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Nordic Grid Infrastructure Strategy Workshop Summary

On 3-4 March, NDGF hosted a workshop on "Nordic Grid Infrastructure – now and in the future" in Copenhagen. The workshop brought together stakeholders in such infrastructure, including user communities, grid researchers, national grid initiatives, national research and education networks, funding bodies, as well as international experts.

The goal of the workshop was to provide a comprehensive presentation of views on Nordic grid infrastructure, to foster open discussion among the stakeholders, and to provide input to both short-term (2-3 years) planning for NDGF and longer term strategy and plans for Nordic grid infrastructure. The outcome sought from the workshop was

- An updated strategy paper, with goals and visions for 2010 and beyond
- To identify focus areas for Nordic grid initiatives, avoiding overlap and improving communication and coordination.
- Provide input for long-term goals and plans for the stakeholders for 2008 and beyond

Session: Visions

Welcome & Introduction (Gudmund Høst).

Topic for the workshop: what should be the focus for NDGF? What will happen after 2010?

Vision for an Infrastructure for Nordic e-Science (Gard Titlestad)

Introduction of Nordic e-Science strategy and Nordic science programmes. E-Science has strong attention from the political level. Funding in the order of 8 MEUR set aside for initiatives in 2009-2010 , with e-Science as a focus area.

Implementation seen to happen through NORIA-net and specific actions plans.

The Nordic e-Science initiative (Gudmund Høst)

A number of Nordic initiatives have focused on e-Science and Nordic participation in European initiatives.

A NORIA-net has been formed in 2007 for Nordic e-Science. An action plan for Nordic e-Science will be developed. There is a need for stable organisation and funding mechanisms for e-Science at the Nordic level. One outcome could be a Nordic e-Science committee hosted by NordForsk.

Q&A: The NORIA-net has had a kick-off meeting in Copenhagen, and will meet to start work on the action plan (with a mandate from NMR) in May.

TeraGrid overview – integration of structure (Rob Pennington)

TeraGrid is part of the longterm implementation of the NSF cyberinfrastructure strategy. A major learning from the Teragrid project is that this is not a technical project - it's a social engineering project.

The talk focused on structure and organisation. The organisation is distributed, with a number of Area Directors and an architecture team. Each area director is financed by TeraGrid. TeraGrid has a user forum and deploys "science gateways"

The users of TeraGrid include molecular bioscience (31%), chemistry (17%), physics (17%). TeraGrid has a central resource allocation and security policy. TeraGrid has a HPC focus.


Computing in the ATLAS LHC Experiment (Gilbert Poulard)

Introduced the production setup for ATLAS in the WLCG. NDGF provided in 2007 8% of ATLAS Tier-1 production resources, making NDGF the biggest European Tier1 for ATLAS.

55% of all ATLAS production resources are contributed by Tier2s.

Nordic Strategies

NDGF Strategy (René Buch)

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The talk presented the NDGF draft strategy document for a "Nordic Grid Infrastructure Strategy". The talk presented the background for the strategy work, and highlighted some key points of the current strategy document.

The strategy document has been written as input to the ongoing discussion of both short-term (2-3 years) focus areas for NDGF as well as the long term strategy and approach to Nordic grid infrastructure, beyond 2010.

The strategy document asks the question "why a Nordic grid infrastructure", and answers that question with reference to the rise of e-Science, the growing need for comprehensive computational resources and access to storage, and the important of joint Nordic science projects, as outlined in the *Nordic e-Science – Research, Education, and Sustainable Infrastructure Services* report from the Nordic Council of ministers. In addition, the strategy document points to the benefits of a joint Nordic body being an enabler for Nordic participation in large-scale international projects, and the increased influence for Nordic countries on European infrastructure initiatives when acting jointly.

The strategy document then described the aim of the joint Nordic grid infrastructure: the support of large-scale initiatives, support for Nordic participation in international collaborations, to support the national grid and HPC strategies of the Nordic countries, and to support Nordic e-Science policies.

The strategy document discussed the importance of having the Nordic strategy based on the strategy of the national initiatives, and the importance of a joint feeling of ownership for a Nordic strategy and Nordic initiatives. It is paramount that a Nordic grid infrastructure be a service to the stakeholders, that it is built on top of and in the collaboration with the national initiatives,

Examples of joint Nordic efforts include support for key middlewares, support for Nordic grid operations, being a technical interface to European projects and coordinating Nordic initiatives.

DCSC & the Danish National Grid Initiative (Rene Belsø)

Denmark has a fully distributed setup with DCSC, with a lightweight governance. Funding is allocated to research groups who purchase resources and place it at participating operations centres.

DCSCs would like to have one Nordic initiative and merge Nordic EGEE participation with NDGF. NDGF to mediate European projects in the Nordic countries – using the NORDUnet setup as a role model. DCSC relies on ARC middleware and would like to see it strengthened.

Growth has to happen in a way that has consensus; Coordinate and strengthen the interaction with the stakeholders. Stresses important of confidence in the joint project.

NGI Presentation, Finland (Kimmo Koski)

CSC has a centralized model, with majority of resources at CSC. CSC has strong participation in a large number of European projects. It is the goal of CSC to be one of the leading HPC centres in Europe.


Would prefer NDGF to focus on a few (2-3) activities. Do a few things and do it well, such a WLCG and middleware development. NDGF collaboration in European projects should be through the Nordic stakeholders.

Argued that grid is closely linked to HPC, not networking, and hence would prefer NDGF to be hosted at a HPC centre, possibly rotating among Nordic HPC centres. Wants open competition on where NDGF should live after 2010.

The Norwegian Grid initiative – as part of the Norwegian e-Infrastructure (Jacko Koster)

UNINETT Sigma administer Norwegian grid and HPC effort (NorGrid, NorStor and Notur). Funding is channelled through a central entity (Sigma), but allocated to four regional HPC centres based at universities. NorGrid is based on ARC middleware. NorStore is the Norwegian national storage project.

NorGrid has a requirement for a stable middleware and someone to actively support and maintain it. The middleware should ensure that NorGrid can participate in international projects. The main role for NDGF would be to act as a middleware factory and to do coordination and grid operations for Nordic projects such as the Nordic WLCG Tier-1.

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Sigma has focus on PRACE, EGI and ESFRI projects. The talk worried that NDGF will just be an extra layer in these efforts.

SNIC Grid Strategy (Sverker Holmgren)

SNIC provides Swedish scientific computing resources through six SNIC centres. Central funding is distributed to the centres; the centres install a mix of clusters and capability resources. SNIC is the Swedish NGI and has a goal to make all SNIC resources available as part of SweGrid. SweGrid is based on ARC middleware. SweStore is the Swedish national storage project.

SNIC manages the Swedish interface to large international collaborations and projects.

SNIC would like a Nordic grid collaboration to develop and maintain middleware , including ARC and distributed storage solutions, and coordinate Nordic Tier-1 operations and possibly operations for other Nordic or European projects.

SNIC wants a stronger coordination between NDGF and the EGEE Northern ROC; the two should be perceived from the European perspective as one entity

NORDUnet Strategy (Rene Buch)

NORDUnet is broadening focus to e-Science infrastructure, not just networking. NORDUnet seeks synergy between e-Science infrastructure projects. Examples include a distributed Nordic organisation and a Nordic operations centre (NUNOC).

Major e-Science initiatives depend on excellent networking to be successful.

Learning from being involved in NDGF include that there is potential for synergy between grid and networking activities (reducing cost for all) and that NDGF is a good model of virtualized distributed operation.

A Strategy for a Nordic Grid Infrastructure (Jacko Koster)

The talk presented joint input to Nordic grid strategy from the four Nordic NGIs.

Nordic projects must be based on mutual understanding among. Nordic collaboration must add value to what is available in the NGIs. The talk presented a competence profile of HPC centres, NGIs, and NDGF, dividing tasks among the three. User interaction falls on HPC centres and NGI, grid operations fall on NGIs and NDGF, middleware development falls on NDGF.

The NGIs would like to focus on a bottom-up approach to building user communities, originating at the HPC centres. The Nordic effort should focus on added value. Today, national users have access to only national resources. There is a need for a pan-Nordic resource provisioning and aggregation framework.

The talk suggest creation of a Nordic centre of excellence on core grid infrastructure. The talk stressed the need for a NGI partnership, including NDGF, and the importance of trust and communication among participants.


The NGIs proposed a working group of 5 people representing NDGF and the NGIs produce a revised strategy document by April 19. The document would include a survey of NGIs and their ideas by NDGF and independent person .

Q&A: Discussion of the short-term vs. long-term (after 2010) strategy. Timing of strategy documents and who should receive the documents. It was suggested the NorduGrid middleware group be represented in the working group as well.

Breakout Group Discussions

Four breakout discussion groups, with group discussion framed by four questions:

- Synergies and sharing of roles between NGIs and Nordic infrastructure.
- Who are the main stakeholders in the strategy?
- How should the users be involved?

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- What is the added Nordic Value of a joint infrastructure?

Following the breakout sessions, each group presented what had been discussed in a plenary session.

Items highlighted in the plenary session included

- Middleware development. The core business of NDGF is deployment and operation of grid infrastructure, and the development and support of the middleware required to have a solid platform and stable operations. Several middlewares, including ARC and dCache, are used to meet the requirements of the users. NDGF supports and maintains these middlewares as needed, and provides these stable and maintained middlewares to the community. Middleware research is outside the scope of NDGF; NDGF should focus on infrastructure support. Hence, development of next generation middlewares should not be included in the NDGF mission; NDGF will work with Nordic research groups and pick best of breed developments to include in the production platform.
- The relationship between infrastructures, resources, and science communities had been discussed. It was expressed that NDGF should focus on grid and infrastructure, not the science projects, while national grid initiatives should focus on the science and the needs of research communities.
- It was discussed how to progress with short-term and long-term planning and strategy. The NDGF SB could ask the management to produce a plan for the remaining period - with the help of the NGI's and the NorduGrid groups. It was suggested that such a report could at a later stage be used as input for a group asked by the NOS-N to produce a grid infrastructure action plan.
- It was pointed out that accounting is important, in order to show who is using resources and who is contributing resources.
- It was pointed out that it is crucial to involve the stakeholders. Stakeholders must have trust in what NDGF is doing, and such trust should be built through open discussion and communication among all the parties.
- The scope of NDGF was discussed. Different views were expressed. CSC sees the HPC centres as the source of sustainability and find that NDGF should focus on middleware and the Tier-1. DCSC argued for a larger scope for NDGF activities.

Researcher and Users


Nordic Grid Research by Example – Minimum Intrusion Grid (Brian Vinter)

The talk outlined the Minimum Intrusion Grid project as an example of Nordic grid research. The talk described the approach to grid computing taking in to account the motivations for seeking this new approach. Minimum Intrusion Grid achieves a lightweight grid infrastructure; hence, the approach is useful for small groups and for resources scavenging, utilization of idle PC's, etc. The approach is less useful for major e-Science projects such as the LHC.

ESSS – European Spallation Source in Scandinavia (Colin Carlile)

The talk described the current status for spallation sources globally, and the agreements that aim to establish new and upgraded sources in Asia, USA, and Europe. The location of the next-generation European source has not been finally decided, but one contender is Lund University. The sources are required for several branches of science, in particular material sciences. The talk outlined both the functions of a neutron source and the European political process that will eventually lead to a decision on the location of the European source.

If a European source is established at Lund, it will produce 20-50 TB data per day. To handle this amount of data, the plans call for establishment of a data management institute in Copenhagen, charged with data archiving, data integrity, instrument optimization, data accessibility (including public access), simulation and virtual reality setups for training, and on-line analysis of data.

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BioInformatics and Grid Computing (Steffen Möller)

The outlined the current activities within bio-informatics and grid computing in Northern Europe. The NDGF bio-grid project as well as the EU FP6 STREP project KnowARC have contributed to the enabling of bio-informatics research on grid.

The talk highlighted different needs from the bio-informatics community: Integration of workflows into the grid infrastructure, easy access to several distributed and frequently changing databases, better support for parallel jobs, schemes for sudden burst computing, and integration with other European efforts.

The talk stressed that several of these challenges are currently being investigated within the Knowarc and Bio-grid projects and a lot of progress have been made.

High Energy Physics in the Era of LHC and ARC (Farid Ould-Saada)

The talk described the use of grid computing in the LHC project, in particular the ATLAS experiment, and highlighted the contributions of the ARC middleware. The talk highlighted the strengths or the ARC middleware, and discussed the need for continuous, stable support, and for further development.

ARC has been chosen as one of the European grid middlewares and as such it is part of the ongoing planning process for EGI. It is expected that ARC will be one of 3 middlewares endorsed and supported by EGI (others are gLite and UNICORE). The talk argued that ARC is essential for ATLAS production in NDGF and responsible for the success of NDGF in this area. ARC is efficient, fast, requires minimal manpower, etc.

The talk estimated that on-going development of new generations of ARC and development of ARC to keep it up to date with new requirements will require funding on the level of 2-3M€/year. A longterm source for such funding will have to be found.

ALMA and Radio Astronomy (John Conway)

The talk introduced e-VLBI and the use of fast network connections in radio astronomy. The talk described the current networking requirements for e-VLBI (from 256 Mbps to 1 Gbps for each station), and discussed the possible use of grid resources for doing correlation and well as for storage.

The talk then described some current projects with Nordic participation. There are several efforts to stream VLBI data to JiVE, the European centre for VLBI. The JiVE Express project is attempting to build a European network infrastructure for this, and is also experimenting with grid computing.


The world-wide astronomy community is currently building the ALMA centre in Chile. The centre will have 66 moveable telescopes. Three regional centres are being built in Europe, Asia, and North America to take and process the data from ALMA. The European centre will be distributed on six locations, including one in Onsala, Sweden. The Nordic countries are contributing heavily to ALMA politically, financially, and in terms of scientific projects. A high level of activity can be expected from the Nordic countries. The talk expressed the hope that use of Nordic computational resources would give Nordic astronomers an advantage in the project.

The talk described the Square Kilometer Array (SKA) project to be built at an unspecified date in either Australia or South Africa, and the LOFAR project currently being built in Europe as a SKA prototype. Onsala has funding for participation in LOFAR, and datastreams of 4 Gbps will be generated, Data will be stored centrally in Groningen in Netherlands, but local computation resources will be required.

The Nordics and Europe

EGI – European Grid Initiative (Dieter Kranzlmüller)

The talk was a presentation of the European Grid Initiative. The aim of the initiative is to secure a sustainable European e-Infrastructure based on National Grid initiatives and middleware developed in EU projects. Currently, ARC, gLite and UNICORE have been proposed as components for a sustainable European e-Infrastructure.

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The talk outlined the proposed process towards a sustainable e-Infrastructure and emphasised the role of the National Grid Initiatives in the roadmap.

Q: When will this be a thing that runs as smoothly as GEANT

A: *entity* should be in place by 2010. but what the entity will be, we do not know

Q: Is national, regional or some mixed representation recommended/possible.

A: The Nordic countries can go in the advisory board and ask to contribute resources and be counted as one entity. Voting is now one vote pr country. This could be changed to other models

e-IRG (Leif Laaksonen)

The talk described the on-going process in the e-Infrastructure Reflection Group. Since 2003 five white papers have been produced, identifying areas of importance for the European research landscape, research and infrastructure trends, and infrastructure initiatives that will support European science

Summary Session

In the final session workshop Gudmund Høst presented slides summarizing views expressed during the two days of the workshop, and led the participant through a discussion of these summary points.

Background: The Nordic political scene

eScience is currently receiving much attention on the Nordic political scene. It has been debated in the Meeting of the Nordic Council in September 2007. It is likely that the Nordic Education Ministers (MR-U) in their next meeting will request that the eScience NORIA-net group works out a Nordic Action Plan for eScience, with the aim to establish an eScience Programme within 5 years. It is also likely that the Ministers will ask Nordforsk to coordinate Nordic eScience.

Further work on long-term strategy, i.e. 2011+

There are currently no plans for Nordic Grid cooperation after 2011. On the European level, the European Grid Initiative aims at establishing a sustainable Grid Infrastructure for science. The current European funding scheme has rather short project cycles, giving discontinuity and possible loss of competence. Similar arguments may be valid in a Nordic context, meaning that one might start thinking about a sustainable Nordic eInfrastructure. A possibility is to propose to the Nordic funding agencies that they establish a working group with a mandate to propose the next generation Nordic Grid Infrastructure.


The National Grid Infrastructures (NGIs) were invited to give their views on a future Nordic Grid infrastructure. It seems that the four NGIs agree that user interaction, user support, the building of (virtual) communities and resource provisioning are natural responsibilities of the NGIs. In contrast, middleware development and middleware support are activities where one should join forces in the Nordic countries. Core grid operations could be run for selected user communities, such as high energy physics (the Nordic Tier-1 service). Creating a framework for resource provisioning and sharing/aggregating national resources is also a joint Nordic responsibility.

This topic was discussed by the NDGF SB immediately after the workshop. The SB decided to produce a summary document from the workshop. A draft will be circulated to the participants for comments. Further, work on long-term strategy will not be taken up again until after the SB has discussed plans for the remaining NDGF project period.

Short-term issues

The importance of improving the communication between the national activities and NDGF was stressed by the NGI representatives. The NGI representatives invited representatives from the NDGF management and middleware development to join in meetings to discuss matters of common interest. The national funding agencies are responsible for the governance and Terms of Reference for the NDGF SB. NDGF SB is responsible for management and the hosting contract with NORDUnet.

The NDGF SB wishes to revise the plans for the remaining project period. The stakeholders were invited to work with the management to propose activities for the next 2-3 years. This would help the management to present qualified plans to be decided upon by the SB.

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