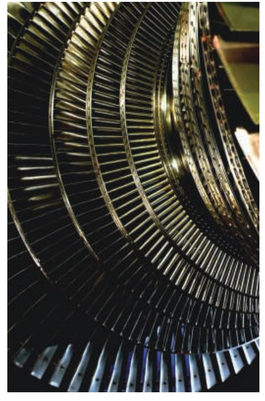
# e-INFRASTRUCTURE IN FP6

## Producing quality computing and networking infrastructure to boost Research and Education in Europe

National Research and Education Networks, Research Centres in Europe doing research in the most demanding and complex scientific fields, together with advanced scientific communities have contributed to building the e-Infrastructure via numerous initiatives. The mapping of the human genome and the discovery of new elementary particles are just two of the many examples of important scientific findings that could only have taken place with the support of advanced computational, data storage, and network technologies.

In addition, the costs and efforts required to establish and efficiently use world-leading research infrastructures in different fields of science are, in many cases, so high, that they are beyond the capability of individual Member States' investments and need to be shared at the European or even global level. e-Infrastructures are vital for facilitating efficient collaboration and information exchange among researchers, and essential in ensuring that Europe continues to play a leading role in global research collaboration.



This is reflected in the significant budget allocated to upgrade the European research and education network GÉANT and to deploy grid-based infrastructures in FP6. Between 2002 and 2006 well beyond 250 million Euro have been spent by the European Commission to fund over 50 projects in the area of e-Infrastructures.

An important part of the European achievements on the e-Infrastructures is the fast integration of resources and their rapid geographic expansion. Today the new GÉANT2 network supplies massive computing power to 30 million users in 35 countries across Europe. It is linked to significant areas of the world: North America, Latin America, the Balkans, Caucasus, Central Asia, South Africa, the Mediterranean, and the Asia Pacific rim. EGEE, the flagship cluster grid infrastructure, spans over 200 sites in Europe, the Americas and Asia. It has surpassed 2 million computing jobs, or the equivalent of over 1000 years of processing on a single PC. The European supercomputing grid infrastructure DEISA consists of more than 20.000 processors, a huge memory space and an aggregate computing power of over 145 teraflops. DEISA connects now 11 supercomputer centres in 7 European countries. Building on these achievements, over 50 RI and IST projects complete the e-Infrastructure landscape by serving new user communities, peering with other world regions, supporting the policy development and helping to improve the basic technologies.

Building upon the world leadership demonstrated with the GÉANT and grid initiatives under the FP6, Europe will continue sustaining and expanding this effort in the future to provide Europe with world-class infrastructures. This is particularly pertinent for complementing and leveraging the national and regional investments in research infrastructure and is critical for guaranteeing that Europe continues to be an attractive region for research.

# e-INFRASTRUCTURE: USER COMMUNITIES

Multiple scientific communities (such as molecular biology, medical sciences, global monitoring for environment and security, meteorology, physics and astrophysics, educational sciences) are already actively engaged in exploring the services currently provided by the e-Infrastructure. In the future, e-Infrastructures will continue being a "forerunner" of cross discipline innovation and a driver in changing the way science is conducted. This will be achieved by further investment in e.g. European high-end computing capabilities and the deployment of repositories of scientific information.


The following are excerpts from representatives of different scientific communities:

Astronomers Demonstrate a Global Internet Telescope: "The ability to connect the largest radio telescopes in Europe in real-time via GÉANT is improving the capabilities of Very Long Baseline Interferometry (VLBI). The telescope data are directly transferred to a super-computer at the Joint Institute for VLBI in Europe (JIVE) detecting astronomical sources that are billions of light years away! The faster we can transfer data from the telescopes to JIVE, the further we can go back in time. In the forthcoming years our aim is to connect the global network of radio telescopes together at several tens of Gbps enabling us to see back to the period when the first stars and galaxies began to form." ***Mike Garrett, Former Director of the Joint Institute for VLBI in Europe (JIVE)***

"Large scientific projects with collaborators distributed world-wide need ubiquitous and permanent access to large scale distributed computing. The collaborations building the four huge experiments to exploit the Large Hadron Collider close to completion at CERN are a prime example of communities relying already today on e-Infrastructures such as EGEE. The expected data rate of 15 Petabytes per year can only be digested using the computing resources available at national or regional level combined into a seamless facility thanks to the novel Grid approach." ***Prof. Tejinder Virdee, Leader of the CMS Collaboration, CERN***

"Existing e-Infrastructures are key instruments for the realization of new knowledge frameworks for supporting researchers, companies, and decision-makers in gathering, producing, maintaining and exchanging knowledge. In particular, they provide core mechanisms for managed sharing that can be easily generalized to knowledge resources. Further, their potentially large processing and storage capabilities offer a proper framework for transforming raw data and information into knowledge formats easily exploitable by researchers. This open the way to new and more powerful forms of scientific communication based on documents that aggregate and combine multi-type components, like multimedia objects, experimental data and products generated by complex elaborations of large amount of raw data, which are maintained in geographically disperse heterogeneous repositories." ***Donatella Castelli, L'Istituto di Scienza e Tecnologie dell'Informazione, Italy***

"Grid infrastructures open up new ways of collaboration for drug discovery as was demonstrated by two large scale virtual screening experiments on the EGEE Grid. In the first experiment, we tried to find molecules that had a high chance of being active on a specific family of proteins on the malaria parasite, while the second evaluated the impact of mutations on the efficiency of existing drugs against the avian flu virus. Conducting these experiments in silico, that means on a computer, rather than in the lab was much more cost effective and thanks to Grid we could test up to 100 000 compounds per hour - a rate impossible for in vivo experiments." ***Vincent Breton, CNRS-IN2P3, LPC Clermont-Ferrand, Coordinator of the WISDOM initiative***

# e-INFRASTRUCTURE: WHAT IS EUROPE DOING TO MAKE IT HAPPEN?

## Programme oriented initiatives

Two objectives of the FP6 are very closely coupled in terms of their aims and open the way towards the deployment of e-Infrastructure:

- the Communication Network Development Scheme of the "Support for Research Infrastructures (RI)" Activity of the Specific Programme "Structuring the European Research Area";
- the Strategic Objective "Research Networking Testbed" of Information Society Technologies (IST) Thematic Priorities of the Specific Programme "Integrating and Strengthening the European Research Area".

Cross-fertilisation and optimisation of synergies between the operational infrastructures launched in the RI Program and experimental test-beds in the IST Programme is an essential factor for the success of e-Infrastructure. The adoption of such an integrated approach in the FP6 promotes the fast validation and pervasive penetration of state-of-the-art technology in the operational research infrastructures at the same time as it creates the ideal scale and focus to foster the new technological and services developments required by the research community.

DG INFSO and in particular Directorate F, Unit F3, has the responsibility to co-ordinate and administrate the implementation of the objectives referred to above.

■ *'Research Infrastructures' Work Programme*
Production Quality infrastructures are addressed in the context of the RI programme. These infrastructures offer all the advantages of novel infrastructures to e-Science and beyond. To date, the World Wide Web has provided transparent access to information for millions of Internet users. The new electronic infrastructures are intended to extend this to provide rapid, secure, and transparent access to distributed computing resources and services.

■ *'Information Society Technologies' Work Programme*
The work on research infrastructures benefits strongly from the work done in the context of the Strategic Objective "Research Networking Testbeds" in the Information Society Technologies Programme. Test-beds are a privileged means of bringing industry and academia together to exploit the opportunities opened in the area. They constitute open spaces for experimentation in various technological fields (ad-hoc networks, security, quality of service, autonomous management, etc), with the involvement of end-users and addressing large-scale challenges. In particular, validation of interfaces and interoperability issues, inherent whilst integrating different manufacturer solutions, as well as the assessment of scalability of technologies in large deployment scenarios are amongst the primary targets for test-beds in the IST Programme. Test-beds are also ideal for showcasing new technologies and for gaining the necessary knowledge and experience which is a pre-requisite to full-scale deployment in operational networks. In essence, test-beds are the ideal means of bridging the gap between research and deployment.

■ *'Co-operation programmes at the international level*
Unit F3 participates in a joint collaboration effort between different services of the European Commission (Information Society and Media, External Relations Directorate Generals and the Europe-Aid Co-operation Office) in an attempt to help develop the Information Society in different regions of the world. These developing regions include Latin America, the Mediterranean rim and Asia. The funds available to foster development projects in these regions have been invested to create network backbones for research and education in the different regions and to inter-connect these research backbones to the pan-European research and education network GÉANT.

## Policy oriented initiatives

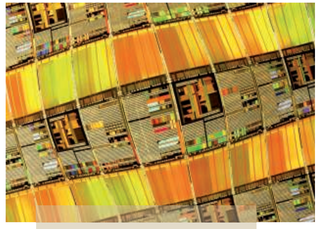
A technological view of the development of e-Infrastructure is already extremely challenging. But more challenging are the related policy aspects: how to stimulate European and National initiatives, how to tackle the organisational aspects induced by the ability to share resources, etc.

■ *e-Infrastructure Reflection Group (e-IRG)*
The e-Infrastructure Reflection Group (e-IRG) is a policy oriented reflection group composed of appointed delegates from the Research Ministries of the Member States. It has the mandate to define and recommend policies and best practices for the easy and cost-effective shared use of electronic resources in Europe (focusing on grid-computing, data storage and networking resources). The recommendations of the e-IRG are included in a White Paper that is updated periodically and in roadmaps.

The main objective of the e-IRG is, thus, to support, on the political, advisory and monitoring level, the creation of a policy and administrative framework for sharing electronic resources in Europe. In particular, the e-IRG has a crucial role in the co-ordination, on a European level, of the introduction of a grid-based infrastructure for e-Science.
(**for further info** http://www.e-irg.org/)

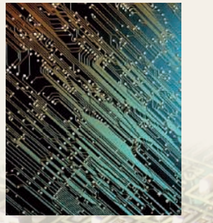
■ *European Strategy Forum on Research Infrastructures (ESFRI)*
The European Strategy Forum on Research Infrastructures (ESFRI) brings together representatives of the 25 EU Member States, appointed by Research Ministries, and a representative of the European Commission. The role of ESFRI is to support a coherent approach to policy-making on research infrastructures in Europe, and to act as an incubator for international negotiations about concrete initiatives. In particular, ESFRI is preparing a European roadmap for new research infrastructures of pan-European interest.
(**for further info** http://www.cordis.lu/era/esfri_home.htm)

■ *European Network Policy Group (ENPG)*
The European Network Policy Group (ENPG) is a forum for the national funding authorities for research networking in Europe, and is based on a Memorandum of Understanding (MOU) signed by the various Member States. ENPG has been instrumental in formulating the basis whereby joint EU and national funding could be used to create a funding framework for the pan-European layer of the research network, eventually leading to the launch of several European backbones for research, such as the GÉANT project. ENPG continues to play an important role in addressing policy and funding issues for strengthening European research networks, in particular on a number of emerging issues related to access, security and new technologies.
(**for further info** http://www.enpg.org)



## WHAT IS e-INFRASTRUCTURE?

The term "e-Infrastructure" was first coined in 2003 to describe a vision for the development of a next generation of trans-national ICT Research Infrastructures across Europe. The idea is that researchers should have controlled, secure, seamless, easy and economical access



to shared science and engineering resources, enabled by the provision of a fully integrated advanced information and communication infrastructure.

The term e-Infrastructures refers therefore to a new research environment in which all researchers – whether working in the context of their home institutions or in national or multinational scientific initiatives – have shared access to unique or distributed scientific facilities, regardless of their type and location in the world.

e-Infrastructures act as a platform for effective distance-independent activities of the scientific communities, augmenting the "same time and place" paradigm of collaboration, encouraging globally sustainable partnerships and offering new opportunities for *what* is done, *how* it is done, and with *whom* it is done.

Building a European e-Infrastructure is about sharing facilities, providing advanced applications and capabilities to all researchers, making the scientific process more effective, capturing commonalities and federating approaches, achieving interoperability and reusing designs, providing tools and services, spreading best practices, and providing assistance, expertise and operational support.

By the provision of an advanced e-Infrastructure, leading edge Information and Communications Technologies (ICTs) – such as broadband and mobile networking, computing and grid platforms, Internet-based and web-based applications and services running next generation protocols – play a strategic role in changing the way science and engineering will be carried out in the future in various fields, such as astronomy, environment, business, or aeronautics.

Various infrastructural layers – computing, communication and services – are required to create pan-European virtual centres of excellence and research laboratories. On top of communication and computing capabilities, ICT research provides technologies for collaboration, knowledge-sharing and experimentation in various areas of science and engineering.

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Directorate-General for the Information Society and Media
GÉANT & e-Infrastructure Unit

http://cordis.europa.eu/ist/rn/home.html

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# e-Infrastructure

## Computer and Network Infrastructures for Research and Education in Europe

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## FOREWORD

Research of all types is vital for driving forward the competitiveness and economic growth of Europe. All manufacturing and service sectors of our economies depend on advances in technology to maintain their competitive edge. Without this, how could they continue to provide prosperity and jobs to our peoples, or to provide sustainable improvements in our standards of living and the very fabric of our society?

Europe is fast becoming the location of choice for the world's best researchers. Why? Because our infrastructure is better than anywhere else. We have high speed networks linking-up all of our research centres and universities, and supporting collaboration on scales that were impossible only a few years ago. Europe's GÉANT backbone for the Internet used by researchers is the fastest in the world. Trans-European grids of computers can be harnessed to provide the capacity necessary for very complex simulations, for consolidating and processing the huge amounts of data arising from our big-science projects, and simultaneously for supporting many thousands of individual collaborative initiatives of a smaller scale.

European science and engineering communities can now work and collaborate together in ways that were completely impossible only a few years ago. With our e-Infrastructure, we have put in place a "virtuous circle" of innovation that is proving to be crucial for Europe's economic development, and the envy of the scientific world.

Viviane Reding Commissioner for Information Society and Media

This document provides a complete overview on the activities in the area of e-Infrastructures under the Sixth EU Framework Programme for Research and Technological Development (FP6).

# ORIENT

**Summary:** ORIENT is a collaborative Sino-European project connecting the research and education networks of China and Europe. Jointly funded from China and Europe, the project connects the pan-European GÉANT2 network with the Chinese networks, CERNET and CSTNET.

ORIENT is a product of collaboration between six European NRENs, CERNET and DANTE, the operator of GÉANT2. The project, which started officially on 1st March 2006, procured and operates an advanced high-capacity network link between the two world regions, meeting the needs of many demanding research collaborations.

ORIENT, coordinated by DANTE in Europe and CERNET in China, works in the context of complementary initiatives, such as TEIN2 which provides an Asia-Pacific regional network and which also links to Europe (www.tein2.net). It is intended that the significant synergies between the two projects can be exploited, bringing bandwidth and reliability benefits to the users of both ORIENT and TEIN2.

CERNET supports the implementation of a direct connection between the GÉANT2 network and the Chinese research networks with bandwidth of 622 Mbps-2.5 Gbps over the comparatively short trans-Siberian route. In doing so, it provides 50% of the cost of the link. The remainder of funding is met by the European NRENs (25%) and the European Commission (25%).

**Objectives:** Research and education rely heavily on the availability of a leading-edge network infra-structure in support of their IT requirements. In Europe, national investment by the NRENs is complemented, on a pan-European and global scale, by connectivity provided by GÉANT2, the network supported under the European Commission's 6th Framework Programme.

As research co-operation becomes increasingly global, it is vital that global connectivity is provided to support collaboration between researchers in different world regions and that such an infrastructure is made available to the indi-vidual research users. This is increasingly true for joint Sino-European initiatives. China is the world's most populous nation and has recently experienced rapid growth both economically and in the research and education sector. The coordinators are aware of research projects in the fields of Radio Astronomy, Meteorology, Sustainable Development and Grid Computing with requirements for high-speed connectivity between the research networks of China and Europe. In Europe the link is complemented by the provision of point-to-point services as part of GÉANT2. In addition, in order to guarantee and demonstrate network performance, measurement devices are increasingly being deployed to create a network performance monitoring infrastructure.

The main objective of the project is to provide appropriate connectivity between research and education sites in Europe and their counterparts in China. Additional objectives aim to ensure the extension of the enhanced services and service support infrastructure of GÉANT2, to services over ORIENT. Dissemination activities aim to raise awareness of the project amongst the academic community, fostering ties and creating 'people networks' across the two world regions.

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ORIENT

**Project acronym:** Orient
**Contract nº:** RI-026686
**Project type:**
Specific Support Action
**Start date:** 1/03/2006
**Duration:** 36 months
**Total budget:** 4 150 000 €
**Funding from the EC:** 1 037 500 €
**Total effort in person-month:** 33, 5
**Web site:** www.dante.net/orient
**Contact person:** John Chevers
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**Project participants:**
Contractors

| | |
|---|---|
| DANTE | UK |
| CERNET | CN |
| GARR | IT |
| DFN | DE |
| RENATER | FR |
| UKERNA | UK |
| GRNET | GR |
| CESNET | CZ |

**Collaboration with other EC funded projects:**
GÉANT/GN2
TEIN2
EUChinaGrid
EXPReS

**Connecting Academic Networks in China and Europe - RI**

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The role of DANTE, the co-ordinating partner will be in the overall management of the project and in the procurement activity. It will also take the lead role in activities relating to dissemination and user support, although clearly, to work effectively these functions must be embraced by all partners. CERNET will jointly take responsibility for implementation and operation of the circuit. All partners in the project contribute to engineering and user support of their network customers and dissemination activities within their own regions of network coverage, such as NREN conferences. All partners also contribute by presenting at international events and joint distribution of dissemination materials.

**User Community:** Projects which aim to use the ORIENT circuit include EXPReS, a radio astronomy project, whose aim is to expand the scope of e-VLBI (electronic Very Long Baseline Interferometry) throughout Europe and beyond. ORIENT helps to connect the EXPReS project partner, the Shanghai Astronomical Observatory (http://center.shao.ac.cn/home.htm), to its European counterparts.

Another project with a special interest in a connection between European and Chinese research networks is EUChinaGrid, a grid computing project, joining computational resources in China and Europe and facilitating data transfer and processing between the two regions. To find out more about EUChinaGrid see: http://www.euchinagrid.org/

ORIENT also hopes to serve researchers in the field of Cosmic Ray Observation. The ARGO-YJB project is keen to see an operational connection to its site at YangBaJing in Tibet, China. Benedetto D'Ettorre Piazzoli, spokesman for ARGO-YJB, expressed his support for the initiative: 'such a connection between China and Europe is of high value, not only from the point of view of the ARGO-YJB experiment, but more generally to provide an adequate support to the Europe-China GRID projects'. http://argo.na.infn.it/

One of the project's objectives is to identify existing Chinese-European collaborative projects and to encourage their usage of the infrastructure provided by ORIENT. It is also hoped that the existence of this infrastructure encourages new collaborations, otherwise impractical or even impossible without a dedicated research network link.

# 6DISS

**Summary:** 6DISS exploits the IPv6 experiences of key players in the Internet research community, from the major EU R&D projects: 6NET, Euro6IX and GÉANT. The participants are committed to aid the deployment of new Internet protocols and services in the developing regions of SE Europe, Mediterranean countries, Sub-Saharan Africa, Southern Africa, the Newly-Independent States, the Caribbean, the Asia-Pacific region, and South and Central America. Exchanges of information and best practices will also take place with people making similar deployment work in China and India.

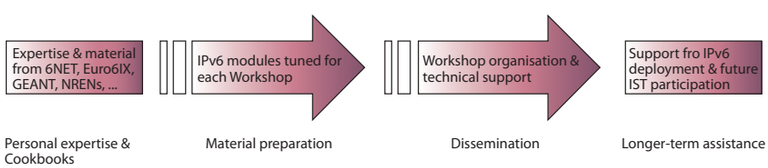
6DISS provides training courses and practical workshops to those responsible for the installation, operation and maintenance of the National Research and Education Networks in these regions, and also inform strategists/decision makers in these countries of the benefits of deploying IPv6.

6DISS continues the support and collaboration beyond these workshops, through access to experts for technical queries and operational support. Furthermore, training of additional trainers is offered, and information is given by equipment manufacturers about new features and products.

Reports are also made available on the status of standardisation, IPv6 Forum activities, etc. Collaboration with these countries has already led to their participation in subsequent IST Calls for Proposals.

Of further importance is the integration of the local organisations in the planning of the workshops, the selection of the attendees and the topics, and consequently the opportunity to benefit from budget reserved for INCO countries.

## Summary of the 6DISS methodology




**Objectives:**

1. To establish and operate a Specific Support Action of information exchange for the optimal transfer of knowledge on Internet deployment and evolution to emerging research network operators, Universities, commercial organisations, ISPs, governments and regulators in the following regions:
   - SE Europe
   - Mediterranean countries
   - Newly-Independent States (NIS)
   - Sub-Saharan Africa
   - Southern Africa
   - The Caribbean
   - The Asia-Pacific region
   - South and Central America.

*continued overleaf*

**Project acronym:** 6DISS
**Contract nº:** IST-015926
**Project type:**
Specific Support Action
**Start date:** 01/04/2005
**Duration:** 30 months
**Total budget:** 1 053 265.00 €
**Funding from the EC:**
899 908.00 €
**Total effort in person-month:** 74.5
**Web site:** www.6diss.org
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**fax:** + 41 31 9942529
**Project participants:**

| | |
|---|---|
| Martel | CH |
| Cisco Systems International | NL |
| RENATER | FR |
| GRNET | GR |
| UCL | UK |
| TERENA | NL |
| Soton-ECS | UK |
| FCCN | P |
| Alcatel | FR |
| Hungarnet | HU |

**Key words:**
IPv6
Dissemination
Workshops
Training
**Collaboration with other EC funded projects:**
6NET
GÉANT
EURO6IX
SEEREN
EUMEDCONNECT
ALICE
SPONGE

**IPv6 Dissemination and Exploitation – IST**

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2. To enhance the knowledge base of the partners by exchanging deployment experiences with especially India and China.

**Technology approach:** The 6DISS project first prepared and is now disseminating information relating to IPv6 deployment that has been collected through partners' participation in several European initiatives, including the 6NET, Euro6IX and GÉANT projects. In this way, existing European R&D results are being given increased value and visibility through a structured programme of information exchange and practical support.
The goal of this action is twofold:
- to assist less developed regions to deploy the latest technology in the most efficient manner, and help them to gain experience with IPv6 to be ready for the Next Generation Internet
- to build contacts to organisations in these regions to support and enable their subsequent participation in projects within the IST Programme

The collaboration with the developing regions is ensured and optimised by including in 6DISS those partners who already have close working associations with the research networking communities in the regions, through significant (often leading) roles in ongoing projects (e.g. EUMEDCONNECT, SEEREN, SEE-GRID, SEEFIRE, ALICE, SILK, SPONGE, TEIN2) in precisely the geographic regions being targeted.
The project is also assisting the integration of organisations from developing countries into the IST Programme, and encouraging the participation of several INCO countries.

**Achievements:**
- Workshops: minimum eight regional training workshops and two liaison workshops, covering IPv6 training, liaison and support for deployment;
- Technical hands-on training sessions for IPv6;
- Training for Trainers: for IPv6 users interested in organising and running further IPv6 training workshops;
- Feedback analysis (attendee survey) from each Workshop: assessment of opportunities for further co-operation and follow-up actions;
- IPv6 e-learning module, IPv6 manual and Deployment Guide published on the 6DISS web site;
- Improvement of the knowledge base in the regions;
- Participation to IPv6 Fora, IPv6 Task Forces (national/regional), RIR meetings
- Additionally, the project will obtain from the regions, information about the status of Internet deployment.
- 6DISS will also support the participation of organisations from the visited regions in new IST Calls for Proposals.

**Dissemination:** The project's public communication strategy is through its Website, workshops, training courses, publications, the "Tiger Team" operating as an open *help desk* service, and the free availability of the e-learning course and other material. The "Tiger Team" comprises experts within the project, willing to answer questions via e-mail and maintain a list of FAQs regarding equipment configuration, hardware and software requirements, RFCs, etc.
The workshops are the main mechanism through which information will be transferred to the targeted regions. The workshops enable to build constituencies and raise awareness; disseminate, benchmark and validate the research results from IST; promote European technologies; exchange best practices; and explain about activities related to standards and interoperability issues.

# ALICE

**Summary:** The ALICE project has created RedCLARA –the first regional research and education network for Latin America. It connects not only the regional researchers to each other, but also with their counterparts
in Europe via GÉANT2, the world's most advanced international research and education network, providing the Latin American countries with a gateway for global research collaboration.

**Objectives:** The project's overall objectives are:

- To plan, build and operate a pan Latin-American research and education network interconnecting the region's national research and education networks (NRENs), and provide international connectivity to Europe
- To stimulate the development of research and education networking in the region
- To pursue initiatives targeted at closing the 'digital divide', and that will promote regional integration and social cohesion
- To examine the future of research networking, exploring the case for sustaining research and education networking beyond the conclusion of the project

**The RedCLARA Topology**: The diagram shows the current network topology as of April 2006. The first phase of implementation saw the construction of a 155 Mbps "ring" to connect the national networks of Argentina, Brazil, Chile, Panama and Mexico, via RedCLARA PoPs (Points of Presence) in Buenos Aires, Sao Paulo, Santiago, Panama City and Tijuana. In addition to this central ring, connections have been made to Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Nicaragua, Peru, Uruguay and Venezuela. The ALICE project is co-ordinated by DANTE, a not-for profit organisation registered in the UK. DANTE has been responsible for planning and building the RedCLARA network. It is supported by CLARA, the Latin American Co-operation of Advanced Networks. The CLARA organisation supports research networking in the region and is responsible for the training and development of network engineers and researchers. As CLARA matures it will achieve independence from DANTE, assuming complete responsibility for the RedCLARA network.

**International aspects:** The ALICE network directly connects Latin American students and researchers with their European counterparts. A 622 Mbps transatlantic link from Sao Paulo to Madrid provides a connection to GÉANT2, the world's first hybrid international network. GÉANT2 is directly connected to National Research and Education Networks across Europe and ultimately provides connections to some 30 million users in 34 countries, as well as to other world regions connected to the GÉANT2 infrastructure. The region also benefits from connectivity to North America.

**Project Partners:** DANTE and CLARA are partnered by 4 European National Research and Education Networks (NRENs), with close historical and cultural ties to Latin America. These are RENATER, GARR, FCCN and RedIRIS, the NRENs of France, Italy, Portugal and Spain respectively.

*continued overleaf*

**Project acronym:** ALICE
**Contract n°:** ALA/2003/061/696
**Project type:** Grant Application
**Start date:** 02/06/2003
**Duration:** 46 months
**Total budget:** 12 500 000 €
**Funding from the EC:** 10 000 000 €
**Total effort in person-month for research activities:** 252
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**Project participants:**

| | |
|---|---|
| DANTE | UK |
| CLARA | |
| ADSIB | BO |
| ARANDU | PY |
| CEDIA | EC |
| REACCIUN | VE |
| CR2net | CR |
| CUDI | MX |
| RAAP | PE |
| RAGIE | GT |
| RAICES | ES |
| RAU | UY |
| RedCyT | PA |
| RedUniv | CU |
| RENATA | CO |
| RENIA | NI |
| RETINA | AR |
| REUNA | CL |
| RNP | BR |
| UNITEC | HN |
| FCCN | PT |
| GARR | IT |
| RedIRIS | ES |
| RENATER | FR |

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Within Latin America, ALICE is partnered by the NRENs of 18 Latin American countries, namely, RETINA (Argentina), ADSIB (Bolivia), RNP (Brazil), REUNA (Chile), RENATA (Colombia), CR2net (Costa Rica), RedUniv (Cuba), CEDIA (Ecuador), RAICES (El Salvador), RAGIE (Guatemala), UNITEC (Honduras), CUDI (Mexico), RENIA (Nicaragua), RedCyT (Panama), ARANDU (Paraguay), RAAP (Peru), RAU (Uruguay) and REACCIUN (Venezuela).

**Key words:** Network Technology
Communication Technology
Information Systems
**Collaboration with other EC funded projects:**
GN2, EUMEDCONNECT, TEIN2, SEEREN2, EELA, @LIS Technet, RING, AugerAccess, EXPReS, T@lemed

**Achievements:** ALICE has made a fundamental contribution to the ability of researchers in Latin America to collaborate in research projects around the world, helping to overcome the digital divide that has held back their progress in this regard. The RedCLARA network transforms the way the continent's researchers work, allowing them to collaborate with colleagues all over the world. The project has stimulated EU-Latin America collaboration on a number of new research projects. These include:

(Image copyright DANTE Ltd)

**EELA:** RedCLARA enables the EELA Project ("E-infrastructure shared between Europe and Latin America) which aims to build a digital bridge between existing e-infrastructures based in Europe (EGEE), with those that are emerging in Latin America. Receiving funding of 1.7 million euro from the European Commission, the two year project will create a collaborative network to share Grid infrastructures between the two continents. This will drive the development of advanced applications in areas such as Biomedicine, High energy physics, e-Learning and climate modelling. RedCLARA is the supporting network for the EELA project, enabling the grid applications to run on top. GÉANT2 is the counterpart network in Europe, enabling operation of the EGEE grid infrastructure.

**@LIS-Technet – E-learning across Latin American Universities**
Innovative e-learning environments now span Europe and Latin America, thanks in part to the @lisTechnet project, which has created a highly innovative teaching environment at universities across seven countries. It creates a virtual teaching environment spanning the infrastructure enabling students, learning professionals and researchers to gain hands-on experience of using cutting edge Web and Internet technologies to create complex on-line applications. Learn more at www.alis-technet.org

**T@lemed:** The T@lemed project provides e-health services to isolated regions of Brazil and Colombia, allowing doctors to remotely diagnose conditions and prescribe treatments to patients, despite being separated by thousands of kilometres. T@lemed is currently testing services helping to combat malaria and tuberculosis in Brazil. The connection of Colombia to RedCLARA will benefit the project, where general ultrasound applications are currently being deployed. T@lemed is being managed by The Fraunhofer Institute, Germany in conjunction with regional and international partners in Latin America, with expertise in telecoms, tele-imaging equipment and software. More information at www.alis-telemed.net

**The future:** The ALICE project has dramatically altered the landscape of research networking and education in Latin America, and it has achieved great success in a short amount of time. With the underlying infrastructure in place, the challenge facing the project partners is in serving a rapidly expanding user community. For true equality in global research, RedCLARA has to implement the advanced services and interoperable technologies, like those currently being deployed in Europe. Continued, close collaboration between Latin American and European networking organisations is essential to help realise the vision of a seamless, global research community.

# ANEMONE

**Summary:** As the ratio of mobile users soars in the ever growing number of connected devices, the Internet is facing the challenge of supporting mobility at a large scale. Applications, services and equipment defined by the R&D community need to be evaluated and validated on complex test benches involving various wireless technologies and mobility capabilities. The primary goal of the ANEMONE project is to help inventing tomorrow's Internet by providing this community a large-scale IPv6 testbed that will feature cutting edge mobility initiatives and a wide range of enhanced services and applications in a wireless and cellular environment.

**Objectives**

The ANEMONE project aims to :

- Design and set up an open distributed testbed by putting together emerging protocols for wireless and mobile IPv6 Internet;
- Validate on this testbed mobility protocols enhancements elaborated within the project;
- Gather and disseminate user feedback, research results and performance analysis;
- Identify and document the key components of such a testbed as well the major issues as encountered while setting it up;
- Draw ways of improvement out of the lessons learned from its use in various situations.

Such a technologically rich playground together with the highly open approach of the project will encourage third parties to evaluate their protocols, applications and devices in real-life situations on the ANEMONE testbed.

**Action Plan:**

The ANEMONE testbed will be distributed over Europe. To achieve a fully operational testbed in June 2008, the following steps are foreseen:

- Four local testbeds are set up and validated in different European countries. Some of these testbeds provide the wireless and/or cellular access networks for the end-users while some others provide a part of the service infrastructure;
- A core network connecting all locations is built and the overall interoperability of the testbed as whole will be validated;
- Connection procedures and secure access methods to the testbed will be defined and made available to its users.

From a software point of view, besides open-source IETF protocol implementations, applications and protocols will be developed when not existing or not adapted.

**Research**:

In parallel with the testbed deployment, research activities in the following domains are led in close relationship with the related IETF working groups:

- Layer 2 handover optimization;
- Vertical handover optimization;

*continued overleaf*

**Advanced Next gEneration Mobile Open NEtwork -IST**

**European Commission**
Information Society and Media

**Project acronym:** ANEMONE
**Contract n°:** IST-035072
**Project type:** STREP
**Start date:** 01/06/2006
**Duration:** 24 months
**Total budget:** 3 393 905 €
**Funding from the EC:** 1 900 000 €
**Total effort in person-month:** 313
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**Project participants:**

| | |
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| BME | HU |
| CRES | IT |
| ENST Bretagne | FR |
| INRIA | FR |
| Thales Communications | FR |
| VTT | FI |

**Key words:**
Mobility
Wireless
IPv6
**Collaboration with other EC funded projects:**
IST-Multinet

- Comparison of various handover protocols;
- Multihoming mechanisms;
- Applications adaptation;
- Network mobility enhancements;
- Advanced security mechanisms.

**Targeted Technologies:**
The main technologies and protocols that will be offered on the full IPv6 testbed will include:
- *Wireless and cellular technologies:* IEEE 802.11, IEEE 802.16, Bluetooth, UMTS/GPRS;
- *Security mechanisms:* 802.11i, 802.1X, Radius / Diameter server;
- *IETF mobility protocols:* Mobile IPv6 suites, Nemo Basic Support, FastHandover;
- *Applications:* Video-conferencing, e-learning, VoIP, video streaming.


The ANEMONE testbed

**Why ANEMONE is so important?**
- It is the first IPv6 wireless & mobility oriented testbed in Europe
- A full range of network types (Metro, Campus, Lab) will be offered and various user profiles (Researcher, student, man in the street) will be addressed
- Openness is its very first design rule

**What is the ANEMONE impact?**
- It is a proof of concept of a near real-life testbed
- The testbed serves the development of new services and businesses
- Such a large scale network contributes to the research in IPv6, wireless and mobile technologies
- It enforces the European position in dissemination activities and in major standardization bodies.

# CYCLOPS

**Summary:** CYCLOPS aims to bridge the gap between Grid and GMES communities making Civil Protection people be aware of the services provided by Grid infrastructures, and, at the same time, letting Grid researcher to be aware of Civil Protection specific requirements and service enhancement needs.

**Objectives:** CYCLOPS will bring together European Civil Protection (CP) and GRID Communities; it will create a fruitful interaction between CP agencies, geospatial information experts and the GRID (EGEE) experts. This effective synergy will guide the development of future GRID research infrastructures and study the feasibility of getting them run onto the European Grid Infrastructure. CYCLOPS will provide a support action to the EGEE and EGEE-2 I3 projects in order to utilize its platform in the Civil Protection community. More specifically, the project objectives are :

- to disseminate EGEE results to the CP Community, assessing EGEE infrastructure for CP applications. A variety of activities will focus on dissemination and outreach, training, workshops, possibly in close relation with EGEE events and on promoting a close collaboration between the two communities.
- To provide the EGEE Community with knowledge and requirements that characterise the CP services. These requirements will also be used to assess the possibility for the development of an advanced grid platform enabling Real Time and near-Real Time services and implementing a security infrastructure very close to the defence systems standards.
- To evaluate the possibility to utilise the present EGEE services for CP applications.
- To develop the research strategies to enhance EGEE platform, considering Earth sciences resources and GMES/CP requirements.

**Technology approach:** The existing EGEE GRID Platform can provide the coordinated sharing of computing, storage and communication resources of present Processing Infrastructure and Network Infrastructure of CP and research centres involved in the emergency management procedures.
Other specific resources that are part of the Environmental Monitoring Infrastructure (sensors and acquisition systems) need to be GRID-enabled through services for Earth Science resources. Such services (e.g. sensor discovery, description, access for acquisition and control, etc.) make possible the virtualization of sensor resources in a GRID view.
On top of the GRID platform specific GRID Services for Earth Science can be implemented to build the infrastructure for CP applications: the CYCLOPS Infrastructure. These are:

a. advanced Grid services (e.g. Quality of Service management, orchestration services, Knowledge Grid services, etc.);
b. Spatial Data Infrastructure services for geo-spatial data management.

These GRID Services for Earth Science make the CYCLOPS Infrastructure suitable to develop GRID-enabled application for CP applications.

*continued overleaf*

**Project acronym:** CYCLOPS
**Contract n°:** RI-031874
**Project type:**
Specific Support Action
**Start date:** 01/06/2006
**Duration:** 24 months
**Total budget:** 825 000 €
**EC Funding:** 825 000 €
**Total effort in person-month:** 119
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**Project participants:**

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| INFN | IT |
| IMAA | IT |
| DDSC | FR |
| CP-CH | GR |
| TEI-CR | GR |
| SNBPC | PT |

**Key words:**
GMES
GRID technology
Geospatial information
Civil Protection
**Collaboration with other EC-funded projects:**
PREVIEW, Risk EOS, RISK-AWARE, BOSS4GMES, EGEE

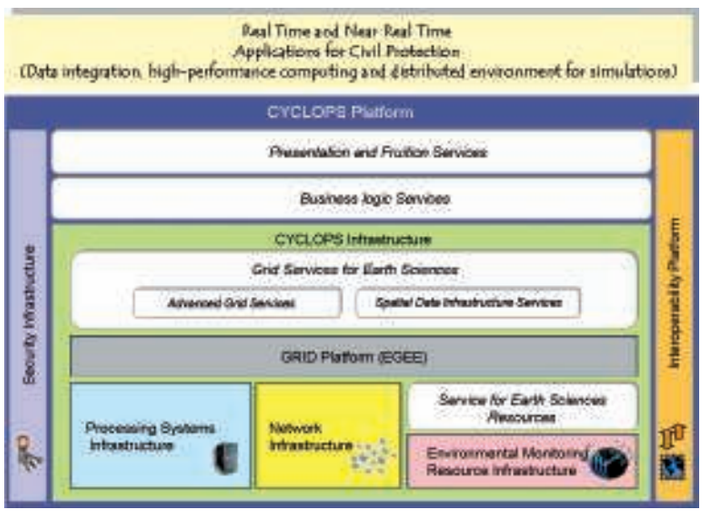
CYber-Infrastructure for CiviL protection Operative ProcedureS – RI

European Commission
Information Society and Media

Besides these services, an advanced Security Infrastructure provides the Security and Policy services, required at each level, for handling the complex data policies which characterize GMES domains.
To complete their tasks, many applications should be able to interact with external infrastructure such as existing GRID platforms, security systems, e-Government infrastructures, and Spatial Data Infrastructures (SDI). Thus, an interoperability infrastructure completes the platform.
These high-level services and tools make the CYCLOPS platform, a complete GRID-based platform supporting GMES/CP applications.

**Applications:**
CYCLOPS expected achievements and its impact can be summarised as follows:

- CP community will fully exploit the existing EGEE Grid infrastructure, testing the quality of the middleware services, providing continuous feedback to EGEE architects, and helping to find common solutions in order to enhance the production-level capabilities of the e-Infrastructure;
- the participation of CP agencies of different European countries to CYCLOPS project will assure the interconnection among their national Grid initiatives;
- the wide use of sensor networks and data acquisition systems is typical of CP applications: the CYCLOPS project will provide a valuable set of requirements in order to integrate these new access facilities into the EGEE platform;
- specially for complex simulation tasks, supercomputers are often needed for the most demanding computations: the CYCLOPS project will deal with the issue of integrating supercomputing and distributed computing technologies, always selecting the best computational solutions for their applications;
- Actually, CP applications adopt several different technologies, but need to cooperate to accomplish their tasks: it means that a coordinate way to share their resources by mean of Grid Virtual Organisations is not enough, but also interoperable solutions among heterogeneous technologies are required and will be investigated within the CYCLOPS project.




CYCLOPS conceptual architecture

# DEISA

**Summary:** DEISA is an infrastructure of infrastructures – the national supercomputing centres in Europe – that deploys and operates a high performance European supercomputing environment. Eleven leading European high performance computing (HPC) centres devised an innovative strategy to enable the cooperative operation of existing national supercomputing infrastructures. This initiative led to the deployment and operation of a world class, persistent, production quality, distributed supercomputing environment with continental scope, called Distributed European Infrastructure for Supercomputing Applications (DEISA). Its main purpose is to enable scientific discovery across a broad spectrum of science and technology, by the deployment and operation of such a European research infrastructure.

**Objectives:**

The main objective of DEISA is to advance Science in Europe by deploying a production quality, distributed supercomputing environment offering advanced cooperative services that cannot be provided by the national centres alone. Other objectives of DEISA are:

- to contribute to the advancement of computational science in Europe, by enabling new, leading grand challenge applications in all areas of science and technology
- to deploy an innovative heterogeneous supercomputing Grid designed to enhance and reinforce High Performance Computing (HPC) in Europe,
- to provide, by strongly integrating human and material resources from leading HPC national organizations, the first basic European supercomputing infrastructure operating as a virtual European supercomputing centre and acting as a support for future, more aggressive European supercomputing initiatives.
- to broaden the impact of high end supercomputing environments by hiding supercomputer resources behind user friendly Web portals, and by enabling the interoperability with the rest of the European IT infrastructures.

**Action Plan:**

The DEISA research infrastructure is constituted of a number of leading national supercomputers in Europe interconnected with a high bandwidth point to point network provided by GEANT and the National Research Networks (NRENs). High bandwidth network connectivity is required to guarantee the high performance of the distributed services, and to avoid performance bottlenecks.

The DEISA Grid incorporates several different platforms and operating systems (IBM Linux on PowerPC, IBM Power4-5, SGI Linux on Itanium, NEC vector systems).

In the first two years of operation, DEISA has deployed middleware that enables the transparent access to distributed resources, high performance data sharing at a continental scale, and transparent job migration across similar platforms. The next planned actions are the deployment of a co-scheduling service (synchronizing remote supercomputers) and high performance data transfer services across sites.

*continued overleaf*

Distributed European Infrastructure for Supercomputing Application – RI

**European Commission**
Information Society and Media

Distributed European Infrastructure for Supercomputing Applications

**Project acronym:** DEISA
**Contract n°:** RI-508830
**Project type:** I3
**Start date:** 1/05/2004
**Duration:** 48 months
**Total budget:** 24 084 000 €
**Funding from the EC:** 13 976 000 €
**Total effort in person-month:** 2 400
**Web site:** www.deisa.org

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**Project participants:**

| | |
|---|---|
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| RZG | DE |
| CINECA | IT |
| UEDIN | UK |
| CSC | FI |
| SARA | NL |
| ECMWF | UK |
| CRF | IT |
| BSC | ES |
| BADW | DE |
| USTUTT | DE |

**Key words:**
Information technology
E-Governement
Media production

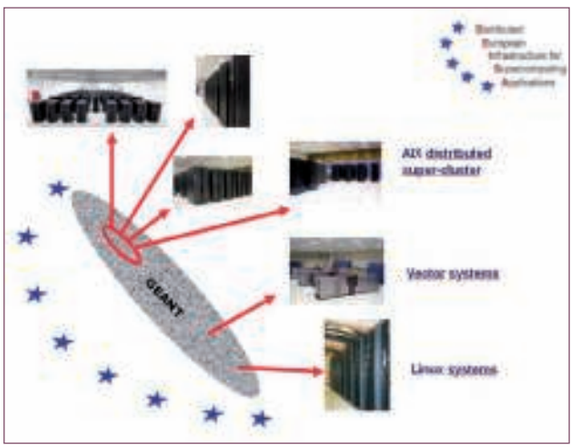
**Collaboration with other EC funded projects:**
GÉANT2,
EGEE

**International Aspects:** The DEISA is a cluster of high end computing platforms, strongly coupled across national boundaries. The resulting system evolves continuously as the national platforms are upgraded. In September 2006 the DEISA supercomputing Grid consist of more than 23.000 processors, a huge memory space and an aggregate computing power of over 170 teraflops.
DEISA is open to collaboration with other Europe HPC centres, with Grid R&D projects, and with other related initiatives world-wide, like TeraGrid in the USA or the EGEE project, led by CERN.
In November 2005, DEISA demonstrated its interoperability with the TeraGrid infrastructure

**User Communities**: Focused on the advancement of science in Europe, DEISA moved in two years from support to an initial set of "early users" in various areas of science (Material Sciences, Cosmology, Fusion Research, Life Sciences, Computational Fluid Dynamics, and Environmental Sciences) to a full scale support of leading, demanding, grand challenge applications in all areas of science and technology that could not come to life otherwise. This is implemented through the DEISA Extreme Computing Initiative, launched in 2005 and reiterated in 2006. This initiative received a large response from the scientific community, and DEISA is currently enabling and supporting more that 50 grand challenge projects in all research areas.

**Service Activities:**
The DEISA heterogeneous grid provides a number of relevant distributed services to the scientific community:

1) simple management of complex applications that need to visit several platforms to perform a job (called workflow applications)
2) high performance global data management in the whole grid, based on high performance global file systems. This enables sharing data between different applications running in different sites, applications accessing different data repositories distributed aver the different sites
3) Support for state-of-the-art, distributed applications that run on several platforms simultaneously
4) portals and Web interfaces to hide complex environments from end users.




The DEISA infrastructure fully exploits the high network bandwidth provided by the European research network GÉANT and the National Research and Education Networks (NRENs).

**Research Activities:** Besides a number of research activities on supercomputing applications arising from "early users" in several areas of science and technology (Material Sciences, Cosmology, Fusion Research, Life Sciences, Computational Fluid Dynamics, and Environmental Sciences), DEISA deploys a strong research activity on middleware development, focused on the specific requirements coming from the operational needs of the infrastructure.

**Networking Activities:** The DEISA Extreme Computing Initiative allows the DEISA infrastructure to create a real impact on science and technology, and to enhance the cooperative operation of large scale research projects in computational sciences in Europe. By encouraging the design of leading, ground breaking applications dealing with complex, demanding, innovative simulations, DEISA stimulates the coordinated operation of major computational projects in science and technology.

**Innovation:** DEISA puts forward innovative technologies and innovative strategies. The DEISA strategy has enabled the deployment of a Grid tailored for high performance computing because of non conventional technology choices made for innovative systems and grid software. Strategies of coordinated operation have been identified and agreed, which makes the integrated infrastructure superior to the sum of its parts. This integrated supercomputing power boost Europe's competitiveness in scientific areas where extreme performance is needed. It provides a partial answer to requirements coming from the increasing global competition between Europe, USA, and Japan, which induces growing demands for computational resources at the highest performance levels, as well as a need for fast innovation.

# DILIGENT

**Summary:** The main objective of DILIGENT is laying the foundations for next generation of collaboration and knowledge management environments by realizing an infrastructure that allows members of dynamic virtual research organizations to create on-demand transient digital libraries based on shared computing, storage, multi-type content and application resources. Knowledge sharing and support of collaboration in a secure, coordinated, dynamic and cost-effective manner are to be the two major facilities offered by the combination of hardware, network, software and content elements that constitute a DILIGENT infrastructure. Whereas this infrastructure is designed to support many different research and industrial applications, two complementary real-life application scenarios are used to demonstrate and validate the project: one from the environmental e-Science domain and the other from the cultural heritage domain.

**Objectives:** DILIGENT aims to establish a digital libraries (DL) test-bed based on standards and integration of state-of-the-art DL and Grid technologies, capable of serving a heterogeneous range of research and industrial applications. Through this infrastructure, members of dynamic virtual research organizations are allowed to create on-demand transient DL based on shared computing, storage, multi-type content and application resources. Knowledge sharing and support of collaboration in a secure, coordinated, dynamic and cost-effective manner are to be the two major facilities offered by the mixture of hardware, network, software and content elements that constitute a DILIGENT based knowledge repository. Furthermore DILIGENT aims to:

- ✓ open up Grid technology to a broad range of research and industrial communities;
- ✓ broaden the diffusion of DL, which are so far restricted to large organisations, by supporting a cost-effective digital library creation and operational model;
- ✓ promote cross-fertilization between the DL and Grid technology domains that will foster synergies and advances in both areas.

**Technical Approach:**

The DILIGENT infrastructure is realised by a set of interacting services which provide:

- ✓ support for the creation and operation of on-demand, transient Digital Libraries;
- ✓ typical Digital Library functionality, such as search, annotation, personalisation, and content visualisation;
- ✓ access to third-party application and information sources;
- ✓ functionality to handle shared content and application resources.

It also offers end-user interfaces that rely on Portlet technology and can thus be plugged into any standards-compliant Portal engine. Ultimately, users and administrators manage and use the DILIGENT infrastructure under the intuitive interface of a personalisable web portal. DILIGENT can both integrate its own infrastructure resources with pre-existing ones (nodes, services, etc) supplied by collaborating parties and exploit those provided by any gLite-compliant infrastructure to carry out computational and storage intensive tasks.

*continued overleaf*

Diligent

**Project acronym:** DILIGENT
**Contract nº:** IST-004260
**Project type:** Integrated Project
**Start date:** 1/09/2004
**Duration:** 36 months
**Total budget:** 9 546 561 €
**Funding from the EC:** 6 300 000 €
**Total effort in person month:** 1 024
**Web site:** www.diligentproject.org
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**Project participants:**

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| UOA | GR |
| ETHZ | CH |
| FHG | DE |
| UMIT | AT |
| CERN | CH |
| ENGINEERING | IT |
| USG | UK |
| FAST | NO |
| ESA-ESRIN | FR |
| SNS | IT |
| 4D SOFT | HU |
| RAI | IT |
| UNIBAS | CH |

**Key words:**
Software, Virtual organizations, Grid, Digital Libraries

**Collaboration with other EC funded projects:**
DELOS-CASPAR
EGEE – BRICKS
DRIVER- BELIEF

**Applications:** DILIGENT will serve a multitude of application needs. In particular, it supports, as early experimenters, two real-life user applications :
*ImpECt* – focussed on the analysis, study and prevention in environmental research through the management of services and information for science oriented applications in Earth Observation;
*ARTE* – targeted at the management of rich-media archives and enabling sharing and dissemination of information / knowledge produced by research in humanities, social sciences and communication.

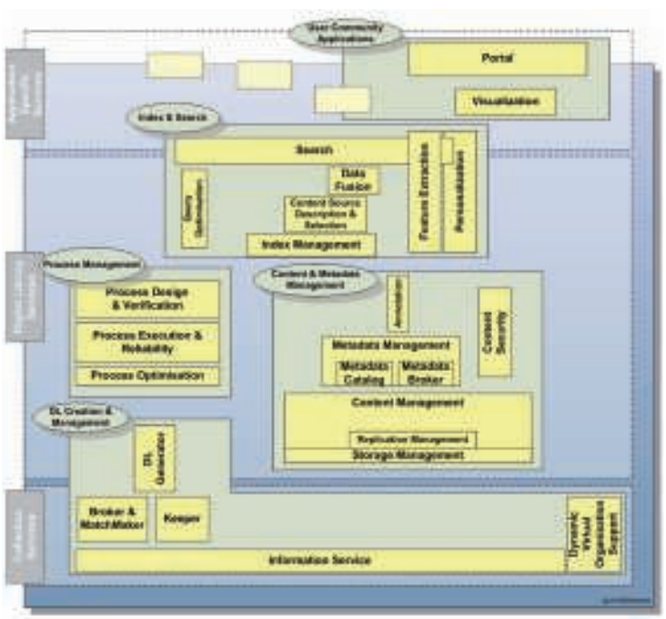
**Test-Bed:** Two gLite infrastructures have been created to serve, respectively, the development and testing phases of the project. Moreover, DILIGENT has joined the EGEE pre-production infrastructure providing initially 34 CPUs and 3,35 TB of disk space organised in two sites maintained by ESA-ESRIN and CNR-ISTI. In the short term period DILIGENT applications will exploit the resources accessible to the DILIGENT Virtual Organisation of this Grid infrastructure. DILIGENT will eventually join the EGEE production infrastructure.

**Architecture:** The DILIGENT architecture is distributed across a stack of logical layers built on top of the gLite EGEE middleware to achieve modularity and independence from hosting system. It is spread over five service groups and three logical layers:

- ➢ The **Collective Layer** lays the foundations for the system by enhancing existing Grid collective services in order to support the complex service interactions required by the Digital Library Layer.
- ➢ The **Digital Library Layer** is the domain-specific functional layer of DILIGENT, for it supports the storage, handling, and retrieval of multi-type and mixed-media content.
- ➢ The **Application-Specific Layer** gathers general-purpose application tools as well as APIs and SDKs for third parties to migrate their data or functional components to the DILIGENT platform. Furthermore it builds a number of tools of common interest to domain-specific application developers.

DILIGENT design and implementation is built around the vision to provide a robust stable system capable of supporting production level DLs. In order to achieve this aim, procedures followed by industrial / commercial software development lines have been adopted leading to:

- ✓ full adoption of the Service Oriented Architecture as dictated by the OGSA paradigm;
- ✓ adoption of JAVA as the development language and of WS-Core as the WSRF enabling toolkit;
- ✓ application of common design patterns for families of problems;
- ✓ development of horizontal mechanisms to support common tasks throughout the system;
- ✓ compliance with commonly accepted coding and documentation guidelines;
- ✓ consistency in reuse of technologies and external components.




Although the system is the internally homogeneous, the Service Oriented nature of the system allows its full or partial reuse and extensibility by a diversity of heterogeneous systems that fit the industrial interfacing standards adopted by DILIGENT.

# DRIVER

**Summary:** DRIVER is building the testbed for a future knowledge infrastructure of the European Research Area. Aimed to be complementary to GN2, the successful infrastructure for computing resources, data storage and data transport, DRIVER will deliver the content resources, i.e. any form of scientific output, including scientific/technical reports, working papers, pre-prints, articles and original research data.
The vision to be accomplished in a second phase is to establish the successful interoperation of both data network and knowledge repositories as integral parts of the e-infrastructure for research and education in Europe. DRIVER meets the three key strategic objectives of the EC programme for research infrastructures: a) it optimises the use of the technical infrastructure GN2 by delivering all types of content resources, b) it contributes to the creation of a new Europe wide infrastructure for knowledge and c) it aggregates and presents the knowledge base of European research to the world.
The knowledge infrastructure testbed, delivered by DRIVER, will be based on nationally organised digital repository infrastructures, similar to GN2 and the NREN's. The successful DARE network in the Netherlands, recently presented to the public by the project partner SURF, will serve as a model to DRIVER.
DRIVER with its testbed will not build a specific digital repository system with pre-defined services, based on a specific technology and serving dedicated communities.
The testbed will in its inception focus on the infrastructure aspect, i.e., open, clearly defined interfaces to the content network, which allow any qualified service-provider to build services on top of it. Like the data network GÉANT, DRIVER's knowledge infrastructure offers mainly a well structured, reliable and trustworthy basis. DRIVER opens up knowledge to the communities; it does not prescribe how to use the knowledge.

**Objectives:** DRIVER's vision is to build on the long-run a Europe wide Digital Repository infrastructure, which follows the principle of linking users to knowledge. The current project presents the first step in an incremental process towards this vision through building a production quality testbed.

**Project Objectives:**

1. To organise and build a virtual European scale network of existing institutional repositories from the Netherlands, the United Kingdom, Germany, France and Belgium.
2. To assess and implement state-of-the-art technology, which manages the physically distributed repositories as one large scale virtual content resource
3. To assess and implement a number of fundamental user services
4. To identify, implement and promote a relevant set of standards
5. To prepare the future expansion and upgrade of the DR infrastructure across Europe and to ensure widest possible user involvement.

*continued overleaf*

**Project acronym:** DRIVER
**Contract nº:** IST-034047
**Project type:** STREP
**Start date:** 1/06/2006
**Duration:** 18 months
**Total budget:** 2 507 152,10 €
**Funding from the EC:** 1 835 000 €
**Total effort in person-month:** 367
**Web site:** www.driver-repository.eu

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**Project participants:**

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| UniBI | GE |
| CNR-ISTI | IT |
| SURF | NL |
| UNOT | UK |
| CNRS-CCSD | FR |
| UKOLN | UK |
| UN-W | PL |
| UGENT | BE |
| UniGoe | GE |

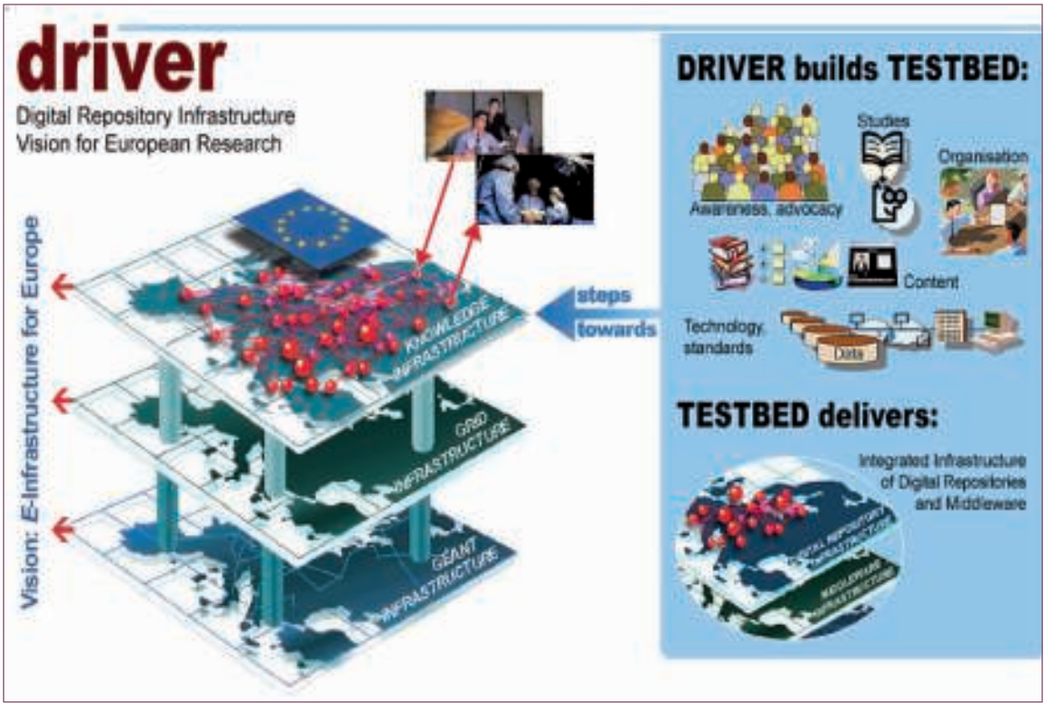
**Key words:**
Digital Repositories
Grid Services
Interoperability

**Collaboration with other EC funded projects:**
DELOS
DILIGENT

**Digital Repository Infrastructure Vision for European Research- IST**

**European Commission**
Information Society and Media

The following scheme shows the general architecture of DRIVER.




Digital Repository Infrastructure Vision for European Research

# eDEISA

Summary: eDEISA (extended DEISA) is a project that complements the DEISA research infrastructure project in many aspects that were not initially planned. DEISA is an infrastructure of infrastructures – the national supercomputing centres in Europe – that deploys and operates a high performance European supercomputing environment. This initiative, operating since 2004, led to the deployment and operation of a world class, persistent, production quality, distributed supercomputing environment with continental scope, called Distributed European Infrastructure for Supercomputing Applications (DEISA). The necessity of adaptive strategies to cope with fast technologies evolutions, as well as new innovative ways of managing users applications, led to this project that will run in parallel with DEISA, with a unified management, in the timeframe 2006 – 2008.

**Objectives:**

The main objective of eDEISA is to complement DEISA, which in turn focuses on advancing Science in Europe by deploying a production quality, distributed supercomputing environment offering advanced cooperative services that cannot be provided by the national centres alone. Other global objectives are:

- to contribute to the advancement of computational science in Europe, by enabling new, leading grand challenge applications in all areas of science and technology
- to deploy an innovative heterogeneous supercomputing Grid designed to enhance and reinforce High Performance Computing (HPC) in Europe
- to provide, by strongly integrating human and material resources from leading HPC national organizations, the first basic European supercomputing infrastructure operating as a *virtual* European supercomputing centre and acting as a support for future, more aggressive European supercomputing initiatives
- to broaden the impact of high end supercomputing environments by hiding supercomputer resources behind user friendly Web portals, and by enabling the interoperability with the rest of the European IT infrastructures

**Action plan:**

The eDEISA extends the DEISA research infrastructure in four different ways:

- Provision of an "Operations" service activity whose main objective is to sustain the production workflow of the infrastructure, and to monitor quality of service to end users
- Upgrade of the dedicated internal high bandwidth network among the DEISA platforms to a new generation network at 10 Gb/s
- Deployment of new middleware and provision of en extended set of distributed services, like improved data management, co-allocation of resources on the supercomputing Grid, and a Life Sciences Portal that will act as an applications service provider interface, hiding supercomputing resources from end users
- Enhanced support for applications, including high level support for the development and deployment of leading scientific applications arising from the Extreme Computing Initiative, and benchmarking activities

*continued overleaf*

Distributed European Infrastructure for Supercomputing Applications

**Project acronym:** eDEISA
**Contract nº:** RI-031513
**Project type:** I3
**Start date:** 1/06/2006
**Duration:** 24 months
**Total budget:** 13 145 700 €
**Funding from the EC:** 70 00 000€
**Total effort in person-month:** 960
**Web site:** www.deisa.org
**Contact person:**
Prof. Victor Alessandrini
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**tel.:** +33 169 358 585
**fax.:** +33 169 853 775
**Project participants:**

| | |
|---|---|
| CNRS | FR |
| FZJ | DE |
| RZG | DE |
| CINECA | IT |
| UEDIN | UK |
| CSC | FI |
| SARA | NL |
| ECMWF | UK |
| BSC | ES |
| BADW | DE |
| USTUTT | DE |

**Key words:**
Information technology
E-Governement
Media production
**Collaboration with other EC funded projects:**
GÉANT2,
EGEE



**European Commission**
Information Society and Media

**International Aspects:**
The eDEISA project operates in a unified way with the DEISA research infrastructure. The pool of computational resources evolves continuously as the national platforms are upgraded. In September 2006 the DEISA supercomputing Grid consisted of more than 23.000 processors, a huge memory space and an aggregate computing power of over 170 teraflops.
Like DEISA, the project is open to collaboration with other Europe HPC centres, Grid R&D projects, and other related initiatives world-wide, like TeraGrid in the USA or the EGEE project, led by CERN.

**User Communities:**
Focused on the advancement of science in Europe, eDEISA was designed to support the DEISA strategic decision of moving from supporting an initial set of "early users" in various areas of science (Material Sciences, Cosmology, Fusion Research, Life Sciences, Computational Fluid Dynamics, and Environmental Sciences) to a full scale support of leading, demanding, grand challenge applications in all areas of science and technology that could not come to life otherwise. This is implemented through the Extreme Computing Initiative, launched in 2005 and reiterated in 2006. This initiative is currently enabling and supporting more that 50 grand challenge projects in all research areas.

**Service Activities:**
The eDEISA project adds a number of service activities to the DEISA infrastructure:


1) Operation of the production class distributed supercomputing environment, with special focus on quality assurance
2) Co-allocation of computing resources on the supercomputing Grid. This is a major requirement for the production operation of distributed applications, and for efficient transfers of large datasets across computing platforms
3) Tests and assessment of new production middleware
4) Fast and efficient data transfers through new middleware capable of exploiting the full available network bandwidth
5) Portals to hide supercomputing resources from some end users communities. The first planned portal is devoted to Life Sciences
6) Enhanced support to the Extreme Computing Initiative, through an "Applications Enabling" activity providing important support to new or existing applications
7) A benchmarking activity devoted to the production of a set of European benchmarks for the procurements of future shared European supercomputers

The DEISA infrastructure fully exploits the high network bandwidth provided by the European research network GÉANT and the National Research and Education Networks (NRENs). This network will soon operate at 10 Gb/s.

**Networking Activities:**
The Extreme Computing Initiative allows the DEISA-eDEISA infrastructure to create a real impact on science and technology, and to enhance the cooperative operation of large scale research projects in computational sciences in Europe. By encouraging the design of leading, ground breaking applications dealing with complex, demanding, innovative simulations, DEISA stimulates the coordinated operation of major computational projects in science and technology.

**Innovation:**
eDEISA enhances the DEISA effort on innovative technologies and innovative strategies. The DEISA strategy has enabled the deployment of a Grid tailored for high performance computing because of non conventional technology choices made for innovative systems and grid software. Strategies of coordinated operation have been identified and agreed, which makes the integrated infrastructure superior to the sum of its parts. This integrated supercomputing power boost Europe's competitiveness in scientific areas where extreme performance is needed. It provides a partial answer to requirements coming from the increasing global competition between Europe, USA, and Japan, which induces growing demands for computational resources at the highest performance levels, as well as a need for fast innovation.

# EELA

**Summary:** EELA (E-infrastructure shared between Europe and Latin America) project aims to build a digital bridge between the existing e-Infrastructure initiatives that are in process of consolidation in Europe and those that are emerging in Latin America, throughout the creation of a collaborative network that will share an interoperable Grid infrastructure to support the development and test of advanced applications. In its collective effort, EELA will start up a common infrastructure in Latin America and Europe, interconnected by means of the RedCLARA and GÉANT networks, in which certain applications of general interest will be implemented: Biomedicine, High Energy Physics, e-Education and Climate. Due to the scope of its action, EELA will help to reduce the digital divide in the Latin American region, making available to researchers a very powerful e-Infrastructure on which to make complex investigations in a simple way, which can be extended in the future to serve as basis for a greater community of users.

**Objectives:**

The overall goal of the EELA project can be summarised in three main objectives:

- Establishing a human collaboration network: the expertise on grid operations from European institutions already active in the EGEE infrastructure will support the current emerging activities at Latin American institutions.
- Setting up a pilot e-Infrastructure in Latin America, interoperable with the existing EGEE one. This will enable a dissemination of knowledge towards research communities via two lines: the technical know-how in sharing a computing infrastructure using Grid technology, and the possibility to test and execute enhanced applications by means of researchers' collaborations.
- Identifying and promoting a sustainable framework for e-Science: the project aims to establish a long-term framework for collaboration in research and e-Infrastructure management and operation between Europe and Latin America. So, not only the communities involved, but also the mechanisms for a long-term support, will be considered and exploited.

**Action Plan:** The major thrust of the EELA project is to connect the activities of Latin American scientific communities and European initiatives of investigation in the field of computer science of high yield, storage and shared use of communication networks towards a unified distributed e-Science platform. The EELA infrastructure will exhaustively use the already existing networks, GÉANT and RedCLARA.

The EELA project is divided in four Work Packages. While the Work Package 1 deals with the Project Administrative and Technical Management, the support activities are implemented in the other ones. The Work Package 2, named Pilot Testbed Operation and Support, makes operative the infrastructure between LA and EU, implements services oriented to provide access, assures an efficient provision of these services and provides a framework for final users. The Work Package 3, designated Identification and Support of Grid Enhanced Applications, deploys high-energy physics and biomedical EGEE applications, and shows the interest of enhanced applications of huge appeal for both Latin American and European partners, namely e-education and climate. Finally, the Work Package 4, denominated Dissemination activities, imparts the Grid knowledge.

*continued overleaf*

**Project acronym:** EELA
**Contract nº:** RI-026409
**Project type:** SSA
**Start date:** 01/01/2006
**Duration:** 24 months
**Total budget:** 2 568 320€
**Funding from the EC:** 1 700 000 €
**Total effort in person-month:** 1 109
**Web site:** www.ue-eela.org

**Contact person:** Jesus Casado
**email:** jesus.casado@ciemat.es
**tel.:** +34 91 346 6180
**fax.:** +34 91 346 6537

**Project participants:**

| | |
|---|---|
| CEDERJ | BR |
| CERN | EU |
| CIEMAT | ES |
| CLARA | LA |
| CSIC | ES |
| CUBAENERGIA | CU |
| INFN | IT |
| LIP | POR |
| RED.ES | ES |
| REUNA | CL |
| RNP | BR |
| SENAMHI | PE |
| UC | ES |
| UDEC | CL |
| UFF | BR |
| UFRJ | BR |
| ULA | VE |
| UNAM | MX |
| UNLP | AR |
| UPV | ES |
| UTFSM | CL |

**Key words:**
Information Technology
Grid Infrastructure
e-Science

**Collaboration with other EC funded projects:**
EGEE
GÉANT2/GN2
ALICE/CLARA

**E-Infrastructure shared between Europe and Latin America – RI**

**European Commission**
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**International Aspects:** EELA seeks to establish a human collaboration network between Europe and Latin America. The expertise on grid operations from European institutions already active in the EGEE project, e.g. CERN (Switzerland), CIEMAT (Spain), CSIC (Spain), INFN (Italy), LIP (Portugal), and UPV (Spain), will support the current emerging activities at Latin American institutions, e.g., CECIERJ/CEDERJ (Brazil), CUBAENERGIA (Cuba), UFF (Brazil), UFRJ (Brazil), ULA (Venezuela), UNAM (Mexico), SENAMHI (Peru), UNLP (Argentina), UDEC (Chile) and UTFSM (Chile).

**User Communities:** The project considers, first of all, communities that have already established research links, and where the experience guarantees that the applications can be enhanced thanks to the use of the Grid. These are biomedical and high energy physics applications, already supported in the EGEE infrastructure. The collaboration within these communities could open new lines of interest.
Two additional areas are also considered due to their expected impact. The first one is education in the grid environment and the second one is climate, which will focus on the research of «El Niño» phenomenon, a topic of key importance where the Grid will greatly improve the research possibilities.

**Service Activities:** The EELA project will provide a large number of services to the interested communities:

- To share the know-how in terms of Grid computing within Latin America and between Latin America and the rest of the world.
- To integrate GRID middleware standards proposed by the Global Grid Forum (GGF) and participate in their evolution.
- The use of the regional networking infrastructures (GEANT, RedCLARA) and to trigger the development of the common computing and storage infrastructure.
- To introduce the participant countries to open market practices in computing, telecommunications, etc.
- To ensure fast, secure and cheap access to huge computing power, storage and bandwidth.
- To enhance the collaboration among scientific communities, both within Latin America and between Latin America and Europe.
- The interaction between research communities and governmental bodies in Latin America, with the aim of gaining long-term support for e-Infrastructures and e-Science.
- The launch of new common projects in educational, scientific and cultural fields.
- To serve as a test-bed for further initiatives.

Besides, common projects, collaborative work, and human resources formation will not be just EELA spin-offs but, rather, EELA main objectives.

**Research Activities:** The EELA project is a Specific Support Action, where no research activities are explicitly foreseen. Nevertheless, the key point in this project is dissemination and implementation of several applications in certain areas of science and technology (biomedical, high energy physics, education in the grid environment and climate sciences). So the development of this project opens the field to a huge number of activities in the research domain. The areas involved have been considered as the most relevant for the research community in the organizations participating in the project.

**Networking Activities:** The project will facilitate the spread and exchange of technical expertise between all participating countries, which already possess strong but isolated clusters of knowledge in the relevant areas. The project will also facilitate the exchange of information between the participating countries and the rest of the world, via close interactions with worldwide Grid efforts and projects. This interaction between the associated participants of the project is envisaged to promote the integration of the research communities of the LA region to the ERA (European Research Area).
The networking activities will develop a culture of cooperation formalised in the management structures elaborated in the project. But will produce, as well, the spread of good practices, especially the adoption of standards for software and operational procedures in the deployment of the e-Infrastructure and its subsequent use.

**Innovation:** EELA proposes innovative technologies and innovative strategies. Technologically, apart from the network itself, the innovations are related to the capability of efficiently share data across a wide network area through a global file system. This integrated platform enhances the computing capability in Europe and specially in Latin America thanks to the possibility of redistributing the global computational workload by migrating jobs across national borders, in a way that is totally transparent to end users.
From the strategic point of view, the EELA project will deploy a supercomputing infrastructure through a deep integration of existing national high-end platforms, tightly coupled by a dedicated network and supported by innovative systems and grid software. Strategies of coordinated operation have been identified and agreed. The result will be an integrated infrastructure whose capabilities will be more robust than the sum of its parts.

# EGEE

**Summary:** The seamless sharing of computing resources on an international scale has been transformed from vision to reality with the Enabling Grids for E-sciencE project, which started on 1 April 2004 and ended on 31 March 2006. The state of computer and networking technology today facilitates extensive computing Grids that integrate geographically distributed computer clusters, instruments, scientific communities and large data storage facilities. Scientific Grid applications require reliable round-the-clock access to the Grid resources. The resulting benefits include a large increase in the peak capacity and the total computing available and data management power for various scientific projects, in a secure environment.

**Objectives:** Originally, EGEE aimed to have 3000 users active on the Grid infrastructure from at least five disciplines by the end of the second year of the project. The Grid infrastructure available to EGEE grew from over 3000 CPUs at the outset to over 20'000 by the end of the second year.
Several measures of quality of service were used to assess the impact of this Grid infrastructure. In addition to demonstrating the added value of Grid technology quantitatively, EGEE aimed to achieve qualitative improvement in terms of new functionality for the participating scientific communities.

**Results:** Over the two years of the project, EGEE constructed an infrastructure with some 200 sites in 39 countries, making it the world's largest multi-science Grid infrastructure. This infrastructure processes in excess of 30'000 jobs per day from many scientific domains, ranging from Biomedicine to Fusion science. The project has produced the gLite open-source middleware distribution, re-engineered by the project from a range of best-of-breed middleware components to produce a lightweight middleware option containing a full range of foundation services as well as support for field- and application-specific high level services.

**International Aspects:** The EGEE infrastructure is built on the EU Research Network GÉANT and exploits 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 US Trillium. The infrastructure provides interoperability with other Grids around the globe, including the US and Asia, contributing to efforts to establish a worldwide Grid infrastructure.
The EGEE project involves 70 leading organisations from around 27 countries, federated in regional Grids, with an ultimate combined capacity of over 20000 CPUs – the largest international Grid infrastructure ever assembled.

| | |
|---|---|
| Astrophysics | Computational Chemistry |
| Earth Sciences | Finance |
| Fusion | Geophysics |
| High Energy Physics | Life Sciences |
| Multimedia | |

Figure 3: Application domains supported by EGEE

*continued overleaf*

Enabling Grids for E-sciencE

Enabling Grids for E-sciencE

**Project acronym:** EGEE
**Contract nº:** RI-508833
**Project type:** I3
**Start date:** 1/04/2004
**Duration:** 24 months
**Total budget:** 46 109 200 €
**Funding from the EC:** 31 867 000 €
**Total effort:** ~400 FTE over 850 people
**Web site:** www.eu-egee.org
**Contact person:** Dr. Robert Jones
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**tel.:** +41 22 767 1482
**fax.:** +41 22 767 2350
**Project participants:**

| | |
|---|---|
| CERN | CH |
| GUP | AT |
| UNIINNSBRUCK | AT |
| CESNET | CZ |
| BUTE | HU |
| ELUB | HU |
| KFKI RMKI | HU |
| MTA SZTAKI | HU |
| NIIF | HU |
| CYFRONET | PL |
| ICM | PL |
| PSNC | PL |
| II-SAS | SK |
| JSI | SI |
| TCD | IE |
| CCLRC | UK |
| UEDIN | UK |
| PPARC | UK |
| UCL | UK |
| CEA | FR |
| CGG | FR |
| CNRS | FR |
| CS SI | FR |
| CRSA | FR |

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**User communities & expansion:**

- Dramatic increase in the use of the infrastructure over the course of the project, in particular in the second year as the middleware and management systems became increasingly stable. This use has been both by the pilot applications (High Energy Physics and Biomedicine), and also by seven other supported domains ranging from financial applications to astrophysics and computational chemistry.
- Major role as an incubator for Grid projects in the European Research Area and beyond by supporting 14 so-called 'related projects'. These satellite projects extend the impact of EGEE in a number of ways, through extension of the infrastructure to new geographical areas (such as the Baltic States, India and China), through adding new applications (including several biomedical applications) or through support projects (involving areas such as training, education and security). Through such efforts, EGEE has had a structuring effect on European and global work in the area of Grid computing, and maximised the use of its infrastructure and project results.

**Innovation:** The key differentiating aspect of the EGEE project is its global nature and its goal of leveraging hardware-, software- and human resources from a large pool of participating institutes all over the world. To be faced with complex communities and to support social structures through training, dissemination and other management activities may not seem to require innovation. However, these are the key driving forces which promote the discovery of new applications and working methods in EGEE.
Furthermore, the EGEE project is providing an outstanding example of how the collaboration efforts by all partners turn into tangible results. After two years, the EGEE Grid infrastructure exceeded 200 sites and 20'000 CPUs, which placed EGEE well ahead of its original targets. Since the Grid provides an interface for a very large number of heterogeneous resources, clear and strong standards are needed. EGEE is actively engaged in the establishment of standards for the Grid, in particular on Web Service technologies (e.g. WSRF, WS-Security, WS-Addressing, WS-Policy) and on proven security solutions (e.g. transport level security with SOAP over HTTPS). This constant pro-active technology assessment allows for the deployment of EGEE middleware which should be readily compatible with such standards. Nevertheless, in the meantime and building on already important experience, EGEE releases and maintains robust Grid middleware today.
As e-Science on the Grid becomes a reality through EGEE, the project faces an increasing demand for the deployment of applications coming from a larger spectrum of scientific domains, with different sensitivity levels to features such as security or performance. This context challenges specialists to develop Grid-enabled applications and to have these deployed on the EGEE Grid soon after that. With its successor, EGEE-II, the project intends to address these challenges and lay the foundations of a sustainable Grid infrastructure on a global scale.

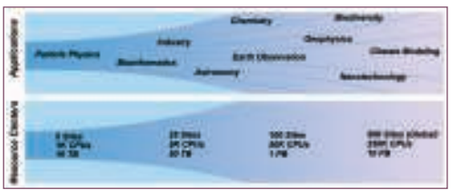


Figure 1: Schema of the evolution of the EGEE Grid infrastructure


Figure 2: gLite Middleware logo

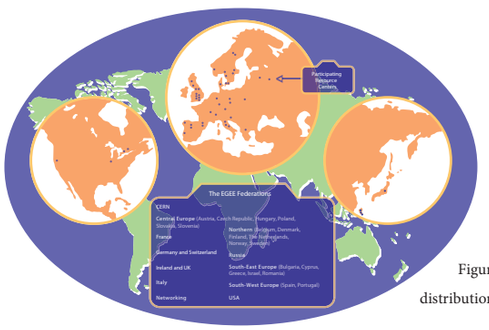


Figure 4 – International distribution of participating Resource Centres

| | |
|---|---|
| DESY | DE |
| DKRZ | DE |
| FhG/SCAI | DE |
| FZK | DE |
| GSI | DE |
| DATAMAT | IT |
| INFN | IT |
| TERENA | NL |
| VUB | BE |
| KU | DK |
| UH.HIP | FI |
| FOM | NL |
| SARA | NL |
| UVA | NL |
| UiB | NO |
| VR | SE |
| IHEP | RU |
| IMPB RAS | RU |
| ITEP | RU |
| JINR | RU |
| KIAM RAS | RU |
| PNPI | RU |
| RRC KI | RU |
| SINP MSU | RU |
| CLPP-BAS | BG |
| UCY | CY |
| GRNET | GR |
| TAU | IL |
| ICI | RO |
| LIP | PT |
| CESGA | ES |
| CSIC | ES |
| IFAE | ES |
| INTA | ES |
| UPV | ES |
| U. of Chicago | US |
| USC | US |
| U. of Wisconsin-Madison | US |
| KTH | SE |
| ENEA | IT |
| UNICAL | IT |
| UNILE | IT |
| UniNa | IT |
| DANTE | UK |
| DFN-Verein | DE |
| GARR | IT |

**Key words:**
Distributed computing
Virtual organizations, Middleware
Production Grid
Multi-science applications

**Collaboration with other EC funded projects:**
GÉANT/GN2, DEISA, SEE-GRID, DILIGENT

e-infrastructure

# EGEE-II

**Summary:** The EGEE project was launched to establish a seamless European Grid infrastructure for the support of the European Research Area (ERA). As the first two-year phase of a four year programme, it completed on 31 March 2006 having established a pan-European production grid infrastructure supporting a range of scientific disciplines. It has expanded its scope beyond Europe, forming relationships with groups in the USA and Asia who are now partners in EGEE-II which officially started on 1 April 2006. EGEE-II will build on the work of the EGEE project to provide a production quality, seamless Grid infrastructure service across the ERA and across the globe. EGEE-II will spread knowledge about the Grid and its benefits to researchers and students in Astrophysics, Biomedicine, Computational Chemistry, Earth Sciences, Fusion, High Energy Physics, and other fields, through dedicated support teams and a well-defined training programme, as well as reinforcing links with the full spectrum of interested business partners. By the end of EGEE-II, essential research and development as well as preparatory technical and managerial work will be completed to establish a sustainable Grid infrastructure, in a GEANT2-like manner.

**EGEE-II Vision:** EGEE-II aims to build on the work of the EGEE project, to provide a production quality Grid infrastructure across the European Research Area and beyond. The EGEE-II project will significantly extend and consolidate the EGEE infrastructure, which links national, regional and thematic Grid efforts, as well as interoperate with other Grids around the globe. The resulting high capacity, world-wide infrastructure greatly surpasses the capabilities of local clusters and individual centres, providing a unique tool for collaborative compute-intensive science ("e-Science").

**Mission:**

In order to achieve the vision outlined above, the mission of the EGEE-II project is to:

- **Manage and operate** a production quality Grid infrastructure service across the ERA.
- **Support and develop collaborations** with diverse scientific communities, ranging from Fusion to Computational Chemistry, which will have applications deployed on the infrastructure.
- **Offer interoperability** with e-Infrastructure projects in other regions of the globe.
- **Disseminate knowledge** about the Grid and its benefits to researchers and students in many scientific domains through a well-defined training programme.
- **Contribute to the acceleration of Grid standardisation efforts.**
- **Encourage technology transfer** through close collaboration with business partners who are interested in using Grid technology.

Reflecting this mission, EGEE-II is structured in three main areas of activity: operational services, middleware re-engineering with quality assurance and networking/community building. The areas are integrated via a "Virtuous Cycle" to offer a full provisioned service to user communities.

The EGEE-II Consortium consists of 91 partner institutes in 32 countries, organised in 12 federations. This group will have strong continuity with the EGEE consortium, preserving an experienced team with proven ability on a European and global scale.

*continued overleaf*

**Project acronym:** EGEE-II
**Contract nº:** RI-031688
**Project type:** I3
**Start date:** 1/04/2006
**Duration:** 24 months
**Total budget:** 52 608 105 €
**Funding from the EC:** 36 971 365 €
**Total effort in person-month:** 11 165
**Web site:** www.eu-egee.org
**Contact person:** Dr. Robert Jones
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**fax.:** +41 22 767 2350
**Project participants:**
CERN (CH); JKU (AT); UNIINNSBRUCK (AT); CESNET (CZ); BME (HU); CSC (FI); KFKI RMKI (HU); MTA SZTAKI (HU); NIIF (HU); CYFRONET (PL); ICM-UW (PL); PSNC (PL); II-SAS (SK); JSI (SI); TCD (IE); CCLRC (UK); UEDIN (UK); IMPERIAL(UK); ETHZ (CH); CEA (FR); CGG (FR); CNRS (FR); CSSI (FR); CRSA (FR); DESY (DE); DKRZ (DE); FhG/SCAI (DE); FZK (DE); GSI (DE); DATAMAT (IT); INFN (IT); SWITCH (CH); ULB (BE); UKBH (DK); UH.HIP (FI); FOM (NL); SARA (NL); UVA (NL); UiB (NO); VR (SE); IHEP (RU); IMPB RAS (RU); ITEP (RU); JINR (RU); KIAM RAS (RU); PNPI (RU); RRC KI (RU); SINP MSU (RU); IPP-BAS (BG); UCY (CY); GRNET (GR); TAU (IL); ICI (RO); LIP (PT); CIEMAT (ES); CSIC (ES); PIC (ES); TID (ES); UPV (ES); U. of Chicago (US); USC (US);

**Enabling Grids for E-SciencE – RI**

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**International aspects and the Future:** EGEE-II maintains strong links to other major Grid projects around the world, such as the US Open Science Grid (OSG), the Japanese NAREGI (National Research Grid Initiative) project and the European supercomputing Grid DEISA (a Distributed European Infrastructure for Supercomputing Activities), several of which have joint members with EGEE-II. Shared work with these projects includes areas like grid security and interoperability with other major e-Infrastructures.
In addition to such cooperation, EGEE-II acts as an incubator for related Grid projects and initiatives that extend the EGEE infrastructure to new geographical areas or bring in new application domains. Work is also undertaken in related projects to help driving the adoption of the gLite middleware. EGEE-II is also involved with a range of projects that provide support in such areas as Grid training, dissemination and security.
EGEE-II will pave the way for a long-term sustainable Grid infrastructure to ensure the resources and knowledge developed during EGEE and EGEE-II are available to researchers in Europe and beyond in years to come. EGEE-II is thus maximizing its structuring effect in the ERA and establishing a new platform for inter-discipline collaboration.

**Benefits to Users:**
The benefits of EGEE from the users' perspective are:

- **Simplified access** – Through Virtual Organisations, EGEE-II offers single points of contact to a huge range of computing resources for each user group, along with all the subsidiary services required by each scientific domain.
- **On-demand computing** – By allocating resources in a dynamic and efficient manner, the EGEE infrastructure can reduce waiting times for a range of applications.
- **Pervasive access** – The EGEE infrastructure is available 24 hours a day, independent of the geographical location of the user through a system of high-speed networking using the GÉANT2 network and round the globe operation centres (Asia, Europe, USA).
- **Large scale resources** – With an increased number of sites in EGEE-II, the project will be able to offer access to an unprecedented level of resources, far exceeding what can be offered by a single site.
- **Sharing of software and data** – By providing a unified computational fabric, EGEE-II allows distributed groups to work together in an efficient and coordinated manner.
- **Comprehensive support systems** – Through combining the expertise of all partners and virtualising support systems, EGEE-II will offer a comprehensive support structure able to deal with problems in all areas from core infrastructure to end-user applications in a timely manner.

UWM (US); KTH (SE);
ENEA (IT); UNICAL (IT);
UNILE (IT); UNINA (IT);
DANTE (UK); DFN-Verein (DE);
GARR (IT); RED.ES (ES);
CESGA (ES); IPB (Serbia);
TUBITAK (TK); FZJ (DE);
UCM (ES); UNIZAR (ES);
CNR (IT); ELETTRA (IT);
HEALTHGRID (FR);
METAWARE (IT); CNES (FR);
RUG (NL); GLASGOW (UK);
UNIMAN (UK); OXFORD (UK);
CKSC (KR); ASGC (TW);
KISTI (KR); SRCE (CR); RENCI (US)

**Key words:**
Distributed computing
Virtual organizations
Middleware
Production Grid
Multi-science applications

**Collaboration with other EC funded projects:**
GÉANT2, DEISA, SEE-GRID2, DILIGENT, EUMedGrid, BalticGrid, EELA, ETICS, etc. (see www.eu-egee.org)

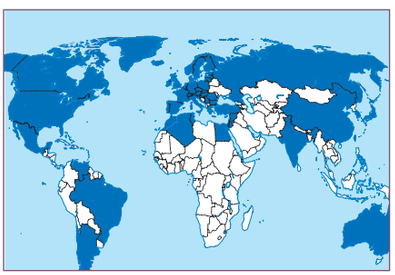


Figure 1: Countries which are/will be connected to the EGEE infrastructure

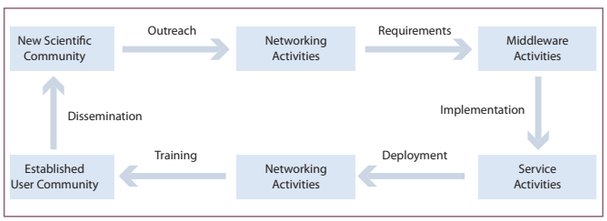



Figure 2: The Virtuous Cycle of the EGEE-II project

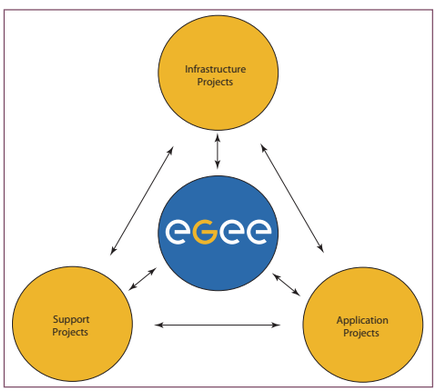



Figure 3: EGEE-II as incubator for Related Projects



e-infrastructure

# e-IRGSP

**Summary:** The e-IRGSP project provides a number of services to support the work of the e-Infrastructure Reflection Group (e-IRG), such as a secretariat (in The Hague, The Netherlands), a knowledge base and policy and editorial support. e-IRG consists of official government delegates from the 25 EU member states, as well as associated countries.

**Objectives:** e-IRGSP supports the operational activities of the e-IRG and ensures continuity of its activity by providing a basic set of support services that enable e-IRG to maximise the results of its work.
The e-IRG was founded in 2003 on the initiative of the Greek EU presidency to coordinate and support the creation of a framework – political, technological and administrative – for the easy and cost-effective shared use of distributed electronic resources across Europe.

e-IRG provides a European forum to filter, transfer and upgrade (technical, economic and other) knowledge and visions for the creation of the above framework within Europe – and beyond. e-IRGSP tries in this context to create the circumstances for the wide patchwork of projects and initiatives to converge into a future-proof European Research e-infrastructure evolving successfully in an international context, establishing global leadership in this area.

**Approach:** The work of the e-IRG is supported by a number of instruments, of which the two most prominent are the e-IRG White Papers and the e-Infrastructures Roadmap. e-IRGSP provides the e-IRG with editorial man power to create these documents. Both the White Paper and the roadmap rely on the efforts and contributions of the European experts' community (including both European national and relevant international expertise).

e-IRGSP provides day-to-day operational support by hosting the e-IRG secretariat in The Hague, The Netherlands.

e-IRGSP maintains also the e-IRG website and helps organise its workshops and meetings. e-IRGSP thus assists the policy work of the above policy body within the enlarging community of e-Infrastructure practitioners by facilitating both online and offline activities of the e-IRG. In addition, e-IRGSP assists e-IRG Task Forces with their activities in the field of e-infrastructures.

**Applications:** e-IRGSP will help e-IRG gather structured information about the current state of affairs in a Knowledge Base based on ISO Topic Maps that will be on-line by end of 2006.

*continued overleaf*

**Project acronym:** e-IRGSP
**Contract nº:** RI-026756
**Project type:**
Specific Support Action
**Start date:** 1/10/2005
**Duration:** 24 months
**Total budget:** 306 000 €
**EC Funding:** 306 000 €
**Total effort in person-month:** 45
**Web site:** e-irg.eu/support
**Contact person:** Dr. Patrick Aerts
**email:** secretariat@e-irg.eu
**tel.:** +31 70 344 0700
**fax.:** +31 70 385 0971
**Project participants:**

| | |
|---|---|
| NCF | NL |
| Grnet | GR |
| Genias/Enter the Grid | NL |

**Key words:**
Communication technology
Information systems
Computer technology
**Collaboration with other EC-funded projects:**
BELIEF
EGEE/EGEE2
GÉANT2
DEISA
ForSociety

**e-Infrastructures Reflection Group Support Programme - RI**

**European Commission**
Information Society and Media

**Publications:**

- e-IRG Austrian White Paper (July 2006)
- e-Infrastructures Roadmap (August 2006)

# EU-IndiaGrid

**Summary:** The principal goal of EU-IndiaGrid is to support interconnection between the most relevant European Grid infrastructure (EGEE) and the Indian Grids to build a common infrastructure available to support data processing for e-Science application areas where strong collaborations already exist between Europe and India.
Such common Grid infrastructure is intended to provide a concrete answer to specific requirements of several existing EU-India collaborative projects, characterized by very demanding computing needs. Coupled with this, the project is expected to trigger the use and development of Grids in India across a number of application areas and foster the creation of new Euro-Indian collaborations for the development of e-Science.
The project started on the 1st October 2006.

**Objectives:** The principal objectives of EU-IndiaGrid are:

- To support the interconnection and interoperability of the prominent European Grid infrastructure (EGEE) with the Indian Grid infrastructure for the benefit of e-Science applications;
- To identify and aggregate research, academic and industrial communities which may benefit from the use of Grid technology resulting in an e-Science Network Community published on the EU-IndiaGrid portal;
- To promote the use of advanced Grid technologies within the created Network Community relying on pilot applications in Biology, High Energy and Condensed Matter Physics, and Earth and Atmospheric Sciences, and specific outreach and dissemination activities;

To disseminate European EGEE Grid technology achievements in India and leverage on Indian Grid experiences and skills.

Expected Results: The projects aims at obtaining the following results:

- To develop synergies between scientific research and industrial communities with ongoing Grid technology developments with the creation of an e-Science Network Community;
- To increase international co-operation through the validation of the pilot intercontinental infrastructure which will act as a driving force at disseminating the results of the successful EGEE grid infrastructure in India endorsing the introduction of new user communities;
- To offer an effective answer to the demanding computing needs of several common EU-India research projects and, at the same time, foster the deployment of grid techniques in research and industrial applications within the Indian subcontinent;
- To bring together over 500 organisations from research, industry, and science communities to exchange experiences during the workshop and training events for an appropriate dissemination and outreach activity,
- To deliver three workshops, a project conference and four training[1] events in strategic areas in India and Europe with major potential user communities, attracting European and Indian industrial communities too(each workshop will have 100-150 participants).

[1] Training and education are meant as actions for the dissemination of knowledge.

*continued overleaf*

**Project acronym:** EU-IndiaGrid
**Contract nº:** RI-031834
**Project type:**
Specific Support Action
**Start date:** 01/10/2006
**Duration:** 24 months
**Total budget:** 1 280 821 €
**EC Funding:** 1 015 910 €
**Total effort in person-month:** 353
**Web site:** www.euindiagrid.org
**email:** www.euindiagrid.eu
**Contact person:**
Dr. Alberto Masoni
**email:** alberto.masoni@ca.infn.it
**tel.:** +39 0706754900
**fax.:** +39 070510212
**Project participants:**

| | |
|---|---|
| INFN | IT |
| Metaware | IT |
| GARR | IT |
| ICTP | IT |
| Cambridge | UK |
| TIFR | IN |
| ERNET | IN |
| Pune | IN |
| Saha | IN |
| C-DAC | IN |
| BARC | IN |

**Key words:**
Grid, e-Science
**Collaboration with other EC-funded projects:**
EGEE-II, BELIEF

**Joining European and Indian Grids for e-Science Network Community - RI**

**European Commission**
Information Society and Media

**Collaboration:** The partners of this project are prominent actors on the European and Indian e-Infrastructures scene:

- Italian National Institute for Nuclear Physics (INFN, project coordinator),
- Metaware SpA,
- Consortium GARR - the Italian Academic and Research Network (GARR),
- Abdus Salam International Centre for Theoretical Physics (ICTP),
- Cambridge University,
- Indian Tata Institute for Fundamental Research ("TIFR", with an Institute in Mumbai and the National Centre for Biological Sciences, "NCBS", in Bangalore),
- Indian Education and Research Network (ERNET),
- University of Pune,
- SAHA Institute Calcutta, the Centre for Development of Advanced Computing (C-DAC)
- Bhabha Atomic Research Centre.

**Deployment plan for EU-IndiaGrid:** The project plans to support the interconnection between EGEE (and its thematic and regional extensions) with the Indian Grids (GARUDA and DAE grids) to achieve the goal of a common infrastructure capable of fulfilling the computing requirements of several e-Science application domains where well established collaborations already exist between Europe and India. The project will represent also an instrument to form new collaborations aggregating scientific as well as engaging industrial communities which may benefit from the possibilities offered by grid technologies.

The partners will capitalize the achieved experience within EGEE and the cooperation with the main Indian grid infrastructures: the GARUDA grid National Project and the Department of Energy (DAE) grid projects.

Pilot applications in Biology, High Energy and Condensed Matter Physics, and Earth and Atmospheric Sciences will be deployed on the newly implemented infrastructure in order to validate it and will furthermore be a first set of case-stories which can be used in the dissemination of the Project.

By this way it will be possible:

- to provide support to several already existing EU-India collaborative projects;
- to contribute to increased awareness of Grid developments among new research and industrial communities;
- to improve the effectiveness of the Grid infrastructure for new applications and to promote scientific and industrial developments;
- to foster the creation of new Euro-Indian collaborations in e-Science and Industry.

Existing and potential user communities in e-Science and Industry will be identified, contacted, and involved in the project, through a specific outreach and dissemination programme, ultimately aiming to create an EU-IndiaGrid community bringing together over 300 organisations from Research, Industry, and Academia.

# EUMEDCONNECT

**Summary:** The EUMEDCONNECT project has created the first research and education network for the Mediterranean region. As a result project partners are successfully benefiting from a high capacity Internet network dedicated to users of the region's research and academic community and is directly connected to the European user community via GEANT2. This new infrastructure fights the digital divide that exists between the Mediterranean and European regions, and increases academic collaboration between the regions. It is available for use by non-commercial applications including other EUMEDIS projects. The current programme has been extended to July 2007.

**Objectives:**
The project's overall objectives are:

- To plan, build and operate a research and education network interconnecting the region's national research and education networks (NRENs), and provide international connectivity to Europe
- To stimulate the development of research and education networking in the region
- To pursue initiatives targeted at closing the 'digital divide', and through this promote regional integration and social cohesion
- To make the case and undertake collective activities to sustain research and education networking beyond the conclusion of the current project.

**The EUMEDCONNECT Topology:** The diagram below shows the current network topology. The first phase of implementation saw the establishment of links to Morocco, Algeria, Tunisia and Cyprus. Existing GÉANT2 links to Cyprus, Israel, Malta and Turkey are connected to the EUMEDCONNECT network. The most recent phase of development has extended the EUMEDCONNECT network to connect Egypt, Jordan, Palestine and Syria. Points of Presence have been established in Sicily at Catania, and in Cyprus at Nicosia. Network usage is growing, and lead to upgrades already being required for the links to Algeria and Morocco.

**International aspects:** EUMEDCONNECT has direct links to GÉANT2, the pan-European multi-gigabit research and education network. The Mediterranean partners are now able to communicate and collaborate with colleagues throughout Europe and beyond. Indeed, with GÉANT2 connections to other world regions, such as North America, Latin America, Asia and the Middle East, Mediterranean researchers can now operate on a truly global scale.

**Project Partners:** The EUMEDCONNECT project is co-ordinated by DANTE, a not-for-profit organisation registered in the UK. The National Research and Education Networks (NRENs) are supporting DANTE for this project in four European countries: France (RENATER), Greece (GRNET), Italy (Consortium GARR) and Spain (RedIRIS). All are experienced in establishing national networks and have been working in the region.

*continued overleaf*

**Project acronym:** EUMEDCONNECT
**Contract n°:** B7-4100/2000/2165-088
**Project type:** Grant and Special Fund
**Start date:** 14/12/2001
**Duration:** 66 months
**Total budget:** 12 400 000 €
**Funding from the EC:** 9 920 000 €
**Total effort in person-month for research activities:** 149
**Web site:** www.eumedconnect.net
**Contact person:** David West
**email:** prm@dante.org.uk
**tel.:** +44 1223 371 300
**fax.:** +44 1223 371 371

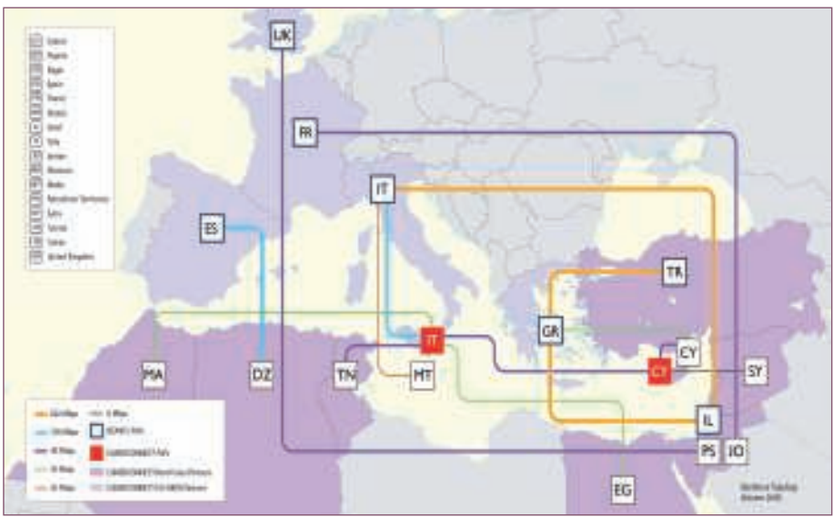
**Project participants:**

| | |
|---|---|
| DANTE | UK |
| ARN | DZ |
| CNCPSRT | MA |
| CYNET | CY |
| EUN | EG |
| GARR | IT |
| GRNET | GR |
| HIAST | SY |
| IUCC | IL |
| JUnet | JO |
| PADI2 | PL |
| RedIRIS | ES |
| RENATER | FR |
| RNRST | TN |
| ULAKBIM | TU |
| UoM | MT |

**Key words:**
Network Technology
Communication Technology
Information Systems
**Collaboration with other EC funded projects:**
GN2, ALICE, TEIN2, SEEREN2, EEGE EUMEDGRID

**EUMEDCONNECT – EuropeAid Co-operation Office**
**European Commission** Information Society and Media

The Mediterranean NREN partners are Algeria, Cyprus, Egypt, Israel, Jordan,, Malta, Morocco, Palestine, Syria, Tunisia and Turkey. Lebanon is also eligible for EC funding.




**Challenge and Success:** The project has provided cohesion to regional research networking, and has enhanced the political and working relationships amongst the project partners. With the support of the Mediterranean partners and their governments, DANTE and the NRENs have been able to overcome local difficulties such as poor infrastructure or monopoly providers. Overcoming these regional difficulties makes the successful creation of the network all the more rewarding.

The successful approach established by EUMEDCONNECT, has been applied to other projects in other world regions. The ALICE, SEEREN and TEIN2 projects have all used the EUMEDCONNECT template for research networking.

Research networking has benefits that extend far beyond the academic community. The provision of good quality, high capacity telecoms infrastructure can contribute to European/Mediterranean collaborative projects in such fields as e-health, e-learning and e-culture.

EUMEDCONNECT is the supporting infrastructure for the EUMEDGRID project. This project aims to empower e-Science across the Mediterranean and helps to bridge the digital divide. Funded by the European Community, EUMEDGRID enables experts to collaborate to develop a grid infrastructure for e-science. The project is fostering the development of applications such as hydro-geological and medical applications within an extended European Research Area.

Plans are also being developed for the connection of Egypt's Alexandria Library to the network allowing the region's rich cultural history to be shared online to a global audience.

Use of the EUMEDCONNECT network is restricted to non-commercial applications. Over half of the EUMEDIS pilot projects benefited from EUMEDCONNECT through higher capacity links and reduced their costs. New projects interested in connecting to the network should contact their National Research and Education Network for further information on connection procedures and terms. There are no additional charges for use of EUMEDCONNECT. Contact details are available at www.eumedconnect.net.

# EuQoS

**Summary:** EuQoS is building a flexible and secure QoS assurance system (the EuQoS System) in order to help the industry to evolve the Internet into the multi-service network of the future. The EuQoS System is being integrated, tested, simulated and validated in NREN and operator research access networks with the GÉANT core providing Pan European support, and is adding value to existing applications for medical, aerospace, SME, corporate, family and education users.

**Objectives:** The key objective of EuQoS is to research and demonstrate end-to-end QoS technologies to support advanced QoS-aware applications over multiple, heterogeneous research, scientific industrial and national research network infrastructure testbeds.
Sub-objectives are:

- to develop a roadmap and strategic guidance for the development of QoS technologies in Europe;
- to foster the interoperability of end-to-end QoS solutions across heterogeneous network domains;
- to promote the creation of new business models for the Internet community.
- to promote standardization on end-to-end QoS issues at standardization bodies.

**Technical Approach:** The EuQoS project is developing a flexible and secure QoS Assurance System (the EuQoS System) by developing new mechanisms which build upon the state-of-the-art technologies. Several planes can be identified in the technical solution:

- the service or application plane processing the service logic;
- the service mediation plane offering an intermediary function;
- the resource control plane, that receives orders from the upper planes and orders the transfer plane to reserve the necessary resources.

The transfer plane is composed by network segments using a specific transfer technology, managed by requests coming from the resource management plane.

**Expected Achievements:** The availability of QoS-capable networks is the first step towards the provision of new communication services to end users. QoS provisioning will allow applications working on separate network infrastructures (such as TV broadcasting and telephony) to gradually migrate to a unified packet-switching infrastructure, thus achieving cost-effectiveness at comparable quality. Besides, EuQoS will enable the further deployment of new multimedia services having a strong focus on interactivity.

**Testbeds:** The project has built a European-wide research testbed to deploy the EuQoS solution and to support end-user applications over the access network infrastructure testbeds interconnected by the GÉANT backbone, NRENs from six different countries and five network operators (Picture 1).

*continued overleaf*

**Project acronym:** EU-QoS
**Contract nº:** IST-004503
**Project type:** IP
**Start date:** 1/09/2004
**Duration:** 36 months
**Total budget:** 16 157 862.85 €
**Funding from the EC:** 9 498 815 €
**Total effort in person-month:** 1 733
**Web site:** www.euqos.org

**Contact person:**
Mr. José Enríquez Gabeiras
**email:** jeg@tid.es
**tel.:** +34 913 374 744
**fax.:** +34 915 103 308

**Project partners:**

| | |
|---|---|
| TID | ES |
| CPR | IT |
| DATAMAT | IT |
| CNRS | FR |
| FT | FR |
| PTC | PL |
| MARTEL | CH |
| NICTA | AU |
| POINTERCOM | IT |
| TP | PL |
| PTIN | PT |
| RED ZINC | IE |
| SILOGIC | FR |
| SOLUZIONA | ES |
| TELSCOM | CH |
| UPC-CCABA | ES |
| UBern | CH |
| UPB | DE |
| CRMPA/UoR | IT |
| FCTUC | PT |
| WUT | PL |
| ERICSSON | ES |
| HDES | PT |

**Key words:**
Quality of Service, Multi-service Network, Access Networks.
**Collaboration with other EC funded projects:** GN2

**End-to-End Quality of Service Support over Heterogeneous Networks – IST**

**European Commission**
Information Society and Media

**Results:** The major achievements of the project to this date have been:

- The project has defined the architecture, which is a significant improvement over the state-of-the-art: it demonstrates flexibility, openness via its plug and play approach to access networks, application integration, extensibility, scalability and technology independence.
- The testbed network has been built, including 12 sites and 4 Access Network types and 6 NREN links. Also, an associated monitoring and measurement system has been built.
- The project has successfully delivered three system releases These prototypes are steps of the incremental strategy adopted for the software development.
- The EuQoS project has an intense dissemination activity including the initiation of a new annual workshop on end-to-end QoS, and work with IPsphere, ETSI, IETF and the DSL forum. The system publicly has been demonstrated in the CER 2005 (Communicating European Research 2005) event.

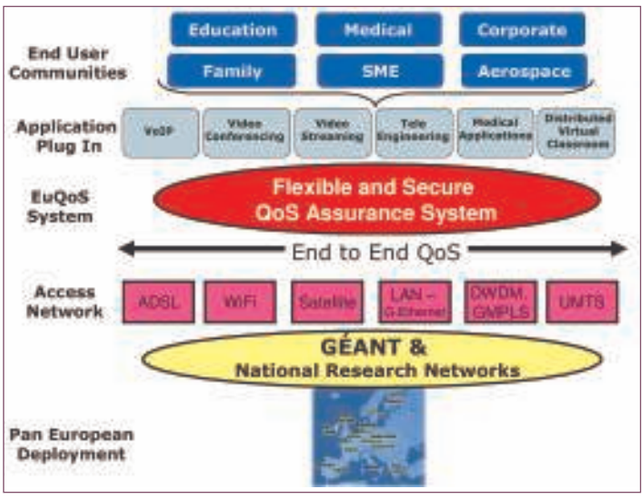



Figure 1: User, Application and Network integration in EuQoS

# EUROLABS

**Summary:** EUROLABS integrates new networking technologies, applications and services in 5 testbeds located in Belgium, France, Germany, Hungary and Switzerland. The GÉANT network interconnects these 5 distributed testbeds. Each centre is specialized in certain technologies, and the features are transferable to all sites.
The EUROLABS testbeds:

- offer new technologies in a realistic environment,
- provide support for IST and other projects for testing their systems, including the capability for testing across heterogeneous networks,
- give the opportunity to validate for interoperability,
- facilitate participation in remote events such as ETSI Plugtests,
- integrate network components and applications into showcases.

**Objectives:** The main objective of EUROLABS is to set up and maintain five well-equipped, interconnected testbeds, offering state-of-the-art "Next Generation Networks" technologies, as well as advanced applications and services.
The access to these testbeds is open to IST and other (national and international) projects, offering possibilities to implement and test innovative products, as well as interoperability testing.

**Technical approach:**
The key technologies addressed by EUROLABS are:

- Access networks
- Quality of Service (QoS);
- Fixed/Mobile networks and applications integration;
- Security;
- Interworking and interoperability of products and services.

EUROLABS organises events for dissemination and establishing contacts with potential user projects.

**The testbeds:**

- The EUROLABS consortium offers a distributed testbed made of five sites.
- The geographical spreading ensures that different projects can get in touch with a EUROLABS partner located close to them. Interconnectivity between the five sites and similar testbeds in Europe and worldwide is assured through the European Research Network GEANT and its successor.

*continued overleaf*

**Project acronym:** EuroLabs
**Contract nº:** IST-511410
**Project type:** Specific Support Action
**Start date:** 1/10/2004
**Duration:** 36 months
**Total budget:** 1 145 966 €
**Funding from the EC:** 916 772 €
**Total effort in person-month:** 125
**Web site:** www.ist-eurolabs.org
**Contact person:** Prof. Paul Van Binst
**email:** vanbinst@helios.iihe.ac.be
**tel:** +32 262 93211
**fax:** +32 262 93816
**Project participants:**

| | |
|---|---|
| ULB | BE |
| TELSCOM | CH |
| NEC | UK |
| INNO | FR |
| BUTE | HU |

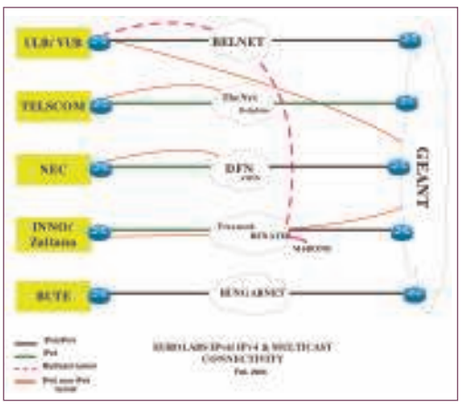
**Key words:**
Internet,
Next Generation Networking,
Telecommunications,
Data communication,
Mobility,
Security,
Quality of Service,
Home electronics,
Testbeds,
Interoperability,
Standards



European Commission
Information Society and Media

**Some results:**

- New technologies have been introduced, tested and demonstrated:
  - Powerline communications, ADSL, WLAN, GPRS/UMTS networks
  - Diffserv and NSIS based QoS in IP networks;
  - SIP signalling; HIP; embedded systems ;
  - Usage of RFIDs
- Contacts with IST projects and others: partners have regular dissemination events
- Collaboration with projects in: QoS testing, Monitoring and Measurement tools, Security mechanisms, Grid technologies…




The following projects or users communities have used the testbeds: 6NET, Athena, BEgrid, EGEE, EuQoS, Euro6IX, Evergrow, MoMe, SEINIT, UniGrids, POWERNET, NETQOS, VISP, WWI Ambient Networks, and various Academic users.

- Interoperability testing

Organisation of Interoperability events (Jul. 05, Mar. 06) on IPFIX, Netconf, NSIS, and Netflow protocols.
Development and testing of Netconf, NSIS and IPFIX protocols implementations.
Participation to the ETSI IPv6 Plugtests: Oct. 04 with a DHCPv6 implementation and Nov. 06.

**Applications and Services available:** All 5 EUROLABS testbeds are available with multiple functionalities and applications, with some specific features at each of the testbeds.

**ULB/VUB**
Interworking and interoperability; tunneling; IPv4/IPv6 transition mechanisms: NAT-PT (BT-Ultima network); (IPv6) mobility, home environment; traffic monitoring; **Grid**; **UMTS**; location based services; videoconferencing: H323 with OpenMCU and Gnomemeeting.

**TELSCOM**
**QoS**, **Security**, Mobility, Home environment, IPv4/IPv6 Network monitoring, Wireless IDS and monitoring, IDS, IPSec, PKI, DNSSec, Games (Quake, Tetrinet), Voice/Audio (RAT, 6VOICE, SIP communicator, Linphone), Video Streaming IPv6 Proxy for application level interworking.
**Embedded systems**

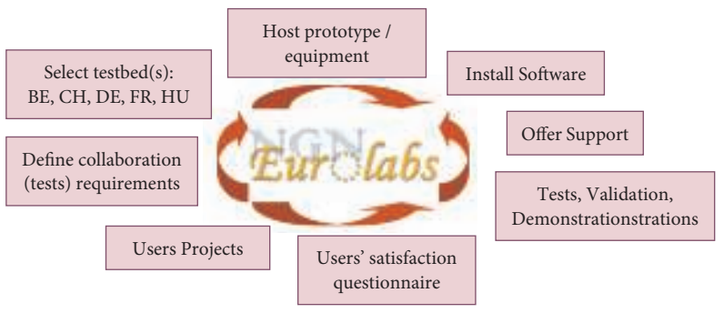
**NEC**
QoS, HIP, SIP, **NSIS**, **IPFIX**, PSAMP, VoIP (Kphone), Asterisk, SER, Tunneling, NAT-PT

**EUROLABS: Distributed testbeds interconnected by GEANT network**

**INNO/ZALTANA**
**Home services**, Automotive services, Web based services, **Multimedia services;**
VoIP: SIP, SER; SMS gateway, Instant messaging, Asterisk

**BUTE**
IPv6 web tools, transition mechanisms, VPN, Monitoring and IDS, **DNSSec**, SIP, **ENUM** database server.

**Have your own prototype or application installed and tested in the EUROLABS testbeds !**






e-infrastructure

# EuroVo-DCA

**Summary:** The concept of a Virtual Observatory is that all the world's astronomical data should feel like it sits on the astronomer's desktop, analysable with a user selected workbench of tools and made available through a standard interface. Euro-VO is the European implementation of this idea that will produce a unified data and service resource (a data and service grid) with the ability to perform complex data discovery and manipulation tasks across the whole range of astronomical research topics. The Euro-VO Data Centre Alliance project will co-ordinate the national and European Agencies Virtual Observatory initiatives, supporting implementation of the Virtual Observatory framework by the European Data Centres to populate the Virtual Observatory with data produced by the European astronomy infrastructures.

**Objectives:**

- Coordinating national Virtual Observatory initiatives and fostering the definition of a European strategy;
- Disseminating knowledge and good practice about interoperability standards and tools among the European data centres;
- Gathering feedback from implementation to convey to the developers of standards, tools and protocols;
- Preparing the inclusion of theoretical and modeling services in the Virtual Observatory data and service grid;
- Coordinating the Virtual Observatory with the development of generic elements of the computing grid;
- Fostering participation of data centres from other European and candidate countries.

**Technology Approach:** There are several challenges which need to be tackled.
Technical issues include:

- Interaction with the computing grid (including interoperability with the different Grid systems developed in different countries/regions);
- Security (for some of the Virtual Observatory usage);
- Single Sign On;
- Efficient management of massive, distributed, heterogeneous data;
- 'Intelligent resource discovery'
- Existing links with the IT community have to be further extended, in particular to take the best advantage of the semantic web and Digital Libraries technological developments.

**Innovation:** The EuroVO Data Centre Alliance will produce a rare example of an operational, interoperable *data and service grid*, relying on generic infrastructure elements (the high bandwidth communication network and the general framework of the Grid infrastructure) and, wherever required, on discipline-specific interoperability standards, with a discipline-wide, world-wide provider and user community. It aims at building a flexible environment adaptable to the user needs, giving users seamless access

*continued overleaf*

**Project acronym:** EuroVO-DCA
**Contract n°:** RI031675
**Project type:** Coordination Action
**Start date:** 1/09/2006
**Duration:** 28 months
**Total budget:** 1 639 440 €
**Funding from the EC:** 1 540 855 €
**Total effort in person-month:** 170
**Web site:** http://dca.euro-vo.org

**Contact person:**
Dr. Françoise Genova
**email:** genova@astro.u-strasbg.fr
**tel.:** +33 390 24 24 10
**fax.:** +33 390 24 24 32

**Project participants:**

| | |
|---|---|
| CNRS-INSU | FR |
| ESA | Int |
| ESO | Int |
| INAF | IT |
| INTA | SP |
| MPG | DE |
| NOVA | NL |
| LU | UK |

**Key words:**
Data and service grid,
Virtual organisations

**EuroVO Data Centre Alliance – RI**

**European Commission**
Information Society and Media

to the heterogeneous, distributed, and in general freely accessible data and services provided by the data centres. The Virtual Observatory framework is also building a *knowledge grid*, including semantics description of data and services in the interoperability layer.

**Testbed:** The Virtual Observatory has a very strong potential for structuring astronomical and astrophysical research which extends well beyond the current participants: common interoperability standards will allow other data archives to join, becoming then accessible and usable by the entire international community; it will become a major component of any major new European ground- and space-based astronomical facility; it will also have a strong structuring effect on the community as a whole, providing all astronomers with seamless access to the best data and tools, independently of their countries of residence.
The coordination between National and European Agencies provided by the EuroVO-DCA project will help to define a common roadmap for large scale deployment and will organize implementation feedback towards technology projects.

# GÉANT2

**Summary:** Designed and built on behalf of a consortium of National Research and Education Networks (NRENs), with funding support from the European Commission as part of its 6th Framework Programme, the GÉANT2 network provides a vital research infrastructure as well as the necessary resources for information technology and telecommunications development. It connects a potential of 30 million users, including over 3 million researchers in more than 3,500 research and education institutes across Europe. It is the largest ever network built for Europe's research and education community, and the first hybrid network deployed on an international scale. Many routes operate at 10Gbps – speeds which equate to transferring 1,000 digital photos in 1.6 seconds. GÉANT2 is operated by research networking organisation DANTE, on behalf of Europe's NRENs.

**Objectives:** The project's overall objectives are:

- To create a multi-gigabit pan-European backbone research network interconnecting Europe's national research and education networks (NRENs), over which a suite of advanced services will be offered to meet the increasingly demanding requirements of Europe's research and education community
- To provide advanced, international connections to other world regions, placing Europe at the heart of Global Research Networking
- To conduct joint research activities into the development of networking technologies and services, to directly benefit the users of GÉANT2 and its connected NRENs
- To support effectively and directly projects and users who have advanced networking requirements
- To pursue initiatives targeted at closing the 'digital divide', through both in-depth analysis of the picture of research networking in developing areas and the provision of direct support
- To examine the future of research networking, exploring the case for sustaining research and education networking beyond the conclusion of the project.

**Technology:** GÉANT2 is a hybrid network which uses a combination of switched and routed infrastructure. It has a network footprint in excess of 50,000 km. This includes 12,000 km of leased dark fibre, which will be lit by the project. This delivers greater control over performance and costs, when compared to leasing lit capacity from suppliers.
GÉANT2 is designed to switch both data packets and data streams. The ability to switch data streams is innovative and opens up new service possibilities. In particular, as streams flow between defined end points of the network, it is possible to reserve "virtual" paths across the network which appear to the user as a dedicated facility. These flexible paths are created by reserving capacity from the pool of bandwidth provided by the pipes in the network.
Advanced networking has become an essential part of many research and education activities. The networks provide the data communications connectivity needed to allow researchers and academics to collaborate together in their work. The technical advances undertaken for GÉANT2 are vital to the development of future research networks. Commercial Internet technology is not efficient nor delivers service availability levels required by current and future projects. Moreover, because GÉANT2 is a switched and routed network, it is paving the way for next generation, high performance, low-cost communication networks.

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**Project acronym:** GÉANT2
**Contract nº:** RI-511082
**Project type:** I3
**Start date:** 1/09/2004
**Duration:** 48 months
**Total budget:** 178 593 731 €
**Funding from the EC:** 93 000 000 €
**Total effort in person-month for research activities:** 700
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**Project participants:**

| | |
|---|---|
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| TERENA | NL |
| ACOnet | AT |
| ARNES | SI |
| BELNET | BE |
| CARNet | HR |
| CESNET | CZ |
| CYNET | CY |
| DFN-Verein | DE |
| EENet | EE |
| FCCN | PT |
| GARR | IT |
| GRNET | GR |
| HEAnet | IE |
| NIIF | HU |
| ISTF | BG |
| IUCC | IL |
| JSCC | RU |
| LATNET | LV |
| LITNET | LT |
| NORDUnet | DK |
| PSNC | PL |
| RedIRIS | ES |



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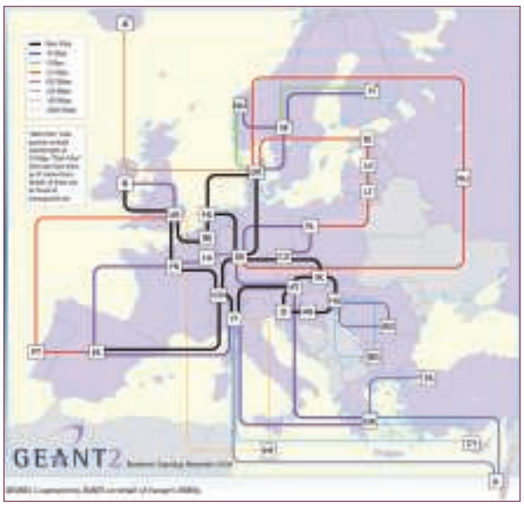
**International aspects:** GÉANT2 puts Europe at the heart of global research networking. It connects European researchers with colleagues in North America, Japan, China, Latin America, Asia-Pacific rim, North Africa, the Middle East, and South Africa, to create a global research community and to meet their communication needs.

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|---|---|
| RENATER | FR |
| RESTENA | LU |
| RoEduNet | RO |
| SANET | SK |
| SURFnet | NL |
| SWITCH | CH |
| ULAKBIM | TR |
| UKERNA | UK |
| UoM | MT |

**Key words:**
Network Technology
Communication Technology
Information Systems
**Collaboration with other EC funded projects:**
ALICE TEIN2, SEEREN2, EUMEDCONNECT

**User communities:**
GÉANT2 connects 30 European national research and education networks (NRENs) which serve 34 countries. The NRENs connect research and education institutions within their respective countries. With over thirty million users, the applications of the network are almost limitless. Any type of research can make use of the facilities that GÉANT2 offers. These may be projects with high bandwidth demands or users simply keen to make use of GÉANT2's geographical reach.

**Joint Research Activities:** GÉANT2 is not just about the deployment of state-of-the-art networking technology. There is also a major effort devoted to new developments in telecommunications services. This research utilises expertise from across Europe's NRENs and DANTE. It focuses on the following areas:

**1) Performance Monitoring and measurement**
Creating an international data path between two research institutions can involve multiple networks and any disruption to one can affect the service a user experiences. In close cooperation with Internet2 and ESNet in the United States, the team has created perfSONAR – a network monitoring architecture that provides information on link capacity and link utilisation across all domains. The aim is to establish a true end-to-end view of network performance. A Performance Enhancement and Response Team (PERT) troubleshoots network performance issues across different domains, providing an essential link between users and experts.

**2) Security**
This activity seeks to equip GÉANT2 and connected NRENs with the ability to take a proactive and cooperative approach to advanced security services. Activities focus on alert systems and monitoring tools and implementing security policies.

**3) Bandwidth on Demand**
Currently researchers requiring dedicated connectivity can only be serviced via special engineering. The objective of the bandwidth on demand activity is to develop technologies whereby network bandwidth can be directly provided between European researchers as and when they are required. It represents a major step forward in terms of internet technology.

**4) Network Testbed**
The network testbed will be implemented independently from the production network to enable testing to take place on experimental work without incurring disruptions to the normal production service.

**5) Mobility**
The success of personal mobility which GSM Telephony has achieved is capable of being replicated in the context of computer users. The mobility activity aims to allow users of computing and networking resources to exploit them independently of the user's physical location. It addresses the issues of access control, authorisation, authentication and single sign-on.

# GRIDCC

**Summary:** Recent developments in Grid technologies have concentrated on providing batch access to computational and storage resources which are physically distributed. GRIDCC will extend this to include access to and control of distributed instrumentation. As the instrument control is both a real-time and an interactive process, the extension into this area requires definition of acceptable quality of service for interactions between different Grid components. GRIDCC will develop these definitions, building on work carried out by various standards organisations and other Grid projects, where appropriate. Access to instruments will be via the interface to the Virtual Instrument Grid Service (VIGS), whose design and implementation is the key part of the GRIDCC development plan.

**Objectives:** The goals of GRIDCC can be summarized as follows:

- To develop generic Grid middleware, based on existing building blocks (Grid Services) which will allow for remote control and monitoring of instrumentation, such as distributed systems;
- To incorporate the new middleware into a few major applications, in order to validate the software, both in terms of functionality and QoS: European Power Grid, Meteorology, Analysis of Neurophysiologic data, Remote Operation of an Accelerator Facility, High Energy Physics Experiment and Device Farm of Telecommunication Measurement Instrumentation;
- To disseminate the new software technology and the test beds' evaluation results in order to encourage enterprises to adopt a Grid-oriented approach to real-time control and monitoring of remote instrumentation.

**Action Plan:** An incremental approach to software development will be adopted, with first releases of the different middleware components being in the second year of the project. Further releases will add to the functionality, robustness and scalability of the software, with final releases being deployed in the final 6 months of the project.
GRIDCC will run a representative set of applications in order to validate the software produced by the project. These applications will control and monitor different types of instruments, acquire data from these instruments and then analyse these data on existing Grid test beds. This will demonstrate the integration of this project with existing Grid projects.

**Applications:** The project will deploy applications with a significant social impact: large-scale emergency management, biomedical applications, transportation applications and traffic control, telecommunications management, distance learning and e-learning in general (with the addition of the important aspect of remote usage and control of laboratory instruments at various complexity levels), energy management and distribution (e.g., electrical power).

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**Project acronym:** GridCC
**Contract n°:** IST-511382
**Project type:** STREP
**Start date:** 1/09/2004
**Duration:** 36 months
**Total budget:** 5 289 000 €
**Funding from the EC:** 3 996 000 €
**Total effort in person-month:** 1 426
**Web site:** www.gridcc.org

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| UBRUN | UK |
| CNIT | IT |
| ELETTRA | IT |
| IBM | IL |
| ICSTM | UK |
| CNR | IT |
| UNI-UD | IT |
| GRNET | GR |

**Key words:**
Grid technologies, control of remote instrumentation, QoS
Quality of service
Virtual Instrument Grid Service

**Collaboration with other EC funded projects:**
EGEE

**Distributed system for remote control and monitoring of complex instrumentation – IST**

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**Testbeds:**
- building state-of-the-art, scalable and cost-effective test beds sharable among remote users;
- providing standardized interfaces;
- producing test beds fully configurable and usable for joint experimentation and demonstrations;
- providing repository and "checkpoint" on research status;
- implementing several testbeds in different scientific areas, over the common architectural and software platform, in order to demonstrate flexibility and adaptability of mature Grid technology

**Results and achievements at the 2nd year of the project:** As planed, the second year of the project has seen the first official release of several components of the GridCC architecture. The main pilot applications of the project have been equipped with the released middleware and deployed on different test beds.
The main items achieved during the year have been:
- first official release of the Instrument Element (IE), the key module of the GridCC architecture, allowing a grid enabled access to the instrumentation. IE exposes to the Grid the Virtual Instrument Grid Service (VIGS).
- first official release of VCR – Virtual Control Room – to provide the user interface to the instrumentation and a collaborative environment for the remote users
- workflow based service orchestration, providing access to the GridCC IEs and to the classic EGEE gLite components, like WMS, CE and SE.
- support and monitor of the real time and interactive requirements based on two levels (strict and loose) of guarantees.

**Middleware deployment on the main GridCC pilot applications:**
The above described main points have been integrated to run the 3 main pilot GridCC applications, namely:
- run control of a high energy physics experiment
- the remote control and monitoring of a grid of small power generators
- far remote operation of a particle accelerator

The deployment of other applications, foreseen in the GridCC program, started also in the second year (e.g. meteorology, control of the territory (geo-hazard), remote control and monitoring operations of telecommunication measurement equipment).

The mentioned applications run on dedicated GridCC test beds and, for the case of the run control of the experiment CMS, the applications run on the real production environment of the "Magnet Test and Cosmic Challenge" at CERN, LHC.

# int.eu.grid

**Summary:** The objective of the Interactive European Grid project is the deployment of an advanced Grid empowered infrastructure in the European Research Area specifically oriented to support the execution of interactive demanding applications. The consortium involves 13 leading institutions in 7 countries, with significant computing capacity and expertise in Grid technology. While guaranteeing interoperability with existing large e-Infrastructures like EGEE by providing basic common middleware services, the initiative will exploit the expertise generated by the EU CrossGrid project to provide researchers with an interactive and simultaneous access to large distributed facilities through a friendly interface with powerful visualization. The Interactive European Grid, whilst interoperable with EGEE, will focus on interactive use for medicine, environment, physics and other research areas (from robotics to archaeology) that have demanding interactive applications that can benefit from being Grid-enhanced.

**Objectives:** The main objective of the Project is to deploy and operate a production-level e-Infrastructure for demanding *interactive* applications that will have an impact on the daily work of researchers. The Project will promote the use of this Grid-empowered European infrastructure, based on powerful clusters connected through an advanced network, to researchers in areas like biomedicine, environment or physics. Int.eu.grid provides:

- **Distributed Parallel (MPI)** Interactive Computing and Storage at the Tera level
- **User Friendly Access** through a Grid Interactive Desktop with powerful visualization
- **Support to Virtual Organizations** at all levels: setup, collaborative environment, Grid-enhancement of applications, execution and monitoring tools, discussion of results.

**Action Plan:** The following activities are planned within the framework of the Project:

- Setup and operation of a computing infrastructure with more than 500 processors available for interactive parallel use, including high performance clusters, large shared memory machines, and significant data storage
- Integration and support for interactive use of MPI from a user friendly Grid-aware desktop interface with powerful visualization, prioritization mechanisms and active security
- Dissemination to scientific communities and support of the creation of their appropriation of the infrastructure through Virtual Organizations.

**International aspects:** The **int.eu.grid** project is built on the expertise and excellence of the consortium Partners that have been involved in international Grid research and deployment projects such as DataGrid, CrossGrid, LCG and EGEE. Many of the partners are already involved in providing production Grid services to scientific communities. The Project infrastructure will be compatible with other major Grid projects by using common basic middleware services, contributing to the standardization of the Grid middleware and to the consolidation of the e-Infrastructures in Europe. For this purpose the Project will follow the recommendations of international bodies such as e-IRG and GGF.

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**Project acronym:** int.eu.grid
**Contract nº:** RI-031857
**Project type:** I3
**Start date:** 1/05/2006
**Duration:** 24 months
**Total budget:** 2 637 000 €
**Funding from the EC:** 1 986 000 €
**Total effort in person-months:** 604
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| PSNC | PL |
| FZK | DE |
| UAB | ES |
| CYFRONET | PL |
| GUP | AT |
| TCD | IE |
| CESGA | ES |
| IISAS | SK |
| ICM | PL |
| BIFI | ES |
| HLRS | DE |

**Key words:**
Grids, Interactivity, MPI, e-Infrastructure, Grid Desktop

**Collaboration with other EC funded projects:**
EGEE II, GÉANT2, GridCC, EUQoS, EELA, DEISA, G-Eclipse

**Interactive European Grid – RI**

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**User communities:** The **int.eu.grid** project already includes a base of researchers from important scientific fields interested in exploiting the capabilities of the Grid infrastructure. In addition to these, several new user communities have shown strong interest in taking advantage of the interactive computing and visualization capabilities to be offered by **int.eu.grid**. The dissemination activity will be key to make the project visible to new communities. However, important dissemination results will also be obtained through the presentation of the results and experience obtained by **int.eu.grid**'s users themselves. The Project Partners will provide additional contribution to dissemination tasks through national and regional contacts with eScience type of initiatives.


**Service Activities:** To achieve its mission the Consortium includes research and computing centres across Europe, the later contributing with high-value computing resources that will be made available and managed by an experienced team. Typically, a user will employ 10-100 Central Processing Units and may benefit from large shared memory configurations in four-processor 64-bit machines, or large on-line storage (hundreds of Gigabits). However, distributed applications across several clusters will use 100-300 Central Processing Units, and will be able to handle terabytes of data. The operation and integration of these resources in a production-level Grid-empowered Infrastructure will be the main objective of the Specific Service Activity. The experience obtained in the CrossGrid test-bed guarantees that this basic but key objective will be achieved. A dual perspective in operation will be considered: provision of Grid infrastructure services, and management of Virtual Organizations.

**Research Activities:** Joint Research Activities will support operational requirements aimed at the integration and adaptation of middleware for an interactive demanding framework, starting from the support for the interactive use of MPI from a user friendly Grid-aware desktop interface with powerful visualization, prioritization mechanisms, and active security, another must in an interactive environment.

**Networking Activities:** The Networking Activities are oriented to disseminate to the researcher communities the possibilities of this e-Infrastructure. Demanding interactive applications identified in the areas of medicine, environment and physics that will benefit from the use of this Grid empowered e-Infrastructure will be supported at all levels.

**Innovation:** The originality and innovation of the Project activities lay in the deployment, operation and support of a European-wide Grid computing infrastructure for interactive and parallel applications, focussing in the provision of a production service for all scientific disciplines where compute and data intensive processing will be needed. To date, there is a short experience with interactive usage of Grid environments and very few projects have addressed the design of middleware components that support interactivity. The existing components, while being a good starting point, still need further work to achieve a high quality of service and high scalability. Developments foreseen in this project will make significant advances in Grid technologies and standards. The tools from Research Activity will advance in hiding the complexity of the Grid to the end-user. Furthermore, the middleware developed in the Interactive European Grid will be available to the Grid research community and will stimulate new usages and exploitation of Grid environments.

# IPv6 TF – SC

**Summary:** This project focuses on the wide-scale deployment of IPv6 in Europe by coordinating a harmonized European IPv6 deployment roadmap, addressing key deployment challenges (clear business and technical cases, political support, policy and market needs) to support the IPv6 deployment over broadband networks and other innovative applications and services. The project objective is also to encourage the targeted business sectors to adopt IPv6 in order to benefit from future business opportunities.

**Objectives:**

- Drafting a European IPv6 deployment roadmap and strategic vision for the future of IPv6 in Europe;
- Coordinating European National Task Forces and providing guidance to achieve the goals for wide deployment of the next generation Internet;
- Monitoring, analysing and reporting on European and global IPv6 deployment progress through basic benchmarking;
- Disseminating and exchanging information with international bodies and organisations, creating a European IPv6 web portal;
- Targeting European industry and commercial organisations, which could benefit from it in short to mid-term.
- Assessing and addressing real business issues in key European sector applications to understand sector-specific problems and operational IPv6 requirements.

**Technology Approach:**

There are several challenges which need to be tackled. Technical issues include:

- Multi-homing
- IPv6 access network equipment
- Network management
- Host OS support
- IP version-neutral applications
- DNS (Dual Stack) infrastructure
- Security (end to end)
- User-Network Interface: UNI (including configuration for typical users)

**Innovation:** Whereas IPv6 has potential to support new, innovative applications and services, the immediate return on investment and technical justification for IPv6 deployment may not be clear. Therefore, relevant industry sectors need to be specifically targeted with convincing technical and business cases. Indeed, it could strongly be argued that Broadband and IPv6 go together, since it is difficult to see how either technology meet the demands of advanced Information Society without benefits of the other one (Picture 1). The intention of the project is to ensure that emphasis is also placed on making technologies work together as reliable and cost effective as possible IPv6 is the next crucial stage in IP evolution opening up a wealth of new applications

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**Project acronym:** IPv6TF-SC
**Contract nº:** IST-004572
**Project type:** Coordination Action
**Start date:** 1/07/2004
**Duration:** 24 months
**Total budget:** 956 831.40 €
**Funding from the EC:** 794 643 €
**Total effort in person-month:** 65
**Web site:** www.ipv6tf-sc.org

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**Project participants:**

| | |
|---|---|
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| 6WIND | FR |
| FCCN | PT |
| FTRD | FR |
| IPCOM | SE |
| NOKIA | FI |
| Soton-ECS | UK |

**Key words:**
Social economics
Innovation strategies
EU policies

**IPV6 Task Force Steering Committee – IST**

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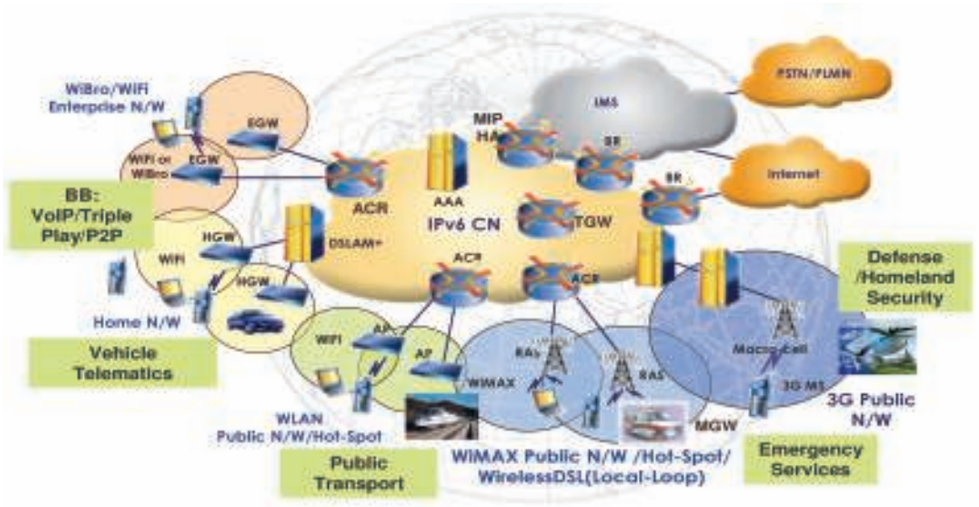
and services. To make Europe to benefit from it, precise deployment plans are necessary within the European business and industry sectors.

**Testbed:** In order to achieve a transition to IPv6, to minimize deployment costs and enable innovative new applications development, it is essential that businesses and governments understand benefits and challenges of IPv6.
The IPv6 deployment requires a significant effort in medium-term planning and awareness-raising. Business and governments are encouraged to maximise and coordinate their efforts to encourage Internet users to benefit from the increased efficiency and opportunities which IPv6 offers.
The project addresses these issues in its roadmap to stimulate business deployment. As a result, it will encourage development and creation of new applications and motivate the transition to IPv6 on a wider scale (Picture 2). Hopefully, Europe through its IPv6 deployment of the new generation Internet, will undoubtedly provide the infrastructure for many innovative Internet services.




Picture 1: IPv6 connectivity to all Business Sector


Picture 2: Paving the way forward in Europe

# LOBSTER

**Summary:** LOBSTER is a support action with the objective to create a pilot European Infrastructure for accurate Internet traffic monitoring that improves performance and provides security in research networking. Based on passive traffic monitoring sensors and capitalizing on experience gained partially within FP5 projects, the LOBSTER infrastructure is being created to be unique in Europe and among the very few existing in the World.

**Objectives:** The main goal of LOBSTER is to develop and deploy an advanced European Internet Traffic Monitoring Infrastructure, based on passive monitoring sensors at speeds starting from 1Gbps, and possibly up to 2.5 and 10Gbps.

**Applications:** To bring the benefits of network monitoring to interested researchers and administrators, LOBSTER has developed several novel applications aiming at improving our understanding of the Internet. For example, to improve the understanding of network administrators regarding the type of traffic that flows through their networks, FORTH researchers have developed a novel monitoring application (Figure 1), which shows the breakdown of network traffic into different categories, such as world-wide web traffic (HTTP), peer-to-peer traffic etc. This application is one of the very few and probably the only open-source application of its type that is available to the network community.

Capitalizing on the accurate LOBSTER timers, Researchers from CESNET have developed a fine-grain "available bandwidth" monitoring application, which enables them to identify the available resources in the network with a sub-second accuracy (Figure 2), a property really useful, if not absolutely necessary, for the designers of real-time distributed applications such as real-time video conferencing.

While CESNET researchers focus on applications for accurate **sub-second predictions**, UNINETT researchers work on producing **long-term statistics** of Internet behaviour in STAGER, an application capable of long-term storing and producing various views of statistics for the Internet. Backed by a sophisticated database, and fed on a daily basis with data from tends of traffic monitors, STAGER is able to guide system administrators from viewing the general status of their network to focusing on specific performance problems.

Besides, however, monitoring performance on micro- and macro-scales as the presented applications suggest, LOBSTER is also capable of supporting security applications as well. Indeed, Figure 3 shows a screendump of EAR, a security application which focuses on detecting **zero-day worms**, that is, malicious self-replicating programs whose sole purpose is to compromise as many computers as possible, by exploiting some recently found vulnerability in their software. By monitoring traffic on the network and analyzing the packets seen, EAR is able to detect the communication patterns which characterize the propagation of worms.

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**Project acronym:** LOBSTER
**Contract nº:** IST-004336
**Project type:**
Specific Support Action
**Start date:** 1/10/2004
**Duration:** 33 months
**Total budget:** 2 058 403 €
**EC Funding:** 1 625 072 €
**Total effort in person-month:** 183
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**Project participants:**

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|---|---|
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| CESNET | CZ |
| UNINETT | NO |
| SYMANTEC | UK |
| ALCATEL | FR |
| FORTHNET | GR |
| TNO | NL |
| TERENA | NL |

**Key words:**
Computers systems
Network technology
Internet technology
**Collaboration with other EC-funded projects:**
SCAMPI



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**Technological Approach:** To detect sub-second performance glitches as well as rapidly spreading cyberattacks, LOBSTER is based on state-of-the-art technology of passive network traffic monitors, partially developed within the FP5 SCAMPI project. By capitalizing on a grid of passive network traffic monitoring sensors spread across Europe, LOBSTER is be able to combine information from different geographical regions and increase the speed and accuracy of its applications.

**Testbeds:** LOBSTER sensors are already up and running in several European counties including Norway, Czech Republic and Greece, while plans are underway to run LOBSTER sensors in some other.
Overall, the LOBSTER European Internet Traffic Monitoring Infrastructure will serve as a catalyst, which (i) will boost our understanding of the Internet, (ii) will lead to its better use in the long-run, and (iii) will provide a powerful tool in the battle against cyberattacks that have been plaguing the Internet.

**Industrial Interest:** The LOBSTER project has recently attracted the attention of the Industry as well. Indeed, Symantec, the world leading company in the area of network and information security has recently joined the project, becoming a full member of the LOBSTER consortium.

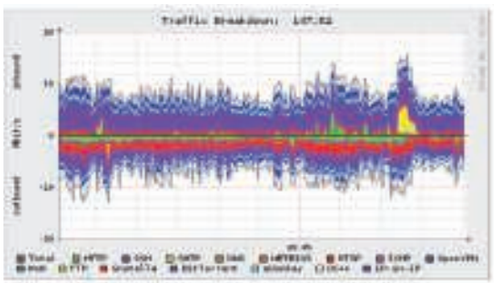

**Figure 1: Traffic characterization using LOBSTER technology:** breakdown of traffic to different application categories. Yellow is email, Red is Gnutella, Blue-Purple is BitTorrent and Blue is eDonkey (peer-to-peer).

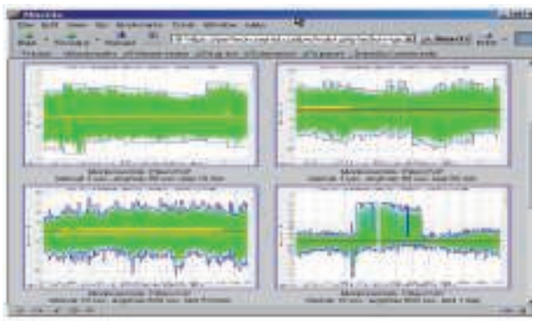

**Figure 2:** Available Bandwidth Monitoring for very short time intervals made possible by accurate LOBSTER counters.


**Figure 3:** Detection of zero-day worms based on packet similarity and communication patterns.

# MUPBED

**Summary:** The main objective of MUPBED (Multi-Partner European Test Beds for Research Networking) is to investigate and to demonstrate advanced network technologies and solutions, which will help to build future flexible ultra-broadband research networks. They are the fundamental building blocks to ensure the competitiveness of research in Europe. This goal is pursued by creating a large experimental environment to assess the proposed network solutions. This environment will be offered as an open test platform to other European research projects and users.

**Objectives:**

- to identify service/network requirements of high-end applications for European research environments;
- to define the ASON/GMPLS features matching the above requirements and enabling the penetration of broadband services in Europe;
- to find and experimentally validate solutions for interoperability between different network domains;
- to assess the ability of ASON/ GMPLS solutions to support demanding research applications, such as Grid computing, through lab and field trials with a large user community (including NRENs);
- to develop guidelines for the introduction of ASON/GMPLS technologies and ultra broadband services in future research infra-structures.

**Technical Approach:** To achieve its objectives, MUPBED investigates requirements of advanced research applications and collaborative systems. Based on that appropriate network architecture solutions are developed, taking into account the latest technological progress.

One key aspect is the introduction of latest Automatically Switched Optical Networks/ Generalised Multi-Protocol Label Switching (ASON/GMPLS) control plane technologies into research networks in a multi-domain environment. These technologies allow flexible, dynamic, on-demand transport services by distributed control processes in the network.

The integration of high-demanding applications and flexible communication networks requires new solutions. MUPBED is demonstrating such integration solutions.

**Applications:** Within the MUPBED project, several applications will be integrated into the testbed environments. In general, MUPBED will provide open test platforms that allow flexible integration of various applications, including those not known today. MUPBED is also working on an application-network interface. In addition, a number of broadband applications selected by MUPBED partners will be included into the testbed and field trial environments:

- Transmission of uncompressed video;
- High quality video conference for distributed collaborative work and education;
- Massive data transfer.

*continued overleaf*

**Project acronym:** MUPBED
**Contract nº:** IST-511780
**Project type:** Integrated Project
**Start date:** 01/07/2004
**Duration:** 36 months
**Total budget:** 9 535 551 €
**Funding from the EC:** 5 299 047 €
**Effort in person-month:** about 780
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| ERICSSON | DE |
| MSPA | IT |
| ACREO | SE |
| TILAB | IT |
| T-SYSTEMS | DE |
| DTU | DK |
| TID | ES |
| MT | HU |
| DFN-VEREIN | DE |
| GARR | IT |
| FAU | DE |
| Red.es | ES |
| JUNIPER | IE |
| PSNC | PL |
| PoliMi | IT |

**Key words:**
Telecommunications engineering
Communication technology
Interoperable network solutions

**Collaboration with other EC-funded projects:**
NOBEL II
MUSE II
GÉANT2
LASAGNE
BREAD

**Multi-Partner European Test Beds for Research Networking – IST**

**European Commission**
Information Society and Media

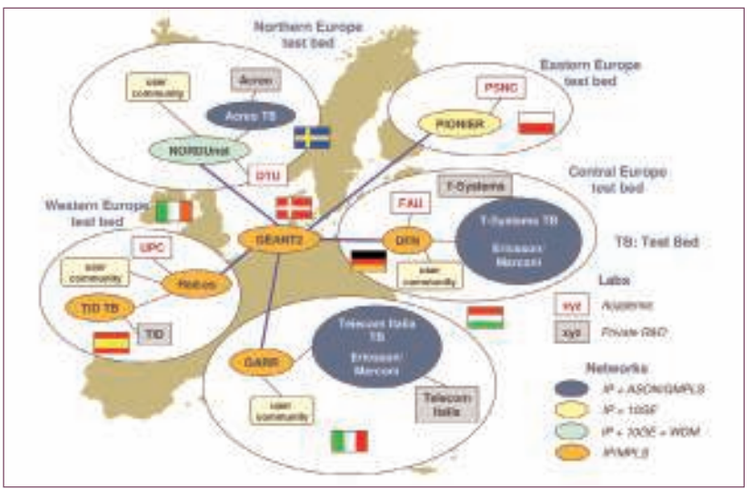
**Pan-European Test Network:** A key characteristic of MUPBED results is that the investigated concepts will be implemented and demonstrated in a large, pan-European test network, comprising interconnected test bed sites in various countries. The concepts are also evaluated on a theoretical basis. The picture shows the test network which has been deployed. To achieve a broad coverage of user requirements and broad dissemination of project results, this platform is also offered to other users that are not part of the project consortium. Apart from demonstration and dissemination of results to NRENs/DANTE and the broad public, the achievements will also be used to drive forward related standardisation, which is key to achieve cost-efficient and interoperable solutions.

**Key Achievements and Results:** Some of the key results in the first two years of the project are:

- realisation of various test beds with a broad spectrum of latest technologies (NG-SDH, IP/MPLS, Ethernet, ASON/GMPLS);
- pan-European interconnection of these test beds, and interworking between several network domains;
- creating a close link between NREN community and standardisation;
- numerous successful dissemination activities.

**Future Perspectives:** Within the third year there are excellent perspectives to achieve several further results:

- broad spectrum of leading edge experiments within the deployed test environment;
- extensive dissemination to the target communities (especially research networks) based on the available network and laboratory environment;
- leveraging on the already successfully established close collaboration with numerous other projects and activities.




**Layout of the Pan-European MUPBED network**


Successful dissemination of MUPBED achievements at major events, such as Broadband Europe 2005 (left) and TERENA 2006 (right)

# NETQOS

**Summary:** NETQOS is a Specific Targeted Research Project (STREP) from the 5th call of FP6 IST framework, contributing to the 'Research Networks Testbeds' strategic objective. The project addresses Management of communication systems that refers to the task of configuring, administering and optimizing the network resources for provisioning end-to-end QoS in a heterogeneous networking environment.

**Objectives:** The main objective of the NETQOS project is the development of an autonomous policy-based QoS management for wired/wireless heterogeneous communications networks aimed to provide enhanced end-to-end QoS and efficient resource utilisation.

The automation of network level policy management addressed in the project allows for dynamic adaptation of the managed system in response to changing requirements of the operational environment, with more flexibility to users and applications to dynamically change their Quality of service (QoS) requirements while maintaining a smooth delivery of the required QoS. NETQOS project proposes development of an autonomous policy-based QoS management for wired/wireless heterogeneous communications networks aimed to provide enhanced end-to-end QoS and efficient resource utilisation. The proposed approach assembles policies at run-time under sets of imposed constraints and goals, based on learning and context identification. The automation of network level policy management allows for dynamic adaptation of the managed system in response to changing requirements of the operational environment while coping with the originally imposed business objectives. The new approach gives more flexibility to users and applications to dynamically change their QoS requirements while maintaining a smooth delivery of the required QoS.

**Technical Approach:** The realization of an autonomous communication system management tool requires the design of a framework which allows business level objectives and users and applications requirements to be accurately reflected into network level policies that can be dispatched at run-time.

The main component in the framework is the Automated Policy Adaptor (APA). The key feature in the APA design is the decoupling between the task of mapping abstract higher level goals into network level objectives from the functionality of adapting network components behavior.

QoS requirements and specifications can be defined at various levels. At the user level, QoS is described as a set of user's preferences (user profile). At the application-specific QoS level, each application provides specific requirements for each media stream.

At the administration level, business objectives are described in terms allocating resources to different users or groups and guaranteed service bounds through service level agreements (SLA). All these QoS levels can be mapped into corresponding layers of policies.

*continued overleaf*

**Project acronym:** NetQoS
**Contract n°:** IST-033516
**Project type:** STREP
**Start date:** 1/05/2006
**Duration:** 29 months
**Total budget:** 2 673 300 €
**Funding from the EC:** 1 500 000 €
**Total effort in person-month:** 257
**Web site:** www.netqos.eu

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**Project participants:**

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|---|---|
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| CINI/UON | IT |
| Fhg | DE |
| Salzburg Research | AT |
| UAM | PL |
| TID | ES |

**Key words:**
Quality of Service,
QoS Management,
Policy Based QoS

**Collaboration with other EC funded projects:**
EU-QoS
GÉANT2

**Policy Based Management of Heterogeneous Networks for Guaranteed QoS – IST**

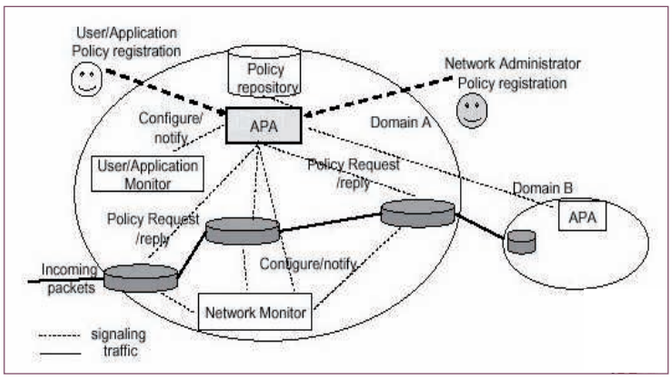
**European Commission**
Information Society and Media

To enforce the dynamic management targeted by NETQOS, a Transport level adaptive policy framework that constitutes the counterpart of the one proposed at the Network level. The proposed framework aims at performing the suitable composition and the dynamic adaptation of configurable mechanisms impacting QoS (e.g. congestion control, reliability control and their parameters value).

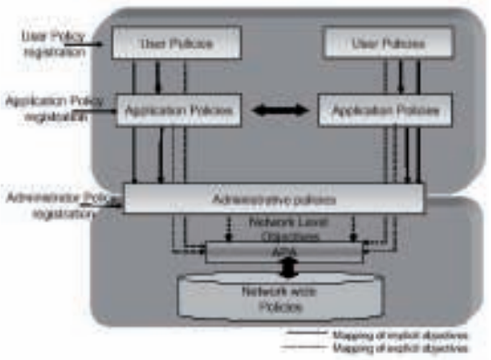
**Expected Achievements:** The NETQOS project will result in:

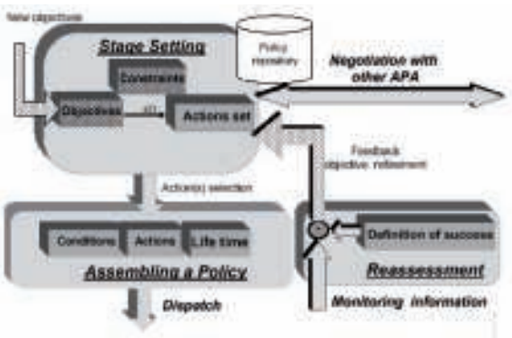
- Requirements for policy based architecture and business scenarios based on analysis of current solutions and state-of-the-art.
- Design of autonomous self-adaptable hierarchical policy-based management architecture
- Integration and demonstration of components into a testbed, for validation of architecture
- Evaluation and validation of the policy based management system

**Dissemination:** The dissemination activities will be organised to address the potential user groups through publications in conferences and workshops. The NETQOS project will take an active participation in the concertation activities. The website (www.netqos.eu) will be set up for on-line dissemination of project results. In order to disseminate project knowledge to industry and, at the same time, to validate the project achievements, several field trials will be undertaken at the partner premises, interconnected by GAENT2 network. These will demonstrate the applicability of the policy based management to deploy QOS aware networks. Standardization will also be consistently addressed to promote the project results in European and international standards bodies.




The Figure below presents a detailed description of the stages of adaptive policies assembly and modification carried out by the APA.






e-infrastructure

# OMII-Europe

**Summary:** OMII-Europe has been established to source key software components for Grid applications and to ensure that these components can interoperate across heterogeneous Grid middleware platforms. OMII-Europe is an Open Systems project that endorses both the use of open standards and open source. OMII-Europe has chosen particular open standards for the Grid that it believes are essential to interoperability across global resources. The OMII-Europe vision is

- to harvest open-source, Web-Services-based, Grid components from across Europe and to
- supply these components across gLite, UNICORE and Globus.

The emphasis in OMII-Europe is on the re-engineering of software components, rather than on the development of new technology. OMII-Europe is thus in the process of becoming a repository of quality-assured service-level Grid components capable of running on existing major Grid infrastructures.

**Objectives:** OMII-Europe aims to bring together the best technologies from Europe and elsewhere and make them available in an easily usable and supported form to scientists across the ERA. The goals of OMII-Europe are consequently to:

- Deliver Grid middleware to the ERA research community which is of production quality and ready and easy to deploy and use. This middleware will be relevant both to needs of existing large-scale Grid Infrastructures and to those of smaller ad-hoc collaborative Grids;
- Federate existing Grid Middleware development activities in Europe and by pooling and coordinating resources achieve a greater effect than would otherwise occur;
- Exploit developments from FP5, FP6 and from national and international initiatives;
- Engage with other activities in the USA, China and elsewhere so as to maximise the benefits to the ERA of global collaboration in this area.

It is clear that these goals have both long-term and short-term outcomes. The proposed work primarily addresses the short-term outcomes, but in doing so will set out a clear roadmap for addressing the longer-term goals.

**Action Plan:** In order to deliver the objectives, OMII-Europe is pursuing the following action plan:

- Defining and implementing a quality assurance process that is recognised as excellent both within the consortium and within the community.
- Re-engineering the identified components to public standards providing the quality assurance associated with OMII-Europe.
- Providing a repository for OMII-Europe components that provides software, documentation and training materials in an easy-to-use and accessible way.
- Ensuring that both current grid users as well as potential grid users are aware of OMII-Europe activities and have the necessary training and support for OMII-Europe products.
- Demonstrating a level of useful interoperation between the defined grid infrastructures and providing users with necessary guidelines.
- Providing confidence to users about the re-engineered components through the publication of benchmark results and the availability of a benchmark codes.

*continued overleaf*

**Project acronym:** OMII-Europe
**Contract nº:** RI-031844
**Project type:** I3
**Start date:** 1/05/2006
**Duration:** 24 months
**Total budget:** 6, 348, 382 €
**Funding from the EC:** 4, 832, 914 €
**Total funded effort in person-month:** 640
**Web site:** OMII-Europe.org

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|---|---|
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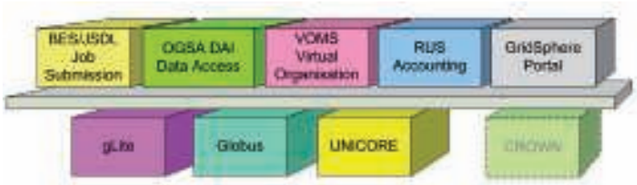
| FLE | UK |
| FZJ | DE |
| KTH | SE |
| UEDIN | UK |
| INFN | IT |
| PSNC | PL |
| CERN | CH |
| UCHIC | USA |
| UILL | USA |
| USC | USA |
| UWM | USA |
| BU | CN |
| ICT | CN |
| CNIC | CN |
| TU | CN |

**Key words:**
Grid, Open Systems Interoperability, Quality Assurance, Impartial Broker
**Collaboration with other ECfunded projects:**
GÉANT, DEISA, EGEE

**International Aspects:** OMII-Europe is a collaboration between eight European, four American and four Chinese partners. The Grid platforms on which OMII-Europe is concentrating its efforts are internationally recognised. These include gLite, UNICORE, Globus and CROWNGrid which between them have users in major international collaborations. OMII-Europe's focus is to enhance interoperability across these internationally deployed platforms as a means of encouraging global computing and exploiting European components in that context.

**User Communities:** OMII-Europe, as an integrating project. inherits users from the suppliers of its platforms and components. All three of the platforms in which OMII-Europe has invested have significant user communities. gLite is the successor to the LCG environment, which is the Grid computing environment for the computational experiments associated with the LHC project at CERN. UNICORE is used as the workflow engine for DEISA, the federation across Europe of a number of national supercomputer resources. Globus is widely used in many large science experiments, particularly in the United States. OMII-Europe's added value is to provide means for users of these resources to interoperate.

**Service Activities:** OMII-Europe has three driving influences, which distinguish it as a project – Interoperability, Quality Assurance and being an Impartial Broker.
Because there are many Grid middleware platforms already in existence, on which established European projects depend, OMII-Europe has taken as one of its main objectives to provide solutions to the problem of Interoperability between these platforms. The adoption of Open Systems methods are key to interoperability, although even when open standards are deployed, there are pragmatic issues with respect to interoperability for which OMII-Europe is a source of essential advice.
Components for deployment on the chosen platforms are already available from various open source repositories. OMII-Europe's added-value is its Quality Assurance role, wherein it is testing these components and commenting on and improving their quality. Currently, OMII-Europe is evaluating components for Job Submission, for Data Access, for Virtual Organisations, for Accounting and for Web-based Portals.
Where components are not available on the chosen platforms, OMII-Europe is porting them, testing them for quality and making them available in its repository.
In these ways OMII-Europe is establishing itself as an Impartial Broker, where unbiased advice about choices of components and platforms can be found.




**Research Activities:** There are five basic service-level components for establishing Grids that OMII-Europe considers essential. These are respectively

1. a Basic Execution Service supporting **JSDL**
2. a Data Integration Service, specifically **OGSA DAI**
3. a Virtual Organisation Management Service, specifically **VOMS**
4. an Accounting Service, based on the forthcoming Global Grid Forum (GGF) **RUS** specification
5. a Portal capability, specifically **GridSphere**

Moreover, OMII-Europe is exploring the need for additional components and has thus established an activity to

6. evaluate candidate components, in particular components available from its Chinese partners, and specifically from CROWNgrid.

The solutions that OMII-Europe will advocate imply an Architecture which assumes deployment of one or more of the chosen middleware platforms and then the deployment of one or more of the quality-approved components on those platforms.
The Figureabove shows each of the platforms and each of the components. Any particular site or location will have chosen one of the platforms and installed one or more of the components. The CROWN platform is not used in Europe at this time, so is a special case. The Chinese partners in OMII-Europe are deploying
OMII-Europe components on that platform as an additional test of interoperability.

# OneLab

**Summary:** The OneLab project will knit together the best of today's networking testbeds, to provide a unified environment for the next generation of network experiments. The availability of such a large scale, open, heterogeneous testbed will be beneficial not only to the world of research and academics, but industry at large will benefit from access to computing and networking resources. Small and medium enterprises (SMEs) that are developing novel distributed systems and services will be able to use OneLab to test the deployment of their products in realistic scenarios, providing them with invaluable information about the performance, resiliency and scalability of their products.

**Objectives:** The OneLab project has two overarching objectives:

1. *To extend the current PlanetLab infrastructure.* OneLab will widen the highly successful and widely used PlanetLab by adding testbed nodes behind links that are not typical research network links. OneLab will also deepen PlanetLab by enhancing the ability of applications that are running on PlanetLab to perceive the underlying network environment: viewing the packets that pass through certain points in the network, and viewing the topology of the network.
2. *To create an autonomous PlanetLab Europe.* OneLab will take over the administration of PlanetLab nodes across Europe, and will enter into a peering relationship with PlanetLab in the United States.

**Action Plan:** OneLab will, over two years, introduce seven new networking testbed components and tie them together into a coherent whole. The plan is to develop the components over the first eighteen months, then validate them, and use the system as a whole, during the six months that remain. Each component is the responsibility of one project partner specialised in the area. A partner expert in software development is responsible for tying the components together. The lead partner, experienced in running networking testbeds and in running consortiums, will administer the testbed, oversee dissemination of the results, and manage the overall project.

**Applications:** OneLab will reinforce the competitiveness of European IST enterprises by shortening the cycle of evaluation for their new applications. Similarly, OneLab will be responsive to the needs of European researchers, allowing research in Europe to set its own priorities in areas that require such testbed work.

**Testbeds:** OneLab will introduce seven new components to the PlanetLab testbed:

- Wireless: WiMAX, UMTS, and ad hoc wireless.
- Wired: multihomed.
- An emulation component.
- Monitoring: passive monitoring, and topology information components.

OneLab will also federate with PlanetLab.

*continued overleaf*

**Project acronym:** OneLab
**Contract n°:** IST-034819
**Project type:** STREP
**Start date:** 1/09/2006
**Duration:** 24 months
**Total budget:** 2 860 420 €
**Funding from the EC:** 1 900 000 €
**Total effort in person-month:** 361.7
**Web site:** www.one-lab.org
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**Project participants:**

| | |
|---|---|
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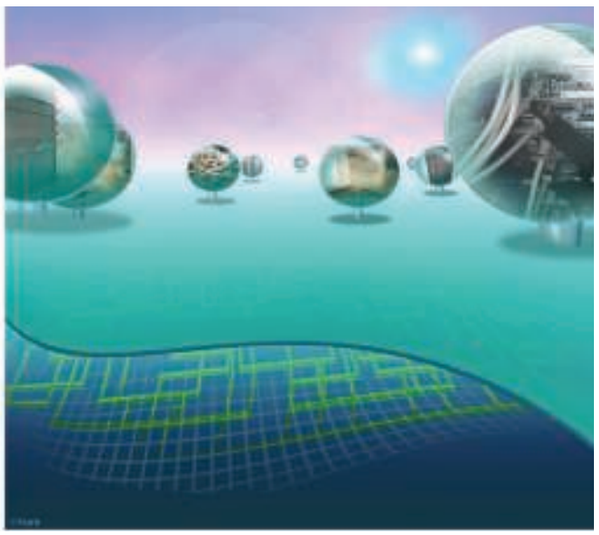
| INRIA | FR |
| INTEL | UK |
| UC3M | ES |
| UCL | BE |
| CINI | IT |
| FT | FR |
| UniPi | IT |
| ALCATEL | IT |
| TP | PL |

**Key words:**
Testbeds
Federation

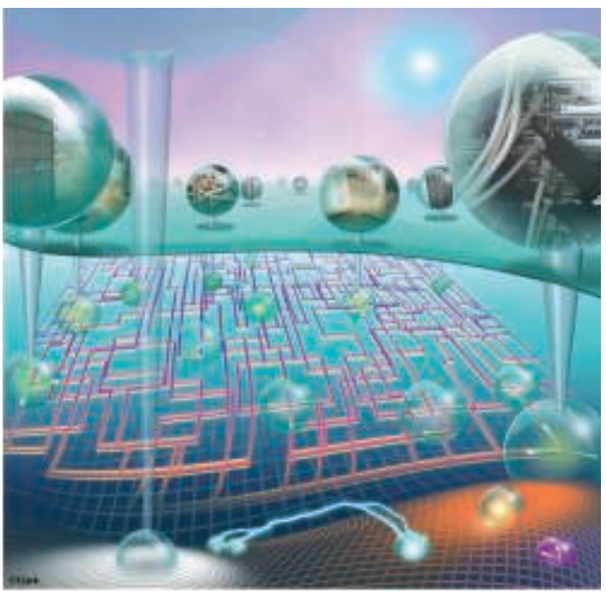
**Collaboration with other EC funded projects:**
ANEMONE
Panlab
WEIRD
NetQoS
INT.EU.GRID
EGEE2

**An open networking laboratory supporting communication network research across heterogeneous environments – IST**

**European Commission**
Information Society and Media



At present, PlanetLab consists of a set of networked hosts, with a limited view of the underlying network, and the network itself is the classic wired internet.



OneLab will better reveal the underlying network, and extend the platform into new wired and wireless environments.

**An open networking laboratory supporting communication network research across heterogeneous environments – IST**

e-infrastructure

# OpenNet

**Summary:** OpenNet brings together the major Internet router manufacturers (Cisco, Juniper), GÉANT (which has activities on bandwidth-on-demand, SLAs, performance monitoring, etc.), NRENs, IST projects and the IPsphere Forum in order to address one of the main barriers to the wider usage of the Internet for all services; namely, the lack of predictable support for aspects such as quality of service (availability, throughput, delay, delay variation, loss), security and privacy, when packets have to cross domains operated by different providers.

There is no single industry-accepted solution today, but in general there are three approaches: bilateral agreements, the utilisation of third parties, and co-operative mechanisms.

As the need for a new business model for the Internet grows, the pace of investigation into this topic is increasing. The objective of OpenNet is to involve Europe more strongly in the discussions towards finding a solution through series of workshops. A particular development that will be followed actively is the definition of a business layer, as (for example) is being worked on in the worldwide IPsphere Forum. This layer is intended to manage all the business aspects (policies, pricing, SLA, service discovery, etc.) in order to enable on-demand secured and assured experience to the application, from end-to-end across multiple operators/ domains. Beneath this new business layer, providers will be free to exercise whatever IP business model they choose, including the current Internet model, but they could also adopt whatever network-layer standards made sense to them and to their equipment vendors.

The key interfaces to this business layer in which all the market (service and network) players meet in a Premium Internet environment are the Client-Network Interface (CNI) and the Inter-Carrier Interface (ICI).

**Objectives:**

1. To address the issue of enabling carriers and IP service providers to profit from the support of premium services, which will encourage them to provide more sophisticated and entertainment-oriented services over the Internet.
2. To involve Europe more strongly in the discussions towards finding a solution for the definition of a *business layer*, as (for example) is being worked on in the worldwide IPsphere Forum. This layer is intended to manage all the business aspects (policies, pricing, SLA, service discovery, etc...) in order to enable on-demand secured and assured experience to the application, from end-to-end across multiple operators/domains.

**Achievements:** Through its workshops, OpenNet will exchange information with other major players in the Premium IP market. The key focus of OpenNet in this process is to accelerate the trend towards a single set of agreed messages that have to be passed between vendors and between service providers. By focusing on the activities of the major players, it increases the chances of the solutions being adopted, and giving European industry advance information about these trends. International relations will be fostered and new contacts with important non-European partners will be built, creating a worldwide pool of knowledge and broadening the scope for the take-up of the results.

*continued overleaf*

**Project acronym:** OpenNet
**Contract nº:** IST-2006-035185
**Project type:** Specific Support Action
**Start date:** 01/06/2006
**Duration:** 24 months
**Total budget:** 348 000.00 €
**Funding from the EC:** 348 000.00 €
**Total effort in person-month:** 33
**Web site:** www.ist-opennet.org
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**Project participants:**

| | |
|---|---|
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| Martel | CH |
| Red Zinc | IE |
| CNRS | FR |
| CISCO | NL |
| Juniper | IE |

**Key words:**
Interoperable network solutions
Premium IP
QoS
VPNs
Triple Play
Dissemination
**Collaboration with other EC funded projects:**
GÉANT2, EGEE, MUSE, EuQoS, Mupbed, Phosphorus, Daidalos, Weird, Vital, Netqos, Agave, 6DISS, Eurolabs

**Open Interconnect for the Internet Community – IST**

**European Commission**
Information Society and Media


**Technology approach:** As an SSA type of project, OpenNet focuses on *exchanging information and generating consensus*. The key issues that will be studied are the interfaces that allow clients, access and core network operators to interoperate to obtain – and provide to their customers – a level of QoS. These interfaces will create a system context including signalling, policy, security, reliability and QoS features to enable service differentiation for users, and competition between providers, in a worldwide, open telecommunications market.

The technical approach is to bring together the major Internet router manufacturers (Cisco, Juniper), GÉANT (which has activities on bandwidth-on-demand, SLAs, performance monitoring, etc.), NRENs, IST projects and the IPsphere Forum, through the organisation of *workshops*.

OpenNet takes an integrated and comprehensive approach, by involving all relevant stakeholders of the QoS value chain, and addressing these issues at different levels and from different perspectives.

These workshops will ensure that there is a full exchange of knowledge and experiences between experts in the field, in order that all parties are aware of the requirements, capabilities and limitations of the various techniques being proposed by the Internet community.

**Dissemination:** OpenNet will develop active promotion and dissemination activities to maximise its interest and impact, and widely disseminate its outcomes. The visibility of the project will be maximized by using the Website and press releases, etc., and through linking to the IPsphere Marketing/Communication Committee.

The project's Website is the place where all the public information is visible and downloadable, and where partners and other visitors can keep updated of the upcoming events and the latest news and achievements. This mechanism will assure an efficient flow of non-confidential information about the results and project achievements, both internally and to the external world.

All the information related to each workshop will be placed on the Website in order to explain clearly their topics, agenda, etc. After every meeting, relevant papers and conclusion will also be available so that any interested organisation or individual can take advantage of them.

# PANLAB

**Summary:** Panlab is a Specific Support Action which enables the establishment of a Pan-European Laboratory for Next Generation Networks and Services. It does so by defining a framework for the interconnection of independent testbeds and laboratories in terms of legal, and operational general conditions, as well as in terms of technical infrastructure.

**Objectives:** The objective of Panlab is the establishment of a Pan-European Laboratory for Next Generation Networks and Services. The activities are split into phases:
**Vision phase:** Production of a "Common Technology Vision" that distils a long-term vision for the ICT industry and landscape. From this common technology vision the long-term requirements for the Panlab are concluded. The features and capabilities that such a laboratory shall offer are captured. The focus of the Vision paper is the integration, testing, validation and certification requirements of the industry in the long term.
**Definition phase:** Detailed definition of the laboratory in terms of technical infrastructure, as well as in terms of legal and operational general conditions. The result of this phase is a framework under which the Panlab shall operate, and the technical specification of the Panlab infrastructure, as well as a description of the approach to implementation.

**Technology Approach:** The Pan-European laboratory is a concept that is being introduced to enable the trial and evaluation of service concepts, technologies, system solutions and business models to the point where the risks associated with launching of these as commercial products will be minimised. The accomplishment of this objective, which should encompass many different European collaborative projects, is an important step towards the establishment of a truly pan European collaboration network.
The indications and propositions of the "Common Technology Vision" should serve as input for all European collaborative projects regardless of the framework in which they are embedded. In particular it targets relevant projects in the European Framework programmes as well as the Eureka cluster programmes, namely the CELTIC community, but also the ITEA and MEDEA+ clusters. It is also input to the full development of the 7th European Framework program.

**Applications:** Panlab is not limited to specific technologies, but is flexible concerning the subject, scope, and scale of testing. Examples of advanced technologies that can be tested for interoperability include roaming aspects of IMS, the Internet Protocol Multimedia Subsystem, and the mobile TV standard DVB-H.
The results will enable the implementation of a physical infrastructure (interconnection facilities, remote management capabilities, etc.), aiming at establishing integration, testing, validation / verification and possibly certification services for product prototypes of European collaborative projects.

*continued overleaf*

Panlab

**Project acronym:** PANLAB
**Contract nº:** IST-034305
**Project type:**
Specific Support Action
**Start date:** 01/06/2006
**Duration:** 24 months
**Total budget:** 19 30743 €
**EC Funding:** 1 321 000 €
**Total effort in person-months:** 130
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**Project participants:**

| | |
|---|---|
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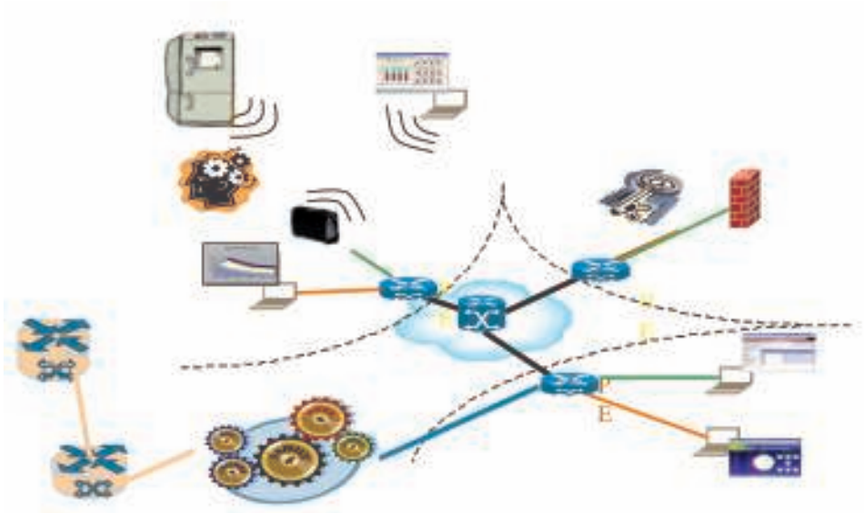
| France Tele-com | FR |
| FhG FOKUS | DE |
| DIMES | FI |
| Nokia | FI |
| Synchrome-dia | CND |
| Alcatel | FR |
| RAD | IL |

**Key words:**
Telecommunications
Communications
Systems
Testbeds
**Seeking collaboration with other EC-funded projects** in FP6, FP7 and Eureka clus-ter projects, e.g. CELTIC, ITEA.

**Pan European Laboratory for Next Generation Networks and Services – IST**

**European Commission**
Information Society and Media

**Testbeds:** Panlab relies on the existing landscape of test laboratories and testbeds, and will present a plan for coordination between these so that the full benefit will be realised. The Panlab will pave the way for a clear view of where in Europe is the best place to test a specific technology, system, service or application.
As a proof of concept the Panlab results, that is the legal and operational frameworks, will be applied to the interconnection of available testbeds in the area of IMS and DVB-H.
Ultimately the Panlab is an aggregation of the state-of-the-art laboratories and testbeds.



Panlab is an aggregation of the state-of-the-art laboratories and testbeds.

The Pan-European laboratory is based on the concept of federation of distributed test laboratories and testbeds that are interconnected and providing access to required platforms, networks and services for broad interoperability testing. The coordination of the required access and test connections will be established through a centralised office. Obviously, in the long term, it must never remain in a static configuration but will have to be extended, adjusted and improved by any new available platform, service and system that can be offered by the connected laboratories or new laboratories joining the federation. The rules and procedures of how this can be achieved will be developed.
The federative approach of distributed test laboratories and testbeds has obviously the benefit of flexibility, but at the cost of the management of the distributed environment. The issues range from logistics, availability of qualified personnel, and remote management of systems, to the legal and operational details that need to be in place in order to allow for interconnection and testing at "competitor's" laboratory environments.
The expected main customers, but also possible providers of laboratory elements (systems), are currently running IST projects and projects that will be defined within the new 7th Framework Programme, especially within the currently defined Technology Platforms, projects of the Eureka cluster frameworks, as well as any other, national or international collaborative initiatives.

# Phosphorus

**Summary:** The Phosphorus project focuses on delivering advanced network services to Grid users and applications interconnected by heterogeneous network infrastructures. The project is addressing some of the key technical challenges to enable on-demand end-to-end network services across multiple domains. The PHOSPHORUS network concept and test-bed makes applications aware of their complete Grid resources (computational and networking) environment and capabilities, and enables dynamic, adaptive and optimized use of heterogeneous network infrastructures connecting various high-end resources.
PHOSPHORUS will enhance and demonstrate solutions that facilitate vertical and horizontal communication among applications middleware, existing Network Resource Provisioning Systems, and the proposed Grid-GMPLS Control Plane.

**Objectives:** The Phosphorus main goal is broken down into the following objectives:

- Demonstrate on demand service delivery across access-independent multi-domain/ multi-vendor research network test-beds on a European and worldwide scale. The test-bed will include EU NRENs and national test-beds connected with GÉANT2, Cross Border Dark Fibre infrastructure and GLIF virtual facility. A set of highly demanding applications will be adapted to prove the concept.
- Develop integration between application middleware and transport networks, based on three planes: Service plane, Network Resource Provisioning plane and Control plane.
- Conduct accompanying studies to investigate and evaluate the further the technological implications of the project outcomes.
- Disseminate the project experience and outcomes to the targeted actors: NRENs and research users.
- Communicate and collaborate with other National, European and Global Grid- and Networking projects in order to understand and possibly integrate relevant developments.

**Technical approach:** The Phosphorus' technical developments span across various areas (fig. 1):
*Service plane:*

- Middleware extensions and APIs to expose network and Grid resources and make reservations of those resources.
- Policy mechanisms (AAA) for networks participating in a global hybrid network infrastructure, allowing both network resource owners and applications to have a stake in the decision to allocate specific network resources.

*Network Resource Provisioning plane:*

- Adaptation of existing Network Resource Provisioning Systems (NRPS) to support the framework of the project.
- Implementation of interfaces between different NRPS to allow multi-domain interoperability with PHOSPHORUS' resource reservation system.

*continued overleaf*

**Project acronym:** Phosphorus
**Contract nº:** IST-034115
**Project type:** Integrated Project
**Start date:** 01/10/2006
**Duration:** 30 months
**Total budget:** 6 868 871 €
**Funding from the EC:** 5 125 000 €
**Total effort (Person Months):** 814
**Web site:**
http://www.ist-phosphorus.eu/
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**Project participants:**

| | |
|---|---|
| PSNC | PL |
| ADVA | DE |
| CESNET | CZ |
| NEXTWORKS | IT |
| FhG/SCAI | DE |
| I2CAT | ES |
| FZJ | DE |
| HEL | FR |
| IBBT, VZW | BE |
| CTI | GR |
| AIT | GR |
| SARA | NL |
| SURFNET B.V. | NL |
| UNIBONN | DE |
| UVA | NL |
| UESSEX | UK |
| UWS | UK |
| NORTEL | NL |
| MCNC | US |
| CRC | CA |

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*Control plane:*

- Enhancements of the GMPLS Control Plane (G²MPLS) to provide optical network resources as first-class Grid resource.
- Interworking of GMPLS-controlled network domains with NRPS-based domains, i.e. interoperability between GMPLS and UCLP, DRAC and ARGON.

The PHOSPHORUS work relies on a distributed test-bed interconnecting European and worldwide infrastructures (fig.2). The test-bed involves European NRENs and national test-beds, as well as GÉANT2, Cross Border Dark Fibre infrastructure and GLIF virtual facility.

**Expected results:** Phosphorus will demonstrate on-demand end-to-end network services across multiple heterogeneous network and Grid domains. The Phosphorus network concept and test-bed will make applications aware of their complete Grid resources (computational and networking) environment and capabilities, and enable them to make dynamic, adaptive and optimized use of heterogeneous network infrastructures connecting various high-end resources.

**Key words:**
Network concept, testbed
Grid resources
Network Resource Provisioning Systems
Grid–GMPLS Control Plane
NREN, GEANT2
Cross Border Dark Fibre Initiative

**Collaboration with other EC-funded projects:**
EC NRENs
GEANT2
EGEE

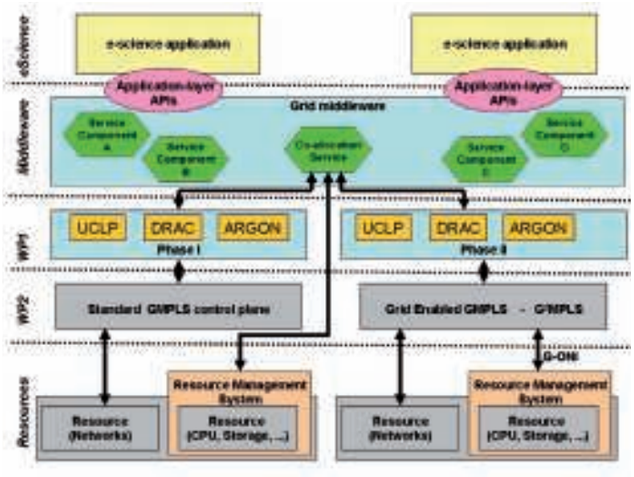


Figure 1. Illustration of the layers of Phosphorus architecture

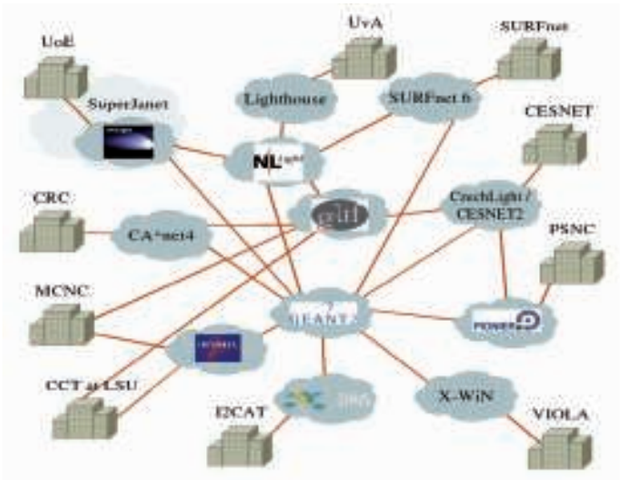


Figure 2. Test-bed infrastructure with major development components

# RiNG

**Summary:** The goal of RiNG is to support the coordination, study and analysis of routing protocols on the Internet, to identify and analyze the challenges ahead, considering the current and future expected Internet growth. This will lead to proposals for novel approaches towards the evolution of routing.
The project has set up an expert group, which will be open to the participation of other experts by collaborative means, leading to a broader community "think tank" on the topic. This "Routing Cluster" will include not only experts from other relevant IST projects, but also from related international activities.
The project will analyze and document the state of the art in standardization and policy, survey the users and service providers, and propose further alternative research and innovation strategies to address the identified challenges.
Through its activities the project will seek to foster the European participation in the related pre-standardization, standardization and policy making processes, to monitor the developments and to disseminate the results.
The research and innovation strategies proposed in the project will most probably require further standardization and elaboration of the policy. The project will therefore look for a community consensus on implementation of the project results by means external to the project.

**Objectives:**

1. To coordinate a community "think tank" on routing aspects (Routing Cluster), providing operational support for the organization of open working meetings and other collaboration tools, such as an e-mail exploder and web site.
2. To survey both ISP and user (site) requirements for routing in the next generation of networks.
3. To analyze the related state of the art in standardization and policy versus the user/ISP perceived requirements.
4. To develop research and innovation strategies for inter-domain routing evolution.
5. To disseminate the project and related results, including the relevant standardization and policy activities.

**Innovation:** Through the activities of the Routing Cluster the RiNG project will reinforce the European strategies in the domain of standardization. To ensure the benefits of new routing architectures, new international standards could be required. Therefore the project will actively cooperate with the respective standardization bodies.

**Technology Approach:** The project will identify a number of issues regarding the current routing protocols and infrastructure and their ability to support the new services in a scalable manner:

1. *Resilience and scalability* (even millions of prefixes) and quick convergence after failures. The convergence time of BGP in case of failures is often measured in tens of seconds; this is not acceptable for mission critical services or emergency situations,

*continued overleaf*

**Project acronym:** RiNG
**Contract nº:** IST-035167
**Project type:** Coordination Action
**Start date:** 1/07/2006
**Duration:** 36 months
**Total budget:** 847 450,75 €
**Funding from the EC:** 745 000 €
**Total effort in person-month:** 68,5
**Web site:** www.ist-ring.eu
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**Project participants:**

| | |
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| TI | IT |
| UC3M | ES |
| CSC | FI |
| INNETTECH | SE |
| UNINETT | NO |
| Soton-ECS | UK |

**Key words:**
Inter-Domain Routing
IPv6
Standardization
Policies
**Collaboration with other EC funded projects:**
Anemone
EuQoS
GEANT/GEANT2
GENI
Phosphorus



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for instance when VoIP is widely deployed and PSTN services may become no longer available in homes and businesses, while they may be connected to multiple services providers and/or different access networks (multihoming situations).

2. Desire of *end-sites to be provider-independent* (PI) by having their own prefixes, especially with IPv6 (which currently has no PI address space). This may be the case either for technical (load-balancing, resilience, etc.) or administrative reasons (corporate policy, security, etc.).
3. *Inter-domain traffic engineering* (or even QoS). BGP was designed with a best effort Internet in mind. It only advertises a single path per prefix and does not take into account QoS metrics in the selection of the inter-domain. The traffic engineering is also difficult.
4. *Security* of the routing infrastructure (e.g., protection against prefix hijacking), prevention of configuration errors and mechanisms to better deal with denial of service attacks (DoS).
5. *Mobile networks.* Utilization of IP in airplanes, cars, trains, ships and other transport means not only for Internet connectivity, but also to provide a communication among vehicles (e.g., Car to Car communications for eSafety).
6. *On-demand or dynamic layer* 1 or 2 media (e.g., on-demand WDM circuits).

**Standardization:** The open "Routing Cluster" of RiNG will support the work of different research groups, standardization organisms and bodies in charge of policy-making, with the aim to improve the networks of tomorrow. The participation of the RiNG expert partners in several research fora and projects carrying out activities related to the RiNG's aims brings added value to this project.

On the other hand, as the project is not carrying out research directly but is basing its activities on the outcomes of previous or current projects and activities related to routing in next generation networks, protocols and technologies (such as IPv6, but not exclusively), these efforts will be coordinated with a wider community support to succeed from the standardization perspective.

# RINGrid

**Summary:** RINGrid provides an architecture which integrates scientific instruments in the eInfrastructure and promotes a vision towards next-generation Remote Instrumentation Systems. It encompasses the current state-of-the-art and near future technology, delivers a conceptual design of missing architectural 'pieces' to achieve such vision and assumes a Grid environment and high-speed network interconnections.

**Objectives:** The main objectives of the RINGrid project include a systematic identification of instruments and corresponding user communities, a definition of their requirements as well as careful analysis of the synergy between Remote Instrumentation and next-generation high-speed communications networks and Grid infrastructure. The dissemination of the results of the project amongst scientific, industrial and business groups of users will promote fair access to the European e-Infrastructure and increase awareness of benefits from using next-generation Remote Instrumentation Systems.

**Technology Approach:** Usage of both Grid-computing and supercomputing technologies as support for performing laboratory experiments gives measurable effects in improving the quality of research. Computations performed on local or Grid resources are (depending on the nature of experiments and the type of application) essential to process and visualise experimental results. The RINGrid project will collect requirements and produce recommendations for using computing techniques in scientific experiments. The project research also addresses the issues of resource virtualization, a general definition of heterogeneous Grid resources and new networking technologies.

**Applications:** RINGrid will seek to identify the benefits of using remote instrumentation systems. We believe that reports that give the current state-of-the-art in the field of e-Infrastructure usage for Remote Instrumentation and reports on future guidelines will be important for broad communities of scientific and business groups of users and will result in their exploitation in the e-science, business and commercial areas.

**Testbeds:**
Validation of the project results will base on the following existing test-bed implementations:
- GridCC (http://www.gridcc.org/)
- CLARA (http://www.redclara.net/)
- PSNC Virtual Laboratory (http://vlab.psnc.pl/)

**Putting RINGrid concepts into practice:** On the basis of the results obtained in the first year prototype, installations will be set up taking into consideration user communities and instruments, as well as software chosen after the survey performed during the early stage of the project.

*continued overleaf*

RINGrid

**Project acronym:** RINGrid
**Contract nº:** RI-031891
**Project type:**
Specific Support Action
**Start date:** 1/10/2006
**Duration:** 18 months
**Total budget:** 999 165 €
**EC Funding:** 770 650 €
**Total effort in person-month:** 185
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| | |
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| JKU | AT |
| GRNET | GR |
| CLMC | BG |
| TUI | RO |
| UNAM | MX |
| UNIS | UK |
| CNIT | IT |
| CLARA | UR |
| CNR/ISTI | IT |

**Key words:**
Remote Instrumentation
Grid infrastructure
Network technology
**Collaboration with other EC-funded projects:**
GridCC
EXPReS
int.eu.grid

**Remote instrumentation in Next-generation Grids –RI**

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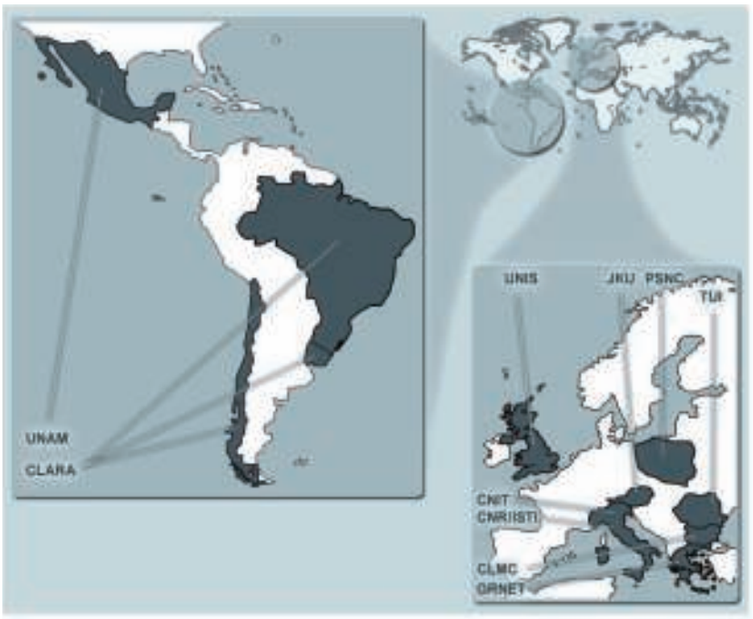


Project participants locations

The requirements, recommendations and overall conceptual design will be crosschecked against the known systems, coming from the projects described below (possibly complemented by any other that may be identified during RINGrid's lifespan). Specifically, systems that can be used to implement test environments come from the following national and European projects (which may also provide user communities, among others), where some of the RINGrid partners are actively involved:

- GridCC – EU project (http://www.gridcc.org)
- UCRAV – (http://www.ucrav.cl/)
- CRIMSON – (http://www.prin-crimson.org)
- SatNEx II - (http://www.satnex.org)
- Virtual Laboratory PSNC (VLab) – project developing in PSNC (http://vlab.psnc.pl)

# SEEFIRE

**Summary:** Southeast European countries have a strategic geographical role in connecting southeast European, Caucasian and Mediterranean countries to GÉANT2. The SEEFIRE project studied the options available for acquiring an optical fibre network infrastructure by National Research and Education Networks (NRENs) in the region and the strategies for the development of research and education networking in southeast Europe (SEE), with a specific emphasis on Balkan countries.
The project provided countries in southeast Europe with a set of useful reports and guidelines about dark-fibre acquisition, deployment of optical transmission technologies, and finally about the regulatory, legal, economical and strategic issues of acquiring dark fibre by NRENs in the region.

**Objectives:** The SEEFIRE project aimed to raise awareness among stakeholders of NRENs, governments, users and telecommunication operators about providing interconnection facilities in southeast Europe to reduce the digital divide.
Specific goals of SEEFIRE were to provide:

- a benchmark of existing and potentially available optical fibre for NRENs in the region;
- an analysis of the technical options available for the deployment of dark fibre and the management of optical transmission by NRENs in the region;
- reports on economic aspects and regulations;
- dissemination of information and increased awareness about dark-fibre deployment both at technical and policy-making levels.

**Action Plan:** As a Specific Support Action SEEFIRE contributed to future collaboration in southeast Europe, like the SEEREN2 project. SEEFIRE built on the results of projects like GÉANT, SEEREN and SERENATE, which outlined fibre acquisition by NRENs as an option to be explored in order to decrease the digital divide.
SEEFIRE provided the research and education community in southeast Europe with information about the availability of dark fibre, guidelines for deployment and political-managerial assessments of the regulatory and economic aspects of dark-fibre deployment. The project carried out studies about the availability of optical fibre in the SEE region and prepared useful documents like templates for procurement, comparative evaluations of technologies, fibre availability database and targeted strategic reports. This information was transferred to the strategic players in the region via publications, online information a technical tutorial about dark-fibre deployment and a policy workshop.

**Project Rationale:** The current standard of research networking provision in southeast European countries varies from a very high degree to the lack of effective services in other countries. SEEFIRE addressed such a digital divide and contributed to increase research cooperation in the region and with the rest of Europe.

*continued overleaf*

**Project acronym:** SEEFIRE
**Contract nº:** IST-015817
**Project type:**
Specific Support Action
**Start date:** 1/03/2005
**Duration:** 12 months
**Total budget:** 416 273 €
**Funding from the EC:** 350 000 €
**Total effort in person-month:** 47.5
**Web site:** www.seefire.org
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| | |
|---|---|
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| GRNET | GR |
| CESNET | CZ |
| NIIF/ HUNGARNET | HU |
| AMREJ | CS |
| RoEduNet | RO |
| ISTF | BG |
| INIMA | AL |
| BIHARNET | BH |
| MARNET | MK |
| DANTE | UK |

**Key words:**
Dark Fibre
Optical Transmission Technologies
Research and Education Networking
Policy and regulation
**Collaboration with other EC funded projects:**
GÉANT2, SEE-Grid, Porta Optica

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Developments in the acquisition of dark fibre by NRENs are ongoing in some countries in the region. In some cases there are concrete plans being developed on exploiting network node terminations close to national borders and investigating the options for border hopping.
SEEFIRE supports the vision on creation of a southeast European fibre backbone fostering collaboration of researchers and students in a region where the development of research and education networking, as well as the information society as a whole, has suffered from years of political unrest and relative isolation from the rest of the European continent.

**Project Impact:** The findings of the SEEFIRE studies provided input to the future planning of networks for research and education in southeast Europe, such as SEEREN2, which resulted in the availability of much larger capacity to support the needs of researchers and students in the region and their collaboration with users across Europe.
The availability of high-performance networks will increase the opportunities of the research and education community in southeast Europe, by enabling researchers and students to better cooperate in their scientific endeavours. This will have a significant impact on existing and future project involving users of high-end applications like, for instance, Grids and biomedical applications, which need long-lasting flows of many Gigabits.
Cost-effective higher bandwidth available for research and education networks will allow more users to obtain high-standard services also in remote areas, and will contribute significantly in building the Information Society in the region and in bringing it closer to the rest of Europe.

SEEFIRE contributed to introduce southeast European countries to the e-Infrastructures community and stimulated the establishment of joint RTD projects in the region.
The SEEFIRE studies revealed the fibre distribution and ownership in the region and provided information about the technology, the regulatory, management and economical aspects of deploying a cost-effective infrastructure for research and education at the local, inter-regional and international level.
Optical fibre is accessible to NRENs in SEE. Figure 1 shows the fibre availability in the region. Almost in all countries there is fibre which is owned by some utility company, railways, etc. in addition to the optical infrastructure of telecommunication operators. From the SEEFIRE dark-fibre footprint database it can be deduced that immediate access to dark fibre is available for the NRENs of Greece, Bulgaria, Romania, Serbia and Montenegro (parts of the country), and Bosnia and Herzegovina (parts of the country). There is actually competition along a number of routes in Greece, Bulgaria and Romania. By contrast, the NRENs of the FYR of Macedonia and Albania might face some difficulties in the immediate future and further actions to access dark fibre there have to be implemented.


Figure 1 – Dark fibre availability in South-East Europe

SEEFIRE raised awareness about the technical feasibility, the cost-effectiveness and the strategic importance of dark-fibre deployment among politicians and government officials responsible for funding research, education and telecommunication in the countries concerned.
SEEFIRE is expected to reinforce and provide incentives for dark-fibre deployment activities, even outside the scope of southeast European NRENs, by providing a model for emerging NRENs in other world regions.

# SEE-GRID

**Summary:** Highly-sophisticated collaborative models for use of computing and data resources across various domains are currently being established through several Grid research initiatives in Europe and abroad. South-East Europe (SEE) has recently entered this very competitive research race via the SEE-GRID project. SEE-GRID provided specific support actions to assist the participation of the SEE states to the pan-European and worldwide Grid initiatives by establishing a seamless and interoperable Grid infrastructure that expanded and supported the European Research Area (ERA) in the region. The results achieved by each country are variable. However, in all cases significant advances have been made seeding the foundation for the establishment of a robust infrastructure with interoperable middleware components, a strong human network, and collaborative liaisons with related projects and regions. There is now a strong initiative at the national and research/university level to go beyond their pilot infrastructure, and be integrated with related European-wide organizations and finally become equivalent members of the global grid community.

**SEE-GRID Key Results:** The SEE-GRID initiative contributed in building a world-wide Grid Infrastructure by expanding the "e-Infrastructure inclusion" into SEE. Through the establishment of the SEE-GRID infrastructure and its interconnection to the pan-European and worldwide eInfrastructures, small and less-resourced SEE sites are now able to access computing power that would otherwise remain unaffordable. The project has given the following key results:

- **Infrastructure:** a large, distributed infrastructure spanning all the involved countries has been developed (including EGEE-SEE sites): 31 sites, 540 CPUs, 11.64 TBs storage. 9 of the sites joined EGEE-SEE and support both SEEGRID and EGEE VOs. The LCG-2 middleware on Scientific Linux has been a standard deployment, SEE-GRID Virtual Organization is supported, P-GRADE portal interconnects the SEE sites and a catch-all SEE-GRID Certification Authority is operated. Finally, operations centre management solutions has been deployed, such as a number of monitoring tools, helpdesk, sites database.
- **Applications:** two regional Grid applications have been developed, which have been extensively tested and used on the SEE-GRID infrastructure: The Search Engine for South-East Europe (SE4SEE) for Grid-aided web-crawling & data indexing, and the Volumetric Image Visualization Environment (VIVE) for medical images and other static or time-dependent scalar and vector 3D fields. Additionally, EGEE applications are deployed on the sites which have been included in EGEE-SEE ROC and thus support these VOs.

**Human Network:** SEE-GRID has been effective in developing a strong human network, through the establishment of National Grid Initiatives (NGIs) and the materialization of concerted dissemination and training activities. SEE-GRID has set the platform for further developing regional cooperation and stability, which is a key objective of its successor project, SEE-GRID-2.

*continued overleaf*

**Project acronym:** SEE-GRID
**Contract n°:** RI-002356
**Project type:** Specific Support Action
**Start date:** 1/05/2004
**Duration:** 24 months
**Total budget:** 1 215 000 €
**Funding from the EC:** 972 000 €
**Total effort in person-month:** 388, 9
**Web site:** www.see-grid.org

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**Project participants:**

| | |
|---|---|
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| CERN | CH |
| IPP-BAS | BG |
| ICI | RO |
| TUBITAK | TR |
| MTA SZTAKI | HU |
| ASA | AL |
| BIHARNET | BA |
| UKIM | MK |
| UoB | CS |
| RBI | HR |

**Key words:**
Distributed Computing
Network Technology
Research Networking

**Collaboration with other EC funded projects:**
SEEREN, EGEE, GÉANT2, DILIGENT



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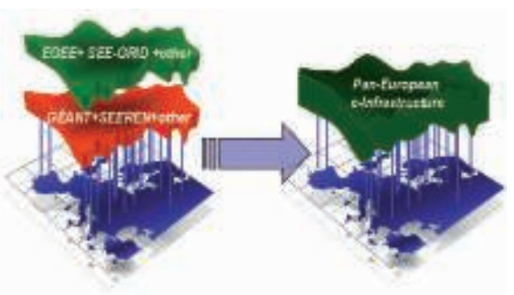
**International Aspects:** The SEE-GRID infrastructure is built upon the EU Research and Education Network GÉANT and its SEE segment SEEREN. It is interoperable with the wide-scale product-level grid infrastructure of EGEE, thus contributing to the establishment of a *Pan-European Grid-enabled e-Infrastructure*.
The usage of the SEE-GRID infrastructure also impacts the underlying network infrastructure. It helped to meet the tight network requirements associated with executing globally-submitted grid jobs in the local infrastructure. As such, it has been a major driving force for further enhancements of GÉANT/SEEREN in the region, thus maximizing efficiency and performance of the network at a regional level.
The SEE-GRID project involved 29 leading research organisations from 11 countries and has been more than just a regional Grid initiative: in an area where regional unrest hindered cooperation and economic growth till quite recently, the outbreak of new efforts in promising science and technology areas like e-Infrastructures, constitutes key steps to eliminate the digital divide between the region and the rest of the European continent, and contributes to future enlargement steps of the European Union.

**User communities:** A key priority of SEE-GRID has been the establishment of a human network in the area of Grid-empowered e-Infrastructures for e-Science in SEE. Through an extensive on-line questionnaire survey, the involved end-user communities, their resources' needs and current state in Grid deployment have been identified. This indicated a very good spread of 10 scientific sectors interested in a vast range of applications, including solving multidimensional integrals and integral equations for problems in semiconductor physics, air-pollution modeling, transport optimization, vehicle routing problems, search engines and data mining, simulations in solid state physics, 3D rendering middleware, biomolecular modeling, simulation of reaction diffusion systems, life cycle simulation of the nuclear power cells, meteorology calculations, building grid-wrappers for commercial codes and grid-portals, fluid dynamic flow simulations, and many more.




**Sustainability of *e*-Infrastructures in the SEE Region:** It is essential that advancements achieved within SEE-GRID (and other SEE initiatives in the area of e-Infrastructures) are not limited to the project life-cycle. This is addressed by both selection of technologies that can be supported and sustained within the available infrastructure in SEE, as well as by appropriate exploitation and dissemination of project results in the region, including a strong emphasis on training tutorials and workshops.
Sustainability of SEE-GRID achievements should have the highest priority and should be pursued by the SEE-GRID-2 project:


- Sustainability plans need to deal with acquiring lasting commitment at the national governmental and research/university level in every SEE country in order to go beyond having a few "selected" sites being supported/funded from international sources and donations, but rather reach out to the entire R&E national fabric in every SEE country.
- The sustainability efforts should be oriented to assist the incubating and existing National Grid Initiatives (NGIs) in SEE to fully establish themselves and to integrate with related European-wide organisations and initiatives (e-IRG, EUGridPMA, etc) and eventually become full members of the global grid community.
- Dissemination events should be organised to raise awareness at all society levels and attract national & regional political and financial support for materializing the e-Infrastructure vision.
- The main instrument in achieving the long-term sustainability of SEE grid sites is enlarging the user community. If a sufficient number of researchers could be induced to use the grid infrastructure and related services, it would prove impossible to cease to provide infrastructure and support. Thus the most pressing task for SEE-GRID-2 is to reach this «critical mass».
- Being the flagship EC regional Grid project SEE-GRID strives to support similar regional developments in other regions through SEE-GRID-2 project.

# SEE-GRID-2

**Summary:** Establishment of collaborative models for use of computing and data resources across various domains all over Europe and worldwide is currently being pursued through several eInfrastructure efforts. The SEE-GRID regional initiative has recently demonstrated that a geographically-independent common pool of computing resources can be of substantial scientific value to a less-resourced region like South-East Europe (SEE). Through the creation of the SEE regional infrastructure and its interconnection to the pan-European and worldwide eInfrastructures, the developing SEE countries can benefit from sharing computing power and advanced applications that would otherwise be unavailable on the local scale, and thus help fulfil the fundamental objective of minimizing the digital divide in the SEE region and ensuring equal opportunities for every citizen.

SEE-GRID-2 (South Eastern European GRid-enabled eInfrastructure Development 2) project aims to further advance and integrate the existing SEE Grid infrastructure and services, proliferate the regional applications, capitalize on the existing SEE-GRID human network to further strengthen scientific collaboration and cooperation among participating SEE communities, and ultimately achieve sustainability for regional and national eInfrastructures that will endure beyond the project's lifetime.

The project aims to help the development of an eInfrastructure to serve the research and educational needs of the scientific communities and end-users that will be sustainable both at national and regional level in its operation and expansion, will have a multi-disciplinary nature in encouraging and supporting grid applications among diverse technology domains, and will comprise of multiple geographically-distributed resource sites per SEE country thus engaging an equally-contributing collaborative group of research and academic groups in all SEE countries.

**Objectives:**

- **Secure sustainable development & operation:** The sustainability of the SEE eInfrastructure is the highest priority of SEE-GRID-2 and is primarily pursued by achieving involvement and cooperation at the national government and research/academic level in every SEE country. The sustainability efforts are supported by the framework of a National Grid Initiative, through the maturing of grid organizational structures and provision of reliable services, including the establishment and operation of Grid Operation Centres and accredited National Grid Certification Authorities. Furthermore, dissemination conferences and PR events are utilized to raise awareness at all society levels and attract national & regional political and financial support for materializing the eInfrastructure vision.
- **Upgrade the SEE-GRID Infrastructure:** In terms of available Grid resources, SEE-GRID-2 pursues the expansion of the current SEE grid infrastructure to new countries in the region as well as by proliferation of the participating resource centres in each SEE country in order to increase the available regional resources (e.g. processing power, storage) thus boosting the performance of the regional infrastructure; furthermore, this positively impacts the diversity and distribution of participating

*continued overleaf*

**Project acronym:** SEE-GRID-2
**Contract n°:** RI-031775
**Project type:** SSA
**Start date:** 1/05/2006
**Duration:** 24 months
**Total budget:** 2 028 886 €
**Funding from the EC:** 2 002 691 €
**Total effort in person-month:** 632PM
**Web site:** www.see-grid.eu
**Contact Person:** Dr Ognjen Prnjat
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**Project participants:**

| | |
|---|---|
| GRNET | GR |
| CERN | CH |
| IPP-BAS | BG |
| RBI | HR |
| TUBITAK | TR |
| MTA SZTAKI | HU |
| ASA | AL |
| UoBL | BA |
| UKIM | MK |
| ICI | RO |
| RENAM | MD |
| UoB | CS |
| UoM | CS |

**Key words:**
eInfrastructure
eScience
Grid & Network Technology

**Collaboration with other EC funded projects:**
EGEE, EUMEDGRID, EUCHINAGRID, EELA, BalticGrid, BELIEF, SEEREN2, GN2

**South-Eastern European Grid-enabled eInfrastructure Development 2 – RI**

**European Commission**
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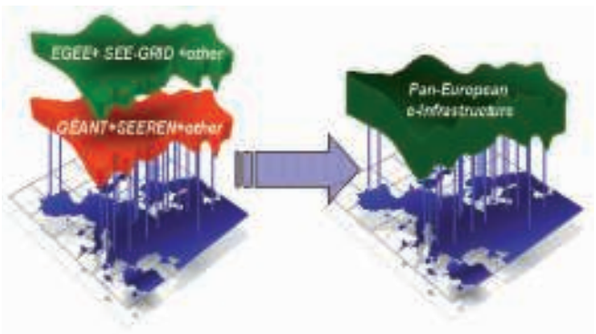
teams per country thus strengthening cooperation and collaboration at national level. The actual usage of the Grid infrastructure is stimulated by the support of multi-disciplinary grids – including applications from different scientific fields. For the view of the infrastructure and for the details of how to access the infrastructure as end-user, please consult the SEEGRID website at http://www.see-grid.eu

- **Strengthen the regional & national Human Network:** SEE-GRID-2 also pursues the strengthening of the human network through extensive national and regional-level training activities in order to develop the necessary Grid user-interface familiarisation and computing-resources sharing culture among the scientific communities, as well as to train new Grid administrators in infrastructure management. A wide range of dissemination activities focus on local scientific communities, policy-makers / government, and public at large, both at national and regional levels.

**User communities:** SEE-GRID-2 supports the philosophy of multi-disciplinary grids, involving a range of research and academic institutes and scientific communities in all SEE countries, with emphasis on the deployment and support of a range of Grid applications in order to engage as many user communities as possible and increase the utilization of the available resources. The target applications cover a spectrum of scientific fields from medical image visualization, superconductivity, through a variety of engineering disciplines, through to Business-to-business e-marketplace models and financial planning of pension funds.

**International aspects:** In the long-term, SEE-GRID-2 aspires to contribute to the regional cooperation and stability, by demonstrating the importance of collaborative efforts in science and technology areas like eInfrastructures, and help contribute and lead the continuing EU efforts to ease the digital divide and aid the integration of the region in the European initiatives.
SEE-GRID-2, being the flagship EC regional Grid project, strives to support similar regional developments in other regions, i.e. Latin America, Mediterranean basin, China, Baltic, South Africa, and India. In this context, SEE-GRID-2 is carrying out wide range of dissemination activities as well as concertation actions to help spread the know-how in these regions.




# TEIN2

**Summary:** The Trans-Eurasia Information Network (TEIN2) provides the first large-scale data communications network for research and education within the Asia-Pacific region. Offering direct connectivity to GÉANT2, Europe's multi-gigabit network, TEIN2 allows regional researchers to collaborate with their counterparts in Europe and thus to operate on a truly global scale.

TEIN2 is already supporting research in areas such as tele-medicine, disaster warning, climate modelling, radio-astronomy and drives innovative e-learning and e-culture initiatives.

Launched at the Asia-Europe (ASEM) Summit in Seoul in 2000, the Trans-Eurasia Information Network initiative took off in 2001 with a first France-Korea link. In 2004, a second phase – TEIN2 – was initiated with European Commission funding of €10M to extend the sucecss of this orginally bilateral link to the regional level. The network was deployed in early 2006 and launched formally alongside the ASEM6 Summit in Helsinki on 9 September 2006.

**Objectives:**

TEIN2 has the following objectives:

- to deploy the first large-scale electronic network for the reasearch and education communities across Asia-Pacific
- to provide Asian researchers with a gateway for global research collaboration via GÉANT2
- to provide direct and fast routes to Europe, enabling real-time collaborations
- to extend the success of the initial bilateral France-Korea initiative (TEIN1) to regional level
- to strengthen links between Asia and Europe
- to drive innovative applications with high societal impact
- to foster regional development and social cohesion in Asia
- to give a boost to Internet development in Asia and to promote digital inclusion
- to prepare the ground for long term sustainable research networking in Asia-Pacific

**Applications:** TEIN2 and GÉANT2 create a gateway for EU-Asian research collaboration for over 60 million users.

With powerful network links now in place, academics in Asia-Pacific have an unparalleled ability to participate in world-class collaborative research projects. They are able to conduct more sophisticated scientific experiments, access digital libraries and geographically dispersed databases, share remote scientific instruments and engage in innovative e-learning activities. Improved network performance gives opportunities to break new ground for science and research in areas such as radio-astronomy, high energy physics, grid computing, telemedicine, and climate modelling.

Many of the applications supported by TEIN2 are of high societal impact, thus bringing tangible benefits to the general population rather than benefiting solely the scientific community.

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TEIN2
www.tein2.net

**Project acronym:** TEIN2
**Contract n°:**
ASIA/AIDCO/2003/5629
**Project type:** Grant contract
**Start date:** 05/2004
**Duration:** 44 months
**Total budget:** 12 250 000 €
**Funding from the EC:** 10 000 000 €
**Total effort in person-month for research activities:** 164
**Web site:** www.tein2.net
**Contact person:** David West
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**Project participants:**

| | |
|---|---|
| DANTE | UK |
| AARNET | AU |
| CERNET | CN |
| ITB | ID |
| NICT | JP |
| NII | JP |
| MAFFIN | JP |
| KISDI | KR |
| MYREN | MY |
| ASTI | PH |
| SINGAREN | SG |
| ThaiREN | TH |
| VINAREN | VN |
| RENATER | FR |
| SURFnet | NL |
| UKERNA | UK |

**Key words:**
Network Technology
Communication Technology
Information Systems

**Collaboration with other EC funded projects:**
GÉANT2, ALICE, EUMEDCONNECT



European Commission
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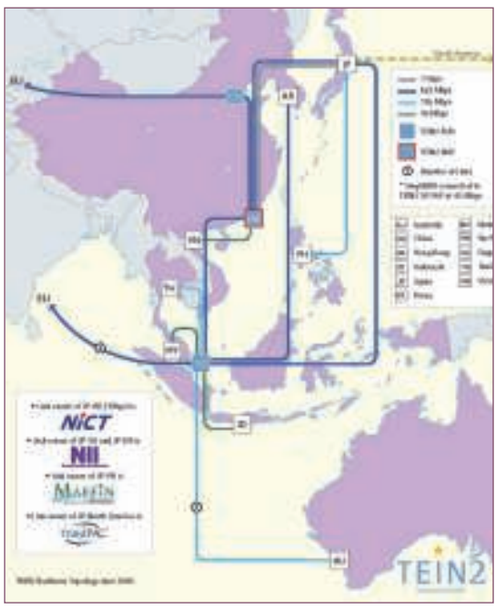
**The approach: a Proven model for regional development**
TEIN2 is building upon the successes ably demonstrated by other initiatives such as ALICE in Latin America and EUMEDCONNECT in North Africa and the Middle East. TEIN2 validates the vison and strategy of the European Commission for promoting global connectivity by supporting a regional backbone and interconnecting it to GÉANT2, linking Asia-Pacific to Europe and beyond.
With the initial network deployed, the focus of the activity is on promoting the use of the network by researchers in Asia and Europe for collaborative activities, and on connecting additional Asian countries.




**The future:** The European Union's EuropeAid programme is contributing €10m (80%) to the total cost of TEIN2 up to the end of 2007.
For the coming years, the overall objective is to maintain and further develop the communciations structure, extending the geographical reach and bandwidth capacities of the network, as well as to develop funding models and organisational structures that provide long term stability and sustainability for research networking in the region. The consolidation of TEIN2 will therefore aim to ensure seamless continuation of connectivity, to further enhance existing EU-Asian research and education collaboration, and equip the region to compete effectively in the global research race.

# VITAL

**Summary:** The results of past and ongoing IST projects related to the research on IMS technology have turned out that IMS still shows a number of restricting factors like interoperability problems with underlying communication technologies and legacy infrastructures as well as insufficient mechanisms for unified resources allocation and IP-level mobility management across heterogeneous networks. VITAL aims at consolidating the technological framework that will enable the smooth transition of multimedia communications, including voice, from circuit to packet switched domains of communication networks. The project will setup a distributed, experimental IMS platform, elaborate solutions to the aforementioned problems and test, validate and assess the resultant integrated IMS functionality in the context of advanced traffic experiments and theoretical simulations.

**Objectives:**

The goals of VITAL can be summarized as follows:

- Define and establish a large-scale IMS test bed based on FlexiNET's platform.
- Explore strategies for moving users' management on IP level.
- Study the implications of new access interfaces on the available QoS schemes.
- Elaborate technologies required for the harmonisation of SIP communication among mobile, wireless, wireline and fixed broadband access interfaces and terminals.
- Develop special resources allocation mechanisms for IP level management across heterogeneous networks.
- Supply and adapt the test equipment to be used in the conduction of simulation, monitoring and conformance traffic experiments.
- Conduct large-scale advanced traffic experiments using both test equipment and user terminals.
- Foster a harmonised methodology in the performance assessment of SIP based communications.
- Define metrics for acceptable IMS Quality of Service thresholds.
- Elaborate a generic methodology for the overall performance assessment of the IMS technology.
- Disseminate VITAL results to the relevant fora.

**Work plan:** The VITAL project will commence by incorporating the confining factors of IMS in the overall testing and validation methodology. In a parallel activity the determination and designation of the overall VITAL platform based on existing network infrastructures of partners will be performed. Furthermore, the project will develop strategies for mobility management, uniform network resources management and QoS provisioning and implement them in the VITAL platform. In a next step, the project will conduct large-scale trials in order to measure performance, interoperability and seamless mobility. Finally, the experimental results will be compared with available data from theoretical traffic models.

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**Project acronym:** VITAL
**Contract n°:** IST-2005-034284
**Project type:** STREP
**Start date:** 01/06/2006
**Duration:** 24 months
**Total budget:** 4 534 064 €
**Funding from the EC:** 2 500 000 €
**Total effort in person-month:** 432,5
**Web site:** www.ist-vital.eu

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**Project participants:**

| | |
|---|---|
| Telekom Austria | AT |
| Siemens AG | DE |
| Alcatel SEL | DE |
| Teletel SA | GR |
| Voiceglobe sprl | BE |
| Keletron ltd | GR |
| Solinet GmbH | De |
| Telefonica I+D | ES |
| University of Bradford | UK |
| University of Patras | GR |
| Tellas SA | GR |

**Key words:**
IMS
Quality of service
Mobility
Interoperability
Test bed

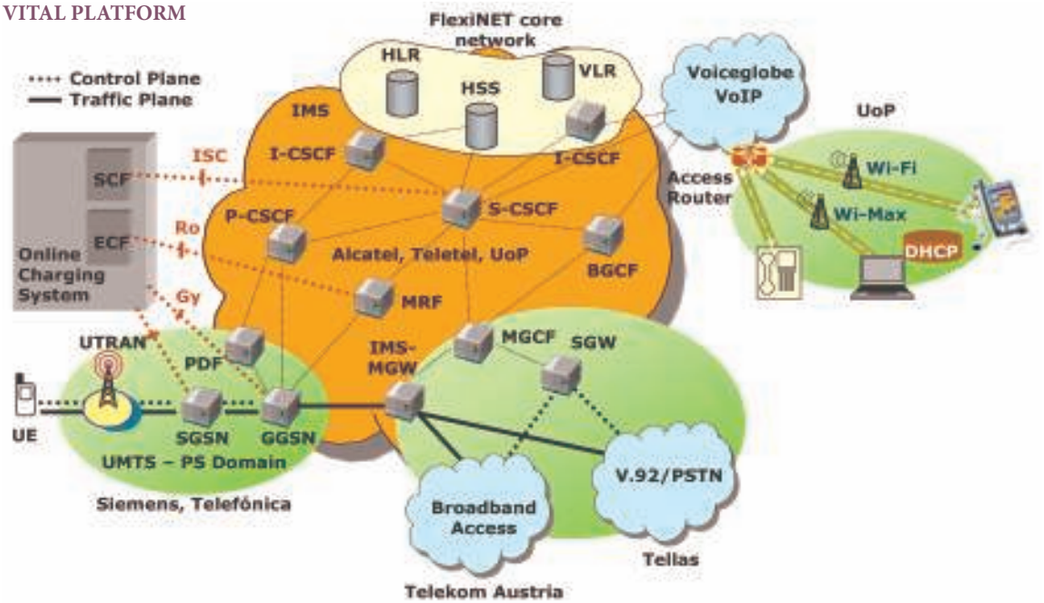
**Enabling convergence of IP Multimedia Services over NGN Technology – IST**

**European Commission**
Information Society and Media

**Results:**

- An IMS platform encompassing mobile, wireless and wireline access technologies including WiMAX and V.92.
- IMS reference communication scenarios.
- IP-level mobility management.
- Harmonized QoS schemes to support services interoperability.
- IMS testing and validation methodology.
- A methodology for the quantitative assessment of IMS technology.
- IMS traffic experiments and services performance assessment.
- Scientific dissemination and contributing to standardization bodies (3GPP, ETSI, ITU)

## VITAL PLATFORM




**Access:** The VITAL research network architecture will comprise various types of access interfaces, including:

- Mobile.
- Fixed broadband.
- Wireless 802.11a/b/c (Wi-Fi).
- Wireless 802.16 (Wi-Max).
- V.92 over PSTN (new access technology).

**Validation Concept:** VITAL will construct an experimental IMS platform by setting up a trials environment, using the illustrated access and core network parts, which will be enhanced with a number of innovative traffic management schemes for harmonised QoS and mobility management.

To demonstrate, assess and validate the capabilities of the VITAL IMS architecture, a number of experiments will be prescribed, are carried out and are aiming at:

- Demonstrate the ability of the enhanced platform to support heterogeneous types of user calls.
- Quantify IMS performance by monitoring, measuring individual traffic parameters and performing comparisons with the results obtained from the theoretical models.
- Test interoperability with legacy infrastructures.

# WEIRD

**Summary:** WEIRD is a 24 month integrated project aiming at implementing research testbeds using the WiMAX technology in order to allow isolated or impervious areas to get connection to the GEANT2 research network. The application scenarios (Figure 1), demanded by the user community partner of the consortium, are categorized into 3 groups: the Volcano and seismic activities monitoring, the fire prevention and the tele-medicine. WEIRD will deploy the application scenarios into 4 European testbeds and will prototype and validate enhanced Network Control and Management Entities and improved versions of WiMAX. The features that the WEIRD system will validate during the project include: QoS, resource and access management, authentication authorization and accounting (AAA) and security, environmental awareness and full mobility.

**Objectives:** WEIRD will provide the scientific community with an empowered broadband access network based on the WiMAX technology and directly connected to GÉANT. To realize that, WEIRD must cope with the following technical objectives:

- Enhancements to the WiMAX technology
- Enhancements to the IP Network Control Plane
- Definition of a set of guidelines and best-practices for the permanent deployment of the WEIRD architecture in GÉANT/GÉANT2 and the NRENs.
- Assessment of scenarios: scientific user communities, partners of the consortium, will describe their user scenarios that will drive system requirements and specifications.
- Validation of applications that the WEIRD convergent solution may include. Among others: Audio and Video over IP; VoIP and Video conferencing and video streaming between scientific personnel; Fire monitoring and volcano monitoring, Telemedicine.

**Technical Approach:** The smooth integration between the WiMAX technology and the GEANT2 network will be achieved by mean of the convergence layer infrastructure envisaged within the project (Figure 2).
The WEIRD convergence layer will assure the combined use of the underlying wireless technology with the full support of access control, QoS and mobility.
The WEIRD Control plane will provide edge to edge QoS, AAA, Network and resource management functionalities, in order to deliver to the user the maximum quality experience, while keeping the network at high efficiency values regarding exploitation.
Finally, MIMO and beam forming techniques will help to improve QoS and, together with Radio over Fiber technology, to lower the costs of network deployment.

**Expected Achievements**: To exploit and enhance the WiMAX technology in a convergence layering heterogeneous network architecture. To prototype a system able to cope with future needs of research user communities and to build test-beds allowing European research to be reachable from isolated or remote areas, efficiently and with full support of security, QoS and mobility.

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**WiMAX Extension to Isolated Research Data networks – IST**

**European Commission**
Information Society and Media

**Project acronym:** WEIRD
**Contract nº:** IST-034622 - IP
**Project type:** Integrated Project
**Start date:** 1/06/2006
**Duration:** 24 months
**Total budget:** 6 606 000 €
**Funding from the EC:** 4 000 000 €
**Total effort in person-month:** 785
**Web site:** www.ist-weird.eu

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**Project partners:**

| | |
|---|---|
| Datamat | IT |
| UoRome-CRAT | IT |
| PTIn | PT |
| VTT | FI |
| Alcatel | IT |
| Orange | RO |
| Wind | IT |
| CPR | IT |
| UoCoimbra | PT |
| Italtel | IT |
| DAS Photonics | ES |
| UPBucharest | RO |
| INGV-OV | IT |
| OASI Maria S.S. | IT |
| IMO | IS |
| Socrate Medical | IT |

**Key words:**
WiMAX,
Broadband Wireless Access,
Convergence Layer,
Control Plane,
Radio over Fiber
QoS
AAA
Mobility

**Testbeds:** The project will build 4 European research testbeds (Finland-Funet, Portugal-FCCN, Romania-RoeduNet, Italy-GARR), interconnected through GEANT2, to deploy the WEIRD solution and to support end-user applications over the WiMAX access network infrastructure.

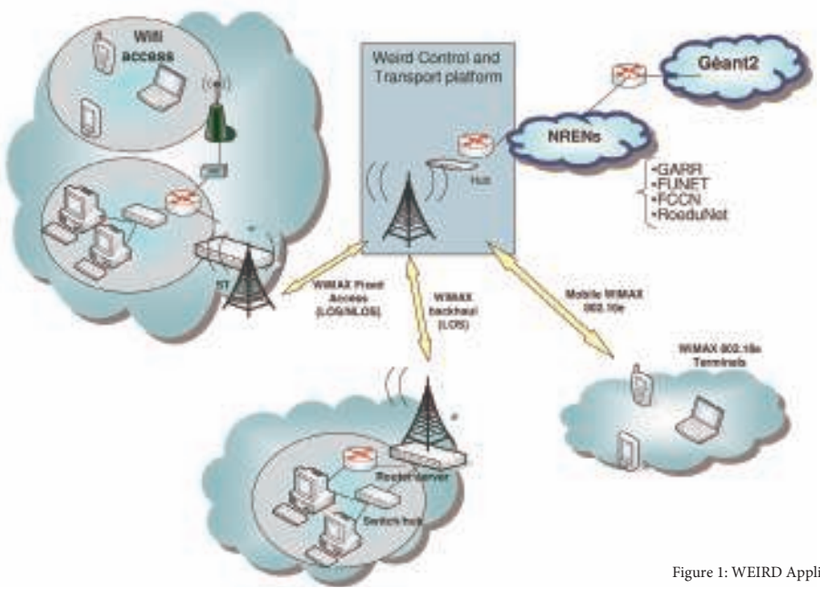


Figure 1: WEIRD Application scenarios

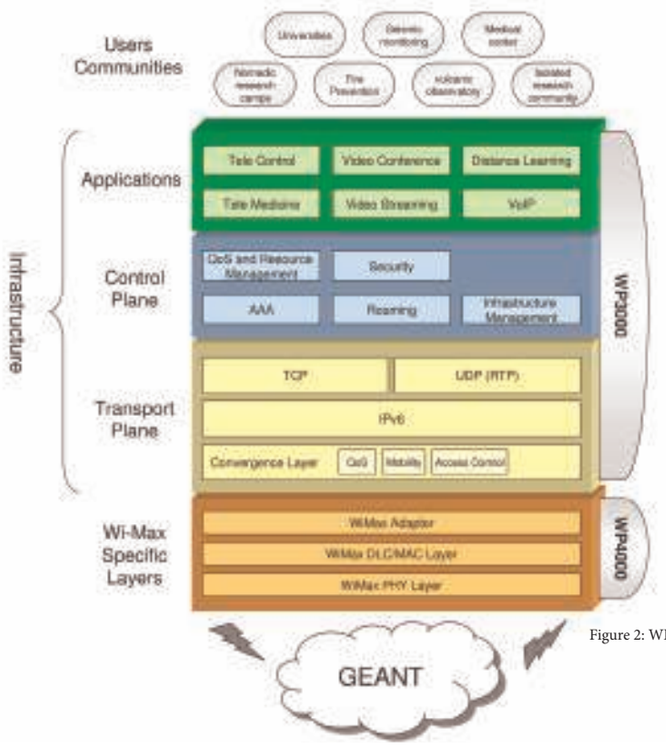


Figure 2: WEIRD functional layering architecture



e-infrastructure

# AUGERACCESS

Summary: AUGERACCESS is a project improving the access capabilities of European research groups working on the Pierre Auger Observatory. Located in a remote place in the Pampa Amarilla in Argentina, the Observatory is designed to measure the flux of ultra-high energy cosmic ray particles with unprecedented accuracy and statistical significance. It is the largest existing infrastructure in this research field. The upgrading of the connectivity between the Auger Observatory and European research institutions will allow rapid access to the data collected at the Observatory thus enhancing the potential of the European groups in data processing and analysis.

**Objectives:** The main objective of AUGERACCESS is to improve the communication between the Auger Observatory in Argentina and the European institutions involved in the study of very high energy cosmic rays.
These high-energy particles hold secrets to the beginning of the Universe, because of the mystery of their enormous energies, so many millions of times greater than any earth-bound particle accelerator can create.
The Auger Observatory is designed to study how these particles are produced and accelerated in the cosmos. Answering these questions is expected to shed light on the basic forces of nature. The rate of the most energetic cosmic rays striking the Earth surface is only ~ 1 per km$^2$ per century and therefore achieving a breakthrough in this field is possible only by deploying sophisticated detectors with very large acceptance.
The Auger Observatory occupies an area of about 3000 km$^2$ in the Pampa Amarilla, a remote location near the small town of Malargüe, in the province of Mendoza, Argentina, not far from the cordillera of the Andes.
The realization of a wide-band and reliable link between the Observatory and Europe has added value in the fields of Atmospheric Science, Volcanology and Seismic studies. These activities are carried out close to the site of the Observatory.

**International Dimension:** The Auger Observatory has been developed by a large international effort, engaging over 300 scientists from Argentina, Australia, Brazil, Czech Republic, France, Germany, Italy, Mexico, Netherlands, Poland, Portugal, Slovenia, Spain, United Kingdom, and United States of America. The total number of participating institutions is 72, of which 33 are in Europe.
In addition to the European institutions, the US and Latin American research groups will also benefit from improvements in the connectivity of the Auger Observatory.
AUGERACCESS is open to collaboration with American institutions and organizations.

**User communities:** Focused on the advancement of Science in Europe, AUGERACCESS is currently working with a number of other users potentially interested in the improvement of the communication infrastructure. In addition to the institutions involved in Earth Sciences and Environmental Studies, there is great interest within the local Argentinean community for the obvious applications in this new class of service that are relevant to the general public. Social requirements such as citizen access to community services, students' access to Internet and healthcare via interactive video-conferencing require higher and higher bandwidth.

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**Project acronym:** AUGERACCESS
**Contract n°:** RI-026457
**Project type:** I3
**Start date:** 1/11/2005
**Duration:** 48 months
**Total budget:** 2050000 €
**Funding from the EC:** 1100000 €
**Web site:** www.augeraccess.net
**Contact person:**
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**fax:** +39 06 2023507
**Project participants:**

| | |
|---|---|
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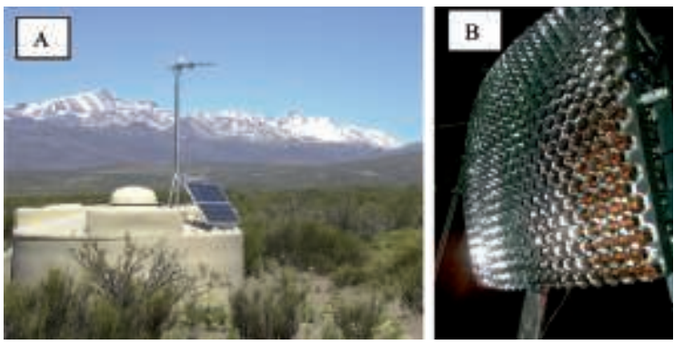
| CNRS | FR |
| FZK | DE |
| Univ. Leeds | UK |
| GARR | IT |
| RETINA | AR |

**Key words:**
Information technology
Interoperable network
Solutions,
Control techniques
**Collaboration with other EC funded projects:**
GÉANT/GÉANT2

**Integrating Auger Observatory and European Research Institutions into a worldwide Grid - RI**

**European Commission**
Information Society and Media




A) A water-Cherenkov detector of the Auger Observatory in the Pampa. The Andes are seen in the background.

B) An Auger detector that is used to study cosmic rays at night.

**Service Activities:** Two Service Activities are foreseen:

- Identification of the weak points within the communication infrastructure between the Auger Observatory and the European network GÉANT. The feasibility study of the upgrading is in progress. The participating institutions mainly involved in this activity are the NRENs (National Research and Education Networks) of Argentina (RETINA) and of Italy (GARR).
- Actual upgrading of the communication infrastructure of the Observatory on the basis of the results of the feasibility study. The most promising solution is the use of high bandwidth optical fibre to replace the present obsolete microwave link.

**Research Activities:** Realization of reliable and large bandwidth connectivity between the Auger Observatory and the rest of the world will allow the implementation of techniques of remote monitoring of the detectors and the use of dynamic databases. This in turn will provide fast feedback on the quality of the data being taken at the Observatory, giving the possibility of the rapid discovery of malfunctioning detector components, with the consequence of early remedial action.
As a result of the implementation of these actions, the work of the European groups will become more efficient, the reliability of operation of the Observatory will be enhanced and the quality of the data will improve, leading to physics results of higher quality. The two research activities of AUGERACCESS are:

- Design and development of computer codes and procedures with the aim of implementing a system of remote monitoring and control of the data taking of the Auger Observatory.
- Development of a dynamic database to store and update information on the status and performance of the detectors.

**Networking Activities:** The project partners will disseminate information on the results of the present activity in order to let other research projects benefit from it.
The achievements of the project will be presented to a wide scientific community and to the general public via such dissemination channels as conferences, public reports and the AUGERACCESS website www.augeraccess.net.

**Innovation:** The tools studied and developed by the activities of AUGERACCESS will be useful in different contexts. The Auger project has special and distinctive features with respect to many other important scientific projects. The project is based on an infrastructure, the Auger Observatory, located far from academic institutions and from research laboratories. The infrastructure is therefore, by definition, not self-contained because the exploitation is based on the connectivity with research institutions in Europe and also in US.
The Auger Observatory is the first of a new class of facilities. It is therefore conceivable that other European Institutions and Organizations will exploit the development of remote monitoring and control, piloted in Auger, in fields not yet foreseen.

# BalticGrid

**Summary:** The main goal of the BalticGrid project is to establish a production quality Grid infrastructure within the Baltic States enabling scientists in the region to efficiently take part in the European Research Area and contribute to the European knowledge economy.

**Objectives:** The Baltic Grid project aims to:

- Develop and integrate the research and education computing and communication infrastructure of the Baltic States into the emerging European Grid infrastructure. This integration will primarily focus on extending the EGEE to the Baltic States;
- Disseminate knowledge about Grids and their use and provide education and training to Grid users and operators;
- Develop a successful user base of significant scientific importance and for these users enable an efficient sharing of computers, instruments and data of high strategic importance to the Baltic states.

**International Aspects:** The Baltic Grid project is of high strategic importance to the Baltic States and is designed to give a rapid build-up of a Grid infrastructure, contributing to the enabling of the new member states participation in the European Research Area. The high strategic value of BG is due to its potential to provide convenient, effective and secure access to critical networked resources anywhere within Europe and beyond, and enable the formation of effective research collaborations with scientists anywhere. Information technologies, especially Grids, enable competitive research teams to form regardless of the participants' geographic location. To maintain and enhance European competitiveness it is important that all of Europe is the base for formation of such teams.

**Technical Approach:** The BG communication network development will ensure the integrated provision of Grid infrastructure related services and raise the level of performance of the infrastructures concerned through the following actions: establishing a production level Grid with high quality user support, a consistent set of security practices, a framework for unified Grid access and use, Grid-wide accounting based on standards, guidelines and support for easy inclusion of additional resources and applications, and by deploying tools for resource selection and performance engineering, carrying out a substantive education and training effort targeting diverse user communities, by offering application development support and a help desk, and by working with faculty to incorporate Grid education into graduate and undergraduate curricula, working intensely with NREN authorities and GÉANT to enhance the network infrastructure and services, in particular in the Baltic States.

**User communities:** The activity identifies application communities for the BalticGrid and develops support for application deployment, focusing on applications from high-energy physics, material science, and bioinformatics.

*continued overleaf*

**Project acronym:** BalticGrid
**Contract nº:** RI-026715
**Project type:** I3
**Start date:** 1/11/2005
**Duration:** 30 months
**Total budget:** 3 009 000 €
**Funding from the EC:** 3 000 000 €
**Web site:** www.balticgrid.org

**Contact person:**
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**fax:** +46 8 247 784

**Project participants:**

| | |
|---|---|
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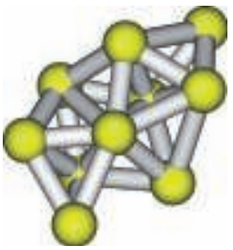
| EENET | EE |
| NICPB, | EE |
| IMCS UL. | LV |
| IFJPAN | PL |
| PSNC | PL |
| VU | LT |
| RTU | LV |
| ITPA | LT |
| CERN | CH |

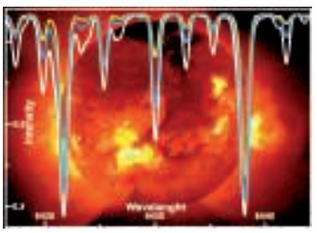
**Key words:**
Information technology
Baltic Region
Grid infrastructure

**Collaboration with other EC funded projects:**
EGEE
ICE-AGE



Special Interests Groups will be formed as a framework for developing new successful Grid user communities with similar or related R&D interest such as:

- Baltic Sea Eco-System Modelling
- Text Annotation Service
- Text-to-Speech Service
- Stellar Spectra Computation
- Atomic and Nuclear Computations
- Computational Modelling of Heterogeneous Processes



**Service Activities:** The key objective of the BG service activities is to provide the following functions:

- Core Infrastructure services;
- Grid monitoring and control;
- Middleware deployment and resource induction;
- Resource and user support;
- Grid management;
- Capture of network requirements and establishment of SLAs.

The BG infrastructure will be open to the entire European Research Area directly or via other Grid infrastructure efforts, such as EGEE. BG will extend the EGEE Northern Region to the Baltic States and within EGEE the overall operational and support responsibility will fall under the EGEE Northern Europe Regional Operating Centre (NE ROC). A homogenization of present national and regional efforts will be performed in integrating those into BG and the larger European Grid infrastructure.

**Research Activities:** In the Baltic region, there is a strong expertise and experiences in the areas of accounting, service level agreements and quality of service. The joint research activity will deliver and deploy the prerequisite functionality that will enable the adoption of a future Grid economy in the Baltic region. This is an ambitious goal, and to date, unprecedented in regional production Grids.

Within the Baltic Grid project maximum impact on the established infrastructure is assured through close coordination and integration with the service activities.

Within the framework of BG's Service Level Agreement Markets and Dynamic Account Management activity the following software components will be delivered: SLA based QoS management and Dynamic Virtual Runtime environment based account management. In addition reports and use cases highlighting the requirements of a sustainable Grid Market as well as a proof of concept of integrating two Grid accounting systems will be provided.

**Networking Activities:** BalticGrid networking activities are critical for developing successful and viable Grid user communities in a broad range of disciplines. The BG Networking Activities constitute an ensemble that supports developing and integrating the research and education computing and communication infrastructure in the Baltic States into the European Grid infrastructure. It also spreads the knowledge on Grid technologies in the Baltic States to a level comparable to that in EU Member States as well as further engages the Baltic States in policy- and standard-setting activities. Overall, the Networking Activities are designed to support the development and use of the Grid infrastructure built up and operated in the specific service activities.

The main aim of BG's Policy and Standards Development is to engage the BalticGrid partners in international standards and policy shaping activities to foster the development and use of a set of coherent policies by:

- Active participation in the work of the e-IRG and other bodies focused on Grid policies and practices,
- Contributing actively in standards setting through participation in GGF Working Groups.

# BELIEF

**Summary:** BELIEF's aim is to create a platform where e-Infrastructure stakeholders can collaborate, reach out to new audiences and exchange knowledge, thus helping to ensure that e-Infrastructures are both developed and used effectively worldwide. It will be a one stop shop for information on e-Infrastructure documentation and activities for both research and industry and will thus aid the knowledge transfer between them.

**Objectives:** BELIEF will:

- **Create** a website where registered members can search and contact other registered e-Infrastructure stakeholders, interact in discussion fora and importantly, access e-Infrastructures documentation on the BELIEF Digital Library.
- **Organise** events that both exchange and generate knowledge:
  - Brainstorming: analysing future visions of e-Infrastructures and how to realise them. The outcome of these will be the BELIEF Technology Reports.
  - Networking workshops: bringing together research and industry communities to exchange knowledge and learn from each others' developments. The outcome of these will be the Industry-Research Handbooks that will help industry understand the eInfrastructure landscape and how to use them effectively.
  - International conferences: Showcasing the developments of emerging economies and creating synergies between different e-Infrastructure communities and initiatives worldwide.

**Belief plan:** There are essentially two streams to the BELIEF plan: creation and constant development of the website with its communication platform and digital library; and secondly, the organisation of events and the dissemination of the knowledge generated by them. This will be carried out over a period of 24 months with a firm view of guaranteeing the sustainable 'service' of BELIEF beyond.

**Innovation:** There are two forms of innovation in this project: one is the technical side, for example the Digital Library that matches documentation requests to the specific requirements of the profile of the searcher. The second stream of innovation lies in BELIEF's adaptability: e-Infrastructures is a growth area and as such we adapt to our users requirements - whether it is new areas on the portal or new themes to discuss on it. In our events we also help generate new knowledge and thus contribute to innovation 'offline' too.

**International Aspects:** The international aspect is a cornerstone of the project, hence the reference in BELIEF's full title to 'expanding frontiers': this refers not just to growth areas of research but to emerging economies and other regions internationally. We in particular engage with Latin America and India, and will organise a major conference in each– India in December 2006 and Brazil in July 2007.

*continued overleaf*

**Project acronym:** BELIEF
**Contract nº:** RI-026500
**Project type:** Specific Support Action
**Start date:** 01/01/2006
**Duration:** 24 months
**Total budget:** €1,208453
**Funding from the EC:** €950,000
**Web site:** www.beliefproject.org
**Contact person:** Stephen Benians
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**Project participants:**

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|---|---|
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| CNR-isti | IT |
| ERNET | IN |
| ENGITECH | IE |
| PUSP | BR |
| UoA | GR |
| UoW | US |

**Collaboration with other EC funded projects:**
BELIEF is a horizontal action that has established links with all RI projects



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**User communities:** Many different types of users can benefit from using BELIEF as a one stop shop for eInfrastructure information and knowledge exchange.
The user communities would include industry; scientific communities; universities; EU funded projects; national projects, other regional grid and connectivity projects; policy makers… and students who are tomorrow's leaders. Some user communities to highlight in particular are those of the emerging economies, India and Latin America.

**Research activities:** The active research carried out by BELIEF is for the brainstorming activities which involves analysis of future visions and direction of e-Infrastructures. For example, the first brainstorming was on developing Scientific Repositories on the knowledge infrastructure. The concept paper for this, as with all other events and their outcomes, can be accessed on the BELIEF website. Another strand of research is exploring how to foster the interchange of knowledge between research and industry, resulting in the Industry-Research Handbook of BELIEF. This will provide case studies and interviews from certain sectors, encouraging industry to understand the e-Infrastructures marketplace and the value of using them. These handbooks are available to registered members on the BELIEF website.

# BioinfoGRID

**Summary:** The project aims to promote the Bioinformatics Grid application for life science, in order to carry out Bioinformatics research based on the Grid networking technology. More specifically the BioinfoGRID project will evaluate applications in the fields of Genomics, Proteomics, Transcriptomics and Molecular Dynamics, reducing data processing time by distributing the calculation on thousands of computers using the European Grid infrastructure.

**Objectives:** The BioinfoGRID Specific Support Action (SSA) will combine Bioinformatics services and applications for molecular biology users with the Grid infrastructure created by the EGEE project. BioinfoGRID also aims:

- To expand the Grid awareness inside the bioinformatics community and in conjunction with the European Grid infrastructure projects, to promote dissemination and tutoring events where Grid experts can discuss the available Grid services and the user requirements with real life examples.
- To evaluate and adopt high-level user interfaces, common to all the different BioinfoGRID applications, to exploit, in a more user-friendly approach, the Grid services provided by European Grid infrastructures.
- To organize Bioinformatics Portals, to simplify the services invocation or the jobs submission to the Grid and Workflows to dynamically establish complex biologic analysis chains.
- To organize an international conference for Grid Bioinformatics applications, with the participation of a large Bioinformatics user community, as main dissemination activity of the project.

**Technical approach:** Grid technology is a very important step forward from the web, which simply allows the sharing of information over the internet. The massive potential of Grid technology is indispensable when dealing with both the complexity of models and the enormous quantity of data, for example, in searching the human genome or when carrying out simulations of molecular dynamics for the study of new drugs. The BioinfoGRID Virtual Organisation of users will be authorized to run the Bioinformatics challenges on the European Grid Infrastructure.

**Service activities:** BioinfoGRID project will contribute to:

- Identify and promote common components and solutions for the feasibility studies of the applications included in the project.
- Evaluate the services provided by the European Grid infrastructures.
- Establish relations with Grid infrastructure projects, in particular with EGEE, to provide feedback in order to improve the European Grid infrastructure.
- Provide the technical support required by the user and for resource integration.

*continued overleaf*

**Project acronym:** BioinfoGRID
**Contract nº:** RI-026808
**Project type:** Specific Support Action
**Start date:** 01.01.2006
**Duration:** 24 months
**Total budget:** EUR 1 054 208
**Funding from the EC:** EUR 1 050 000
**Web site:** www.itb.cnr.it/bioinfogrid
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**fax:** +39 02 26422770

**Project participants:**

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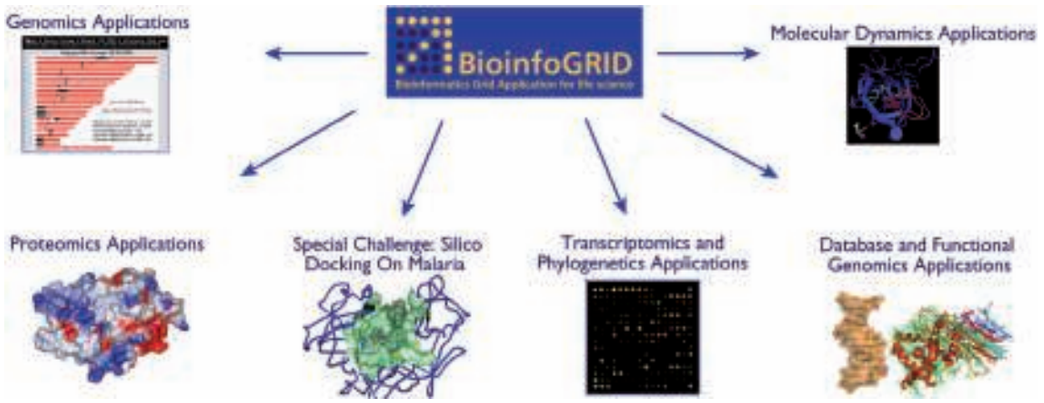
|---|---|
| CNR-ITB | IT |
| INFN | IT |
| DKFZ | DE |
| CNRS | FR |
| UCAM | UK |
| CILEA | IT |
| STC | DE |

**Key words:**
Grid technology
Bioinformatics
Life sciences

**Collaboration with other EC funded projects:**
EGEE-II
SHARE
EELA
DILIGENT
BELIEF
EMBRACE
SYMBIOMATICS

**Bioinformatics Grid Application for life science - RI**

**European Commission**
Information Society and Media




**Research activity areas:** Data challenges will be organized to perform:

*Genomics Applications in Grid*

- Analysis of DNA data based on Grid.
- Analysis of rule-based multiple alignments in Grid.

*Proteomics Applications in Grid*

- Analysis for domain search for protein functional domain analysis in Grid.

*Transcriptomics Applications in Grid*

- Microarray data analysis based on the Gridplatform.

*Database and Functional Genomics Applications*

- Clustering of Gene Ontology gene products by their functionality.

*Molecular Dynamics and Docking Applications*

- Participation to a large scale deployment of In Silico Docking On Malaria.
- Participation to a large scale deployment of In Silico Docking On Avian Flu.

**User communities:** The BioinfoGRID SSA will establish a common ground for collaboration between the European Grid infrastructure providers and the Bioinformatics research user community in various fields of Bioinformatics applications. This will be achieved through specific studies for each reference application in the Bioinformatics domain in which experts of various disciplines can collaborate on the solution of highly complex problems.

**International dimension:** The BioinfoGRID project will contribute to use Grid technology and Bioinformatics applications as a global network for several research laboratories using thousands of interconnected computers, allowing the shared use of computing power, data storage and complex data analysis. A new challenge of the World wide In Silico Docking on Malaria and Avian Flu will be organized in conjunction with international research groups in this field. An international conference and course for Grid Bioinformatics applications will be organized as well.

**Innovation:** The BioinfoGRID programme will cover the most contemporary uncharted fields of investigation in biological and medical research. The project will support studies on applications for distributed laboratory management systems for microarray technology, for gene expression studies, for gene data mining, for analysis of cDNA data, for phylogenetic analysis, for protein functional analysis and for molecular dynamics simulations in Grid.

**Success stories:** A new challenge of the Wide In Silico Docking on Malaria and Avian Flu will contribute to generate new discoveries that may result in finding new specific cures.

# ETICS

**Summary:** Recent experiences in large research projects have shown that the software products developed by distributed communities often suffer from a lack of coherence and quality. Among the causes of this problem are the large variety of tools, languages, platforms, processes and working habits employed by the partners of the projects. In addition, the issue of available funding for maintenance and support of software after the initial development phase in typical research projects often prevents the software tools developed from reaching production-level quality.

The ETICS project aims to support such research and development initiatives by integrating existing procedures, tools and resources in a coherent infrastructure. In addition it provides an intuitive access point through a web portal and a professionally managed, multiplatform capability based on Grid technologies. The outcome of the project is a service, operated by experts, that enables distributed research projects to integrate their code, libraries and applications, validate code against standard guidelines, run extensive automated tests and benchmarks, produce reports and improve the overall quality and interoperability of software.

The ETICS consortium is composed of CERN (European Organization for Nuclear Research - leading partner), INFN (Istituto Nazionale di Fisica Nucleare), Engineering Ingegneria Informatica S.p.A, 4D Soft Ltd, University of Wisconsin-Madison (UoW).

**Objectives:** The main objective of ETICS is to set up a service providing software projects with an automatic build and test facility to perform systematic and controlled built, test and release activities. In the longer term, the project aims at laying the foundations for an international software certification process that will allow labelling of software artefacts with trusted certification quality measures.

**Technical approach:** The ETICS service is a client/server application building on existing Grid technologies. A web application and a set of command-line tools allow users to model and define different elements of a project structure (for example: projects, subsystems, components and configurations) and their dependency relationships. The user also specifies the different actions (i.e. commands) required to build and test their software as well as dependencies on the environment. From then on, ETICS can automatically perform the actions that developers, integrators, testers and release managers would normally do on their own machines. With this information, the ETICS service can use Grid middleware (NMI and Condor in this case) to dispatch build software modules on a wide variety of platforms, operating systems and environments, building, configuring and installing automatically, while running complex and distributed test scenarios. In the process, ETICS also collects and archives a wide range of reports and metrics, so that the user can perform trend analysis on key quality indicators. The service also provides consistent and complete build and test result reports.

*continued overleaf*

**Project acronym:** ETICS
**Contract nº:** RI-026753
**Project type:** Specific Support Action
**Start date:** 01/01/2006
**Duration:** 24 months
**Total budget:** EUR 1 471 155
**Funding from the EC:**
EUR 1 400 000
**Website:** www.eu-etics.org
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**Project participants:**

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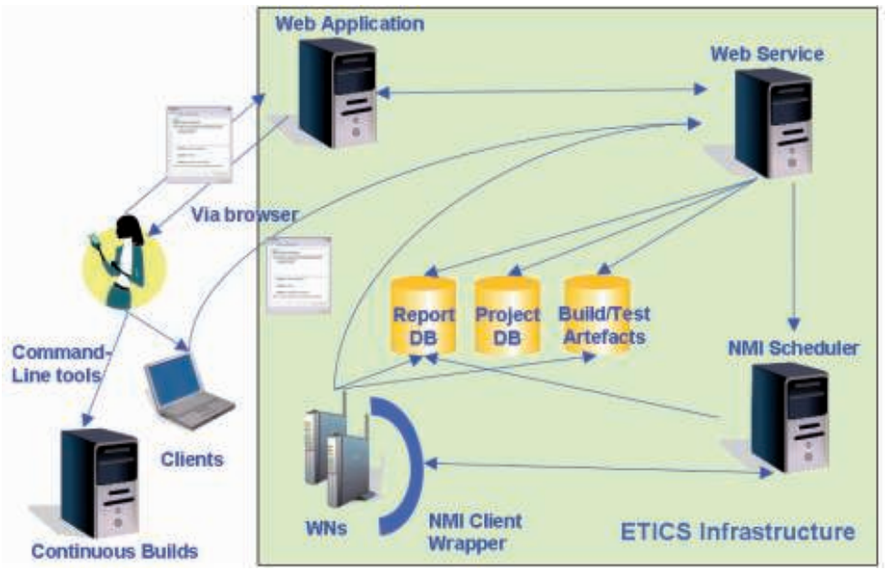
| INFN | IT |
| Engineering SpA | IT |
| University of Wisconsin | US |
| 4DSOFT | HU |

**Keywords:**
information technology
e-infrastructure
software quality assurance
build system
test system
automation
**Collaboration with other EC-funded projects:**
EGEE
DILIGENT
BELIEF
ICEAGE
Health-e-Child

**International dimension:** The prime customers of ETICS are EGEE, composed of over 90 partners (including partners outside Europe), and the DILIGENT project, composed of 13 partners. The project is also generating interest from other projects and communities of international dimension that we hope will soon join the ETICS user community.

**User communities:** The project is currently targeting two different user communities: the software teams of EGEE (Enabling Grids for E-sciencE) and DILIGENT (Digital Library Infrastructure on Grid Enabled Technology). Both of these communities include software developers, integrators, testers and release managers. The EGEE middleware, called gLite, as well as the DILIGENT application, built on top of gLite, will both use the ETICS service.




ETICS high-level architecture

**Innovation:** The project is pushing forward the boundaries of automated software engineering by exploiting the versatility of Grid computing to build and especially to test Grid middleware and applications. Such an approach also accelerates the assessment of interoperability between Grids, as well as between applications and underlying Grid service. In this respect, ETICS is contributing to the Global Grid Forum (GGF) standardisation efforts on Quality Assurance and Certification Processes. The project is also directly contributing to the e-Infrastructure Reflection Group, both on the "White paper" and "e-Infrastructures Roadmap" documents.

# EUChinaGRID

**Summary:** EUChinaGRID will provide specific support actions to foster the integration and interoperability of the Grid infrastructures in Europe (EGEE) and China (CNGrid) for the benefit of e-Science applications and worldwide Grid initiatives, in line with the support of the intercontinental extension of the European Research Area (ERA).
The project will study and support the extension of a pilot intercontinental infrastructure using GRID-enabled applications and will promote the migration of new applications on the Grid infrastructures in Europe and China.

**Objectives:** EUChinaGRID is promoting the creation of a human network in the area of Grids, e-Science and e-Infrastructures between Europe and China and is also disseminating the results of successful European Grid infrastructures in China, comparing them with the CNGRID experience.
The project is supporting the interoperability of existing European and Chinese Grids, towards the creation of a "virtual Grid-based research space" for e-Science exploiting the existing and planned infrastructure provided by the research networks like GÉANT2 and the initiatives of high-speed intercontinental connections, such as TEIN2 and ORIENT.
EUChinaGRID is also fostering interoperability of solutions across disciplines to achieve broader scale uptake of Grid technology across user communities, harmonizing European and Chinese e-Science requirements and providing recommendations to adapt the present best practices, policies and tools.

**Technical approach:** EUChinaGRID will exploit the already available middleware developed within other Grid projects like EGEE and make use of established common practices in the deployment of such large infrastructures. By achieving the interoperability of the wider European and Chinese infrastructures, EUChinaGRID will provide the international research and education community with transparent access to a worldwide amount of storage and computing resources larger than currently available in separate environments.

**Service activities:** All Pilot applications, while providing a proof-of-principle approach to validate the EUChinaGRID infrastructure, will immediately take advantage of the new Grid infrastructure and services. A special effort will be devoted to developing common security policies and proposing deploying solutions for advanced services, in order to make the achieved interoperability effective.
The project team will provide operational support at the network and middleware level; furthermore, they will disseminate advanced knowledge to grid administrators and user groups, thus improving the accessibility of the Grid infrastructure.

*continued overleaf*

**Project acronym:** EUChinaGRID
**Contract nº:** RI-026634
**Project type:** Specific Support Action
**Start date:** 01/01/2006
**Duration:** 24 months
**Total expected budget:** €1,995,000
**Maximum EC contribution:** €1,299,9898
**Website:** http://www.euchinagrid.org
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**Coordinator:** INFN (Italy)
**Participants:**

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| CNIC | CN |
| IHEP | CN |
| Peking University | CN |
| GRnet | GR |
| Consortium GARR | IT |
| Jagiellonian University in Krakow | PL |
| CERN | CH |

**Collaborations with other EC-funded projects:**
ORIENT
TEIN2
GÉANT2
EGEE
GRIDICE
BELIEF
ICEAGE

**Interconnection & Interoperability of Grids between Europe & China - RI**

**European Commission**
Information Society and Media


**User communities:** The EUChinaGRID Pilot Applications are currently divided in three large application fields, but others will be involved.
***Astrophysics:*** the Cosmic Ray Experiment ARGO in Yangbajing (Tibet) - Nowadays will be provided with a gigabit link and grid services, thus greatly improving the efficiency of the data transfer and coordinated analysis between Europe and China.
***High energy Phisics:*** ATLAS and CMS experiments at LHC (Large Handron Collider) at CERN, will start taking data in 2007 and a strong group of Chinese scientists is actively participating to the experiments. The data collected by each experiment will be of the order of 100 Mbytes per second and will be widely available to all the collaborators in Europe and worldwide, provided that a good connectivity and a compatible grid infrastructure is available.
***Computational Biology:*** A research plan involving European and Chinese researchers will study the so-called "never born proteins» (NBP). The current plan is based on a computational approach to study the structural principles characterizing a large library of NBP (10**9 sequences) and selected sequences which can potentially give rise to stably folded proteins. Grids will allow to enlarge by orders of magnitude the libraries, distribute them among different laboratories and implement more powerful selection algorithms.

**International dimension:** The project is mainly addressing China, but other Asian countries will be contacted and, if possible, involved.

**Innovation:** The project will carry out studies on the interaction of IPv4 and IPv6 grids, as well as on IPv6-compliant middleware in a real environment. Grid developers and networking experts will take advantage from the project results.

**Success stories:** Since its start on the 1st of January 2006, the project has already set up a pilot infrastructure with European and Chinese sites (see the map).

# EUMedGrid

**Summary:** The EUMEDGRID project will set up a grid infrastructure for Research in the Mediterranean Region, which can eventually become part of EGEE and be integrated with analogous initiatives in the Balkans, South East Europe, Latin America, and Far-East Asia.
EUMEDGRID's main purpose is to raise grid awareness and competences among the researchers operating in the Mediterranean area, thus allowing them to benefit from this new powerful technology, fostering collaboration with other European and worldwide Grid projects and promoting scientific and industrial development in the area.

**Objectives:** EUMEDGRID aims to promote Grid awareness in the Region and stimulate the formation of National Grid Infrastructures (NGI) in the Mediterranean, towards the creation of a global "virtual Grid-based research space".
Local e-Science user requirements will be captured in order to guide the Euro-Mediterranean regional integration; pilot Grid resource centres in each country will be installed and provided with operational support. EGEE applications (from High Energy Physics and Biomedicine) will be deployed on the EUMEDGRID infrastructure and other applications of regional interest will be ported on the pilot infrastructure.
With regard to softer actions, the project team will provide guidelines to drive regional integration in the Euro-Mediterranean e-Infrastructure and encourage the dialogue about the development of common policies in the area.

**Technical approach:** EUMEDGRID will focus on improving both the technological level and the know-how of networking and computing professionals across the Mediterranean region, thus fostering the introduction of an effective Mediterranean Grid e-infrastructure for the benefits of e-Science.
The project will build upon the European forefront experience of the GÉANT2, EGEE and EUMEDCONNECT eInfrastructures, profiting of the already available middleware developed by other Grid projects like EGEE and making use of established common practices in the deployment of such large infrastructures.

**Service activities:** EUMEDGRID will perform pilot Grid sites installation, validation and certification within each country in the region, thus creating a pilot interoperable infrastructure and related services.
A group of expert will as well provide operational support at a network and middleware level and will disseminate advanced knowledge to grid Administrators and user groups in order to improve the accessibility of the Grid infrastructure.

**Research activities:** The project will mainly support external research activities through enabling the migration of applications on the Grid platform.
Furthermore, a considerable effort is devoted to capture and analyze the state of the art in the region, in order to develop a model for the formation of sustainable National Grid Initiatives in the participating countries and propose a technical roadmap sustaining the regional deployment strategy.

*continued overleaf*

**Project acronym:** EUMEDGRID
**Contract n°.:** RI-026024
**Project type:** Specific Support Action
**Start date:** 01/01/2006
**Duration:** 24 months
**Expected budget:** €1,995,000
**Maximum EC funding:** €1,299,9898
**Website:** http://www.eumegrid.org
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Roberto Barbera [TM]
Federica Tanlongo [PO]
**Contact email:** po@eumedgrid.org
**Coordinator:** INFN (Italy)
**Project partners:**

| | |
|---|---|
| CERIST | DZ |
| CERN | CH |
| CNRST | MA |
| Consortium GARR | IT |
| CYNET | CY |
| DANTE | UK |
| EUN | EG |
| GRNET | GR |
| HIAST | SY |
| MRSTDC | TN |
| RED.ES/redIRIS | ES |
| TUBITAK | TR |
| University of Malta | MT |

**Project third parties and contributors:**

| | |
|---|---|
| Bilkent University | TR |
| CRS4 | IT |
| Dep. of Physics – University of Roma Tre | IT |
| ICTP | IT |
| IUCC | IL |
| JUNet | JO |

**EUMedGrid: empowering e-Science across the Mediterranean - RI**

**European Commission**
Information Society and Media

**User communities:** EGEE-enabled applications relating to several application fields (Physics, Biomedicine, Heart Science) will be deployed on the EUMDEGRID infrastructure; furthermore, other applications of regional interest (i.e., Hydro geological) are expected to be involved as the project works proceed.

**International dimension:** EUMEDGRID will deeply involve nearly the whole Mediterranean region, both on the European and neighbouring countries of North-Africa and Middle East side, thus actively contributing to support the intercontinental extension of the European Research Area (ERA) in this strategic area.

**Innovation:** The EUMEDGRID project will allow researchers operating in the Mediterranean region to use Grid technology in their work and port their own application on the new e-Infrastructure. This will strongly favour collaboration with European and worldwide counterparts and foster the growth of new, high-level competences among professionals in the area, thus enabling scientific and industrial development in the Area.

**Success stories:** The interest of the EUMEDGRID experience is not restricted to scientific issues. Given the current political situation in the Mediterranean region, the creation of a human network, allowing people really willing to communicate and collaborate with their neighbours to meet and work together, can easily become the most challenging aspect of the initiative.
The first steps in this direction are indeed encouraging: the project started in January 2006 and representatives from the whole Mediterranean region (including Algeria, Egypt, Jordan, Morocco, Palestine, Syria, Tunisia and Turkey) are already working together and meeting periodically, either physically or via video conferences.

| | |
|---|---|
| Laboratoire Cristal - Ecole Nationale des Sciences de l'Informatique | TN |
| Padi2 | PS |
| Research Unit of Technologies of Information and Communication – University Of Tunis | TN |
| Dep. of Mathematics - University of Messina | IT |

# EXPReS

**Summary:** EXPReS (EXpress Production Real-time e-VLBI Service) employs high-speed communication networks in order to create a globally distributed, large-scale astronomical instrument of continental and inter-continental dimensions, a Very Long Baseline Interferometer (VLBI) operating in real-time, and connecting some of the largest and most sensitive radio telescopes on the planet. EXPReS will realise a production-level "electronic" VLBI (e-VLBI) service, in which the telescope sites are reliably connected to the central data processor at the Joint Institute for VLBI in Europe (JIVE, NL) via optical fibres. The telescope network connectivity relies on the pan-European Research Network (GÉANT2) and various National Research Networks, in particular SURFnet6 in the Netherlands. The e-VLBI infrastructure will be a unique facility in the world, generating high-resolution images of cosmic radio sources in real-time, providing astronomers with a reliable and Target of Opportunity (rapid-result) service, well matched to the study of transient phenomena such as active stars, supernovae and Gamma-Ray bursts.

**Objectives:** The main objectives of EXPReS include:

- To develop an operational, production-grade, real-time e-VLBI network openly accessible to the international astronomical community
- To expand the number of e-VLBI capable telescopes across the globe by supporting the provision of additional last-mile (local-loop) connections or upgrading existing connections to Gigabit Ethernet standard
- To reliably service and robustly correlate (in real time) e-VLBI aggregate data flows of up to 16 Gbps to the central European VLBI Network (EVN) data processor at JIVE
- To realise high performance networking capabilities (via the pan-European Network GÉANT2 and National Research Networks) by using dedicated lambda networks and employing new, congestion tolerant transport protocols
- To transparently include the UK e-MERLIN radio telescope array within the larger EXPReS e-VLBI facility
- To develop an e-VLBI Target of Opportunity (Rapid Response) Science capability, reacting reliably and flexibly to transient, unexpected astronomical events,
- Research into advanced networking and computing technology that could support the creation of a next-generation e-VLBI network in which the aggregate data flows will be many hundred of Gbps
- To investigate the feasibility of processing e-VLBI data using distributed Grid-based computing resources
- To support the expansion of new radio telescope facilities (e.g. e-MERLIN and LOFAR) via public communication networks
- To generally promote and demonstrate the way in which advanced communication research networks can be used to create enhanced, large-scale distributed scientific facilities of global significance

*continued overleaf*

**Project acronym:** EXPReS
**Contract nº:** RI-026642
**Project type:** I3
**Start date:** 1/03/2006
**Duration:** 36 months
**Total budget:** 12454450 €
**Funding from the EC:** 3900000€
**Web site:** www.expres-eu.org
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**fax:** +31629731413

**Project participants:**

| | |
|---|---|
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| AARNET | AU |
| PSNC | PL |
| DANTE | UK |
| ASTRON | NL |
| IGN | ES |
| JBO | UK |
| OSO | SE |
| MPIfR | DE |
| MRO | FI |
| INAF-IRA | IT |
| TCfA | PL |
| ShAO | CN |
| HRAO | SA |
| VIRAC | LV |
| TIGO | CL |
| NAIC | US |
| CSIRO-ATNF | AU |

**Key words:**
Information Technology, e-Infrastructure, Astronomy & Astrophysics

**Collaboration with other EC funded projects:**
GÉANT2
RadioNet
SKADS

**Creating a real-time radio telescope of continental dimensions - RI**

European Commission
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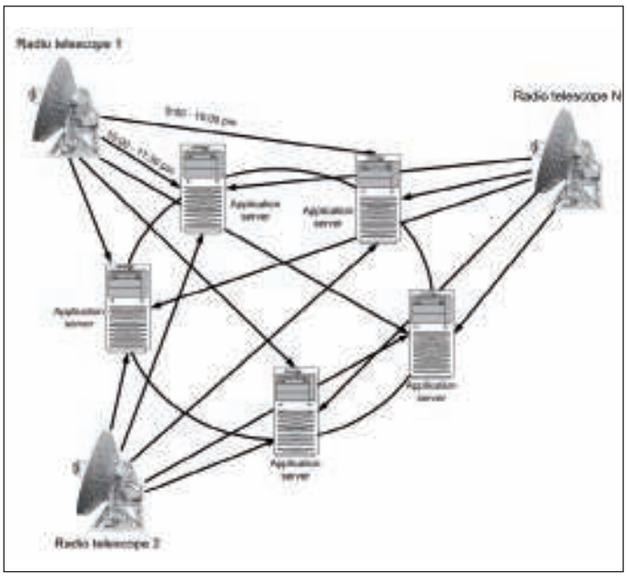
**Project planning & Technical challenges:** EXPReS closely integrates the service engineering and research aspects of the project within the standard instruments of Specific Support, Joint Research and Networking Activities:

**Service Activities:** EXPReS includes interdependent Specific Service Activities that form the core of the overall service project goals. These aim to realise a production-level e-VLBI service in which data can be transparently transferred to the data processor at JIVE, generating net data flows of up to 16 Gbps. An important part of the overall effort will be to ensure that when the data arrives at JIVE, it can be processed in real-time in a robust manner, with a level of reliability that closely approaches that achieved via traditional (non-realtime) VLBI data processing. A cornerstone of the project is to ensure that the telescopes of the e-MERLIN National Facility (operated by Jodrell Bank Observatory in the UK), participates transparently within this larger e-VLBI network. Another important aspect of the project is to expand the number of radio telescopes that have direct access to the GÉANT2 network, and thus the EVN data processor at JIVE in the Netherlands (via SURFnet6). In particular, one plans to stimulate and partially finance «last mile» connections to some of the largest and most sensitive radio telescopes in the world. In some cases existing communication services to these telescopes are improved and enhanced. The vast majority of the radio astronomy partners within EXPReS already participate in VLBI observations, and are operated by institutes that are members of the European VLBI Network (EVN). The creation of links to radio telescope facilities in other areas of the world is also an important project goal. Radio telescopes are located in Australia, China, South Africa, South America & the USA. The EXPReS infrastructure fully exploits the network bandwidth provided by the European research network GÉANT2 and the National Research and Education Networks (NRENs). The EXPReS project seeks to capitalise on the potential of lambda networking resources.

**Research Activities:** EXPReS Research Activities focus on the development of e-VLBI towards the use of high data rates, aiming to demonstrate the feasibility of data rates well in excess of 1 Gbps. Future e-VLBI arrays will require data rates in excess of 10 Gbps per telescope, implying aggregate data rates of 100 Gbps or more. Servicing such large data flows will require the construction of a new data processor. The EXPReS project will investigate whether it is possible to consider a Grid based approach to VLBI data processing.

**Networking Activities:** Within EXPReS the various networking activities support the overall management of the project and public outreach. The latter is extremely important, especially given the interest of the general public in all aspects of astronomy, not to mention its relevance in attracting young people into the study of the physical sciences. Critical review of the progress made by the EXPReS Service Activities is also provided by two additional networking activities; these are focused on supporting the activities of the e-VLBI engineers (drawn from both the radio astronomy and research networking communities) and the e-VLBI astronomical/scientific community.




**Innovation:** An important aspect of EXPReS is its intrinsic technical innovation that impacts the project and the e-Science community in terms of its high networking demands and its ambition to create a large (real-time) distributed astronomical research infrastructure. The research into the day-to-day use of photonic high speed links and in optimised data communication protocols is also Innovative.

# Go4IT

Summary: The Go4IT project allows better exploitation of the large European investments made to develop state of the art telecommunication research infrastructures by providing to all user communities open and generic tools to test IPv6 protocol implementations. These tools will increase end-users trust and confidence in the new IPv6 equipment and infrastructures.
The better exploitation of the Research Infrastructure depends on the capacity first to raise the level of knowledge and preparation of users to move to IPv6, and secondly to enlarge the IPv6 community of users. These two challenges are the principal objectives of the Go4IT project.

**Objectives:** While there is important effort to pool all forces to provide the necessary standards to deploy global and interoperable services, standards are not enough if operational tools and services are not available to get the critical mass of adopters from users and industry players.
Interoperability standards are part of the solution but the existence of well-defined and validated testing tools and facilities is also crucial for achieving the goal of interoperability.
The Go4IT project intends to provide Research Infrastructure users, the IPv6 development and user communities with IPv6 oriented test tools, test suites and the related services based upon the standardised TTCN-3 methods. This environment will allow more efficient use of the existing infrastructures, raise user knowledge and confidence in these new technologies and boost their adoption. Users will be able to validate compliance and interoperability before deployment and follow-on testing on the large European Research Infrastructures. In addition, the test environment will be made available to the IPv6 community at large and to any other interested party.

**Action plan:** To achieve the targeted objectives, the Go4IT project is conducting a set of activities and services.
They are:

- To provide a roadmap to a free, open & generic test environment
- To develop open & generic test tools for IPv6 protocols
- To offer free test tools, test services such as plug&test events and related support
- To raise user communities awareness of testing and validation methodologies
- To disseminate worldwide

**International aspects:** The Go4IT consortium comprises partners from Europe, Russia, China and Brazil.
This international consortium allow:

- to communicate and disseminate in covered countries;
- to organise an IPv6 plug & test event and a parallel session during the Global IPv6 summit in Beijing, in April 2006;
- to gather users and market needs in these regions.

*continued overleaf*

**Project acronym:** Go4IT
**Contract n°:** RI-026649
**Project type:** I3
**Start date:** 1/11/2005
**Duration:** 30 months
**Total budget:** 1 273 705 €
**Funding from the EC:** 1 000 000 €
**Total effort in person-month:** 137 pm
**Web site:** www.go4-it.org
**Contact person:**
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**Project participants:**

| | |
|---|---|
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| Fokus | DE |
| ISPRAS | RU |
| Jtest | FR |
| BII | CN |
| CATR | CN |
| BUPT | CN |
| IPT | BR |

**Key words:**
Conformance testing IPv6
TTCN-3
IPv6 interoperability
**Collaboration with other EC funded projects:**
6DISS
EuroLabs
IPv6TF-SC



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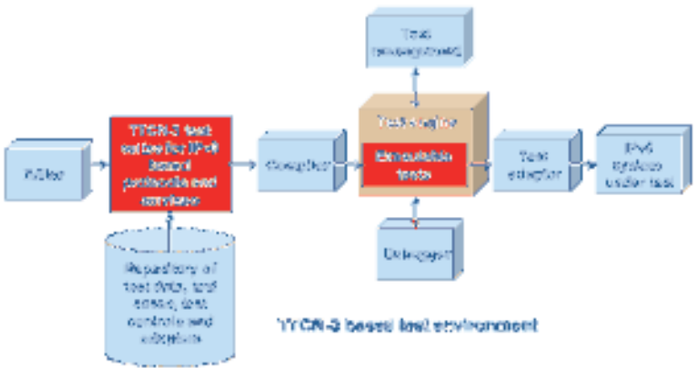
**User communities:** Focused on users trust and confidence into IPv6 system by providing conformance testing tools, Go4IT is evaluating the users needs, depending on the addressed user communities
***Test developers:*** needs in terms of test environment
***End-users:*** needs in term of IPv6 hot topics to be addressed in priority.



**Service activities:** The Go4IT project intends to provide a set of services related to IPv6 protocols testing:

1. Dedicated web portal
2. General documentation on test and validation approaches
3. Free executable test tools
4. Associated documentation
5. Synchronous and asynchronous users support

All these services are to be progressively deployed during the year 2006.

**Research activities:** First 6 months of the project have been dedicated to the definition of a roadmap toward an open and generic test environment, taking into account the users and market needs.
This will be concretised during the development phase that will target

1. Delivery of executable test suites
2. Delivery of the open and generic test environment

**Networking activities:** The networking activities of the Go4IT project aim to increase the user's awareness of test and validation approaches. This objective is ensured through

- The set-up of an open and collaborative web portal
- The organisation of Plug & Test events, bringing together IPv6 vendors and researchers to test and verify the interoperability of their solutions
- The participation to conferences (IPv6 global summit in Beijing, TUC3 conference in Berlin)
- The preparation of a users workshop to be held in 2007 in Russia

**Community enlargement:** To increase the impact and achievements of the Go4IT project, several levels of participation, from «being aware» right up to «active contribution», have been defined and open to communities

- ***Be informed:*** Share aims and results while accessing for free the full services offered by the Go4IT project and having the opportunity to give your feedback… *Go4IT forum*
- ***Contribute:*** Get privileged access to private information and tools and participate in technical and dissemination activities… *Go4IT factory*
- ***Coordinate:*** Ensure the project deliverables remain aligned to the overall objectives of Go4IT and the interests of individual contributors… *Go4IT consortium*

# ICEAGE

**Summary:** The ICEAGE project addresses a key requirement complementary to the investment in developing and deploying e-Infrastructure. It sets out to stimulate and support advances in grid education throughout Europe. This will involve collaboration across the world. By education we mean not only education in the use of the grid, but also the use of the grid in education. ICEAGE will create a roadmap and insights into the future of education in an era of pervasive e-Infrastructure.
Grid Education in rapidly advancing scientific domains is particularly labour intensive. It must draw on the expertise of a small community of pioneers. A major objective of ICEAGE is to provide an effective mechanism for distilling their knowledge and rapidly propagating it across Europe. ICEAGE will create a forum to bring together experts worldwide to expand and advance Grid Education. Building on EGEE, ICEAGE will demonstrate the wide potential of Grids, revealing new creative and business opportunities which will lead to the inclusion of social, ethical and economic issues in educational programmes. ICEAGE will show clearly how education can benefit from e-Infrastructure.

**Objectives:** The main aim of the ICEAGE Project is to stimulate and support advances in grid education throughout Europe by meeting the following objectives:

- Achieving rapid growth in effective advanced grid education
- Broadening engagement in an advanced grid education both geographically and across disciplines and make best use of worldwide capacity for advanced grid education
- Using the ICEAGE User Forum as an effective mechanism for distilling their knowledge and rapidly propagating it across Europe
- Enabling students and educators to obtain and develop Grid Education via sustained, large-scale, multi-purpose e-Infrastructure
- Delivering a stimulating programme of Educational Events, including International Summer Schools
- Encouraging European Universities to adopt courses in many disciplines to support the deployment and exploitation of e-Infrastructure. ICEAGE will ensure that citizens are well prepared to use e-Infrastructure in their private and professional lives. It will stimulate European educators by closely coupling the ICEAGE forum with a pioneering educational system, based on e-Infrastructure, involving a dynamic programme of events, shared strategies, information and material.

**Technical Approach:** In several forums, including GGF, e-IRG and ICEAGE (forum) we will develop a community and understanding of the requirements and best practice in Grid education. In the ICEAGE forum we will develop a roadmap for grid education. The ICEAGE team will build repositories of information, educational material and education facilities, drawing together digital library techniques, e-Learning facilities and e-Infrastructure to provide resources for educators and students throughout Europe. The outreach will be directed towards influencing educational decision makers in order to increase commitment to grid education.

*continued overleaf*

**Project acronym:** ICEAGE
**Project nº:** RI-026637
**Project type:** Specific Support Action
**Start Date:** 1 April 2006
**Duration:** 2 years
**Total budget:** 1200000 €
**Website:** http://www.iceage-eu.org/

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|---|---|
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| UCAT | IT |
| SPACI | IT |
| CERN | CH |
| KTH | SE |
| SZTAKI | HU |

**Collaboration with other EC funded projects:**
EGEE-II
NextGRID
DEISA

**International Collaboration to Extend and Advance Grid Education - RI**

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**Service Activities:** ICEAGE intends to deliver a stimulating programme of Educational Events, including International Summer Schools. Three schools are currently confirmed:

- ISSGC'06 Italy http://dma.unina.it/issgc06
- ISSGC'07 Scandinavia
- ISSGC'08 Hungary

ICEAGE will deliver sustainable e-Infrastructure. The focus will not be on short-term targeted training or linked to immediate demand. ICEAGE will develop long-term and sustained knowledge and educational systems, providing generic conceptual models and develop a culture of Grid Education which is then developed and built upon over many years and becomes part of the curricula of establishments throughout Europe.

**Research activities:** ICEAGE will develop new understanding of curricula, for example, if there are 20 hours available for Earth Science students what would be teach to best equip them for their future in an e-Infrastructure rich world? ICEAGE will explore emerging virtualization techniques in order to deliver and sustain a breadth of shared e-Infrastructure investigating how it can be designed to support teaching of principles and concepts. We anticipate the education will benefit from grid infrastructure that enables students to experience models, geographically distributed collaboration in problem solving and multi-disciplinary multi-national teams.

**User Communities:** Focused on the advancement of Grid Education in Europe, ICEAGE is aiming to work with a number of users from European research and academic groups in several scientific and application disciplines. We will work with researchers working on Grid projects with commitment for Grid research and development mainly from computer science, computational science but also from other application disciplines. Many users will have experience in some aspects of software development, distributed systems, computational systems, data systems and Grid applications. However ICEAGE will also seek to work with educators in other disciplines who have no prior exposure to grids.
ICEAGE seeks to give researchers involved in Grid Education throughout Europe the skills and knowledge to then continue to educate researchers within their own communities and regions. We will particularly target university education, though we recognise that there are similar needs for industry, community and school education.

**International Dimension:** The project partners are distributed throughout Europe giving the advantage of local knowledge and an established network of contacts. In addition ICEAGE has created a forum to bring together experts worldwide to expand and advance Grid Education, 51 Founder Members from 21 Countries originally agreed to be Members of the Forum. It has started a community group at GGF and a working group in e-IRG.

**Innovation:** There will be internationally agreed recommendations on curricula, shared educational material and shared t-Infrastructure which will be described in GGF documents.

**Success stories:** The Fourth International Summer School in Grid Computing, which the project is organizing, already has over 30 international leaders, e.g. Professor Ian Foster, committed to delivering the school. It is already oversubscribed with excellent students from throughout the world and other summer schools, including specialist schools are being planned.

# ISSeG

**Summary:** ISSeG is a two-year project partly funded by the European Union, which started the 1st of February 2006. It aims to contribute to the consolidation of the European Grid infrastructure in the field of computer security, by creating and disseminating practical expertise on the deployment of Integrated Site Security (ISS), as a complementary action to Enabling Grids for E-sciencE (EGEE) project's Grid Security. ISS is a concept where all Site Security components (technical, administrative, educational) are developed in a coordinated fashion. The ISSeG vision is that Grid Security, which focuses on inter-site security, middleware, and authentication, needs to be complemented by a comprehensive ISS strategy at every centre. The ISSeG consortium comprises three large scientific centres, CERN, CCLRC and FZK, all involved in EGEE. The project objectives will be achieved by the creation and capture of raw expertise through full-scale ISS deployment at CERN and FZK, and by dissemination through the provision of applicable recommendations and methodologies for further ISS deployments.

**Objectives:** ISSeG aims to contribute to the consolidation of the European Grid infrastructure in the field of computer security.

- The specific objective is to create and disseminate practical expertise on the deployment of Integrated Site Security (ISS) to complement Grid security activities undertaken in the EU-FP6 EGEE project.
- Through this objective, the project aims to create conditions for wider scale deployment of improved Site Security in the scientific community. This will in turn strengthen the emerging scientific e-Infrastructure.

**Methodology:** The creation of ISS expertise is achieved through the actual deployment of Integrated Site Security on the sites of two participants, CERN, a particle physics research centre, and FZK, a multidisciplinary research centre.
The **dissemination of ISS expertise** is achieved through the production of methodologies and material for the deployment of ISS to new Grid sites, in the form of technical and operational recommendations. In addition, generic educational material for on-site security training will be created, adapted, referenced, organized and published.

**Service activities:** ISSeG aims to produce applicable recommendations that can be tailored to any site, whether connected to the Grid or otherwise. It also aims to develop training plans and content, as well as conduct specific pilot actions. Concretely, this will include:

1. Specific Pilot dissemination actions such as participation in the EGEE meetings, and a workshop on ISS with site security officers.
2. The creation and publication of ISS educational material on a dedicated dissemination web site.

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**Project acronym:** ISSeG
**Contract n°:** RI- 026745
**Project type:** Specific Support Action
**Start date:** 01/02/2006
**Duration:** 24 months
**Total budget:** 1,309,030 €
**Funding from the EC:** 1,086,000 €
**Total effort in person-months:** 205
**Web site:** http://cern.ch/ISSeG
**Contact person:** David Myers
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**Project participants:**

| | |
|---|---|
| CERN | CH |
| FZK | DE |
| CCLRC | UK |

**Key words:**
Site Security
Grid
**Collaboration with other EC funded projects:**
EGEE/EGEE-II
ICEAGE
ETICS
BalticGrid
BELIEF
CERN
CCLRC
FZK

**Integrated Site Security for Grids - RI**

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**Technical approach:** Like most ideas based on the concept of integration, Integrated Site Security (ISS), as developed at CERN, is more a practical approach than a new paradigm. The idea is to consider all dimensions of site security, and to develop them consistently and in a coordinated way. The three dimensions of the ISS are:

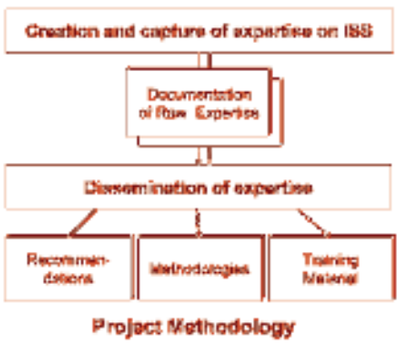
a) The Technical Security Infrastructure
b) The policy, administrative and regulatory framework
c) The training and sensitization aspects.

Another feature of the approach lies in the distinction made between Grid and site security. The Grid paradigm aims to share computer resources that are geographically distributed and operated by different physical organizations. As a result, Grid security activities are mainly focussed on

a) Inter-relations between physical Grid sites
b) Authentication and authorization of Virtual Organizations members
c) Threats specific to the Grid technologies.

Site security focuses on protecting the resources of the sites, detecting security breaches and responding to security alerts. The resources to protect include:

- the users themselves (e.g. their identities)
- the accounts used to access a computer, an application by users or automatic systems
- the roles and privileges associated with the accounts
- the physical devices including desktop and laptop computers, network equipment, telephones, PDAs, etc
- the software including operating systems
- the rights to access the network (who has access, to communicate with whom)



The three dimensions of an Integrated Site Security approach

**User communities:** ISSeG recommendations target scientific organizations, in particular but not exclusively those hosting computing resources – computer clusters, data storage systems, scientific data. ISSeG is therefore a project that should benefit all scientific communities requiring Grid services. Specific scientific communities are involved in two ways:

1. Through the multi-disciplinary partners, FZK and CCLRC, which are serving communities including Earth and Environment, Energy Research, Health, Key Technologies, Material sciences, Micro electronics and Nano Technologies, Optics and Laser research, Particle Physics, Space Science, Synchrotron Radiation.
2. Through close collaboration with the EGEE-II project that involves several communities including Astrophysics, Bio-Informatics, Computational Chemistry, Earth Sciences, Fusion Physics, High-Energy Physics.

**International Dimension:** ISSeG is closely connected with the leading Grid initiatives in Europe, the Enabling Grids for E-sciencE project (EGEE) In addition, the project is developing synergies with two national Grid initiatives, GridPP and D-Grid as well as with other EU-funded project including BalticGrid, BELIEF, ETICS, and ICEAGE. The project is coordinated by CERN, an International organization with 20 member states.

**Challenges and the future:** The main challenge for ISSeG is the antagonistic requirements between the openness of scientific sites and the protection of their mission critical resources, an issue that will soon concern most organizations, scientific or not.

ISSeG is a two-year project. It does not aim to achieve wide-scale ISS generalization – this may be the subject of a second phase – but instead to create the conditions for generalization: methods, recommendations, training, all of which are validated by the two deployments.

# Ithanet

**Summary: Ithanet** is a Euromediterranean network of research centres conducting molecular and clinical research of thalassaemia and related haemoglobinopathies. Participants of **Ithanet** include all major European research institutions active in haemoglobinopathy research and a number of collaborating partner institutions from non-EU Mediterranean and Black Sea countries.

The main objective of **Ithanet Co-ordination Action** is to enhance the scientific potential of this research community using infrastructures and tools of European Research Networks. **Ithanet** aims to harmonise and develop these resources for the coordination of existing research activities as a base for future collaborative projects.

Using eInfrastructure tools to consolidate and strengthen a research community with a specific geographic distribution and research topic, **Ithanet** strives to create new opportunities for high-impact collaborative research in the European Research Area.

**Objectives:** The specific objectives of **Ithanet** are:

- to stimulate the development of common research strategies and pooled resources in the field of haemoglobinopathy research, based on the efficient and effective use of Research Infrastructures (Research Networks, Grids)
- to create an inclusive research environment and provide access to various research resources
- to promote the efficient dissemination of research results in the field of haemoglobinopathies and provide support to improving quality and availability of health care services offered to the European population.

**Action Plan:** Ithanet will set up a common information and communication environment in order to facilitate and provide support for common and collaborative research activities, exchange of data, protocols, research results, and their effective exploitation.

The specific actions of **Ithanet** are focussed on:

- introduction of media broadcasting and streaming technologies into conferences and teaching courses on haemoglobinopathies
- implementation of a European portal for thalassaemia and associated haemoglobinopathies, targeting researchers, specialist doctors, and the general public
- creation of a common publication scheme for haemoglobinopathy case reports, that will prepare the ground for a new e-journal of thalassaemia case reports
- creation of repositories of methods, protocols and data descriptions that will initiate the pooling of data and further resources relevant for studies relating genotypes to thalassaemia phenotypes
- setup of a database of genetic mutations associated with thalassaemia and related haemoglobinopathies linked with geographical information on specific mutations.

*continued overleaf*

ithanet
Electronic Infrastructure For Thalassaemia Research Network

**Project acronym:** ITHANET
**Contract n°:** RI- 026539
**Project type:** Coordination Action
**Start date:** 01/04/2006
**Duration:** 24 months
**Total budget:** EUR 1 207 300
**Funding from the EC:** EUR 1 200 000
**Web site:** www.Ithanet.org

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**Project participants:**

| | |
|---|---|
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| Boğaziçi University | TR |
| Cairo University | EG |
| CESNET | CZ |
| Chronic Care Center | LB |
| Cyprus Institute of Neurology & Genetics | CY |
| EGE University | TR |
| Erasmus University Medical Center | NL |
| European Genetics Foundation | IT |
| Ferrara University | IT |
| Hadassah Medical Organization | IL |
| Hospital Clinico San Carlos | ES |
| Hopital Henri Mondor | FR |
| IRCCS Policlinico San Matteo | IT |
| Laikon General Hospital | GR |
| Leiden University Medical Center | NL |



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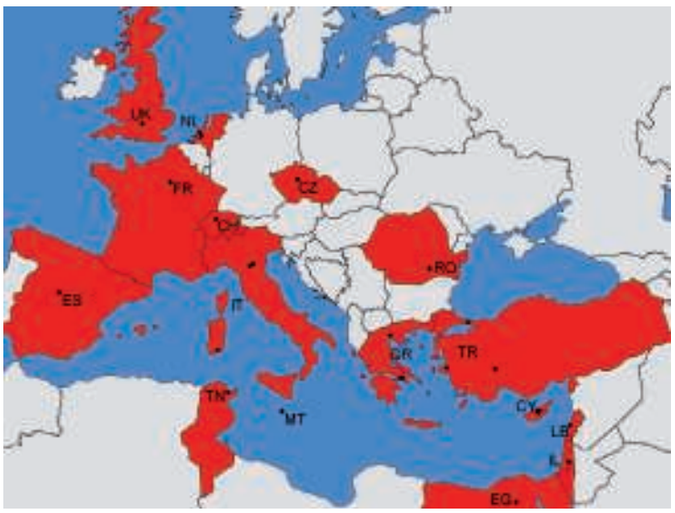


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|---|---|
| Makarios III Hospital | CY |
| Oxford Radcliffe Hospital NHS trust | UK |
| Research Laboratory of Molecular Biology (Hopital d'enfants de Tunis) | TN |
| Thalassaemia International Federation | CY |
| University of Athens | GR |
| University of Bucharest | RO |
| University of Cagliari | IT |
| University of Malta | MT |

**Keywords:**
information technologies
research coordination
thalassaemia

**Collaboration with other EC funded projects:**
GRID projects
SILK
GÉANT2

**User Communities:** The **Ithanet** network associates 25 participants from 16 countries, including scientific and medical communities, patients and their families, and patient associations.

It represents the research community in the field of haemoglobinopathies, which is on the borderline of molecular biology and medicine. This research field is amongst those most likely to benefit from the emerging tools of high-profile computing (Grids), which allow complex studies correlating phenotypic features with genetic data. The **Ithanet** action will pave the way for use of these tools in the biomedical research of haemoglobinopathies.

# OCCASION

**Summary:** The Silk Project provides connectivity to GÉANT2 from the National Research and Educations Networks (NRENs) of the 8 Newly Independent States (NISs) of the Caucasus and Central Asia, and Afghanistan. The Silk Project is supported by a number of organisations, with the largest funding coming from the NATO Security through Science Programme, with substantial contributions from Cisco and DESY. The OCCASION Project manages the Silk Project, provides additional features (e.g. network management, VoIP and videoconferencing tools), and services such as information, CERTs (Computer Emergency Response Teams) and operational support. Their deployment and maintenance help researchers in the Silk countries to collaborate with their colleagues in the European Union. Another aspect of the project is to identify significant User Groups, active in both the Silk countries and the European Union, who need to use the Silk network for their collaborations. It then fosters the requisite training and joint workshops (co-funded with other bodies) to enable useful collaborations. Finally, it will assist the Silk NRENs to move towards an environment in which their networks will be self-sustainable without continued large-scale financial contributions from the EC and NATO.

**Objectives:** The main objective of OCCASION is to advance collaboration between European researchers and those in the Caucasus and Central Asia – the Silk countries shown in the figure below. The other objective is to help develop the National Research and Educational Networks (NRENs) in the Silk countries – both in technology and facilities. Specifically OCCASION will pursue the following themes:

- to manage the network linking the Silk NRENs to GÉANT2.
- to coordinate the provision of information services by the Silk NRENs.
- to deploy and operate a set of VoIP and multimedia conferencing end-stations to provide collaboration facilities between the researchers from the European Union and the Silk countries.
- to deploy and assist in the operation of a Computer Emergency Response Team in each Silk country.
- to facilitate training in relevant areas.
- to set the scene for the Silk NRENs to move to a sustainable NREN infrastructure with good performance within its financial limitations.

**Action plan:** We will first make an inventory of the current status of the NRENs in the Silk countries and how far each has currently reached in attaining sustainability.
The whole Silk project will upgrade its communication facilities later in 2006; the OCCASION partners will be involved in the tender evaluation during Q2 2006, in order to provide a higher performance system starting a few months later. In parallel we will start putting into place facilities for Voice/IP (VoIP) and conferencing. Their full deployment will be delayed until the new system is fully operational. The successful operations of such systems will require us to pay careful attention to the maintenance of Quality of Service, since we expect the system to be very fully loaded.

*continued overleaf*

**Project acronym:** OCCASION
**Contract nº:** RI- 026546
**Project type:** Specific Support Action
**Start date:** 1/11/2005
**Duration:** 24 months
**Total budget:** 1333000 €
**Funding from the EC:** 750000 €
**Total effort in person-month:** 109
**Web site:** www.ist-occasion.org

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**Project participants:**

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| DESY | DE |
| RUG | NL |
| ARENA | AM |
| GRENA | GE |
| AZRENA | AZ |
| KAZRENA | KZ |
| AKNET-KRENA | KG |
| TARENA | TJ |

**Key words:**
Caucasus
Central Asia
Satellite connectivity
Personal Communication
Sustainability

**Collaboration with other EC funded projects:**
GÉANT2
PORTA OPTICA
SEEREN2
EUMED-CONNECT

**Organising Caucasus and Central Asian Internet Offerings to NRENs – RI**

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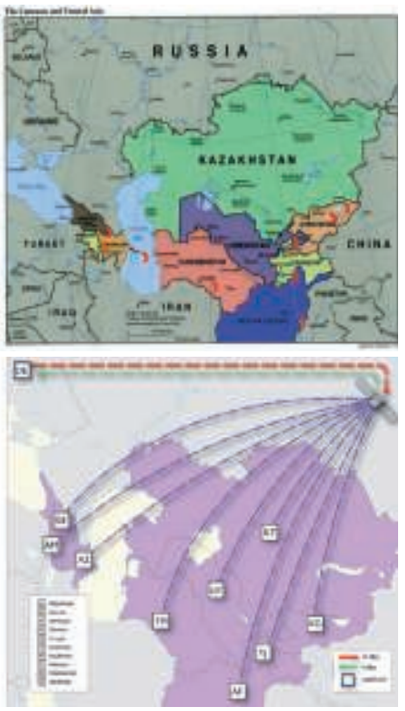
During this period, we expect also to introduce Computer Security Incident Response Teams (CSIRTs) in each of the Silk countries.
In preparation for forming up-to-date NREN organisations in each of the Silk countries, we will ensure that all have adequate address registration authorities, autonomous domains and information services in place.

**International Aspects:** The project is fundamentally international, with the recipient NRENs covering all of the Caucasus, Central Asia and Afghanistan. The problems encountered are similar to those in other regions; as a result, we will establish links with other similar communities in the Balkans, the Mediterranean countries and in Africa. Here cross-participation of some of the OCCASION partners with other projects working in those areas will be helpful.
Another aspect of international activity in the project will be working with NGOs in the Silk region to explore training, complementary funding and moves towards sustainability

**User communities:** We will also make an inventory of current collaborations between research groups in the Silk countries and those in the European Union. This will be a precursor to assessing their needs for communication services and training to facilitate their collaborations. We will introduce VoIP and conferencing facilities to help the user groups collaborate, and provide training facilities both to the NRENs themselves and to the users. These will be co-funded with other NGOs as a series of workshops.
There is particular interest in Distance Education by many of the user groups; this will be pursued further.



Schematic of Region covered by Silk/OCCASION

**Service and Support Activities:** The OCCASION project provides a number of relevant services and support to the scientific community:

1) Management of the Silk Project as a whole.
2) Management and Performance measurement of the Silk network communications system between the NRENs and GEANT2. This includes the provision of bandwidth, looking after equipment maintenance and repair, and managing the billing of extra bandwidth on a subsidised basis
3) Scheduling and performance management to ensure adequate Quality of Service for the VoIP and conferencing applications.
4) Assistance in the addressing organisation and equipment set-up to ensure that the Silk/OCCASION services are compatible with those running on the European NRENs.
5) Operations of the CERTs in the Silk countries as part of the European CERT system.
6) Ensuring adequate Web portals and information to keep the NRENs themselves, their users and the European research community informed of the potential of the Silk/OCCASION services.
7) Limited provision of supercomputing facilities on the Blue Gene supercomputer at Groningen U.
8) Provision of VoIP and Multimedia Conferencing facilities for collaboration with European researchers.

The Silk/OCCASION infrastructure fully exploits the network bandwidth provided by the European research network GÉANT2 and the National Research and Education Networks (NRENs) – both in Europe and the Silk countries.

**Networking Activities:** Besides facilitating a number of research collaborations in areas of science and technology (e.g. Material Sciences, High Energy Physics, Grid research and Life Sciences and Environmental Sciences), OCCASION deploys a strong activity on the provision of real-time collaboration services over medium speed networks with heavy utilisation.
The total activity of the OCCASION project is to ensure the current integration of the Silk NREN networks into the European GÉANT2 research community, and to facilitate their progression to higher performance interconnection in an economic and sustainable manner.

# Porta Optica Study

**Summary:** The Porta Optica Study is a one year project with the goal to prepare the development of high-speed, fiber-based research and education networks in Eastern Europe, the Baltic States and the Southern Caucasus region. Expansion of academic optical networks is one of the key aspects of building a research and education infrastructure in the European countries and one of the essential elements of an integrated growth of the European Research Area. The Porta Optica Study addresses the disparity in the development of advanced research networks, especially visible in the Eastern Europe.

**Objectives:** The ultimate goal of the Porta Optica Study is the stimulation and consolidation of initiatives to ensure successful, dark-fiber based research network deployment in the Eastern Europe countries, particularly in Armenia, Azerbaijan, Belarus, Estonia, Georgia, Latvia, Lithuania, Moldova and Ukraine. For this purpose the project is:

- Identifying potential beneficiaries of NREN services – the user base, user location and requirements, with the focus on user communities with potential to collaborate with EU partners. The accurate information about users allows more precise identification of the priority areas and preferred routes for fiber deployments;
- Identifying the availability to deploy dark-fiber based NRENs and dark-fiber interconnections to GÉANT2 via favoring market conditions and funding opportunities;
- Performing case studies and propose viable deployment scenarios for dark fiber infrastructures in the targeted areas, including interconnections to GÉANT2;
- Raising awareness and disseminating the project results in order to achieve critical mass necessary to enable future deployments of fiber infrastructures

**Technical approach:** The Porta Optica Study project will achieve the most important results by performing the case studies, providing scenarios with optimal solutions for building dark-fiber based network infrastructure. The case studies are based on data collected from the target communities (research institutes, network providers, government agencies, research networks). The solutions worked out in the case studies, are disseminated during workshops and meetings.

**Service activities:** The project is concentrating on providing deployment scenarios for dark-fiber network infrastructures in the target areas, including interconnections to GÉANT2, rather than on the service and network construction itself. However, the case studies results and complete deployment plans for dark-fiber network infrastructures capable of providing enhanced services will be delivered by the project.

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**Project acronym:** Porta Optica Study
**Contract nº:** RI-26617
**Project type:** Specific Support Action
**Start date:** 01/02/2005
**Duration:** 12 months
**Total budget:** 319 528 euro
**Funding from the EC:** 316 878 euro
**Total effort in person-month:** 83
**Website:** www.porta-optica.org
**Contact person:** Artur Binczewski
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**Projects participants:**

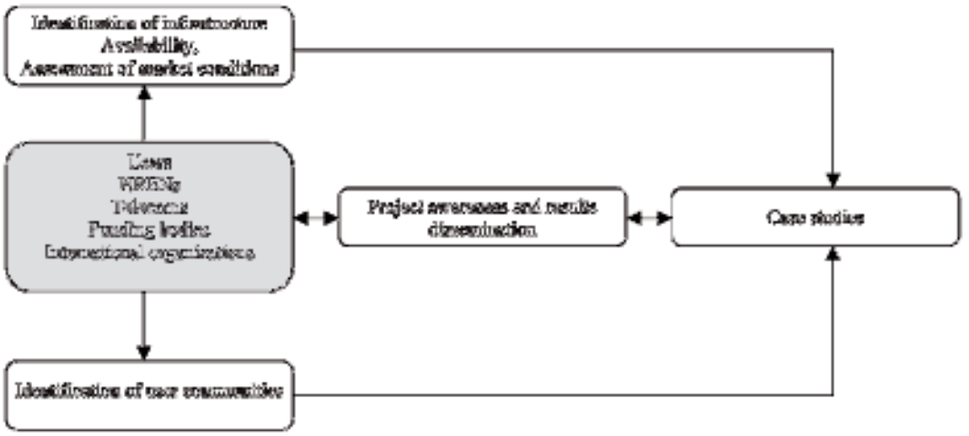
| | |
|---|---|
| PSNC | PL |
| CEENET | AT |
| LITNET | LT |
| IMCS-UL | LV |
| EENET | EE |
| URAN | UA |
| NCIRT | BY |
| RENAM | MD |
| GRENA | GE |
| GRNET | GR |
| CESNET | CZ |
| SANET | SK |

**Key words:**
Dark fiber, digital divide, deployment scenarios

**Collaboration with other EC funded projects:**
GÉANT2, SEEFIRE



European Commission
Information Society and Media




**User communities:** The extensive studies of Porta Optica will enhance the opportunities of the research and education communities in Eastern and Southeastern Europe. The main concept here is to indicate directions for the future expansion of academic optical networks, which can be achieved by both increase of their capacities, as well as provision of virtually unlimited access to the GÉANT2 network. Such infrastructure expansion will have a significant impact on user engagement in the new research projects related to radio astronomy, high energy physics and grids, which usually have very high network requirements. Furthermore, it will allow students and researchers from beneficiary countries for more efficient co-operation in scientific ventures with leading research centers in the world. High-speed communication infrastructure will provide advanced network services and will contribute significantly to building the Information Society in Eastern and Southeastern regions of Europe. Porta Optica Study project results will have influence on over 1400 scientific institutions and 700 higher education institutions in nine target countries.

**International dimension:** Results of Porta Optica Study project will also have a wide impact on international research co-operation. Implementation of project results will allow building of a high capacity network connecting Eastern Europe, Baltic States and Southern Caucasus countries, thus enabling new form of co-operation in very demanding research disciplines. The Porta Optica Study involves organizations from 14 countries, both from EU and NIS countries. The project supplements and cooperates with similar existing initiatives in the European Union, South East Europe and Mediterranean (GÉANT2, SEEFIRE and EUMEDCONNECT)


**Innovation:** Although no innovation aspects in terms of contribution to the existing standards are foreseen, the project has an impact on the evolution of knowledge about international network cooperation, dark fiber deployment and procurement in Eastern Europe.

# SEEREN2

**Summary:** SEEREN2 aims at creating the next generation of the southeast European segment of GÉANT2 that intends to make leading-edge technologies and services available to the entire Research and Education communities and all scientific sectors without discrimination between users and sites in southeast Europe in an attempt to further ease the 'digital divide' that still separates most of the SE European countries from the rest of the continent. With respect to its predecessor (SEEREN), the infrastructure is substantially enhanced in its performance but more significantly adds a new key item to its fundamental characteristic, the consolidation of the networking and Grid infrastructures, into an eInfrastructure for South East Europe, fully integrated with the pan-European efforts (GÉANT2, EGEE2, SEE-GRID2, etc).

**Objectives:** The ultimate goal of the project is to consolidate the network and services into the pan-European eInfrastructure and the NREN end-users into the European Research Area. This promotes the cooperation of scientific and educational communities of EU member states with the southeast European countries.

- ***Sustainable Development:*** SEEREN2 continues to assist the incubating and existing NRENs to fully establish themselves and to integrate with related European-wide organisations and initiatives, and eventually become full members of GÉANT2.
- ***Upgrade the SEEREN Infrastructure:*** SEEREN2 upgraded the South-East European eInfrastructure interconnecting the National Research and Education Networks. With respect to its predecessor the infrastructure is substantially enhanced in its performance but more significantly adds a new key item to its fundamental characteristic, the consolidation of the networking and Grid infrastructures, into an eInfrastructure for southeast Europe, fully integrated with the pan-European efforts (GÉANT2, EGEE2, SEE-GRID2, etc).
- ***Strengthen the Human Network:*** The SEEREN2 infrastructure provides a significant increase in the network capacity available for communication and experimentation among end users. In order to ensure that the investment in this resource is effectively exploited, a promotional and training activity involving the distribution of publicity material, presentations at scientific conferences and other relevant activities is undertaken with an objective to strengthen the human network in the area of eInfrastructures in Southeast Europe.

**Technical Approach:** Based on South East European NREN connectivity requirements, market conditions, supplier capabilities and technical, operational and commercial requirements, all possible implementation approaches and topology options of GÉANT2–SEEREN2 interconnections has been assessed. An international tender abided by EU legislation seeking for "traditional" connectivity services and dark fibre lease between the beneficiary countries and the GÉANT2 PoPs was carried out. The network development is encircled by a plethora of networking services. A review of the current state of the established and emerging technologies, and software tools applicable to network services and management is carried out and evaluates the usefulness for the SEEREN2 NRENs. Those services/tools and any other identified during the project timeframe are assessed and whether technically feasible, are developed/deployed.

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**Project acronym:** SEEREN 2
**Contract nº:** RI- 026748
**Project type:** Specific Support Action
**Start date:** 1/10/2005
**Duration:** 30 months
**Total budget:** 3 083 860 €
**Funding from the EC:** 2 510 885 €
**Total effort in person-month:** 188,50
**Web site:** www.seeren.org
**Contact person:** Yannis Mitsos
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**tel.:** +30 210 7475687
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**Project participants:**

| Contractors | |
|---|---|
| GRNET | GR |
| DANTE | UK |
| TERENA | NL |
| NIIF/HUNGARNET | HU |
| RoEduNet | RO |
| ISTF | BG |
| UoB/AMREJ | CS |
| UKIM/MARNET | MK |
| ASA/INIMA | AL |
| BIHARNET | BA |
| UoM/MREN | BR |
| SENAMHI | CS |
| SEEREN2 Third Parties | |
| PUT | AL |
| UT | AL |
| UpTu | AL |
| UoBL | BA |
| UoS | BA |

**Collaboration with other EC funded projects:**
GÉANT2
SEE-GRID2
6DISS

South East European Research & Education Network - RI

European Commission
Information Society and Media

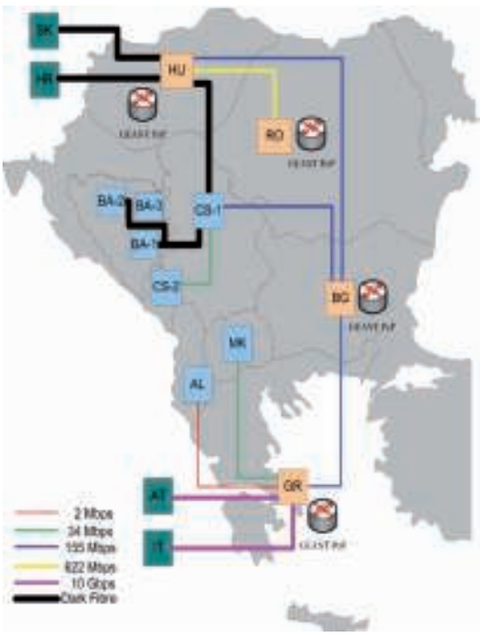
**Service Activities:** In the course of the SEEREN2 project a number of services and tools will be deployed. The project further invests into the deployment of additional services and tools while maintaining in operation the previous ones. Service categories can be discriminated into *basic* (routing/switching, DNS, NTP, Web and ftp Trouble ticket system), *networking* (IPv6, End-to-End BoD with QoS guarantees, IPv4 & IPv6 multicast), *network management* (active/passive monitoring, SLA management), *security, user-level* (IP telephony, directory services, EduRoam).

**User Communities:** The SEEREN2 infrastructure provides a significant increase in the network capacity available for communication and experimentation among end users of the research and education community in southeast European countries and of the rest of the world. The SEEREN2 infrastructure extends, through the infrastructures of the participating NRENs, to more than 300 universities and research institutes in the region -in some cases also to libraries, hospitals and schools- and through the infrastructure of the connected entities to 2,500,000 potential end-users (professors, researchers and students).

**International Dimension:** SEEREN2 directly supports international collaboration and enables the South East European region to participate in advanced communication technologies activities by providing the foundation upon which eInfrastructures can be deployed. There are already a number of ongoing international collaborative efforts in the South East European region in the area of advanced communication technologies (e.g. SEE-GRID2, SEE virtual University, etc.) that critically depend on SEEREN2 in order to be able to sustain their execution and pursuance of their objectives.

**Innovation:** SEEREN2 is expected to be an essential instrument for the creation and exploitation of a range of new service and best current practices, to support research & education, as well as offering facilities for collaboration and experimentation carried out as part of FP6 and other international projects. The collaboration with GÉANT2 helps the transferring of advanced networking services and technologies, and leverages the best practices followed by the SEE research & education communities by:

- Offering permanent, dedicated and stable connectivity for SEE academic community
- Introducing new technologies and know-how through collaborative work, and making these technologies and knowledge available to the SEE community
- Serving as reference for further developments and future European collaboration




**Success stories:** SEEREN2 has stimulated the interest of the Research & Education Communities of South East Europe, as well as National & International bodies and business communities that have committed to assist in the development of eInfrastructures and Information & Communication Technologies (ICT) in the region. Relations have been established with SEE regional projects such as SEE-GRID2, which targets the provision of a Grid infrastructure to deliver a vast spectrum of applications to the South East European regional distributed research communities, and SEEFIRE which produced studies on regulatory and legal framework for the support of dark-fibre infrastructures, and models for dark-fibre acquisition at international and national level that can be adopted by the SEEREN2 countries.
SEEREN2 is considered an indispensable element for fulfilling the strategic roadmap of enlarging the geographical coverage of the GÉANT2 network in South East Europe (its footprint will cover one of the last network "holes" in Europe), thereby helping to ease the acute digital divide between the South East European region and the rest of the continent.