National computing infrastructure for all sciences and institutes

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Jacko Koster
SNIC & UNINETT Sigma

Some words about me …

Jacko Koster:

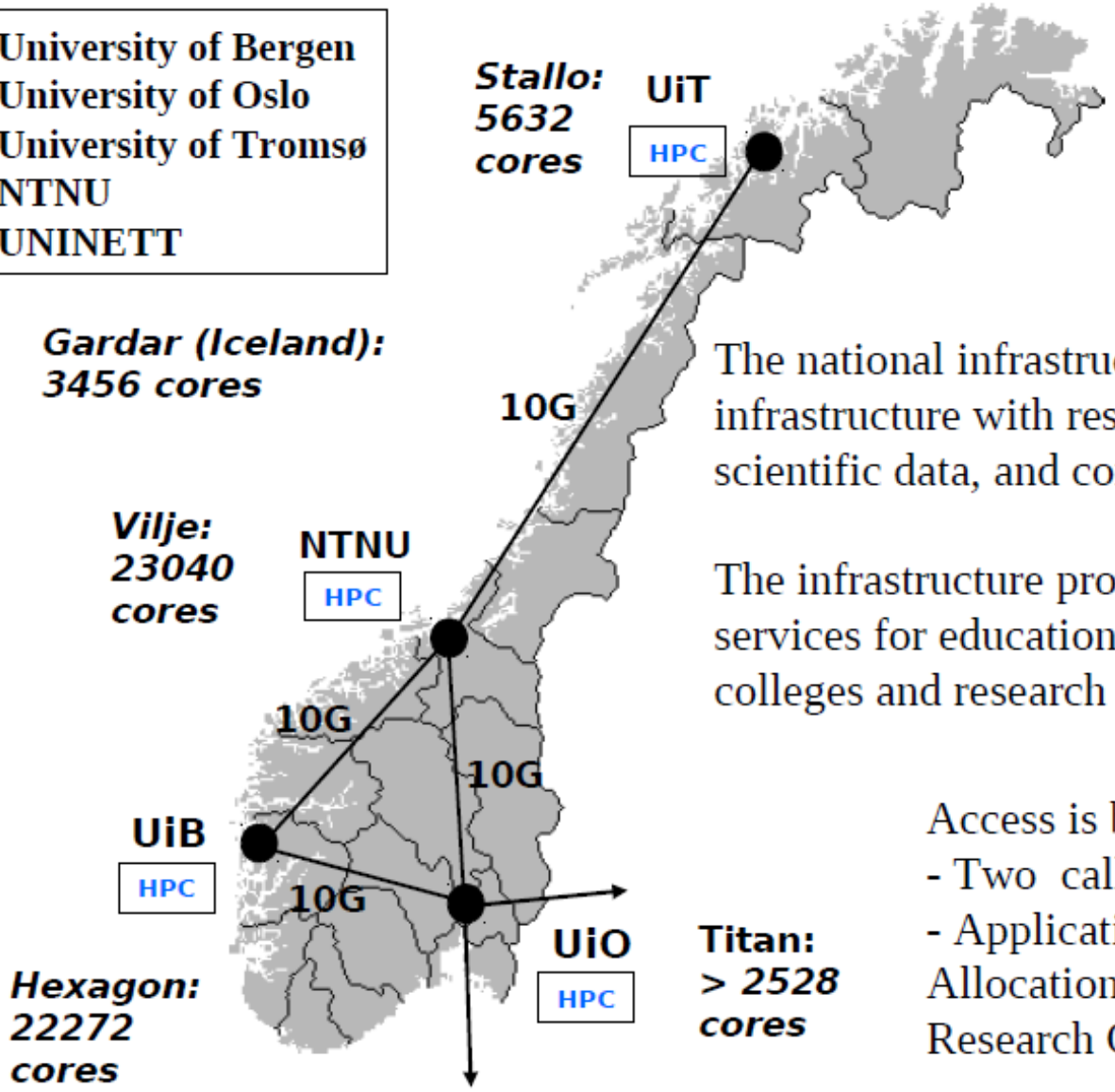
Education:
- Eindhoven University (NL, MSc)
- CERFACS (Toulouse, France, PhD)
- Rutherford Appleton Laboratory (Oxford, UK, postdoc)

1999-2005: Parallab, Uni Research, Univ. of Bergen
2005-2012: UNINETT Sigma, Trondheim
- Managing Director UNINETT Sigma
- Project leader Notur – Norwegian HPC infrastructure

2012: SNIC, Uppsala (start June 1)

Norwegian HPC: Notur

University of Bergen
University of Oslo
University of Tromsø
NTNU
UNINETT



Notur: 2005 – 2014

The national infrastructure is a distributed infrastructure with resources for computation and scientific data, and corresponding support services

The infrastructure provides access to resources and services for education and research at all universities, colleges and research institutes.

Access is by application:
- Two calls every year
- Applications are evaluated by Resource Allocation Committee, appointed by Research Council

Swedish HPC: SNIC

- The Swedish Metacenter for large-scale computing and data storage
- SNIC has been organized within the Swedish Research Council (SRC) since early 2003.
- The organisation recently moved to a host university (Uppsala)

SNIC

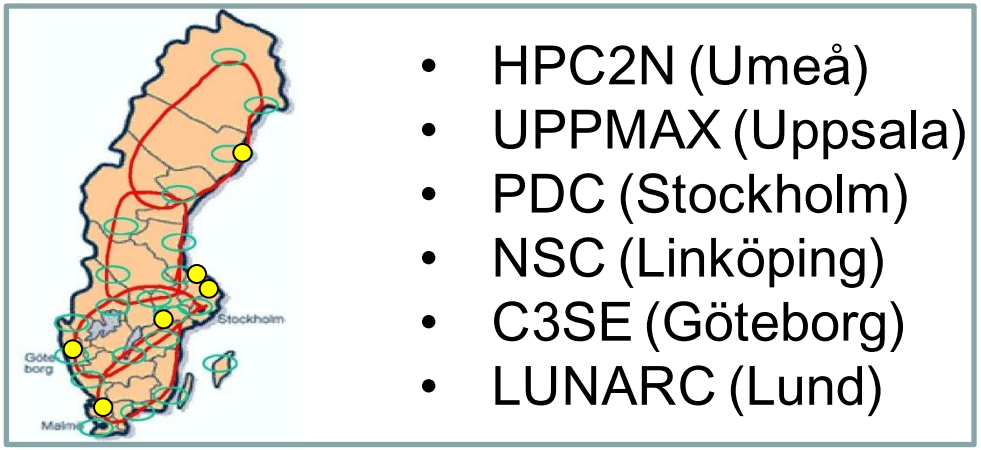
Mission:

- Build the national Metacenter structure providing access to large-scale computing and data storage for Swedish research
- Ensure sufficient funding for SNIC activities
- Coordinate investments, competence (national application experts) and development
- Allocate resources to users (SNAC committee)

Means:

- Work and resources mainly at six SNIC centers
- Strong connections to international initiatives
- A board and a very small executive organization
- Strategic plan: The SNIC Landscape Document

SNIC

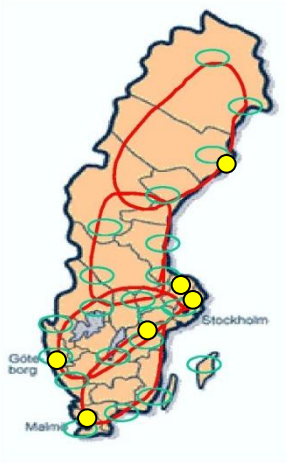


- HPC2N (Umeå)
- UPPMAX (Uppsala)
- PDC (Stockholm)
- NSC (Linköping)
- C3SE (Göteborg)
- LUNARC (Lund)

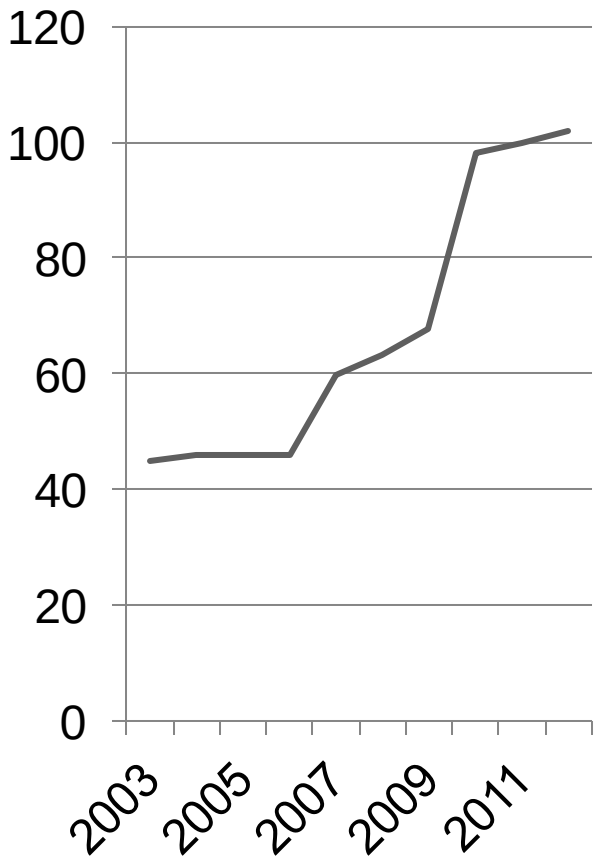
+ OptoSUNET, 10 Gbit

- More than 350 user groups (1-50 researchers each)
- Main services:
  - A few large-scale computing systems
  - Foundation-level computer systems, storage and user support at all centers
  - Coordinated access to international initiatives (European, Nordic, …)
  - SweGrid initiated 2003
  - SweStore initiated 2008
  - Extended advanced user support effort initiated 2010

SNIC funding



- SNIC funding from SRC 2012: 102 MSEK
- SNIC coordinates additional funding
  - KAW: 45 MSEK 2007-2009
  - CERN consortium: 27,4 MSEK 2007-2009
  - Other foundations, research groups, …
- Significant co-funding also by hosting institutions (facilities, running costs, staff, …)



SRC funding

Landscape for SNIC resources

European-level resources

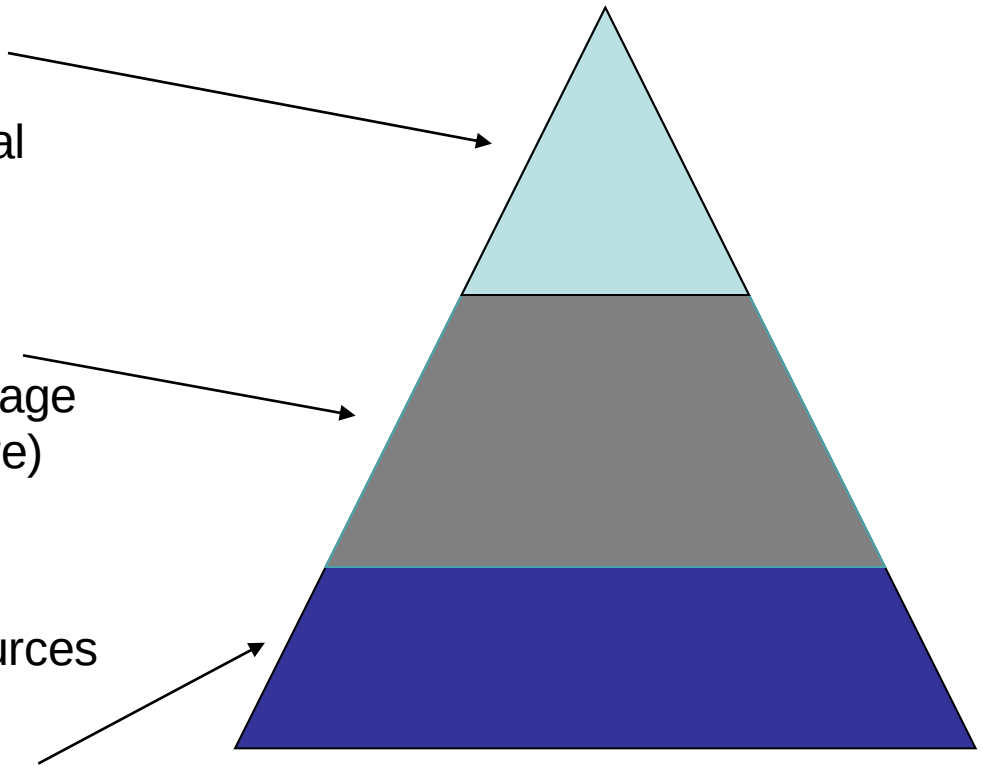
- Grand-scale resources provided by e.g. PRACE (Petascale)

Special resources

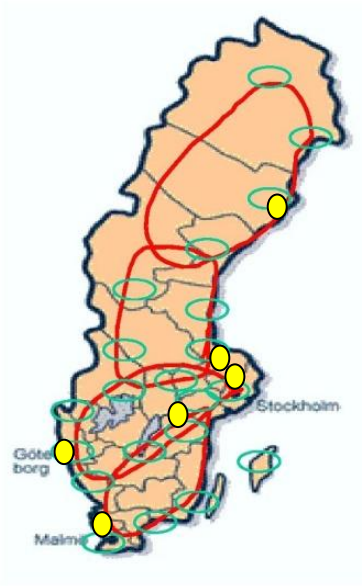
- A few large-scale computational resources
- A few other special-purpose computational resources
- The national grid and data storage system (SweGrid and SweStore)
- Collaborative efforts with other partners, e.g. KAW
- Potentially other external resources
- …

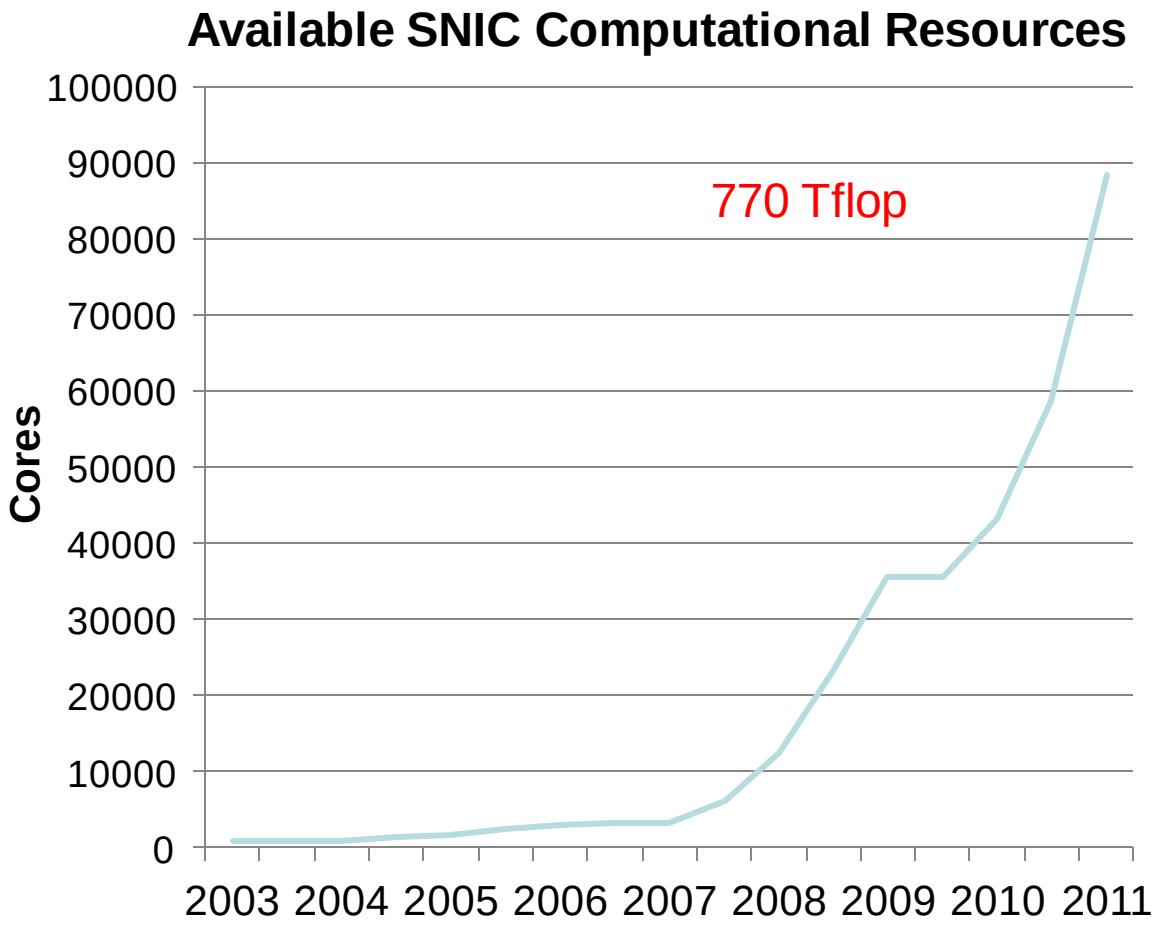
Foundation-level resources

- Computing and data storage at all SNIC centers



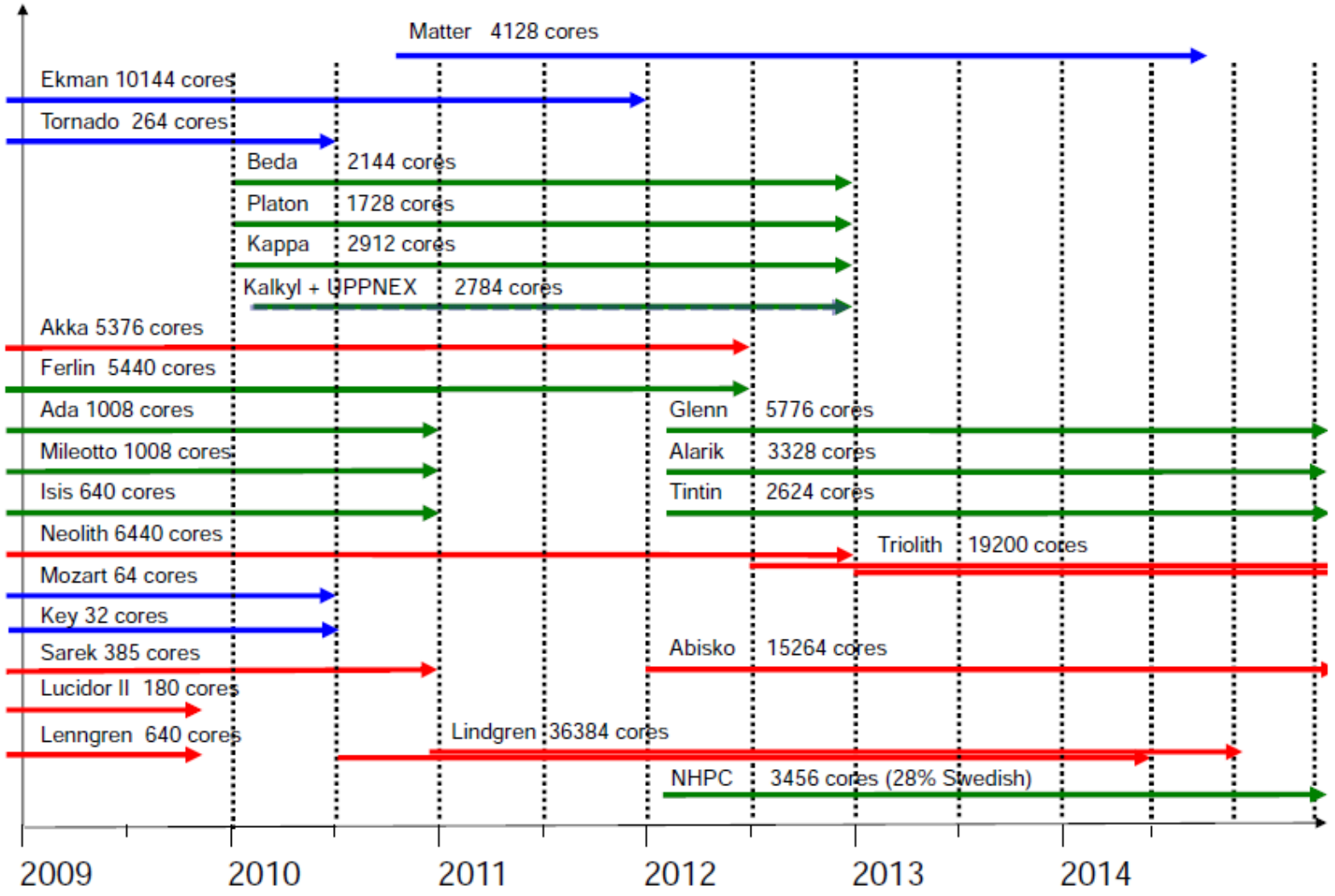
SNIC resources at centers





Average performance doubling time: 11 months

SNIC resources



Additional resources

- Cross-national pilot project – initiated 2011
  - Focus on total cost of ownership
  - Project formed by SE, NO, DK
  - Application procedure: University of Iceland (HI) consortium won
  - Small-scale pilot system – standard cluster (3456 cores, 35 Tflop)
  - System is operational since January, inaugurated April 16

SNIC - International

National entry point to major international collaborations

- PRACE
  - Prototype system (4320-core cluster, energy efficiency)
  - ”PRACE Tier-1 system”: 305 Tflop CRAY XE6
  - Participation in the PRACE projects (PP, 1IP, 2IP, 3IP)
- EGI
  - SweGrid resources (1/3 dedicated to WLCG Tier-1/2)
  - Participation in EGI-InSPIRE
  - Complete integration of earlier work in EGEE and NDGF

From the SNIC Evaluation

- SNIC has significantly improved the landscape of computing in Sweden.
  - ~all academic computing resources integrated.
- Strong support from the computing centres and users.
  - Support for a stronger and more strategic role
- SNIC has overseen an increase in resources and improved collaboration across the Swedish Computer Centres.
  - HPC in particular
  - Funding increased from ~30MSEK/year to over 100 MSEK/year
- SNIC is responsive to the needs of existing large user communities
  - Has delivered effectively and efficiently for these groups.
- SNIC needs to develop and improve its interactions with new and emerging communities.
- The Panel believes that SNIC is well placed to meet these challenges.

Recommendations

1. **There is a pressing need to create a 5-year, rolling plan that clarifies the objectives, timeline, milestones, and priorities needed to carry out the SNIC vision**
2. **SNIC must be more proactive in addressing Swedish research priorities**
3. **SNIC must transition to focus on user needs, rather than HPC resources**

1. **SNIC should move towards a distributed National Research Infrastructure**
2. **The new structure should be led by an independent Board of directors, appointed by the Research Council**
3. **The new organisation should have a flexible but strategic approach to its centres**
4. **All SNIC Centres must be required to use SNIC branding**
5. **SNIC should continue to develop its role in strategic International actions**

Recommendations

1. More consolidation is needed in the SNIC services
2. SNIC emphasis should be on services that can only be done at a national level or that make most sense coordinated nationally
3. Develop user-oriented metrics for monitoring services and usage
4. Investments in new services and hardware resources must be driven by evaluation of scientific requirements

1. SNIC should reduce emphasis on (local) foundation-level computing resources, and put more financial resources into national-scale services and HPC resources
2. SNIC should procure "SNIC services" from the centres (or from units outside the centres if appropriate)
3. The SNIC Board & Director need a more stable planning baseline for their activity

From the evaluation: The Role and Function of SNIC - 2

SNIC must be more proactive in addressing Swedish research priorities.

- SNIC Board more proactive in supporting strategic areas
  - e.g., assign SweStore resources to environmental and biomedical data.
  - SNIC management should be more proactive in seeking out potential users in these areas.

SNIC must also transition to focus on user needs, rather than HPC resources.

- Increase emphasis on solving user problems
  - E.g., specialized services in strategic areas.
  - Move from a hardware to a human infrastructure
- The balance may differ from one SNIC Centre to the other
- SNIC should plan its services as a whole portfolio

From the evaluation: Organization

SNIC should move towards a distributed National Research Infrastructure.

- Independent unit outside of the Research Council
- Responsibility for national and international priorities
- Continue to develop user focused strategic leadership
- Retain separation between strategic planning and day to day operational activities.
  - A simple Consortium model where, for example, the SNIC Centres themselves jointly take responsibility for delivery of a distributed infrastructure against agreed budgets may not deliver the required strategic flexibility.

The new structure should be led by an independent Board of Directors, appointed by the Research Council.

- SNIC management should remain independent of the centers
- Strengthening of the position and mandate of the Director
  - Appointed by, and report to, the Board

From the evaluation: Organization - 2

The new organisation should have a flexible but strategic approach to its centres

- Nothing sacred about the existing centres, be open to creation of new centres.

SNIC should continue to develop its role in strategic international actions

- Leveraging expertise/opportunities across all centres
- Support the approach currently being taken in this area.
- The opportunity for further Nordic collaboration should be pursued, e.g. in the context of PRACE (Tier-1)
  - This may be helped if SNIC assumes a stronger role.
  - Ultimately, investment should be guided by scientific research priorities.

SNIC today

Board:

- Madelene Sandström (KKS, chair)
- Pontus de Laval (SAAB)
- Erik Lindahl (KTH)
- Kersti Hermansson (UU)
- Paula Eerola (Helsinki University)
- Markku Rummukainen (LU)
- Erik Elmroth (UMU)

The SNIC office will be 4-5 FTE.

My first steps in SNIC …

- Get acquainted with the present SNIC organization
- Visit the centres, determine their needs, (preferred) roles in the SNIC consortium
- Visit the key Swedish user communities, determine their satisfaction with the present infrastructure & future needs (both computation and storage&data)
- ….
- ….
- Strategic plan (SNIC Board and SNIC centres)
- Yearly activity plans