



**Towards integrated
Networking and Grids
infrastructures for
eScience and beyond**

**The EU eInfrastructures
initiative**

**12 June 2003
Athens, Hellas**



Workshop Chairs

Mario Campolargo EC
Vasilis Maglaris GRNET

Local Host

Dimitris Deniozos GSRT
Vasilis Maglaris GRNET
Evangelos Bouboukas EKT

Organizing Committee

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Under the aegis of the Hellenic Presidency of the European Union



Workshop objectives

The Workshop intends to stimulate at pan-European level an open discussion and take further actions for the new EU policy initiative on eInfrastructures aiming at:

- Providing a framework for an easier, faster and more cost-effective access to all researchers in Europe and all types of information resources (networking, computing, data storage) distributed across Europe.
- Promoting a best practice implementation of such a model in the research area to facilitate and accelerate a later commercial uptake of the new paradigm.

Some of the more concrete objectives of the proposed meeting in Athens are:

- To define the main lines of the new policy initiative in Europe. Significant progress in this area may lead to the formulation of a new policy for approval by the Council of Ministers of the EU.
- To discuss on the option of the creation of a high-level committee of representatives from networking-, computing- and data-resource administrative authorities in Europe (in the example of the policy committee for Geant) to monitor and support on a policy advisory level the process of the creation and use of an eInfrastructure in Europe.

Organizer

The workshop is organised by the General Secretariat for Research & Technology (GSRT), the European Commission and the Greek Research and Technology Network (GRNET) in collaboration with the Greek National Documentation Centre (EKT).

Workshop venue

Athens, National Hellenic Research Foundation (NHRF), Vas. Konstantinou Avenue 48.

Registration

On-site registration on Thursday, 12 June at 08:30-09:00.

Social event

Wednesday, 11 June at 20:00 - Paleo Panepistimio, Tholou str., Plaka, Athens

Lunch

Lunch will be served on Thursday from 12:30-13:30 in the venue area.

Workshop sponsors

The Hellenic Presidency of the European Union, the Greek Research and Technology Network (GRNET) and the National Documentation Center (EKT).

Workshop agenda

PLEASE REMEMBER TO TURN OFF YOUR MOBILE TELEPHONE AND SOUND ON YOUR LAPTOP

Thursday, June 12, 2003 National Hellenic Research Foundation, 48, Vas. Constantinou Avenue, Athens			
	08:30	30 min	Registration and Coffee

0.1	09:00	10 min	Welcoming of participants and greetings	Evangelos Bouboukas, Director, National Documentation Centre
Session 1: New challenges for Europe on eInfrastructures				
1.1	09:10	15 min	eInfrastructures and ERIA	Dimitris Deniozos, General Secretary for Research and Technology, Ministry of Development, Greece
1.2	09:25	15 min	Broadband & eInfrastructures: a path to Regional Development and Information Society	Yannis Kalogirou, Secretary for the Information Society, Ministry of Economy and Finance, Greece
1.3	09:40	15 min	Global eInfrastructures – The EU leading the way	Spyros Konidaris, Advisor to the Director General, European Commission, - DG INFSO
Session 2: EU perspectives				
2.1	09:55	15 min	The EU eInfrastructure initiative	Mario Campolargo, Head of Unit, European Commission – DG INFSO
2.2	10:10	15 min	Policy aspects in support of the EU eInfrastructure Initiative	Jean-Louis Picqué, European Commission - DG Research
2.3	10:25	15 min	Towards a common European Networking and Grids infrastructure area - next challenges	Kyriakos Baxevanidis, Scientific Officer, European Commission - DG INFSO
Session 3: A European Networking/NREN perspective				
3.1	10:40	15 min	Moving Towards European Research Area: the two sides of the Coin	Fernando Liello, Chairman, European NREN Consortium Chairman
3.2	10:55	15 min	An eInfrastructure in Europe: A European NREN perspective	Dany Vandromme, Director, RENATER
3.3	11:10	15 min	European NRENs and GTREN	Vasilis Maglaris, Chairman, GRNET
3.4	11:25	15 min	Research networks and the new regulatory framework – competing public priorities?	Claire Milne, Antelope Consulting
Session 4: National/regional initiatives				
4.1	11:40	10 min	Building a European eInfrastructure: The urgent need for an Open Middleware	Tony Hey, Director, e-Science Core Programme, EPSRC
4.2	11:50	10 min	How to build an inexpensive production Grid infrastructure?	Peter Kacsuk, MTA SZTAKI
4.3	12:00	10 min	The role of local and regional coordination	Manuel Delfino, Director, Port d'Informació Científica (PIC)
4.4	12:10	10 min	The Grid Infrastructure in Italy	Mirco Mazzucato, Director of Research, INFN
4.5	12:20	10 min	The promotion of an eScience environment: a view from eSciencepark Amsterdam	Walter Hoogland, Dean Faculty of Science, University of Amsterdam
	12:30	60 min	Lunch break + Press conference	
4.6	13:30	10 min	CEGC: view from local, regional and European perspective	Aleksander Kuszniur, Deputy Director Cracow Academic Computer Center
4.7	13:40	10 min	Perspectives of Grids and e-Science in Germany	Marcel Kunze, Grid-Computing Kompetenzzentrum, Karlsruhe

4.8	13:50	10 min	Grid deployment and support – the NGC, EGSC and SweGrid initiatives	Lennart Johnsson, PDC, Royal Institute of Technology (KTH), Sweden
Session 5: Application initiatives				
5.1	14:00	15 min	Grids and LHC, towards a first global Grid Prototype	Hans Falk Hoffmann, Director, Technology Transfer & Scientific Computing, CERN
5.2	14:15	15 min	Towards a common European market for computing and data	Fabrizio Gagliardi, DataGrid General Manager, CERN
5.3	14:30	15 min	The Grid – Challenging HPC infrastructure provision in Europe	Mark Parsons, Commercial Director, EPCC and NeSC
	14:45	30 min	Coffee Break	
Session 6: Conclusions				
6.1	15:15	165 min	Open discussion and wrap-up	Round table: Spyros Konidakis, Mario Campolargo, Jean-Louis Picqué, Dany Vandromme, Vasilis Maglaris, Tony Hey, and Hans-Falk Hoffman
6.2	18:00	30 min	Grid technology showcase - Teravision- A Virtual Collaboration Environment technology	Electronic Visualization Lab- University of Chicago/GRNET

For updated information on the event please visit <http://www.cordis.lu/greece/events120603.htm>

Background document

Overview of the current situation

Recent advances in Europe in the area of Research Infrastructures (RI) resulted in a pan-European coverage by a high speed research network (the fastest in the world) including a full-fledged administrative and operational support. This support is provided by DANTE/NRENs for the backbone network (Géant) and by the corresponding NREN entity in each Member-State. A policy committee, in addition, consisting of representatives from all NRENs defines common rules in the access to Géant, common approaches for its continuous upgrade and coherent views in the upgrade of the NRENs.

At the same time a number of research initiatives in Europe and the world (building on the availability of high-speed networks and broadband connections, advanced virtual environments and the Grid-middleware technologies) are creating pilot implementations of a model of a shared use of computing and data resources across technological, administrative and national domains.

As an example here is mentioned the DataGrid EC-funded research project, whereby computing and data storage resources distributed across different technology and administrative domains (e.g. institutions located in different countries in Europe) are used in a collaborative and shared mode in the context of three different scientific application areas, namely High Energy Physics, Biology and Earth Observation.

In addition to the above mentioned European initiatives, some National programmes in Europe are creating a similar model for the shared use of resources on the National level across institutional and user application domains. Most characteristic example in this case is the e-Science programme in the UK whereby a Grid-based infrastructure is being built to enable next generation scientific research based on the shared use of computing and data resources across the country and across numerous scientific disciplines.

The vision and the challenge

The above developments create the expectation that technology is maturing in fast pace to support the emergence of a new infrastructure paradigm according to which the shared use of computing and data resources across administrative and technology domains will become a commodity service. The idea is also such an infrastructure to be built on top of the existing high-speed networking infrastructure in a way that a fully integrated communication and information processing service is provided to the user application communities. An objective of the Research Infrastructures part of the 6th Framework Programme for research of the EU (FP6), is to create such an infrastructure in Europe, else known as an **eInfrastructure**. It is obvious, that such a paradigm has the potential to dramatically change the way in which people work and do business over the Internet today and this is the reason why Grids is seen by many people today as the enabling technology for the next generation of the Web.

The importance of virtual collaborative environments (eScience) is acknowledged today world-wide and important new research initiatives are almost daily announced in Europe, the US, the AP-region and others. Those initiatives aim at extending and further advancing the technology base and at the same time creating a Grids enabling infrastructure for e-Science. In the context of the Research Infrastructures part of FP6, for example, a budget of €250m is foreseen to support the building/upgrade of high-speed networking and Grid research infrastructures in Europe including the transition from pilot to production level facilities which will provide a pan-European coverage and will be able to serve a broad range of scientific disciplines. Still in FP6, an additional budget of €125m is also planned for the further development of the Grid technology base in Europe.

Further to the research effort, experience shows that the full exploitation of a new innovative technological paradigm with such a broad scope and cross border relevance like the eScience concept can better (and in some cases only) happen when the appropriate administrative and policy decision mechanisms (on the level of the resources shared use) are put in place, in close pace with the technological advances.

The following are some relevant questions in this context:

- Is it the interest of the Member and Associated States in Europe to support the creation of a Nation- and European-wide eInfrastructure in the extended ERA for e-Science?
- What are the necessary policy level decisions and actions to enable the effective cross institutional, cross border and cross scientific discipline sharing of resources? Regulatory framework?
- What would be the appropriate administrative and operational support schemes in this case?
- What could be the roles for National legacy schemes (e.g. the NRENs)?
- What should GEANT do for L1-L2-L3 end-to-end service provisioning?
- How and when should IPv6 deployed?

It is proposed in this context the creation of an initiative on the policy level to discuss and formulate views on the above issues and to facilitate the creation of the necessary administrative and policy decision mechanisms for the successful deployment of eInfrastructures in the extended ERA for e-Science with both scientific and commercial relevance.

Abstracts

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Global e-Infrastructures - The EU leading the way: The beginning of the 21st Century finds us trying to come to terms with the transition from the “industrial” to the “information age”. Pre-condition for this transformation is an “e-Infrastructure”, which should first enable the development of knowledge (science – research – education), and gradually extend to accommodate all functions subject to this transformation. Europe has been actively pursuing world leadership in this infrastructure. The synergies between GEANT and GRIDs shape the vision of an e-Infrastructure for the benefit of the European users, and open to the world at large with a genuine good will for global co-operation.

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The EU eInfrastructure initiative:

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Policy aspects in support of the EU eInfrastructure Initiative: The deployment of communication networks and Grid architectures will be in the coming years a corner stone for the construction of a European Research Area (ERA). The creation of a European-wide eInfrastructure providing a fully integrated communication service should greatly facilitate the development of collaborative research throughout Europe. The Sixth Framework Programme (FP6) has been designed to contribute to the creation of the ERA. In FP6, the support for the implementation of GEANT and Grids is provided through the Research Infrastructure action. The eInfrastructure will offer all European scientists an equal opportunity to access such infrastructures as data collection or computing centres. This will complete the support for physical access to major research infrastructures which has been the core activity of the Research Infrastructure action so far. The deployment of the European high speed research network has been organised with the support of the national NREN entities, under the co-ordination of a policy committee consisting of representatives of the NRENs. Various Grid initiatives, made possible by the availability of this network and the development of enabling middleware technologies, are now emerging in a less co-ordinated way. The European Strategy Forum on Research Infrastructures (ESFRI), recently created by the EU Member States to develop a coherent and strategy-led approach to policy-making on Research Infrastructures in Europe, may play a useful role in this context.

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Towards a common European Networking and Grids infrastructure area – next challenges: Still in the early stages of the implementation of Grid technologies it becomes clear that equally important to technology development is the removal of barriers on the organisational policy level that potentially prevent a widespread deployment of the technology. This is because moving to a model of shared use of IT-resources between people, institutions, Nations etc, requires agreement on a global infrastructure, meaning - among other things - setting policies and guidelines that everyone has to agree upon to give up their own resources into a shared pool. From a first approach the problem looks multilevel and multidimensional. One could easily e.g. identify such barriers on the institutional (sharing resources between different departments in an institution or between different institutions), scientific discipline, business activity (different scientific disciplines or business activities put their IT-resources in a common pool), and National levels (different nations share a common pool of IT-resources). On the other side just a few examples of different policy related aspects that need to be tackled include authentication, authorisation, billing even new IT-infrastructure investment plans of organisations. The 12 June meeting offers an excellent opportunity for a discussion of those aspects on European scale. This discussion is expected to lead to a number of concrete steps and actions that will aim to create an IT-resource sharing policy level framework in Europe. As such is proposed the establishment of a high level committee of experts to play a monitoring and consulting role in the creation of this framework. Of particular importance is that the above discussion will be carried out in the context of the eInfrastructure initiative of the European Union that proposes a fully integrated infrastructure framework for the provision of communication and information processing services to researchers and that draws on the GÉANT successful model in dealing with technology as well as policy related aspects. The creation of a successful IT-resource-sharing policy framework in Europe for Research Infrastructures is expected to catalyse the appearance of

similar models in business and eventually to remove significant barriers in the deployment of new technologies like Grids in this field.

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European National Research & Education Networks (NRENs) and Global Terabit Research & Education Networking (GTREN): European NRENs have adopted over the last decade a “business model” characterized by the following traits:

1. In the vast majority of European nations, a single state-controlled advanced infrastructure serves all Universities and Research Centers networking needs. These, apart from pure “research” electronic communications (between or among researchers), may in many cases include “commodity” traffic, i.e. traffic that has a source or a sink in the Research & Education community, while the other end is the global Internet. Transient “commercial traffic” defined as connections using the NREN as a “via” structure to serve two commercial entities is strictly forbidden by a service level agreement between NRENs and end-users, referred to as the Acceptable Usage Policy (AUP). Thus, NRENs do not compete with the ISP community and do not distort electronic communications markets in a highly competitive environment. It is worth mentioning that only 3-5 NRENs applied for a general license (authorization) to provide communications services, out of more than 30 belonging to TERENA (Trans-European Research & Education Networking Association). In Europe, the NREN community maintains the academic – research networking tradition that was the driving force for the ARPAnet – NSFnet – Internet early stages in the USA. The successor of the Academic – Research network in the US (Internet2 initiative, Abilene) may be a technologically advanced platform for cutting edge applications (e.g. collaborative virtual environments with tele - immersing experiments, virtual distributed orchestras etc.) but is restricted to around 200 Universities and Research Foundations (the University Corporation for the Advancement of Internet Development –UCAID); even within UCAID, Abilene serves a minority of users (advanced eScience experiments), while the majority is being served by commercial ISPs. Few members of the US Academic community take advantage of the largely under-utilized Abilene resources, sometimes not even knowing of the option to use it. On the other hand, NRENs in Europe and their Pan-European gigabit interconnection GEANT, serves more than 3000 Institutions, half of which using it as their sole gateway to the global Internet.

2. The European Research & Education networking model evolved into a three-tier architecture: The campus LAN, the national MAN – WAN (the NREN) and the federal gigabit interconnection GEANT. All three tiers enable end-users to communicate with gigabit speeds as if the campus LAN is extended into the whole European Research Area. Thus, apart from serving connectivity of researchers and the educational community, the three-tier structure may arrange for the provision of Virtual Private Networks (VPN) resources to eScience projects (e.g. GRIDS) on request, with possibly end-to-end Quality of Service guarantees (jitter, speed, security etc.) The strictly hierarchical structure of Research & Academic networking in Europe may facilitate the provision and management of user, national and Trans-European resources, but may suffer from rigidity to follow the overall Internet paradigm, which is based on peering and neutral interconnection facilities (GigaPoP telehousing). The latter becomes evident when planning the introduction of user-empowered infrastructures in Research & Education Networking such as dark fiber ownership, condominium sharing (the Canadian business model) and long-term IRU leasing. Note, that at present GEANT is based on IP/MPLS provision over DWDM λ 's (or over SDH circuits in cases where DWDM circuits are not available), on short-term leases from international electronic communications operators. Note also, that the three-tier hierarchical model does not encourage NREN clustering at regional levels; this may introduce a fourth level in the hierarchy or may eventually render the Trans-European level (GEANT) obsolete and replaced by peering arrangements. Nevertheless, the hierarchical (federal) model is up to now a great enabler for Universal Service Provision and a means to bridge the digital divide across Europe.

3. The European “federal” Research & Education Networking platform attracted global interest as it unified hundreds of thousands of advanced European researchers into a critical mass comparable or superior to US, Canadian and Japanese networked communities. Thus, the successor to GEANT is expected to be the driving force in the Global Terabit Research & Education Network – GTREN. As a first step, European NRENs (together with their non-for-profit corporation DANTE and TERENA) are tying together the European Research Area (GEANT) including South-East Europe (SEEREN initiative), North America (gigabit Transatlantic connections to Internet2 and Canarie), South American (@lice initiative), Third Mediterranean countries (EUMED-CONNECT initiative), links to NRENs in the Russian Federation, Ukraine, Asia – Pacific (TEIN initiative) etc.

It is expected that GEANT+ (the future GEANT upgrade) will continue to drive networking technology to its limits (e.g. optical switching, terabit capacities) and will help establish the European researcher as an ever-growing user of world-wide distributed eScience applications. This is exactly the driving force in deploying GTREN from a European perspective.

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An e-infrastructure in Europe: A European NREN perspective: The talk will focus on two aspects of the e-infrastructure issue: 1) Do we need it? 2) If so, what are the legacy problems, related to the provision and exploitation of such instrument, and what will be the benefit of having it. Beyond showing scientific cases who may justify it, the experience gained from the existing research networks across Europe will be extrapolated to envisage a still more cohesive action, with an balance of pro- and con- arguments for an European Research Infrastructure. Final conclusion will be brought in to relate this to the strategic objectives of the FP6 and successors to build an integrated Europe of research and education.

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Research networks and the new regulatory framework – competing public priorities?: The new European communications regulatory framework coming into force in July 2003 will overall be positive for research networks (NRENs), as it will tend to strengthen competition to provide services to NRENs, and will allow NRENs to provide for themselves whatever infrastructure and services they choose to obtain this way (subject to local regulations such as rights of way). • However the framework does distinguish in a significant way between public and non-public service providers, and it is not always clear which of these categories an NREN would fall into (examples). • More importantly, it is not clear what public policy should favour in this regard. The greater obligations associated with public status may tend to deter NRENs from assuming it. But some Member States may positively wish their NRENs to have a public status, eg so that they can enhance connectivity for schools and schoolchildren. NRENs deserve clarity here (and may merit special treatment in relation to certain obligations). • A parallel issue is that the publicly funded status of NRENs may lead to complaints from private ISPs about unfair competition.

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Building a European eInfrastructure: The urgent need for an Open Middleware Infrastructure Institute: There are many national and EU Grid R&D projects that are developing research prototype Grid middleware. In order to realize the vision of a robust middleware eInfrastructure implemented on top of the high-speed backbone network, there is a need to consolidate such 'research quality' or 'proof of concept' software into 'production quality' grid middleware that conforms to open standards such as OGSA and is capable of inter-operation with industrial Grid solutions. This will require both the establishment of a repository for EU Grid middleware to perform Quality Assurance and Compliance Testing and investment in a significant software development effort by teams of software engineers capable of developing key grid middleware components to production quality. A common rule of thumb in software development is that the effort required to re-engineer research quality code to production quality is a factor of ten more than the effort that was required to produce the original code. Thus establishment of an EU Open Middleware Infrastructure Institute must be one of the top priorities for EU Research Infrastructure funding. The UK e-Science is funding such an activity which could be the UK component of such an EU Institute. Ultimately the Institute would need world-wide acceptance and a dialogue with the NSF in the USA and other major organisations will be necessary.

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How to build an inexpensive production Grid infrastructure? - The Hungarian way: The talk explains the Hungarian efforts to create a relatively inexpensive Grid infrastructure based on teaching laboratories at the universities. The concept is based on the idea that the PC laboratories used for teaching at day time are switched to Cluster and Grid mode for the night and for the weekends. At switch time the necessary Grid software is automatically booted at all machines together with the reconfiguration of routers that provide a virtual private network for these machines and clusters on top of the Hungarian academic network. The Grid works as a supercluster based on the Condor-flocking technology. Currently about 500 machines of 8 universities and polytechnics are connected and work as a production Grid service during the night. The aim is to connect more than 2000 PCs from all the Hungarian higher educational institutes by the end of 2003.

Further steps to be taken are the investigation of other Grid softwares to deploy and to create gateway points by which the Hungarian ClusterGrid can be connected to other European national and international Grid systems. Within the DataGrid project and the EGEE project we would like to connect it to the EDG and EGEE Grid infrastructure, respectively.

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The role of local and regional coordination in the successful introduction of eInfrastructures: Convergence between Grids, digital signature and other technologies and infrastructures over the next years will lead to the creation of "eInfrastructures" in Europe, with benefits for society from increased creativity and capabilities thanks to more dynamic geographically and institutionally unbound collaboration ("virtual organizations") combined with massive exploitation of digital resources. The question of how to structure the introduction of these "eEnhancements" without creating a ".grid bubble" or a "World Grid Wait" is complex. Because the key added value of eInfrastructures is to enable dynamic collaboration at a distance, end-to-end issues, ranging from the technical such as network connectivity to the legal such as compatibility of data privacy laws, will be of paramount importance. In addition, there must also be commensurate end-to-end growth of eInfrastructures and eApplications in order to realize the foreseen benefits. These considerations mean that a tight coordination of policies and investments at the local, regional, national and supra-national level is necessary for the optimal success of eEnhancements. Europe is uniquely positioned to implement such coordination.

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The Grid Infrastructure in Italy: Started at the beginning of 2000, the INFN grid infrastructure is now a reality. It includes ~ 4-5 major resource sites and 15 client sites, a Certification Authority, Registration Authorities, central support of main general grid services as VO management, data management, information system, resource brokering and scheduling. An operation and support center is under development. The INFN grid is currently used by LHC experiments and Babar and is integrated with the DataGrid and LCG infrastructure. A general Italian project on Grid Computing was approved on September 2002 and funded with a grant of 8.1 MEuro. This project, having a strong interdisciplinary character, as one of the main objectives aims to define the solution of the deployment, operation and management issues of a multi-purpose Italian Grid infrastructure including a large variety of computing resources, from PC clusters to high performance and parallel system, from disk pools to large tape archives. The proposal includes the development of some demonstrators selected within application fields that are of maximum interest for high performance Grid platforms: • Earth Observation, • Geophysics, • Astronomy, • Biology and Genomics, • Computational chemistry. An additional project called SPACI aiming at creating a powerful Grid facility constituted by 3 computing centers located in the South of Italy and integrated in the Italian Grid infrastructure has been approved at the end of 2002. All Italian Science National Institutions, many Universities and more than 30 Industries have given rise to the Italian Grid for Business, Government, E-Science&Technology (IG-BIGEST) initiative which provide a coordination framework for the participation of the Italian Institutions to the international projects as the EU funded Grid FP6 program. The policy issues raised in this workshop are of great interest for Italy since the Italian IG-BIGEST community share the vision that modern Science, Business, Industry and Government activities need in Europe a supporting eInfrastructure which integrate the different national components. Technical problems to allow Virtual Organization to share resources in Europe have been addressed by many projects and in particular DataGrid and in future EGEE. They are near to be satisfactory solved, but the policy implications have up to now remained somewhat open. They should be actively addressed.

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The promotion of an eScience environment: a view from eSciencepark Amsterdam: eScience should by definition serve the full range of scientific disciplines. To promote this broad approach of eScience it is useful to establish national centers of expertise where eScience environments for several scientific disciplines are developed. Such centers should work in close collaboration with the National Research Network and have access to new developments in broadband connectivity like lambda networking. In our contribution we will describe how such an approach is being implemented in The Netherlands, where building on the existing infrastructure and expertise in Amsterdam two big national projects are launched: Gigaport Next Generation and Virtual Lab for eScience. These will extend the reach of eScience to a broad range of scientific disciplines.

It is our strong opinion that a European programme should use such national centers of expertise to efficiently coordinate and stimulate activities on the European scale.

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CEGC: view from local, regional and European perspective: New country-members of the European Union present a considerable human and computing infrastructure potentials. Czech Republic, Hungary, Poland, Slovakia and Slovenia are members of the pan-European GEANT network. Many institutions from the above countries participate in the EU R&D projects, in the area of computing, putting particular emphasis on grid projects. Based on this, a new Central European Grid Consortium (CEGC) has been established, comprising the a.m. countries and Austria, with the goal to participate in the EU 6th Framework Programme, concerning infrastructure (EGEE) and applications (FloodGrid) as well.

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Perspectives of Grids and e-Science in Germany: The technique of Grid-Computing establishes at the same time in the scientific as well as in the industrial area. Key technical questions are the wide-spread use of a securely working middleware and the development of high-bandwidth networks with complex service levels. Currently we are mainly constructing Grids that are established between friends. Building a common national or even international e-Infrastructure requires much more: Besides the technical challenges there are additional logistical, legal, ideological and political issues to be solved. The talk tries to address some of the questions. On the way to establish an overall German e-Infrastructure the following list of support actions is seen to have strategic meaning: - Deployment of a network of competence and coordination centers for Grid computing, - Development of a common Grid infrastructure to integrate resources for science and industry, - Implementation of generic and prototyping Grid applications, - Development of problem solving environments for e-Science.

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Grid deployment and support – the NGC, EGSC and SweGrid initiatives: During the last year several initiatives have been undertaken in the Nordic countries aimed at providing an easy to use and reliable Grid service for the Nordic academic community. During the Spring of 2002, PDC, the leading national HPC center in Sweden for the academic community, CSC, the Finish Ministry of Education's HPC center for the Finish academic community, and Parallab, a leading HPC center in Bergen Norway, formed the Nordic Grid Consortium (NGC) with the purpose of providing an operating Grid environment for Nordic researchers by deploying, and develop as necessary, Grid middleware and a scientist portal. Early this year, PDC together with the UK e-Science program through CLRC and CERN established the European Grid Support Center (EGSC) to address the support needs for Grid software, primarily middleware, and systems configuration and operations, but also education and training. The EGSC seeks to realize its mission through cooperation with development projects and operations centers by establishing agreed upon procedures for bug reporting and fixing as well as user feedback relevant for future releases. The third initiative on which we will report is the SweGrid project that is planning to establish a working national Swedish Grid by this fall. Sunet, the Swedish University Network providing a 10 Gbps national backbone and Nordunet providing a 2.5 Gbps Nordic backbone and high-speed connectivity beyond the Nordic region are important and very supportive organizations, in particular for the NGC and SweGrid endeavors. The initiatives in different ways have to address diversity in hardware and software technology, security, human resources, and policies and procedures in order to succeed. Among important unresolved issues are policies for transnational use of national resources. Development of (community) standards and shared development of production quality middleware is critical for the success of Grids with the limited resources and talent available in light of the complexity of Grids.

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Grids and LHC, towards a first global Grid Prototype: The world-wide LHC programme produces unprecedented amounts of data which will have to be analysed by thousands of scientists around the world. Therefore grid ideas for LHC data analysis were picked up early by scientists working on LHC in Europe, the

US and in Asia Pacific. Now ideas on global grid collaboration are emerging (Virtual Middleware Institute, (Paul Messina)). This is an opportunity for Europe to become a significant partner in global computing infrastructures. Grids and global scientific computing infrastructures also will play a role in the upcoming "World Summit on the Information Society" (Geneva 10-12 Dec 2003) where CERN organises an event on the "Role of Science in the Information Society" on 8-9 Dec 2003 with more opportunities for Europe.

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Towards a common European market for computing and data management: Based on pioneering work in the US and in Europe, software toolkits for distributed Grid computing – such as Globus, Condor, and Unicore – are now available. As a result, a number of projects have demonstrated first early results for various aspects of computer Grids. Europe, thanks also to early support actions from the EU, has achieved a prominent position in this field, in particular for its success in establishing a functional Grid testbed comprising more than 20 centres in Europe, in the context of the European DataGrid (EDG) project. This Grid has been deployed using the EU supported RN Geant network of which it has become one of the best test-benches, users and demonstrators.

Individual countries, such as the UK, France, and Italy, have developed comprehensive "e-Science" programs that rely on emerging national computing Grids to deliver unprecedented computing resources to science. However, as yet, there are no real production-quality Grids that can offer continuous, reliable Grid services to a range of scientific communities. To implement a pervasive and production quality infrastructure we need to integrate current national, regional and thematic Grid efforts, in order to create a seamless European Grid infrastructure for the support of the European Research Area. This infrastructure will be built on the EU Research Network GEANT and exploit Grid expertise that has been generated by projects such as the EU DataGrid project, other EU supported Grid projects and the national Grid initiatives such as UK e-Science, INFN Grid, Nordugrid and the US Trillium (cluster of projects). This Grid infrastructure will provide European researchers in academia and industry with a common market of computing resources, enabling round-the-clock access to major computing resources, independent of geographic location. The infrastructure will support distributed research communities, including relevant Networks of Excellence, which share common Grid computing needs and are prepared to integrate their own distributed computing infrastructures and agree common access policies. The resulting infrastructure will surpass the capabilities of localised clusters and individual supercomputing centres in many respects, providing a unique tool for collaborative compute-intensive science ("e-Science") in the European Research Area. Finally, the infrastructure will provide interoperability with other Grids around the globe, including the US NSF Cyberinfrastructure, contributing to efforts to establish a worldwide Grid infrastructure.

Besides the technical challenges to produce the appropriate production quality middleware and the necessary investments in the deployment and the support of this Grid infrastructure other more policy oriented obstacles will need to be tackled. Access policies of the different computing and data centres are different and reflect different ownership and different user communities. Authentication methods and authorisation authorities are not commonly recognized and coordinated in Europe as in the rest of the world. Accounting methods and procedures are also different and not compatible at a large extent. No business models are yet established to motivate industry to invest in this technology at a large scale, although all major IT companies are making strong statements and showing a growing interest.

There is also the perception among some of the large traditional computer centres that Grid technology could eventually undermine their customer market by offering cheaper and kind of home made solutions often confusing Grid computing with P2P computing. The role of commercial Telecom operators and national NRENs needs also to be understood since they are potentially in an ideal position to gradually integrate Grid services in their standard service offering. Standards for seamlessly connecting to the Grid, publish and bid for resources are still emerging. In order to address the above issues in an effective way the EU should consider fostering the creation of an international board of senior representatives of all stakeholders: resource providers, regulatory national and international agencies, major user communities. This board should discuss and monitor the creation of an adequate regulatory framework to facilitate the establishment of large European Grid production infrastructures as the one mentioned above.

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The Grid – Challenging HPC Infrastructure Provision in Europe: Grid technologies present many opportunities for users to gain seamless access to resources both within their national boundaries and across Europe. Such access poses many challenges for High Performance Computing providers. The University of

Edinburgh has provided National HPC Services to the UK academic community for a decade – it currently owns Europe’s largest supercomputer – the 1280 processor HPCx IBM system. Through our EU DG-RESEARCH TRACS programme we have allowed limited access to these resources to visiting researchers from across the European Union. Such access has been at a sufficiently low level (a few percent) that we have managed to provide access within EPCC time allocations. With the advent of ERA and the Grid this ad-hoc approach will no longer suffice and we must formalise our access policies. Challenges that arise include: charging mechanisms, authentication and authorisation, security, conflict with national policies etc. If the vision of the ERA is to be realised then policies need to be agreed at a Governmental level which allow and encourage sharing of resources across Europe in a fair, well-managed way which encourages European collaboration without conflicting with national priorities – no easy task.

Arrival and Transportation

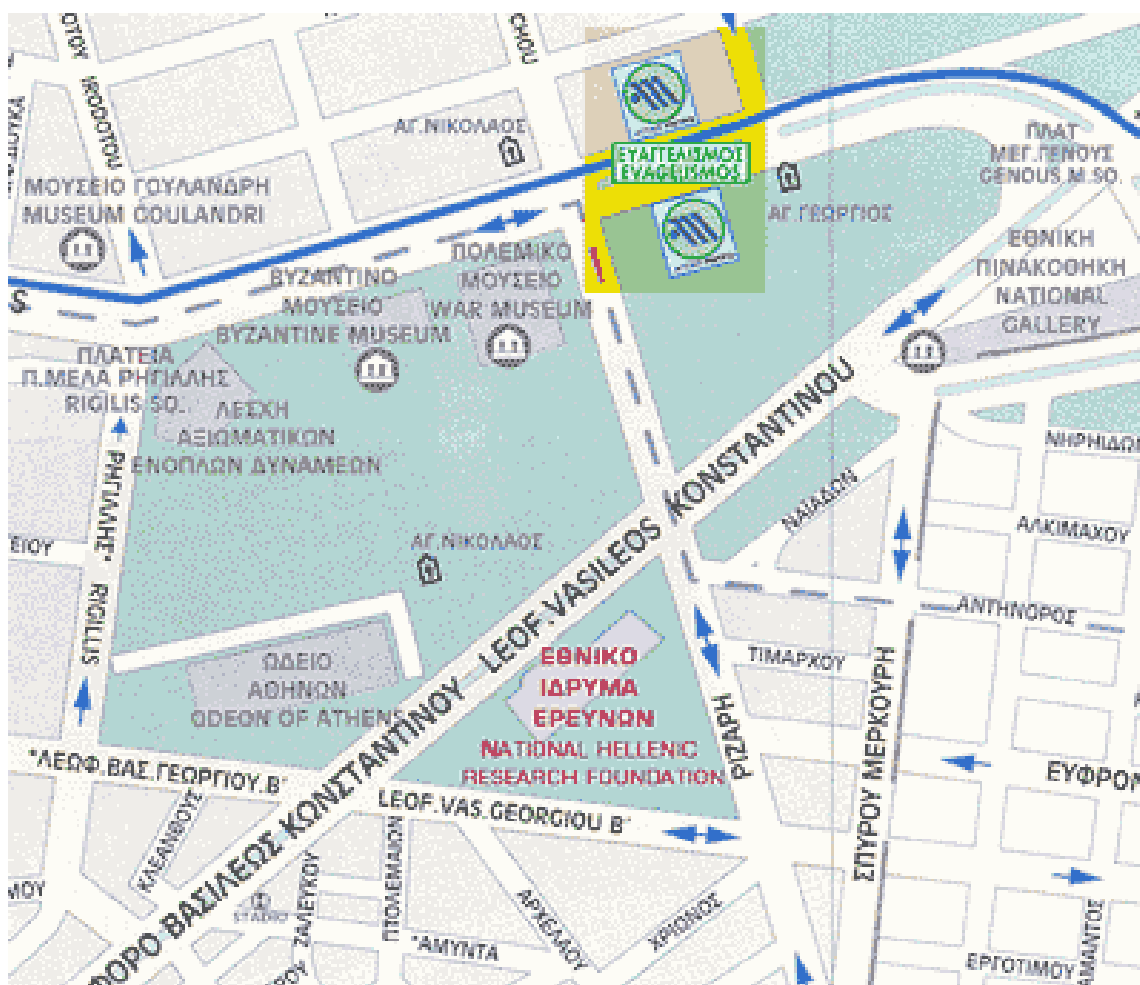
The Athens International Airport “Eleftherios Venizelos” (www.aia.gr) is located 27 km northeastern of Athens. Public transport to the city centre (Syntagma Square) is provided by the express airport bus line no.E95 on a 24 hours basis. Buses depart from the airport, outside the Arrivals Building, every 25 minutes. The ride to the city centre takes about 65 minutes, and the fare is 2.90 €. Tickets can be bought from the bus driver. The “Amalia Hotel” is right across the street from the bus terminal station, while “Astor” is less than 5 minutes walk, from the bus terminal station as well.

“Ilisia” and “Divani Caravel” are also 5 minutes walk away from the “Hilton” bus stop. The taxi ride from the airport to the city centre takes about 40 minutes and costs approximately 25 €

The meetings site is within walking distance from the hotels (5 min. from Divani, 10 from Ilissia, 15 from Amalia and Astor). However, participants who will choose to stay at either Amalia or Astor can also use the metro blue line, direction Ethniki Amyna, at Syntagma and get off the next stop (Evangelismos).

Please refer to the following maps

Event venue: National Hellenic Research Foundation, 48 Vas. Constantinou Avenue, 116 35 Athens



Metro map:



Bus map/relevant link:

http://www.oasa.gr/uk/routes/i_stops.asp?route_id=%20%C595&rvariant_id=1&medium=0