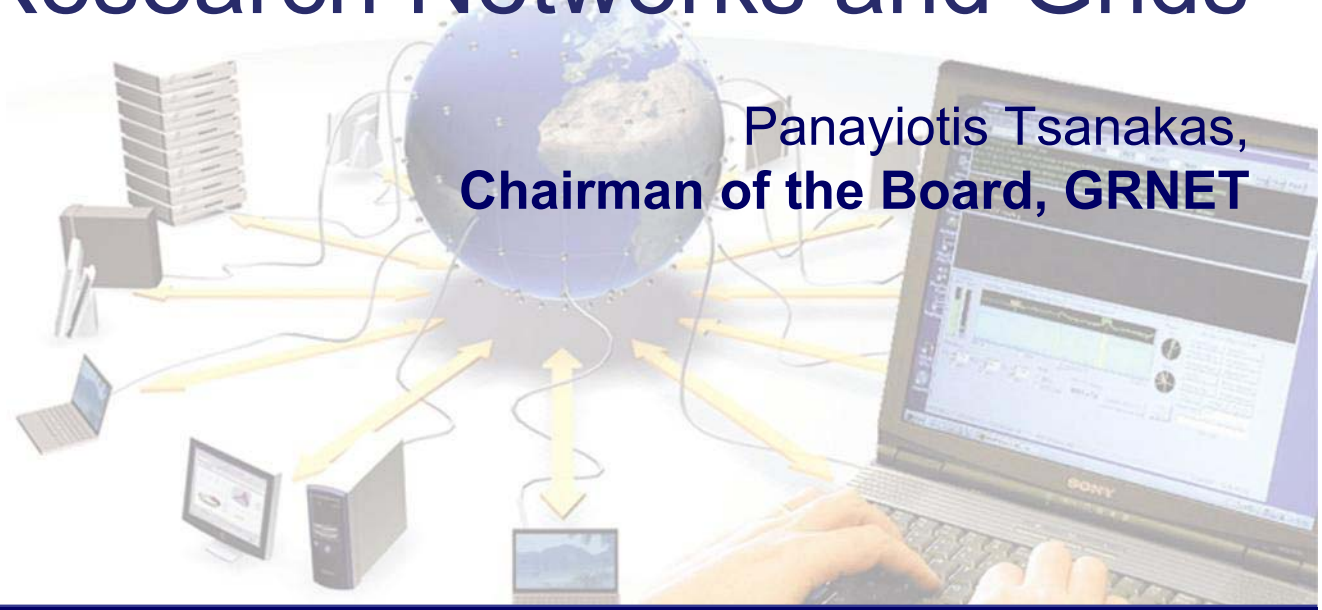
Enabling Grids for E-science in Europe

EGEE 3rd parties Advanced Induction Course, Athens 20-21/01/05

GRNET strategic viewpoint on eInfrastructures: Research Networks and Grids



Panayiotis Tsanakas,
Chairman of the Board, GRNET

EGEE is a project funded by the European Union

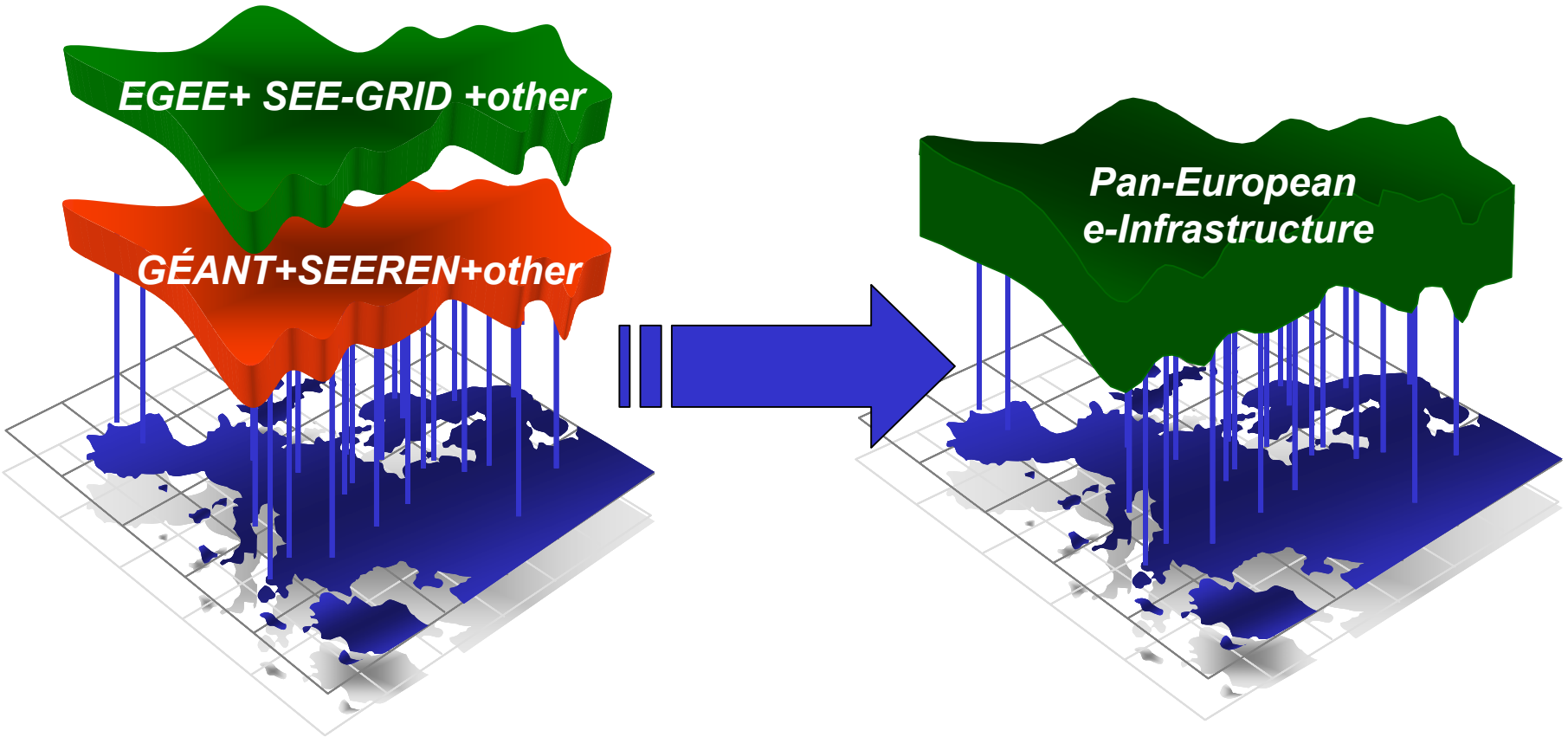
GRNET mission statement

Enabling Grids for E-science in Europe

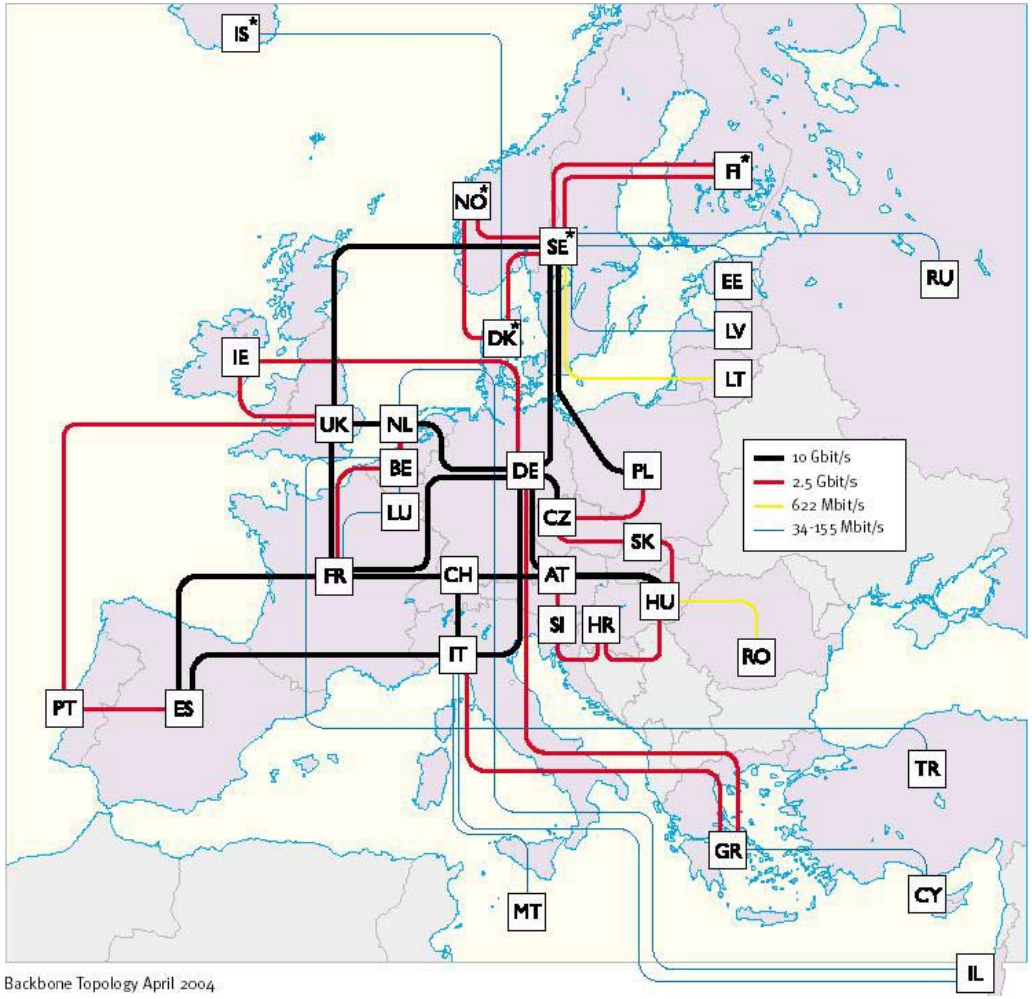
- Provide high-quality international and national ***e****lectronic* ***infrastructure*** services to the Greek academic and research institutions and to the public and private sector to support their research and educational activities
  - ***eInfrastucture = networking + Grid services***
- Promote and disseminate the use of ICT in the public and private sector towards an *e*Government, *e*Learning and *e*Business environment

eInfrastructure EU vision

Enabling Grids for E-science in Europe



- Pan-European coverage (32 countries/NRENs)
- Connectivity up to 10 Gb/s
- Linking more than 3100 Universities
- Total 178 MEuro over 4 years (93 MEuro from EU)
- Peer connectivity to North America and Japan
- Extending Mediterranean, Asia Pacific, Latin America, Russia, Balkans, Central Asia.



Backbone Topology April 2004

GRNET Grid Activities

Enabling Grids for E-science in Europe

- Hellas Grid Task Force (http://www.hellasgrid.gr)
  - Setting the basic guidelines for national, regional and EC activities
- EGEE (http://eu-egee.org)
  - Creating and deploying Grid technologies for e-Science applications throughout the European Research Area
- SEE-GRID (http://www.see-grid.org)
  - Extending the European eInfrastructure to South Eastern Europe:

    Albania, Bosnia-Herzegovina, Bulgaria, Croatia, FYROM, Greece, Hungary, Romania, Serbia-Montenegro, Turkey + CERN

HellasGrid Task Force

- Task Force composed of 27 representatives of all major research and academic institutes working on Grids-eScience
  - Task Force mission will be continued after 1/1/2005 through the ***EGEE 3rd parties Management and Technical Boards***
- Main envisaged application users:
  - HEP, Bio-informatics, Meteorology, Astronomy, Computer scientists, Virtual Collaboration Environments
- Final version of the Strategy Document published in November 2003
- Hellasgrid workshop held in December 2003
  - Combined with European Data Grid training
- Hellasgrid Infrastructure proposal submitted December 2003
  - Updated version resubmitted in February 2004
  - Finally approved November 2004 (DELAYED)
- WCIT Grid workshop supported by EGEE– May 2004
- Hellasgrid HG-01 node (Isabella) inauguration combined with 1st EGEE Induction course – May 2004
- Hellasgrid presented in Baltic Grid Conference (Lithuania) – October 2004
- Final delivery of Isabella – December 2004 (DELAYED)
- Hellasgrid presented in CoreGrid workshop – Crete, January 2005

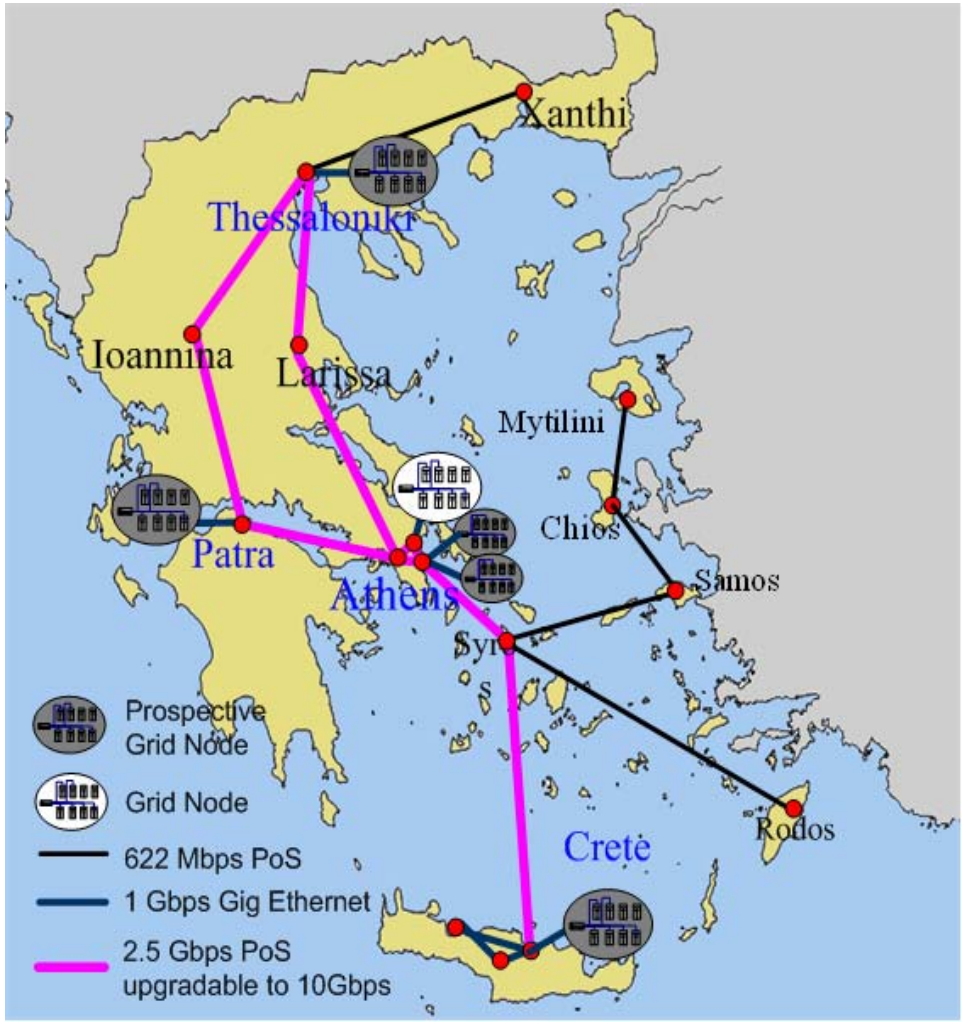
www.hellasgrid.gr → Calendar

HellasGrid infrastructure

Enabling Grids for E-science in Europe

Two phases:

- 1. HG-01-GRNET node (Isabella) fully operational and integrated in the pan-European infrastructure
  - 64 CPUs, 10TB storage, 10TB tape
  - Scientific Linux and LCG2 m/w
- 2. Expansion to 6 more sites
  - 768 CPUs (384 dual) + 30 TB disks +60 TBs tape:
    - 128+64 CPU nodes Demokritos
    - 2 x 96 CPUs NTUA and IASA-UoA
    - 3 x 128 CPU nodes AUTH, FORTH, CTI
    - 6 x 4 TB on-line storage in local sites
  - 10+ 50 TB Tape Library at HG-01-GRNET
  - 4 Access Grid nodes



Access to the infrastructure

Enabling Grids for E-science in Europe

- HG-01-GRNET node finally delivered by the vendor late (December 2004):
  - LCG2 2.0 M/W requirement of Redhat 7.3 (specified in the tender 26/06/03)
  - Redhat 7.3 End of Life: 1/1/2004
  - GPFS v1.3 (over RH7.3) unsupported!
  - ***GPFS v1.3 distributed file system configuration and stability issues***
  - GPFS > 2.0 required RHEL 3.0 (RH Enterprise Linux) or equivalent

  → ***Final delivery as defined in the tender (RH 7.3)***
- Node operations team (ICCS) started September 2004
- LCG2 M/W adaptation compatible with new OSs (Scientific Linux) delivered by EGEE December 2004!
- Upgraded to Scientific Linux 3.03 and GPFS 2.2 January 2005 → **Stability issues solved!**
- **Isabella is ready for access by users: Request for an account**

  http://www.hellasgrid.gr/users

EGEE Project

Enabling Grids for E-science in Europe

- 71 leading institutions in 27 countries, federated in regional Grids
- 32 M Euros EU funding (2004-5), O(100 M) total budget
- Started in 1/4/2004, in full production now:
  - one of the largest international Grid infrastructures ever assembled
- ~ 300 dedicated staff + contribution from many non EU funded collaborators
- Leverage the Particle Physics LCG infrastructure to provide production services to other sciences
- Establish production quality sustained Grid services
  - 3000 users from at least 5 disciplines
  - over 8,000 CPU's, 50 sites
  - over 5 Petabytes (10^{15}) storage
- Demonstrate a viable general process to bring other scientific communities on board (Biomedical, Generic supporting MPI-based applications)

Expanding ERA to South-East Europe

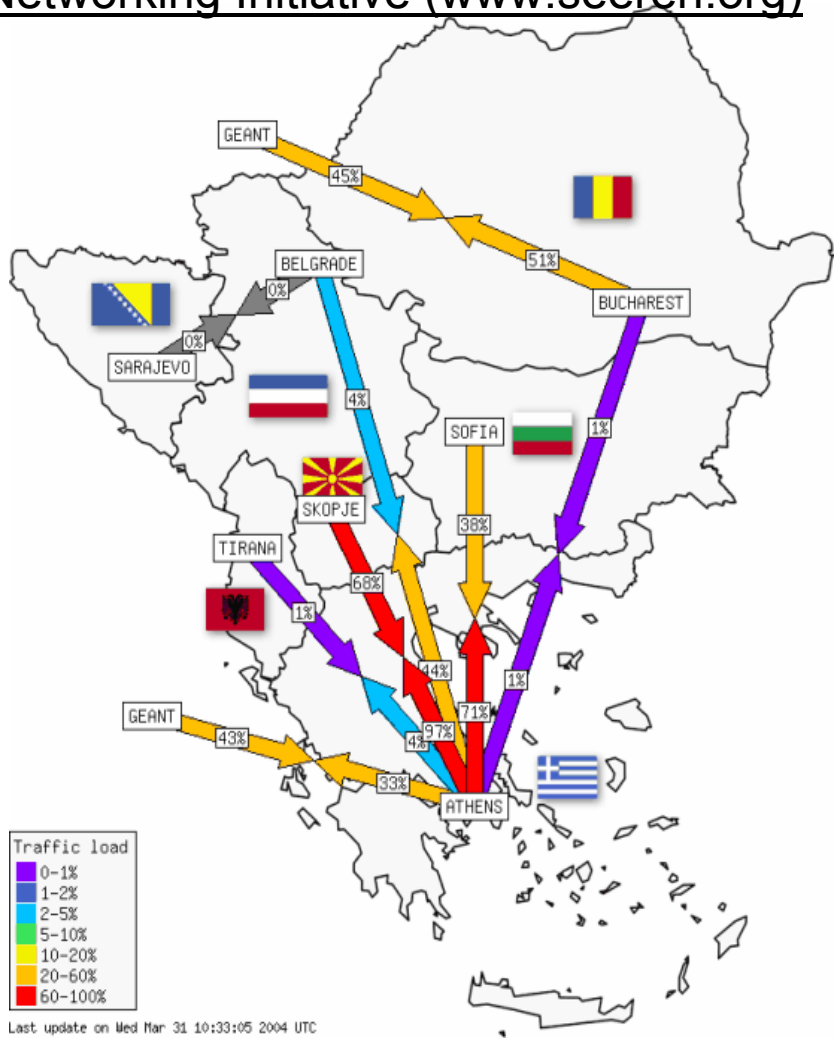
Enabling Grids for E-science in Europe

- The vision: '**ease the digital divide in SE Europe**'
- Help the promotion of the scientific and educational cooperation between EU MS and SEE
- Act as an enabler for dissemination and development of the next generation of Internet technologies in SEE states
- Contribute to the reconstruction and stabilisation of the region

SEEREN

South-Eastern European Research & Education Networking Initiative (www.seeren.org)

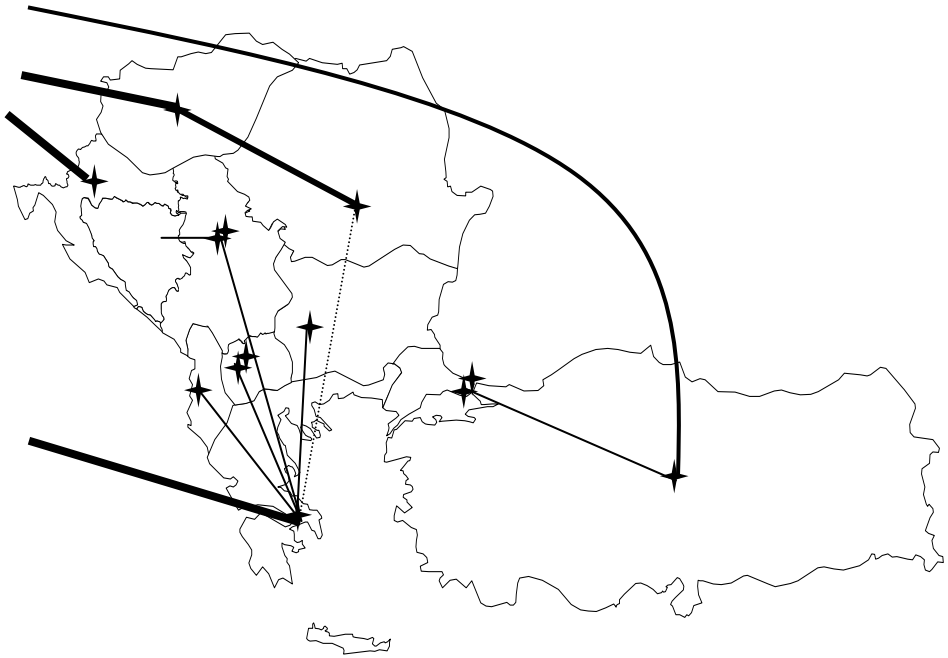
- Interconnects the Research and Education Networks of Balkans among them and to GEANT.
- Built in 2003, launched and entered its stable operation on Jan. 2004
- 1.3 m€ initial seed funding by the EC/IST. 4 m€ through complementary (sub)-projects (FP6, NATO, National funds, etc.).
- 100% availability for all links for the last 9 months.
- Virtual Network Management & Operations



SEE-GRID

South-Eastern European GRID (www.see-grid.org)

- Contribute to building a Pan-EU eInfrastructure by expanding the “eInfrastructure inclusion” into South-East Europe
- Start day: May 2005, clusters already established in all countries
- 1.215 m€ Initial seed funding by the EC/IST
- Expanding the EGEE Regional Operations Centre



Mid-term strategy: Grid infrastructure

Enabling Grids for E-science in Europe

- Next 1,5 years
- Now basic operations stable (GRNET, ICCS, AUTH, UoM)

- Achieve a critical mass of computing and storage resources
  - Facilitated by HellasGrid project
  - Also legacy clusters should be integrated
  - 3rd parties vital to support the infrastructure in Greece

- Reach production-level operational know-how
  - Crucial for building “seed” community
  - Facilitated by EGEE and HG

Mid-term strategy: Grid users

Enabling Grids for E-science in Europe

- Attract the initial scientific user community
  - eScience is a leading enabler of Grid computing
  - Facilitated by EGEE/HG operations - 3rd parties vital to support users in Greece
  - But end-user community training is crucial
  - HEP, BioMed, Computational Chemistry, Earth Observation, Meteorology, etc.
- Develop sharing mentality among VOs, specify operational policies – AUPs
- National funding instruments needed: Grid-Applications call coming soon!
  - Details in Hellasgrid session tomorrow
- IST projects focused on Grid applications could be supported by our infrastructure, subject to negotiations

Long term strategy

Enabling Grids for E-science in Europe

- 2+ years
- Attract EU funding (GN2 already active, EGEE2 to be submitted in September 2005
  - *3rd parties efforts are critical to attract more EGEE2 funds and expand activities (M/W development and applications)*
- Lobby for EU infrastructure funding for Grids
  - To allow for infrastructure and M/W harmonization across EU
- Enlarging the eScience user community
- Seek industrial – commercial support / liaison
  - Already started:
    - eBusiness Forum Z6 group – Comdex workshop – strategy paper
    - EGEE Industry Forum
  - Expanding from eScience to eGovernment and eBusiness,
  - using the eScience expertise and experience
  - in terms of guidelines, etc
- Integration of diverse platforms: expand the infrastructure with scavenger grids and other computing resources
- Common policies, SLAs, economic models and regulation

Opportunities

Enabling Grids for E-science in Europe

- "The Network Computer"
  - Inexpensive but complex
- Geographic globalization via broadband optical networks
- Increased scalability
- Increased reliability
- Transparency

- Proliferation of Virtual Collaborative Applications and Data Centers (teaching & research, data mining, rendering & simulations in entertainment, engineering, life sciences, financial services, e-government, earth observing systems..)
- Growing experience of eScience users and transfer to other realms of society

- Endorsement by major IT vendors: IBM, Intel, HP, SUN, Oracle…
- Priority of public funding for research and proofs of concept (e.g. EU, UK, Nordic Countries …)

…and Challenges

Enabling Grids for E-science in Europe

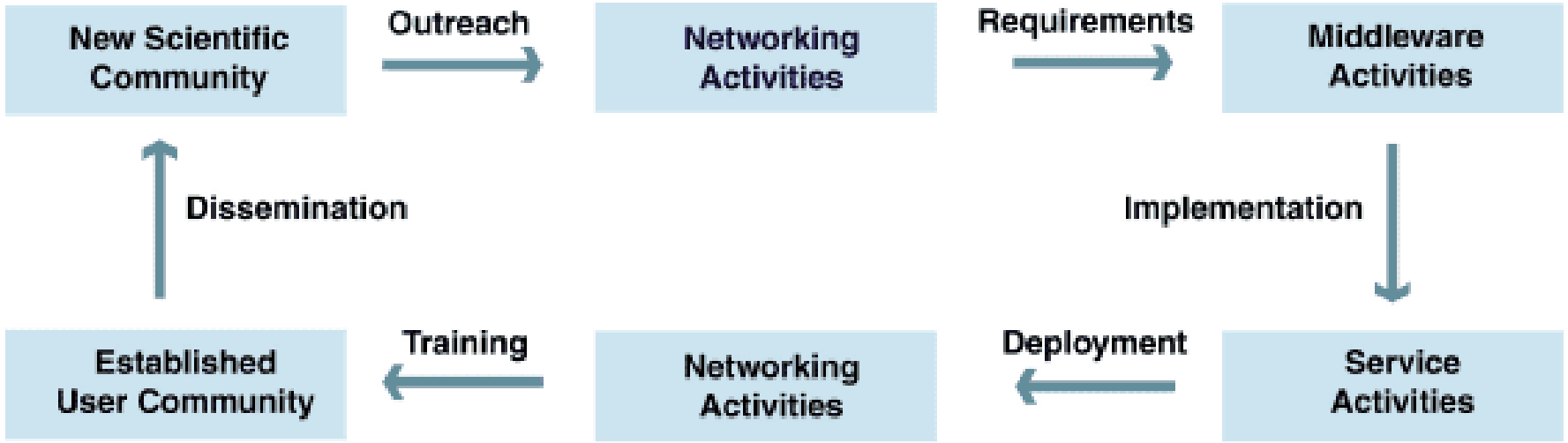
- Grids are not a mature solution yet
- Going through an early standardization stage
- Security concerns

- Inhibition of users towards sharing
- Issues of policy, negotiation, provisions and other cross-organizational aspects
- Accounting problem, new economic model

- World-wide lack of enabled applications and success stories

Conclusion

- Essential to form the **community**, enlarge it, train it, disseminate further
- Similar to the EGEE Virtuous Cycle



- Crucial to have a number of well coordinated initiatives running in parallel: i.e. infrastructure, operations, applications…