	MS	no	MS	yes	yes	n/a	n/a
	FI	yes	no	MS	no	MS	no	no	n/a	n/a
	IC	no	no	no	no	no	no	no	n/a	n/a
	NO	yes	yes	MS	no	MS	yes	yes	n/a	n/a
	SE	yes	no	MS	no	MS	no	no	n/a	n/a
ESSneutrons	DK	yes	yes	Co-host	yes	co-host	yes	yes	n/a	n/a
	FI	no	no	no	no	no	no	no	n/a	n/a
	IC	no	no	no	no	no	no	no	n/a	n/a
	NO	yes	no	no	no	MS	yes	yes	n/a	n/a
	SE	yes	yes	host	yes	host	yes	yes	n/a	n/a
XFEL	DK	yes	yes	pp partner	yes	MS	yes	yes	n/a	n/a
	FI	no	no	no	no	no	no	no	n/a	n/a
	IC	no	no	no	no	no	no	no	n/a	n/a
	NO	no	no	no	no	no	no	no	n/a	n/a
	SE	yes	no	pp partner	yes	MS	yes	yes	n/a	n/a
ILL 20/20	DK	yes	no	consortium	no	consortium	yes	no	n/a	n/a
	FI	no	no	no	no	no	no	no	n/a	n/a
	IC	no	no	no	no	no	no	no	n/a	n/a
	NO	no	no	no	no	no	no	no	n/a	n/a
	SE	yes	no	consortium	no	consortium	yes	no	n/a	n/a

Physicals Sciences Engineering										
			PREPARATORY PHASE Dec. 2010			IMPLEMENTATION PHASE Dec. 2010				
Project	Country code	RI Roadmap	Official support letter	Participation level	Special funding	Participation level	Ministry or funding agency commitment - MoU signed	Special funding allocated	Interest in national node	Funding for node allocated
CTA	DK	no	no	inst.interest	no	no	no	no	no	no
	FI	no	no	inst.interest	no	inst.interest	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	yes	yes	high interest	no					
E-ELT	DK	yes	no	MS	no	MS	no	no	no	no
	FI	yes	no	MS	no	MS	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	yes	no	MS	no					
ELI	DK	no	no	no	no	no	no	no	no	no
	FI	no	no	no	no	no	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	no	no	no	no	no	no	no	no	no
FAIR	DK	no	no	no	no	no	no	no	no	no
	FI	yes	yes	pp.partner	yes	member	Agreement	yes	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	yes		pp.partner	yes	MS	yes	yes	no	no
KM3NeT	DK	no	no	inst.interest	no	no	no	no	no	no
	FI	no	no	no	no	no	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	no	no	no	no	no	no	no	no	no

Physicals Sciences Engineering										
Project	Country code	RI Roadmap	PREPARATORY PHASE Dec. 2010			IMPLEMENTATION PHASE Dec. 2010				
			Official support letter	Participation level	Special funding	Participation level	Ministry or funding agency commitment - MoU signed	Special funding allocated	Interest in national node	Funding for node allocated
SKA	DK	no	no	inst.interest	no	no	no	no	no	no
	FI	no	no	no	no	no	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	yes	no		no					
SPIRAL2	DK	no	no	no	no	no	no	no	no	no
	FI	no	no	no	no	no	no	no	no	no
	IC	no	no	no	no	no	no	no	no	no
	NO	no	no	no	no	no	no	no	no	no
	SE	no	no	no	no	no	no	no	no	no
ICT										
PRACE (ex HPC)	DK	Yes	No	no	no	no	no	no	no	no
	FI	yes	yes	pp.partner	yes	interest	no	no	yes	yes
	IC	no	no	no	no	no	no	no	no	no
	NO	no	yes	pp.partner	yes	no	no	no	no	no
	SE	yes		pp.partner	yes					