

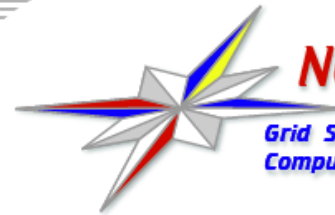


# **NDGF and NorduGrid - new user communities**

*Michael Grønager, PhD  
Technical Coordinator, NDGF  
The 20th Open Grid Forum  
Manchester, May the 7<sup>th</sup>, 2007*

- Background
  - NorduGrid and ARC
  - NDGF
- New user communities
  - Strategies

- 2001-2002: a *research project* of the NORDUNet2 program aimed to enable Grid in the Nordic countries
- Since end-2002 it is a **research collaboration** between Nordic academic institutes
  - Open to anybody, non-binding
- Since end-2003 it focuses on **middleware**
  - Develops own Grid middleware: the *Advanced Resource Connector (ARC)*
  - Provides middleware to research groups and national Grid projects
- **ARC** is now installed on ~50 sites (~5000 CPUs) in 13 countries all over the World



**NORDUGRID**

*Grid Solution for Wide Area Computing and Data Handling*



**Members, associated partners and contributors**

- University of Oslo
- Copenhagen University
- Lund University
- Uppsala University
- Helsinki Institute of Physics
- Linköping University
- Umeå University
- University of Bergen
- P.J. Šafárik University in Košice
- Aalborg University
- University of Southern Denmark
- University of Melbourne
- Jozef Stefan Institute
- National Institute of Chemical Physics and Biophysics
- Tartu University
- University of Bern
- Norwegian University of Science and Technology
- Royal Institute of Technology
- St. Petersburg State University
- Finnish IT Center for Science
- JINR University Centre

**NorduGrid** is a collaboration established by five Nordic academic institutes with the purpose of pursuing Grid technology research. The collaboration is at the core of a worldwide Grid Research and Development community that develops, maintains and supports a free Grid middleware, known as the Advanced Resource Connector (ARC).

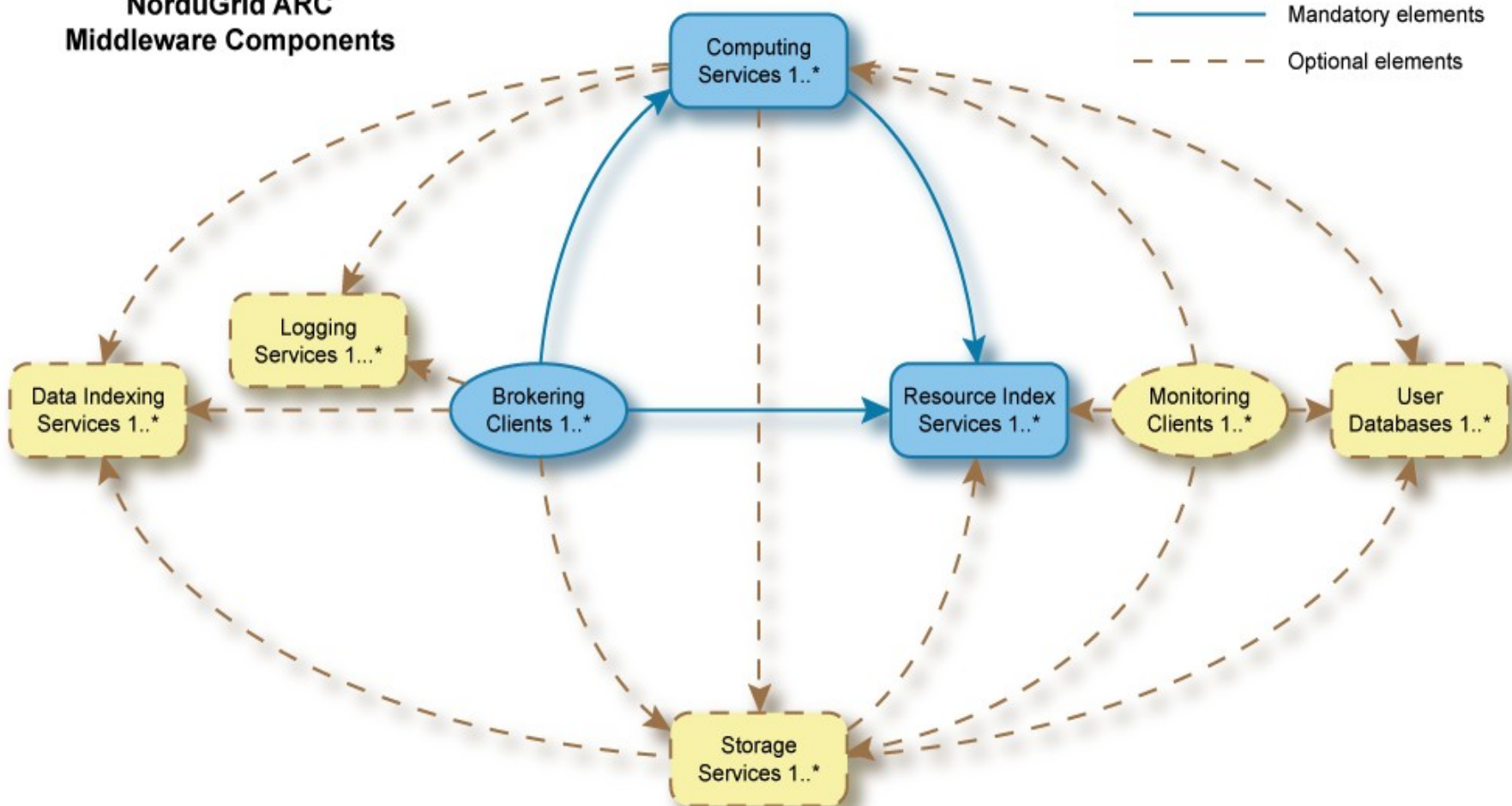
The aim is to deliver a fault-tolerant, scalable, portable, light-weight and yet fully featured solution for a global computational and data Grid system. This set of tools and services developed by NorduGrid comprises the ARC middleware. ARC is an Open Source software, available for a wide range of Linux systems.

**The goals**

- ❖ Develop and support ARC middleware
- ❖ Coordinate contributions to the core ARC code
- ❖ Define strategical development directions following the latest tendencies in Grid technologies
- ❖ Promote ARC middleware solutions in such areas as Grid development, deployment and usage
- ❖ Contribute to development and spread of world-wide Grid standards

# The Advanced Resource Connector

## NorduGrid ARC Middleware Components



# ARC Design philosophy

## 1. The system must be:

- a) Light-weight
- b) Portable & modular
- c) Non-intrusive on the resource side:
  - Resource owners retain full control
  - No requirements w.r.t. OS, resource configuration, etc.
  - Clusters need not be dedicated
  - Runs independently of other existing Grid installation
- d) Special attention to functionality & performance

*“Traditionally, Scandinavian design has been associated with simple, uncomplicated designs, functionality and a democratic approach”*  
design.org



## a) Flexible & powerful on the client part

- must be easily installable by a novice user
- trivial tasks must be trivial to perform
- no dependency on central services
- No central client(s), create a real distributed system

2. Strategy: start with something simple that **works for users** and add functionality gradually



Source of design illustrations:  
"Scandinavian Design beyond the Myth"  
[www.scandesign.org](http://www.scandesign.org)



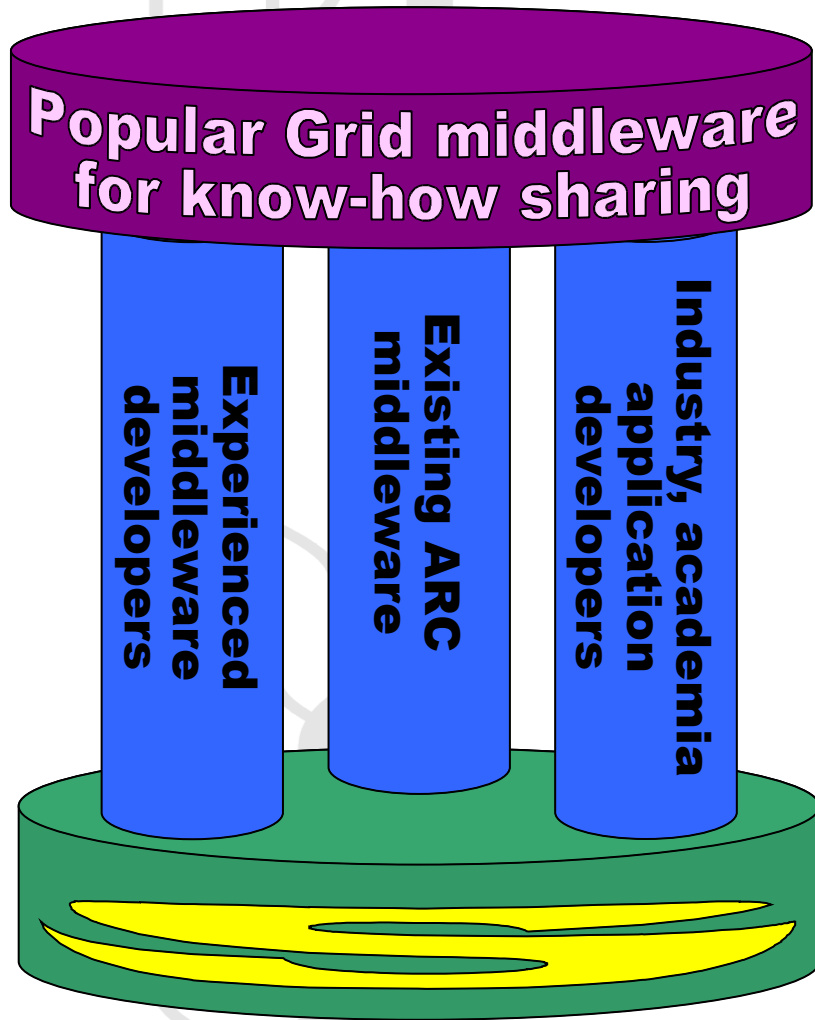
# ARC new user strategy

- New users through easy to use software
- Have them coupled loosely through the NorduGrid collaboration (see NorduGrid monitor)
- Ad hoc resource sharing

Grid Monitor - Microsoft Internet Explorer

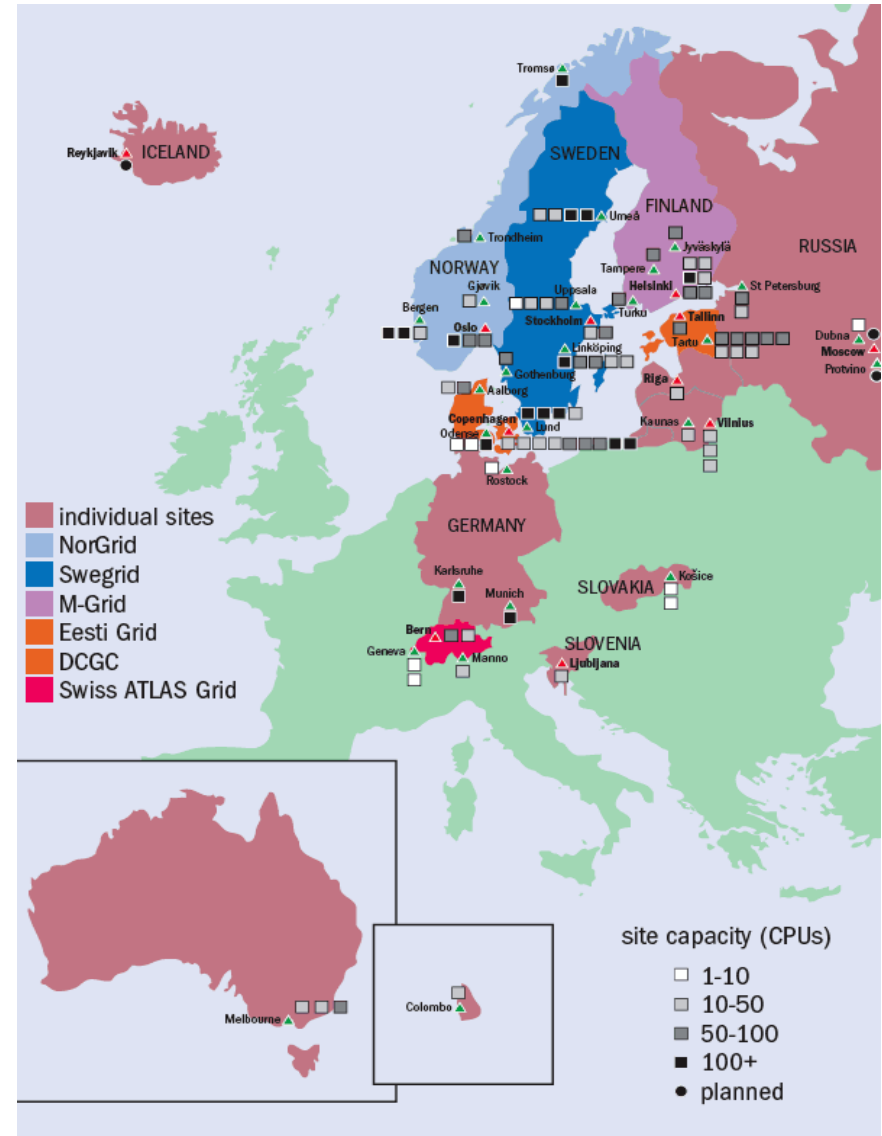
Processes: ■ Grid ■ Local

Country	Site	CPUs	Load (processes: Grid+Local)	Queueing
	Atlas (UniMelb)	26	0+2	0+0
	Charm (UniMelb)	36	0+0 (queue down)	0+0
	Alfred (UniMelb)	90	0+6	2+1
	DistLab (DIKU)	10	0+0	0+0
	Aalborg Grid Gateway	46	38+0	0+0
	Niflheim (DCSC/DTU)	902	0+898	0+17
	Horseshoe (DCSC/SDU)	1192	0+873	0+3
	HEPAX1	1	0+0	0+0
	Morpheus	18	15+0	23+0
	Theory (DCSC/KU)	112	0+42	0+1
	VCR (VideoRecorder)	1	1+0 (queue down)	0+0
	UT IMCB Anakonda clus>	15	3+0	0+0
	UT CS Antarctica Clus>	20	6+0	0+0
	CMS on CERN Linux	1	0+0	0+0
	CMS Production server	5	0+0	0+0
	UT DOUG Cluster	2	0+0	0+0
	CMS test cluster	1	0+0	0+0
	EENet cluster	6	0+0	0+0
	UT Physics Cluster	3	3+0	0+0
	CSC Kirppu	1	1+0	6+0
	Mill (Physicum)	60	0+15	0+0
	Alpha (HIP)	1	0+0	0+0
	Testbed0 (HIP)	1	0+0	4+1
	FZK cluster	996	83+349	0+0
	LRZ cluster	234	0+230	0+243
	Oslo Temp Cluster	11	0+0	25+0
	Parallab IBM Cluster	58	0+57	0+75
	Bergen Grid Cluster	2	2+0	7+0
	Oslo Grid Cluster	41	9+15	51+0
	UiO Grid	100	0+98	0+1
	SIGNET	40	6+31	6+0
	Bluesmoke (SweGrid, NS>	99	95+0	187+0
	Kosufy farm	60	36+0	0+0
	ISV	4	4+0	14+0
	Hagrid (SweGrid, Uppm>	100	56+0	68+0
	Ingrid (SweGrid, HPC2N)	101	69+0	124+0
	Monolith (NSC)	398	0+342	0+121
	Quark Cluster	7	0+0	0+0
	Beppe (SweGrid PDC KT>	96	32+0	49+0
	Sigrid (SweGrid, Luna>	99	49+50	19+25
	Toto7/Whenim64 (Lunar>	192	0+161	0+11
	Bern ATLAS Cluster	8	8+0	12+0
<b>TOTAL</b>		<b>42 sites</b>	<b>5196 570 + 3169</b>	<b>597 + 499</b>

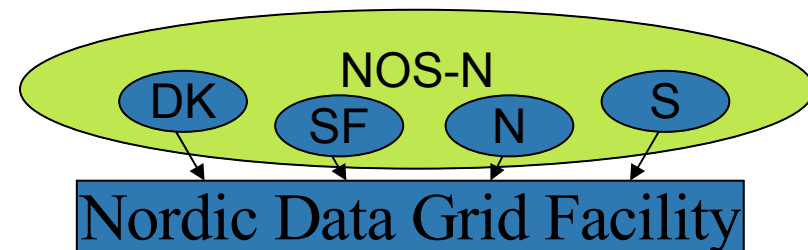




- National Grids in the NorduGrid collaboration:
  - NorGrid (Norway)
  - SweGrid (Sweden)
  - M-Grid (Finland)
  - Eesti Grid (Estonia)
  - DCGC (Denmark)
  - Swiss ATLAS Grid (Switzerland)
- Regional Grid in the NorduGrid collaboration:
  - Nordic DataGrid Facility



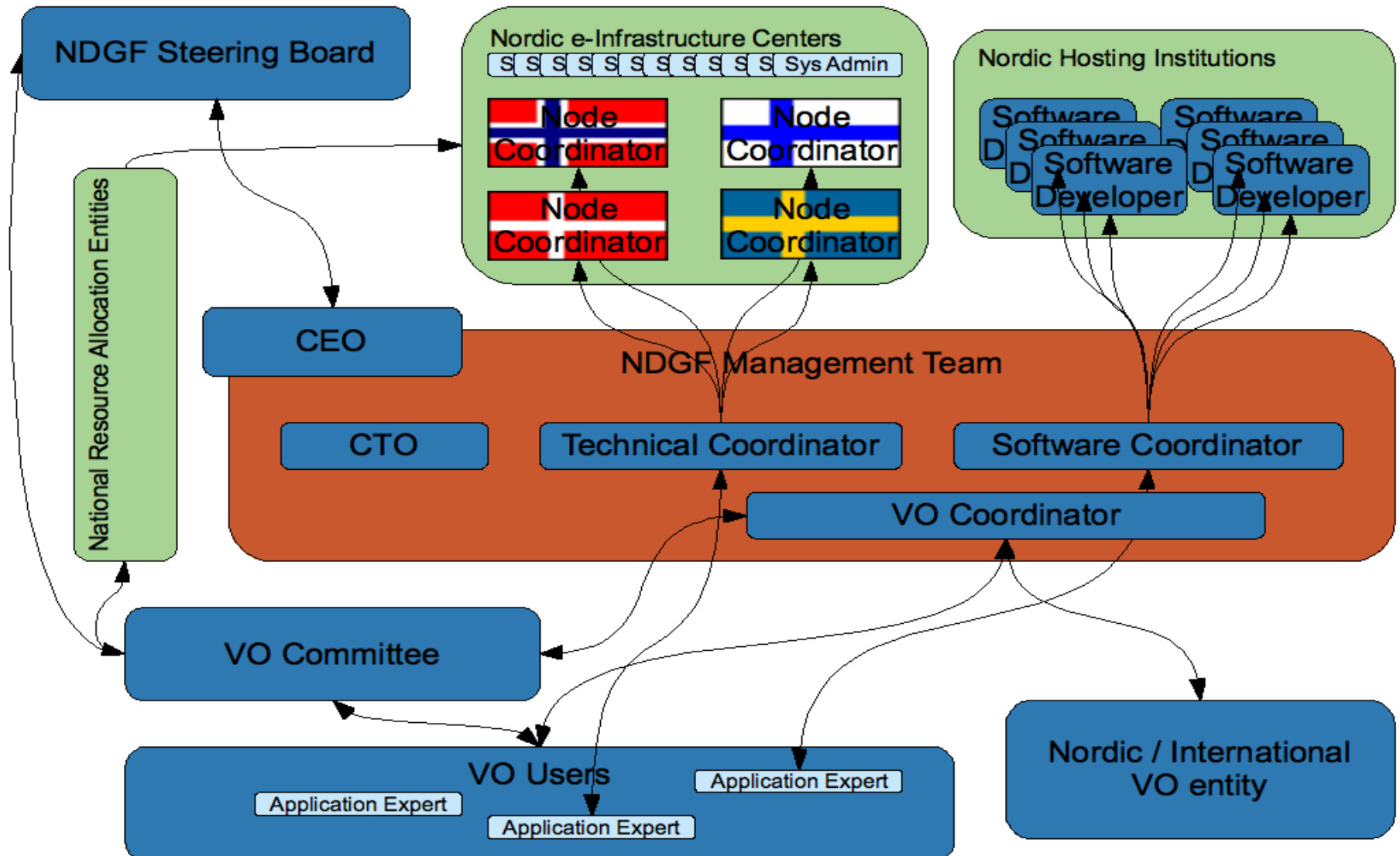
- A Co-operative Nordic Data and Computing Grid facility
  - Nordic production grid, leveraging national grid resources
  - Common policy framework for Nordic production grid
  - Joint Nordic planning and coordination
  - Operate Nordic storage facility for major projects
  - Co-ordinate & host major e-Science projects (i.e., Nordic WLCG Tier-1)
  - Develop grid middleware and services
- NDGF 2006-2010
  - Funded (2 M.EUR/year) by National Research Councils of the Nordic countries
  - Builds on a history of Nordic grid collaboration



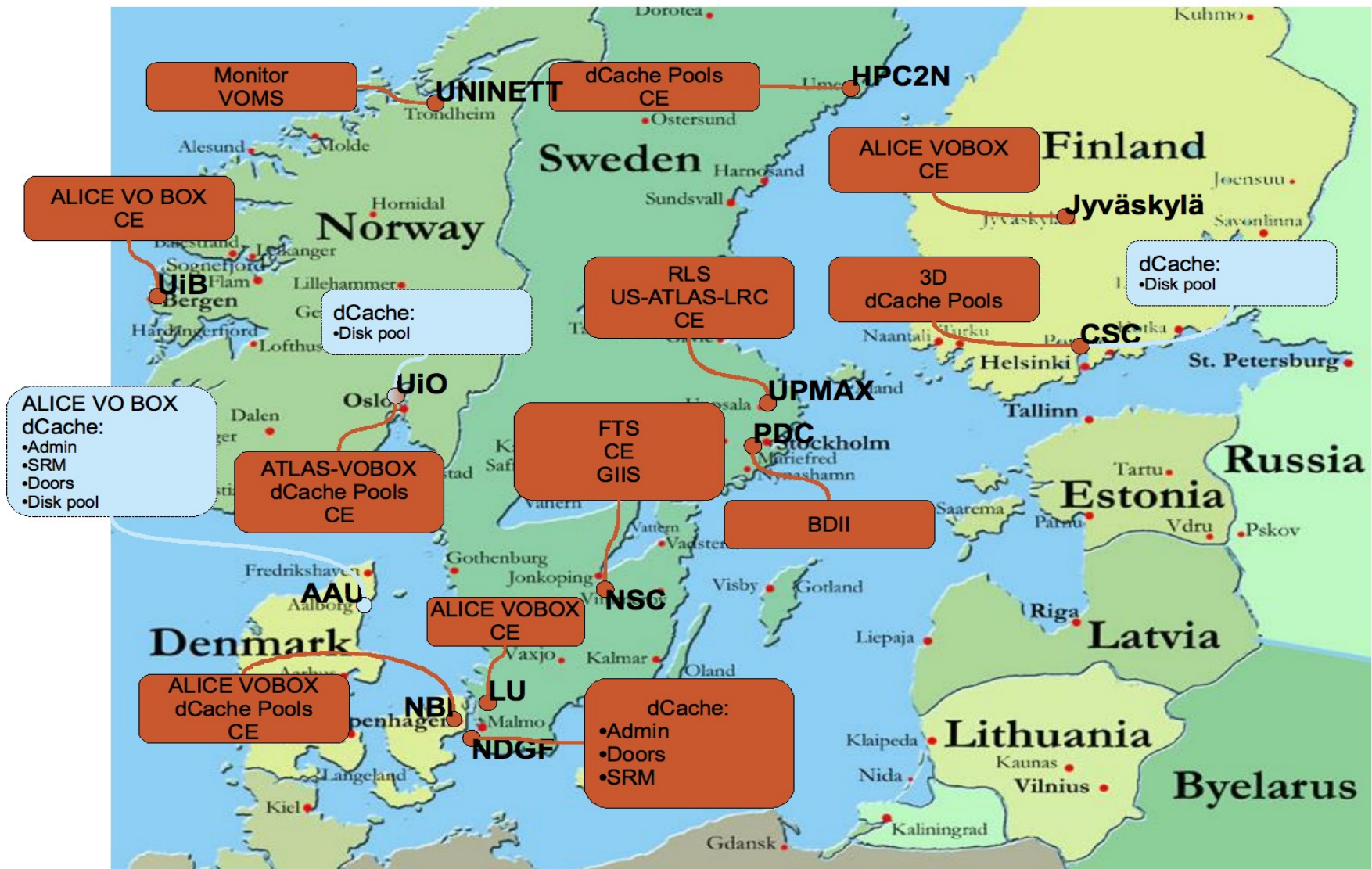
- The Nordic Regional Research and Educational Network (RREN)
- Owned by the 5 Nordic National RRENS
- 25 Years of Nordic network collaboration
- Leverage National Initiatives
- Participates in major international efforts
- Represents Nordic NRENS internationally, gateway to the Nordic area

The NORDUnet Network



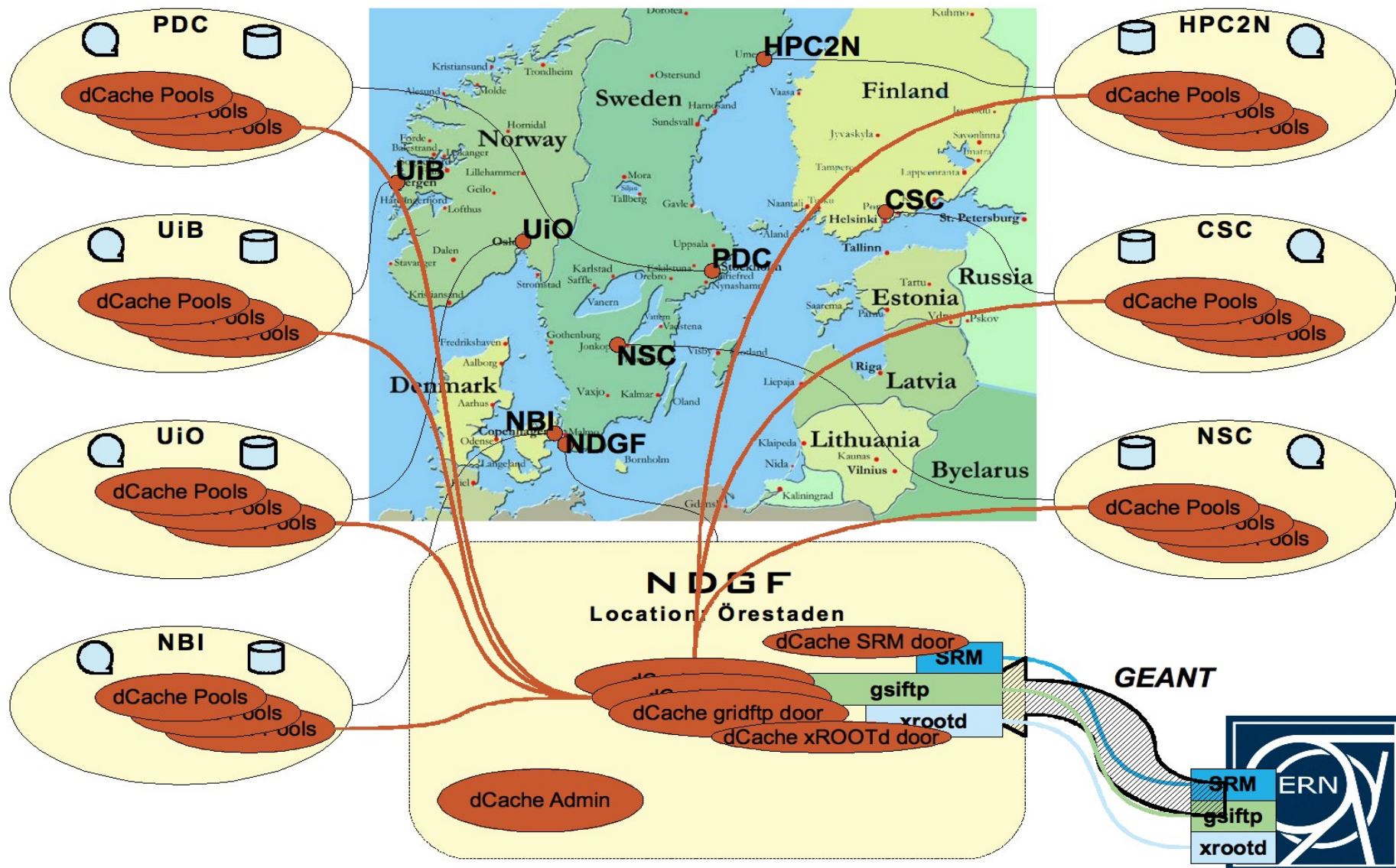




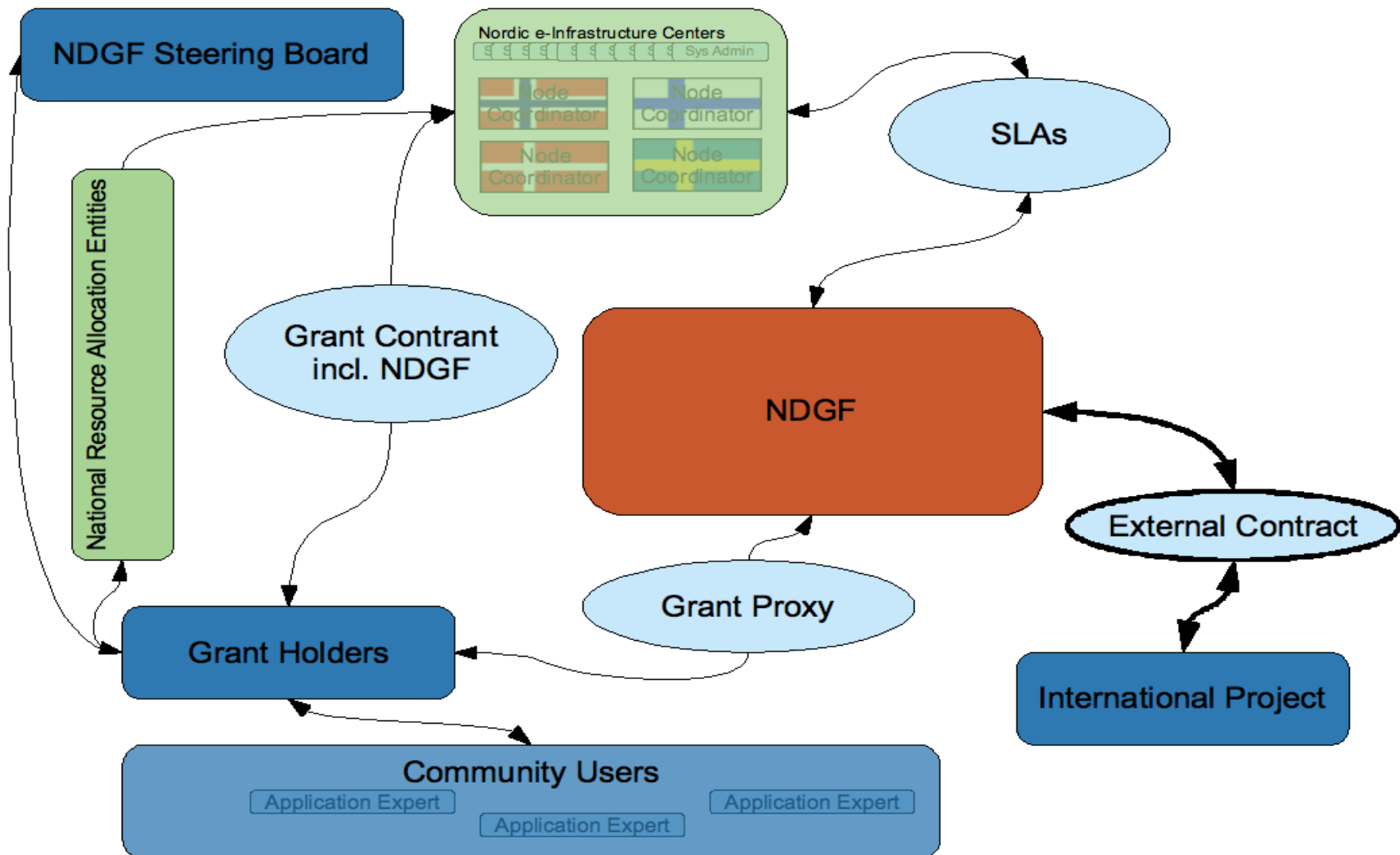




# Nordic Storage facility



- Umbrella organization for Nordic/international resource sharing
- Host the Nordic WLCG Tier-1 for the ATLAS and ALICE VO
- SLA and contract based resource sharing
- Currently starting up new VOs



- NDGF strategy for new communities
  - Users already have (access to) resources
  - Established user (inter/Nordic) community
  - Pool resources pr VO
  - Primary for large scale production
  - Resources and services are committed through SLAs
- ...Grid is just a tool
- NDGF becomes a virtual Super Computer Center

- New communities have different needs
  - Need for software integration
  - Resource sharing paradigm different pr VO
  - General CE/SE setup rarely enough
- New communities requires changes to the facility:
  - Developers needed for this
- New NDGF community projects during May



- Certificate based security removes need for bi-lateral agreements or a “big brother” organization
- Works fine for trust, but using actual resources re-introduces the need for bi-lateral agreements / an umbrella organization
- NDGF takes the umbrella role for the Nordic region
- ... alternative would be some kind of economy

- New user/community strategies:
  - The ad-hoc sharing era is insufficient for large scale production
  - Need for SLA / contract based resource sharing
  - Need for development for the new communities
- Grid or virtual SC Center?