Project no. FP6-015994

Grid@Asia

Advanced Grid Research Workshops through European and Asian Co-operation

SSA
Grid Technologies

**Catalogue of Grid Initiatives and projects:
Europe, China & South Korea**

Supplementary deliverable:

Actual submission date: March 2007

Start date of project: 1 April 2005 Duration: 22 months

Organisation name of lead contractor for this deliverable: GEIE ERCIM
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Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination Level		
PU	**Public**	**PU**

Keyword List: International collaboration on Grid technologies, programs and initiatives

Abstract: This report gives a brief overview on the Grid national and international program in Europe, China and South Korea. For each of these programs, a short description is provided along with a contact point and web site if available.

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A. Introduction

I. Grid Research and Technologies

Grid computing emerged in the mid-nineties as a new high-performance computing infrastructure for scientific and engineering applications. The Grid (Foster and Kesselman 1998) focussed in its early stage mainly on metacomputing: sharing computing resources over the Internet. Nowadays, Grid technologies have evolved in such a way that their scope encompasses a wider range of applications such as those in e-Business or e-Engineering. Grid technologies are now able to cope with various kinds of resources and not only those for high-performance computing. They address the need to develop complex distributed software environments to match industry requirements. Today's industrial design, engineering and manufacturing is organised in complex workflows and is usually characterised by a strong demand for different and reliable distributed resources such as databases, high-performance servers, visualisation systems and even personal digital assistants or mobile phones. Similar requirements exist in commerce and business, in agriculture, extraction industries, transport, health, government, culture and the environment. Grid has now evolved to a fully distributed, dynamically reconfigurable, scalable and autonomous infrastructure to provide location independent, pervasive, reliable, secure and efficient access to a coordinated set of services encapsulating and virtualizing resources (computing power, storage, instruments, data, etc.) in order to generate knowledge. This vision was defined by the European Grid research community from the CoreGRID network of excellence.

Today, we are still quite far from realizing this vision since there are numerous research challenges to be solved to meet the broader requirements such as those of business or heavy-duty scientific computing. Such requirements include scalability, robustness, dynamicity, self-healing, high integrity, business-strength security and trust, low effort threshold end-user interfaces, and homogeneous access to heterogeneous resources and sources. To speed up the industrial adoption of Grid Technologies, these challenges must be addressed at an international level, combining the experience and expertise gained in many Grid initiatives worldwide. Europe and Asia have funded several well-known projects and initiatives in the area of Grid Research and Technologies allowing them to seed cooperation in this particular research field.

II. Grid@Asia

The Grid@Asia project is fostering collaboration between the European Union and Asia in the field of Grid research and technologies. Cooperation between the European Union, China and South Korea could help to resolve some of the research challenges more efficiently than would be possible if working in isolation. This initiative focuses on stimulating the scientific cooperation with China and South Korea, before potentially extending to other Asian countries. Grid@Asia promotes innovative Grid related technologies in both China and South Korea, with the objective to facilitate the integration of Asian teams within strategic EC funded projects. By weaving additional links between European and Asian Grid research communities, Grid@Asia supports long term international cooperation, in particular through the collaboration between the main Asian Grid programs with leading European Grid initiatives (such as Networks of Excellence, Integrated Projects, STREPS,...), both within FP6 and the forthcoming FP7. Relying on three core players in Asia (Beihang University and the Shanghai Jiao Tong University in China, and the South Korean Institute of Science and

Technology Information, KISTI Supercomputing Center in South Korea), Grid@Asia has been rapidly 'federating' and integrating many of the leading Chinese Grid stakeholders within its activities, as well as the major Grid Programs. The main achievement has been to organise a series of three strategic workshops held successively in Beijing (June 2005), Shanghai (February 2006) and Seoul (December 2006). As a consequence of the first two workshops, several collaborations led to the preparation of proposals for the EU-IST FP6 Program. In particular, the IST Call 5 on Grid technologies resulted in a first group of projects with joint collaborations with Chinese partners, while the IST Call 6 that specifically addressed international cooperation on Grid Technologies with China, has received a large number of proposals for collaborations between major EU and Chinese Grid initiatives.

III. Sustainability

By strengthening cooperation between the two communities, Grid@Asia is building strong links with the Grid community in the two Asian countries involved, and is preparing a solid foundation for sustainable and long-term collaboration. As an example, cooperation between China and Europe has been substantially improved by the participation of Chinese key players in Grid research and technologies in EU-funded projects. Grid@Asia paved the way for Chinese partners to join three main Grid projects in Call 5 and Call 6: XtreemOS (IP), GridComp (STREP) and EchoGrid (SSA).

The overall objective of the XtreemOS project is the design, implementation, evaluation and distribution of an open source Grid operating system (named XtreemOS) with native support for virtual organizations (VO) and the ability to run on a wide range of underlying platforms, from clusters to mobiles. The project investigates the construction of a new Grid OS, XtreemOS, based on the existing general purpose OS Linux. There ar two Chinese partners working in this project: the Institute of Computing Technology (ICT) of the Chinese Academy of Sciences and Red Flag Software. ICT is already involved in research activities relating to the design and implementation of OS-level user and resource management mechanisms to support VO while Red Flag Software will contribute to the exploitation of the results of the project by providing a Grid-aware Linux distribution package.

GridCOMP aims to develop a standard and domain-independent Grid component platform for efficient Grid applications, supporting dependability and security. Non-functional aspects will be covered that allow components to be seamlessly executed with minimal programmer intervention, thus implementing the invisible Grid concept. One Chinese partner, Tsinghua University, will bring in its expertise in the area of software components.

The goal of EchoGrid is to foster cooperation with China in Grid research and technologies by defining a short, mid-, and long-term vision in the field. The project will develop, among other activities, a collaboration roadmap that identifies common areas of interest and opportunities for collaboration on Grid technologies between the EU and China. It will support lasting cooperation and establish tangible partnerships in the field through support activities and tools, ranging from a mobility program to a dedicated partner profile database. EchoGrid involves five Chinese partners: ICT and CNIC from the Academy of Sciences, Beihang University, National University of Defense Technology and Huawei Technologies Co. Ltd.

Thanks to these three projects, the EU will be able to build up extensive cooperation with China in Grid research over the next three years, at least, and it should eventually develop into a concrete and stable relationship.

Content

To maximise the impact of Grid related activities, it is of vital importance that existing national, bilateral and multilateral research activities are funded by national and international bodies. In most European countries, as well as in China and South Korea, Grid research is promoted and funded by national programs; however on a European level as a whole, it is the Framework Program 5 and 6 which tends to structure this field of research.

The following report is divided into 5 chapters and provides short and useful on current Grid activities in Europe, China and South Korea. The chapters are structured as follows:

- List of national programs in Europe: program name and short description, contact and web link;
- List of the Grid funding programs of the European Commission: Short description of Units F2, F3 and D3 of the Information Society and Media Directorate-general and list of the main EC funded projects: Name, acronym, contract number, instrument, coordinator name, starting date, duration and funding.
- List of the national Grid programs and Grid projects in China: Short description, funding agencies, duration, contact.
- List of the national Grid programs and Grid projects in South Korea: Short description, funding agencies, duration, contact.
- List of bilateral and international Grid projects between EU and Asian countries.

B. Grid in Europe

I. European National Grid Programs

Most European countries have national programs to support Grid technologies. However, these programs do not necessarily include funding for bilateral or multilateral cooperation between institutes or companies located in different countries.

In the context of European Grid funding programs, the section below presents (i) the name of the program, (ii) the web site, (iii) a short description of the program and (iv) contact details.

Links:
GridCoord - EC funded project:
http://www.gridcoord.org/grid/portal

Academic Supercomputing in Europe:
http://www.arcade-eu.info/academicsupercomputing/
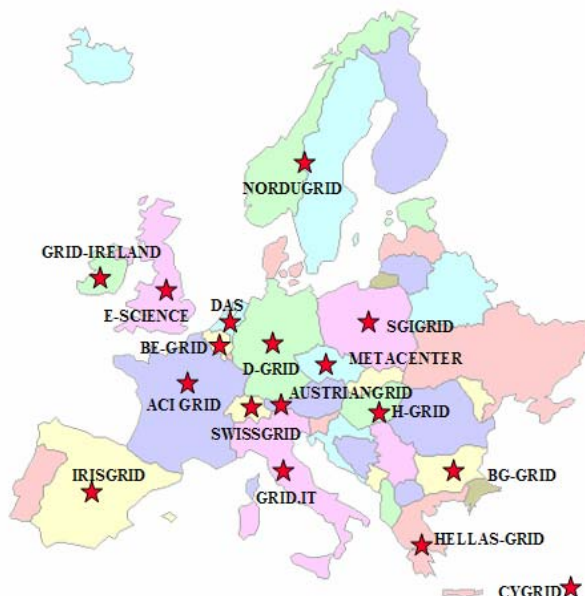
AUSTRIA
Austria   **http://www.gup.uni-linz.ac.at/austriangrid/index.php**
In Austria, the Federal Ministry for Education, Science and Culture started funding AustrianGrid in 2004. The main goal of this initiative is the realization of a Grid that is used for the development of Grid-specific applications and tools in order to demonstrate the benefits of such approaches for scientific applications. AustrianGrid aims in the long-term to increase the Austrian competence in Grid computing, not only of academic institutions but also of other research facilities and industry.
Contact: contact@austriangrid.at

BELGIUM
BEGrid   **http://www.begrid.be**
BEGrid is the computing/data grid infrastructure that results from the BELNET Grid initiative. It was started at the beginning of 2003 by BELNET and is open for participation to all BELNET clients. BEGrid is growing in machines, participating organizations and users.
Today more than 400 CPUs are available and the infrastructure is heading towards 500 CPUs before the end of the year. About 200 users have access to that infrastructure and carry out different types of applications including high energy physics, astrophysics and earth sciences.
Contact: Rosette Vandenbroucke, rosette.vandenbroucke@belnet.be

BULGARIA
BG-Grid   **http://www.grid.bas.bg**
The BG-Grid consortium in Bulgaria was founded in 2002 by the Bulgarian Institute for Parallel Processing and the Bulgarian Institute for Nuclear Research. Its main objectives are sharing resources and expertise in Grid, and the development of Grid-enabled algorithms.
Contact Ivan Tomov Dimov, ivdimov@bas.bg

CZECH REPUBLIC
METACentrum   **http://meta.cesnet.cz/cms/opencms/en**
The initiative METACentrum covers the majority of Czech activities dealing with Grids, supercluster and Grid computing and/or high performance computing in general. The aim of METACentrum is to maintain current computational resources and to widen the computational capacity of the largest academic centers in the Czech Republic in the future.
Contact: Lenka Vojtěchová, lenka@ics.muni.cz

CYPRUS
CyGrid   **http://www.cs.ucy.ac.cy/crossgrid/cygrid**
CyGrid is coordinated by the high-performance computing laboratory, department of computer science, University of Cyprus. The CyGrid initiative is supported partly by the IST CrossGrid Project and the University of Cyprus. CyGrid activities include:
- Deployment and management of a local grid cluster, connected with the CrossGrid test-bed, and providing computational and storage services
- Management of the CyGrid Certification Authority (CyCA), which issues Grid users with certificates for accessing the Grid
- Presentations and tutorials on accessing the Grid and installing the CrossGrid and DataGrid middleware
- Coordination of efforts to expand the Grid infrastructure in Cyprus and to promote the use of the Grid by national academic and research communities.

Contact: Marios Dikaiakos, mdd@ucy.ac.cy

FRANCE
ACI Grid   **http://www-sop.inria.fr/aci/grid/public/acigrid.htm**

The ACI GRID is an initiative that aims at strengthening and increasing the visibility of the French Grid research community as well as stimulating synergies between research groups. The initiative has funded around 30 projects of different kinds (multidisciplinary, software, collaboration, international cooperation, young research team and test-bed). The latest project started in 2003 with the building of an experimental test-bed, called Grid'5000. It is a highly reconfigurable test-bed allowing researchers to upload their grid software stacks (from the operating systems to the applications) and to perform large-scale experiments. In 2006, Grid'5000 provides around 3000 processors distributed in 9 geographical sites connected by the Renater network (10 Gbit/s).
Contact: Thierry Priol, thierry.priol@inria.fr

GERMANY
D-Grid   **http://www.d-grid.de**

In 2005, the e-Science initiative and D-Grid started to build a sustainable Grid infrastructure in Germany. Its goal is to design, build and operate a network of distributed integrated and virtualized high-performance resources and related services which allow processing of large amounts of scientific data and information. D-Grid currently consists of a Grid infrastructure project and 6 community projects in the areas of high-energy physics, astrophysics, medicine and life sciences, earth sciences (e.g. climate), engineering sciences, and libraries.
The long-term goal of D-Grid is a take-over by industry and service providers who offer Grid and e-Science services to the scientific communities, similar to internet providers offering network bandwidth to users.
Contact: Wolfgang Gentzsch, wgentzsch@d-grid.de

GREECE
Hellas Grid   **http://www.hellasgrid.gr/index.php?language=en**

The main objective of Hellas Grid is the development of a national strategy on Grid technologies and the coordination of activities and actions of the related communities, in order to provide a seamless electronic infrastructure environment throughout Greece and facilitate participation in pan-European and international efforts.
The Hellas Grid Task Force was established by the Operational Program of the Information Society, Secretariat for the Information Society, Ministry of Economy & Finance.
Contact: Athina Sakka, info@hellasgrid.gr

HUNGARY
ClusterGrid   **http://www.clustergrid.iif.hu**

The Hungarian ClusterGrid is a unique Grid initiative in Europe. It aims to integrate Intel processor based PCs into a single, large, countrywide interconnected set of clusters. The PCs are provided by participating Hungarian public institutions. All the contributors use their PCs for their own purposes during official working hours and offer their infrastructure for high-throughput computation at other times. The combined use of "day-shift" (i.e. individual mode) and "night-shift" (i.e. grid mode) enables ClusterGrid to utilize CPU cycles to provide firm computational infrastructure to the national research community.
Contact: Peter Stefan, stefan@mignon.ki.iif.hu

IRELAND
Grid Ireland **http://www.grid.ie**
In Ireland, the universities and other institutions of advanced education and research are represented in Government by the Higher Education Authority (HEA), and computing systems at these institutions are interconnected by the HEAnet. Grid-Ireland is a managed layer above HEAnet that provides Grid services. The aim of Grid-Ireland is to enable communities of users, for example, astrophysicists, geneticists or linguists, to construct virtual organizations above Grid-Ireland. The guiding principle is that there may be many virtual organizations, but there need be one Grid layer only. The benefit is both a research platform for scientists and an object of research for computer scientists, and a natural symbiosis between the two.
Contact: Brian Coghlan, coghlan@cs.tcd.ie

ITALY
Grid.IT **http://grid.it**
The initiative has a strong interdisciplinary character and aims at defining, implementing and applying innovative solutions for network computing enabling platforms, oriented towards scalable VOs (virtual organizations) and based on the "Grid Computing" paradigm. The research topics span from high performance photonic networks, innovative middleware services to high performance programming environments.
The development of demonstrators is envisaged, selected within application fields that are of maximum interest, not only for their scientific value, but also as test-beds for high performance Grid platforms in the areas of: Earth Observation, Geophysics, Astronomy, Biology and Genomics, Computational Chemistry.
Contact: Marco Vanneschi, vannesch@di.unipi.it

NETHERLANDS
The Distributed ASCI Supercomputer 2 (DAS2) **http://www.cs.vu.nl/das2**
DAS-2 is a wide-area distributed computer of 200 Dual Pentium-III nodes. The machine is built out of clusters of workstations, which are interconnected by SurfNet, the Dutch university Internet backbone for wide-area communication, whereas Myrinet, a popular multi-Gigabit LAN, is used for local communication.
The clusters are located at five Dutch Universities: Amsterdam University, Vrije Universiteit, Leiden University, Delft University of Technology and Utrecht University.

DutchGrid **http://www.dutchgrid.nl**
DutchGrid is the platform for Grid Computing and Technology in the Netherlands. Being open to all institutions for research and test-bed activities, the goal of DutchGrid is to coordinate the various deployment efforts and to offer a forum for the exchange of experience on Grid technologies. Next to the DutchGrid Platform, the Grid Forum Nederland association has been established to promote the Grid in the Netherlands at all levels.The DutchGrid Platform will continue to support practical Grid deployment and support, including the worldwide-recognised authentication service (CA).
Contact: Thilo Kielmann, kielmann@cs.vu.nl

NORWAY, SWEDEN, FINLAND
NorduGrid **http://www.nordugrid.org**
NorduGrid is a Grid Research and Development collaboration consisting of several Nordic academic and research institutes, and aiming at development, maintenance and support of the

free Grid middleware, known as the Advance Resource Connector (ARC). The objective of the NorduGrid collaboration is to deliver a robust, scalable, portable and fully featured solution for a global computational and data Grid system. NorduGrid develops and deploys a set of tools and services – the so-called ARC middleware, which is free software. Its goals are to:

- Develop and support the ARC middleware
- Coordinate contributions to the ARC code
- Define strategical directions for development of the ARC middleware following latest tendencies in the Grid technologies
- Promote ARC middleware solutions in such areas as Grid development, deployment and usage
- Contribute to development of Grid standards, e.g. via GGF

Contact: Mattias Ellert, mattias.ellert@tsl.uu.se

POLAND
PIONIER   **http://www.pionier.gov.pl/eindex.html**

The PIONIER program (Polish Optical Internet – Advanced Application, Services and Technologies for the Information Society, 2000-2006) has triggered many supporting activities directed to the attainment of three strategic objectives:

- Construction of the broadband optical Internet. Today the Polish research community has access to leading-edge transmission infrastructure, with current transmission capacities matching those of leading research networks in the world
- Development and verification of pilot services and applications for the information society, creating a base for new developments in: e-Science, e-Learning, e-Health, government and local administration, industry and business services
- Creation of competitive conditions for active software development for new applications in the information society

Preparations for the Pionier2 program have been launched, which will be focused around service platforms for various e-Science, e-Government and e-Health domains.
Contact: Maciej Stroiński,   stroins@man.poznan.pl

SPAIN
IRISGrid   **http://irisgrid.rediris.es**

IrisGrid is an open research initiative with more than 20 partners in Spain. The Spanish Thematic Network on Grids in the framework of e-Science Initiatives has three main objectives:

- Survey of the experience and interest of the Scientific Community (Drafts in the different areas of interest)
- Proposal of an e-Science center network (First proposal structured in two phases)
- Organization of the participation in EU FP6 Calls (Presence in EGEE, Participation in the next call, i.e. COREGRID, RTGrids)

Contact:Rosa Badia, rosab@ac.upc.es

SWITZERLAND
Swiss Grid   **http://www.swiss-grid.org**

The new Swiss Grid Initiative is a national effort that represents the interests of the Swiss academic and research institutions involved in various national and international Grid projects. It aims to gather all the expertise available in Switzerland and to offer a point of contact for the exchange of ideas and expertise. It also provides a central point for collaboration when looking for new synergies and for initiating new projects.

The objectives of the SwissGrid Initiative are to:
- Initiate and coordinate Grid activities in Switzerland, helping to raise necessary funds
- Provide the gateway for consulting, support and expertise on Grid and Collaborative Computing for the Swiss research community
- Get involved in joint multinational projects which serve the interests of the Swiss research community
- Promote connectivity and collaboration between disciplines and users, especially Computer Science and applications in need of high throughput or ubiquitous computing
- Represent the interests of the national research community towards other national and EU Grid projects, international projects as well as standardization bodies and industry
- Identify middleware components to fill gaps and coordinate the solutions developed by member institutions
- Continuously initiate thematic projects and e-Science pilot studies, assist fund raising
- Build the basis on which a national Grid infrastructure and service can develop

Contact: info@swiss-grid.org

UK

e-Science Centres **http://www.rcuk.ac.uk/escience**

The UK e-Science Program was launched in July 2001 and in the subsequent 5 years substantial funding was invested in the basic e-Science infrastructure as well as e-Science projects in academia, industry and commerce.

The first phase of the Core e-Science Program was structured around six key elements:
- A National e-Science Centre linked to a network of Regional Grid Centres
- Generic Grid Middleware and Demonstrator Projects
- Grid 'IRC' Research Projects
- Support for e-Science Pilot Projects
- Participation in International Grid Projects and Activities
- Establishment of a Grid Network Team

The second phase of the Core e-Science Program is based around six key activities, some of which are now starting:
- A National e-Science Centre linked to a network of Regional Grid Centres
- Support activities for the UK e-Science Community
- An Open Middleware Infrastructure Institute (OMII)
- A Digital Curation Centre (DCC)
- New Exemplars for e-Science
- Participation in International Grid Projects and Activities

Contact: Judy Redfearn, judy.redfearn@epsrc.ac.uk
Contact: Ron Perrott, r.perrott@qub.ac.uk

II. Grid Funding Programs of the European Community

There are ten directorates within the European Commission "Information Society and Media Directorate-General". Grid related activities are organised by Directorate F – *Emerging Technologies and Infrastructures* and since January 2007 Directorate D – *Network and Communication Technologies*.

1. Description of EC Units

A. Unit F2   **http://cordis.europa.eu/ist/grids**

The mission of the Unit is to contribute to the development of technologies and tools for next generation Grid systems, services and applications for use by science, industry and business. These developments are expected to support, in particular, the take-up and validation of Grids in new application domains and to tackle complex problems that cannot be solved with present technologies. In addition, work will include the conceptualisation and/or development of "network-centric Grid operating systems", a key challenge to support the realisation of the vision of an "invisible Grid".

Grids are crucial for enabling Information and Communication Technology to meet the goal of the 'Lisbon Strategy' of transforming the EU into the most competitive knowledge-based economy in the world by the year 2010. Grid, Peer-to-Peer and other types of networked distributed computing and storage technologies, as well as emerging web-technologies, make it possible to conceive new paradigms exploiting distributed resources. Industrial and business applications will be supported, and efforts will target industrial-strength middleware and enabling application technologies as foundation for a future Grid enabled adaptive network infrastructure.

The Unit's mission also encompasses an active role in the establishment of global standards, international cooperation as well as development of a coherent strategy for Europe. Development of this coherent strategy for Europe is being pursued, inter alia, through the creation of a 'European Research Area' for Grid Technologies (supporting better coordination between national and EU initiatives) and the establishment of an 'Industrial Forum' for Grids (with the aim of creating more effective routes for industrial exploitation).

2005-06 Work Program: Advanced Grid Technologies, Systems and Services
Strategic Objective
- To advance the current generation of Grids towards the knowledge Grid and complete virtualisation of Grid resources. To foster uptake and use in business and society.
- To reduce the complexity of Grid-based systems, empowering individuals and organisations to create, provide access to and use a variety of services, anywhere, anytime, in a transparent and cost-effective way, realising the vision of a knowledge-based and ubiquitous utility.

**2003-04 Work Program:** Grid-based systems for Complex Problems Solving
Strategic Objective
- To expand the potential of the Grid and peer-to-peer approaches to Complex Problems Solving which can not be solved with current technologies in application fields such as, but not limited to, industrial design, engineering and manufacturing, health, genomics and

drug design, environment, critical infrastructures, energy, business and finance, and new media.

- To overcome present architectural and design limitations hampering the use and wider deployment of computing and knowledge Grids and to enrich its capabilities by including new functionalities required for Complex Problem Solving. This should help the larger uptake of Grid type architectures and extend the concept from computation Grids to knowledge Grids, eventually leading to a "semantic Grid".

Framework Programme 7: In FP7, the F2 Unit on Grid technologies has been replaced by the *Future and Emerging Technologies – Open Unit*. Most of the current research projects funded by this former Unit have been transferred to Unit D3 and F3 (see below)

Unit F2 funded projects – The Grid House

B. Unit F3   **http://cordis.europa.eu/ist/rn/home.html**
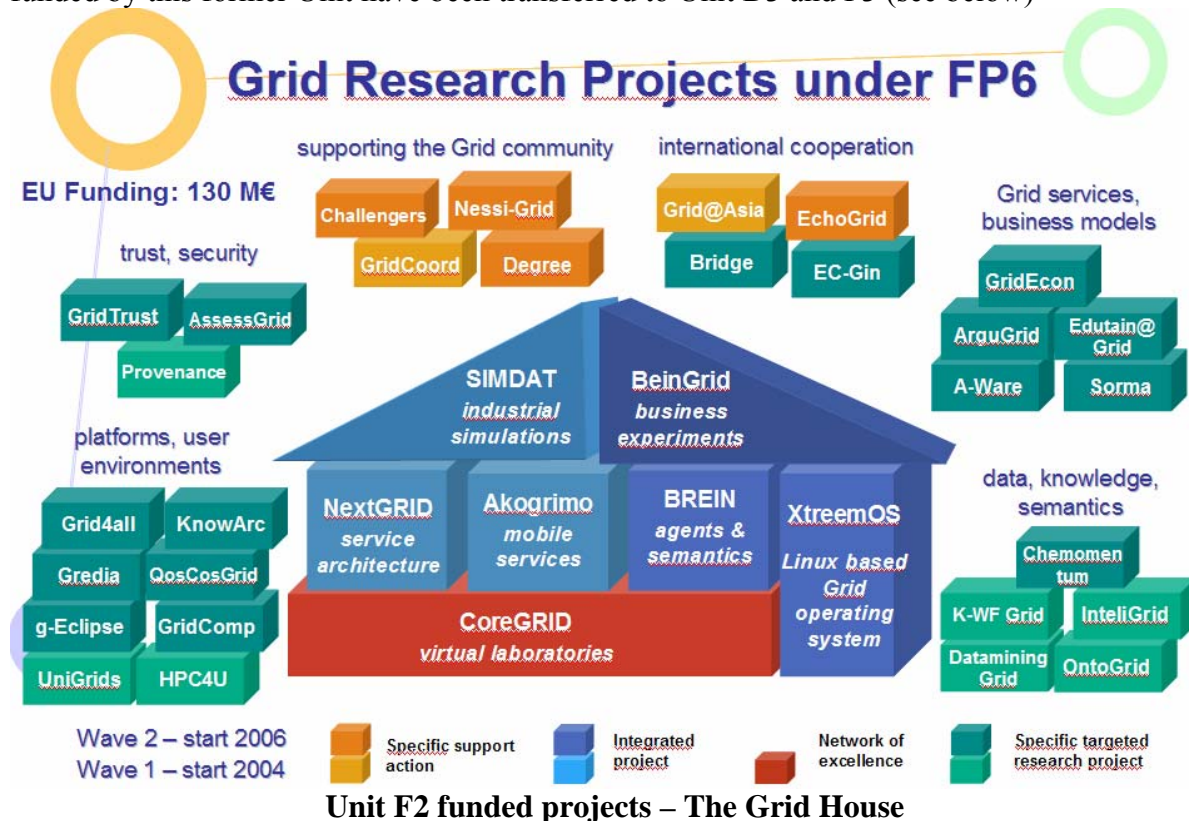
Unit F3 "Research Infrastructure" supports the provision of computer and communications infrastructures of the highest quality and performance to Europe's researchers, namely by establishing a high-capacity and high-speed communications network for all researchers in Europe (GÉANT) and specific high performance Grid-enabled advanced test-beds, exploiting the benefits of a strong co-ordination between Research Infrastructures and the IST (Information Society Technologies) and an enlarged co-operation with corresponding national and international initiatives.

The work of the Unit directly supports the Communication Network Development Initiative defined in the Research Infrastructures Action of the "Structuring the ERA" FP6 Program. It will exploit the potential of the new Instruments in FP6 to ensure critical mass, economies of scale and a cohesive approach to the deployment of Infrastructures for the ERA.

The work done in Unit F3 "Research Infrastructure" will reinforce and complement eEurope 2005 objectives (in aspects such as "broadband"), will be in line with recently endorsed

Communications of the Commission (in topics such as IPv6) and will be an essential building block for the European Research Area (ERA).

Work Program

Within FP6, the "Research Infrastructure" Unit is responsible for implementing the following parts of the Specific Program "Structuring the European Research Area" in the Research Infrastructures activity:

- GÉANT - provision of a high-capacity and high-speed communications network interconnecting the European National Research and Education Networks. It will represent a significant step forward as compared to FP5, both in terms of services, communities served, geographical scope, bandwidth and readiness to adopt relevant new technologies.
- Grids - deployment of advanced Grids-empowered infrastructures. They should exhibit production-level performance capabilities and constitute themselves distributed facilities at gigabit/terabit scales (in terms of computing, storage and communication power).

The Unit also takes part in implementing the "Integrating and Strengthening the European Research Area" Specific Program, within the Information Society Technologies Priority, focusing on:

- **Research networking test-beds** - deployment of advanced, user-driven large scale test-beds with the goal to integrate and validate the state-of-the-art technology.
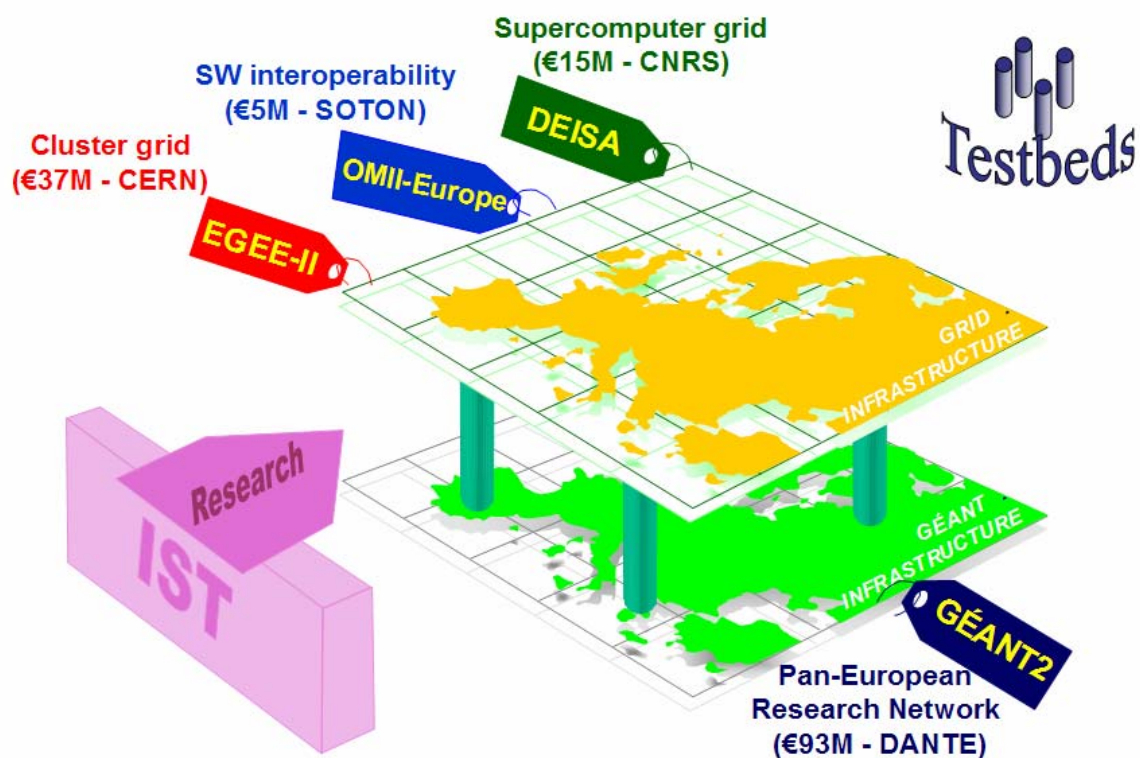
Major F3 Unit projects

C. Unit D3

The mission of the Unit "Software Technologies" is to promote global competitiveness of the European industry in software and services by supporting research activities and developing policies in the field of Software, Services and Distributed Systems.
Since 1 January 2007, most contracts managed under Unit F2 (see description in section II.1. B.) have been transferred to Unit D3.

Objectives
- Building an industrial capability to develop innovative services and software including free and open source software
- Increasing the productivity and quality of software and service engineering
- Fostering software and services interoperability through promotion of standards
- Promoting research in distributed and complex systems of software and services. Understanding the role free and open source software (FOSS) can play in this
- Supporting the development of policies aiming at improving the competitive position of software production in Europe

Activities
In practical terms, the unit:
- Co-finances research projects related to service engineering, software engineering, complex software systems and free and open source software
- Supports a technology platform on software, services and systems (NESSI)
- Manages a variety of studies that may help in the formulation of future policy

2. List of funded projects (launched 2004 - 2006)

Name	Acronym	Contract no.	Project type[1]	Coordinator	Contact	Starting date	Duration in months	Max. EC contribution in euro	URI
Access to knowledge through the Grid in a mobile world	**Akogrimo**	004293	IP	Telefónica Investigación y Desarrollo	Antonio Sánchez, ajse@tid.es	01/07/04	39	7,000,000	www.mobilegrids.org
ARGUmentation as a foundation for the semantic Grid	**ArguGrid**	035200	STREP	Imperial College London, UK	Francesca Toni, fr@doc.ic.ac.uk	01/06/06	36	1,999,000	www.argugrid.org
Adaptive service Grid	**ASG**	004617	IP	Potsdam University	Regina Gerber, regina.gerber@uni-potsdam.de	01/09/04	24	7,500,000	www.asg-platform.org
Risk assessment and management for Grids	**AssessGrid**	031772	STREP	Paderborn University	Odej Kao, okao@upb.de	01/04/06	33	1,971,000	www.assessgrid.org
An easy way to access Grid resources	**A-WARE**	IST-034545	STREP	CINECA	Paolo Malfetti, a-ware@cineca.it	01/06/06	24	870,000	www.a-ware-project.eu
Business experiments in Grid	**BEinGrid**	034702	IP	Atos Origin	Santi Ristol, santi.ristol@atosorigin.com	01/06/06	42	15,700,000	www.beingrid.org
Business objective driven reliable and intelligent Grids for real business	**BREIN**	034556	IP	Telefónica Investigación y Desarrollo	Antonio Sánchez, ajse@tid.es	01/09/06	36	6,599,012	www.gridsforbusiness.eu
Bilateral research and industrial development enhancing and integrating Grid-enabled technologies	**Bridge**	045609	STREP	Fraunhofer Gesellschaft zur Förderung der angewandten Forschung e.V.	Eckart Bierdümpel, bridge@fraunhofer.de	01/01/07	24	1,700,000	www.bridge-project.eu
Support action on Challenges in Grids	**Challengers – 'Against mainstream research'**	034128	SSA	ICCS/NTUA – Institute of Communications and Computer Systems of the National Technical University of Athens	Theodora Varvarigou, dora@telecom.ntua.gr	01/06/06	30	746,000	www.challengers-org.eu
Grid services based environment to enable innovative research	**Chemomentum**	0033437	STREP	ICM, Warsaw University	Piotr Bala, bala@icm.edu.pl	01/07/06	30	2,590,809	www.chemomentum.org

[1] IP: Integrated Project; STREP: Specific Targeted Research Project; SSA: Specific Support Action; I3: Integrated Infrastructure Initiative; NoE: Network of Excellence

Name	Acronym	Contract no.	Project type[1]	Coordinator	Contact	Starting date	Duration in months	Max. EC contribution in euro	URI
European research network on foundations, software infrastructures and applications for large-scale distributed, Grid and peer-to-peer technologies	CoreGRID	004265	NoE	GEIE ERCIM	Bruno Le Dantec, bruno.le_dantec@ercim.org	01/09/04	48	8,200,000	www.coregrid.net
Data-mining tools and services for grid computing environments	DataMining Grid	004475	STREP	University of Ulster, School of Biomedical Sciences	Werner Dubitzky, w.dubitzky@ulster.ac.uk	01/09/04	27	1,883,000	www.datamininggrid.org
Digital business ecosystems	DBE	507953	IP	International Business Machines Belgium	Jonathan Sage, jonathan.sage@be.ibm.com	01/11/03	39	10,500,000	www.digital-ecosystem.org
Dissemination and exploitation of Grids in earth science	Degree	034619	SSA	Institute of Informatics, SAS	Ladislav Hluchy, hluchy.ui@savba.sk	01/06/06	24	1,000,000	www.eu-degree.org
Distributed European infrastructure for supercomputing applications	Deisa	508830	I3	IDRIS-CNRS	Victor Alessandrini, va@idris.fr	01/05/04	48	21,000,000	www.deisa.org
Data, information and process integration with semantic web services	DIP	507483	IP	National University of Ireland – Galway Digital Enterprise Research Institute (DERI)	Sigurd Harand, sigurd.harand@deri.org	01/01/04	36	10,100,000	www.dip.semanticweb.org
Europe-China Grid Inter-Networking	EC-GIN	045256	STREP	Innsbruck University	Michael Welzl, michael.welzl@uibk.ac.at	01/11/06	36	2,200,000	www.ec-gin.eu
European and Chinese cooperation on Grid	EchoGRID	045520	SSA	GEIE ERCIM	Bruno Le Dantec, bruno.le_dantec @ercim.org	01/01/07	24	1,600,000	www.echogrid.eu
A scalable QoS-enabled business Grid environment for multi-user real-time online interactive applications	Edutain@Grid	034601	STREP	Innsbruck University	Thomas Fahringer, tf@dps.uibk.ac.at	01/09/06	36	2,498,000	www.edutaingrid.eu
Enabling Grids for E-science	EGEE II	INFSO-RI-031688	I3	CERN Geneva, Bob Jones (Project Director)	Hannelore Hammerle, Hannelore.Hammerle@cern.ch	01/04/06	24	36,971,365	www.eu-egee.org/
European learning Grid infrastructure	eLegi	IST-002205	IP	Atos Origin, Spain	Antonio Paradell, antonio.paradell@atosorigin.com	01/01/04	48	7,472,000	www.elegi.org

Name	Acronym	Contract no.	Project type[1]	Coordinator	Contact	Starting date	Duration in months	Max. EC contribution in euro	URI
The EUChinaGRID Project aims to support the interoperability of the Grid infrastructures in Europe and China for the benefit of eScience applications.	**EUChinaGRID**	6-SSA-026634	SSA	INFN (The National Institute of Nuclear Physics, Italy)	Federico Ruggieri, po@euchinagrid.org	01/01/06	12	1,299,998	www.euchinagrid.org
An integrated Grid-enabled workbench tool for Grid application users, Grid developers and Grip operators based on the Eclipse platform	**g-Eclipse**	034327	STREP	Forschungszentrum Karlsruhe Germany	Harald Kornmayer, harald.korrmayer@iwr.fzk.de	01/07/06	24	1,960,000	www.geclipse.eu
Grid enabled access to rich media content	**Gredia**	034363	STREP	Athens Technology Center SA	Nikos Sarris, n.sarris @atc.gr	last quarter of 2006	30	2,410,895	www.gredia.eu
Self-Grid: dynamic virtual organisations for schools, families, and all	**Grid4All**	034567	STREP	France Telecom	Ruby Krishnaswamy, ruby.krishnaswamy@francetelecom.com	01/06/06	30	2,900,000	www.grid4all.eu
Advanced Grid research workshops through European and Asian cooperation	**Grid@Asia**	159945	SSA	GEIE ERCIM	Bruno Le Dantec, bruno.le_dantec@ercim.org	01/04/05	18	300,000	www.gridatasia.net
Grid programming with components: an advanced component platform for an effective invisible Grid	**GridCOMP**	034442	STREP	INRIA and ERCIM	Bruno Le Dantec – ERCIM bruno.le_dantec@ercim.org	01/06/06	30	1,750,000	gridcomp.ercim.org
ERA pilot on a coordintated Europe-wide initiative in Grid research	**GridCoord**	511618	SSA	Universiteit van Amsterdam	Geleyn Meijer, geleyn@science.uva.nl	01/07/04	24	960,000	www.gridcoord.org
Grid economics and business models	**GridEcon**	033634	STREP	International University in Germany	Jörn Altmann, jorn.altmann@acm.org	01/07/06	30	2,350,000	www.gridecon.eu
Trust and security for next generation Grids	**GridTrust**	033817	STREP	Centre d'Excellence en technologies de l'information et de la communication	Philippe Massonet, phm@cetic.be	01/06/06	36	2,200,000	www.gridtrust.org
Highly predictable cluster for Internet Grids	**HPC4U**	511531	STREP	IBM France	Géry Schneider, gery.schneider@fr.ibm.com	01/06/04	36	1,700,246	www.hpc4u.eu

Name	Acronym	Contract no.	Project type[1]	Coordinator	Contact	Starting date	Duration in months	Max. EC contribution in euro	URI
International Collaboration to extend and advance Grid education	**ICEAGE**	INFSO-SSA-26637	SSA	National e-Science Centre, University of Edinburgh	Lilly Hunter, lilly.hunter@nesc.ac.uk	01/03/06	24	1,200,000	www.iceage-eu.org
Interoperability of virtual organisations on a complex semantic Grid	**InteliGrid**	004664	STREP	Univerza v Ljubljani	Ziga Turk, ziga.turk@itc.fgg.uni-lj.si	01/09/04	30	2,122,000	www.inteliGrid.com
Grid-enabled know-how sharing technology based on ARC services and open standards	**KnowARC**	032691	STREP	University of Oslo	Farid Ould-Saada, farid.ould-saada@fys.uio.no	01/06/06	36	2,899,494	www.knowarc.eu
Knowledge-based workflow system for Grid applications	**K-Wf Grid**	511385	STREP	Fraunhofer Gesellschaft (FIRST)	Steffen Unger, Steffen.Unger@first.fraunhofer.de	01/09/04	30	1,746,822	www.kwfgrid.eu
Networked European software and services initiative-Grid	**NESSI-Grid**	033638	SSA	Telefónica Investigación y Desarrollo	Jaime González, jaimeg@tid.es	01/05/06	30	1,202,231	www.nessi-europe.com
The next generation Grid	**NextGrid**	511563	IP	EPCC – University of Edinburgh	Mark Parsons, m.parsons@epss.ed.ac.uk	01/09/04	36	11,000,000	www.nextgrid.eu
Open Middleware Infrastructure Institute for Europe	**OMII-Europe**	INFSO-RI-031844	I3	University of Southampton	Peter Henderson, ph@ecs.soton.ac.uk	01/05/06	24	4,832,914 €	www.omii-europe.com
Paving the way for knowledgeable Grid services and systems	**Ontogrid**	511513	STREP	Universidad Politécnica de Madrid, Facultad de Informática	Asunción Gómez-Pérez, asun@fi.upm.es	01/09/04	36	2,638,940	www.ontogrid.net
Enabling and supporting provenance in Grids for complex systems	**Provenance**	511085	STREP	IBM UK Ltd	John Ibbotson, john_ibbotson@uk.ibm.com	01/09/04	27	1,981,996	www.gridprovenance.org
Quasi-opportunistic supercomputing for complex systems in Grid environments	**QosCosGrid**	033883	STREP	School of Biomedical Sciences, University of Ulster	Stephen Robinson, s.robinson@ulster.ac.uk	01/09/06	30	2,800,000	www.QosCosGrid.org
SIMDAT-data Grids for process and product development using numerical simulation and knowledge discovery	**SIMDAT**	511438	IP	Fraunhofer Institute SCAI	simdat@scai-fraunhofer.de	01/09/04	48	11,000,000	www.simdat.eu
Self-organising ICT resource management	**SORMA**	034286	STREP	Universität Karlsruhe (TH)	Dirk Neumann, neumann@iism.uni-karlsruhe.de	01/08/06	36	2,700,000	www.sorma-project.org

Name	Acronym	Contract no.	Project type[1]	Coordinator	Contact	Starting date	Duration in months	Max. EC contribution in euro	URI
Trust, security and contract management in dynamic virtual organisations	**Trustcom**	001945	IP	AtosOrigin, Spain	Santi Ristol, Santi.Ristol@atosorigin.com	01/02/04	36	10,720,000	www.eu-trustcom.com
Uniform interface to Grid services	**UniGrids**	004279	STREP	Forschungszentrum Jülich GmbH	Dietmar Erwin, d.erwin@fz-juelich.de	01/07/04	24	1,916,162	www.unigrids .org
Building and promoting a Linux-based operating system to support virtual organisations for next generation Grids	**XtreemOS**	033576	IP	Caisse des dépôts et consignations	Jean-Noël Forget, jean-noel.forget@caissedesdepots.fr	01/06/06	48	14,199,895	www.XtreemOS.org

C. Grid in China

Grid Computing has taken a leading role in China's developmental process, due to the countries' immense potential. The main research focus has been placed on building large-scale applications and reliable testbeds over a centralized Grid infrastructure (China National Grid - CNGrid). CNGrid, is an application-driven key project, supported by the National High-Tech R&D Program of China, aiming to build a nation-wide Grid infrastructure, based on eight major nodes across the country. The hardware layer of CNGrid includes supercomputers while the developed middleware is mainly based on Globus Toolkit with specific add-ons developed by the research centers involved.

The applications and testbeds developed over CNGrid are directed to problems of every day life. On June 21, 2005, the first Grid@Asia (http://gridatasia.net) meeting was held in Bejing. Applications related to Resource and Environment (GSG, DFG, SeisGrid), Research (SDG, BioGrid, DDG, ChinaGrid), Services (MSG, ITG), Manufacturing (AviGrid, SimGridResource) were presented by Chinese Grid-related research key players such as AVIC II, China National Geologic Survey Bureau, Network & Information Center of CAS, and others.

I. National Grid Programs

1) High Productivity Computer and Grid Service Environment under the National High-tech R&D Program (863 program) in Information Technology

Short description: This is the successor of the *'863 key project on High Performance Computer and Core Software'*, with national funding from 2006 to 2010. Major activities include: creation of high productivity computers, development of Grid software, continuous construction of CNGrid, high performance computing and Grid applications, Grid service environment research. To achieve these objectives, the creation of high productivity computers is funded in two stages with a budget of 530 million RMB for equipment purchases. In the first stage, two high-performance computers of 100Tflops will be created - one of which is a DAWN 5000A. The budget available for equipment is 180 million RMB. In the second stage, one superpower computer of 1000Tflops will be developed (the budget is 350 million RMB).
Funding agency: All projects within the framework of the '863 program' are funded by the Chinese Ministry of Science and Technology (MOST).
Funding duration: 2006-2010
Maximum national contribution: 640 million RMB*
Contact: Depei Qian (Chief scientist in 863 program), depeiq@buaa.edu.cn

Note: RMB is the national Chinese currency and short for RenMinBi. The unit is Yuan. 1US$ equals approx. 7.8 RMB Yuan, and 1Euro approx. 10.3 Yuan.

2) Network Based Environment for Scientific Research

Short description: Basic research on Grid, creation of Grid test-bed for research, development of Grid software, support of applications in e-Science.
Funding agency: National Science Foundation (NSF) of China
Funding duration: 2003-2008

Maximum national contribution: 40 million RMB

3) China Education and Research Grid

Short description: Creation of a Grid for research and education, development of Grid software (CGSP), support of Grid applications.
Funding agency: Ministry of Education (MOE)
Funding duration: 2003-2006 (first phase), 2007-2010 (second phase)
Maximum national contribution: 20 million RMB (first phase), 150 million RMB (second phase)

II. List of Grid projects in China

1) China National Grid (CNGrid)

Short Description: CNGrid was supported by the national high-tech program via the key project "High performance Computer and Core Software" from 2002 to 2005. A second round of support will come from the new 863 key project "High Productivity Computers and Grid Service Environment". Until 2005, 8 Grid nodes and a CNGrid Operation Center have been established, including two major nodes at the Computer Network and Information Center (CNIC) and Shanghai Supercomputing Center, and 6 ordinary nodes in other participating institutes. CNIC is one of the institutes of the Chinese Academy of Sciences (CAS) and is involved in a number of EU projects.
From the second phase of 2006, 3 new nodes have been added. The total computing resource is 18TFlops. CNGrid has supported more than three hundred users all over the country. Funding from the previous 863 high-tech program was about 10 million RMB. Matching funds amounting to about 20 million RMB were provided by the institutes where the Grid nodes are based. Funding from the current 863 high-tech program is about 27 million RMB. Matching funds amounting to about 40 million RMB are provided by the institutes where the Grid nodes are based.
Partners: Beihang University, Computer Network and Information Center (CNIC) of CAS, Shanghai Supercomputing Center, Xi'an Jiaotong University, University of Science and Technology of China, Tsinghua University, Hong Kong University, Institute of Applied Physics and Computational Mathematics, National University of Defense Technology (first phase), new partners from second phase: Shandong University, Huazhong University of Science and Technology, and Shengzhen University.
Funding agency: Ministry of Science and Technology (MOST)
Contact: Depei Qian (Chief scientist in 863 program),depeiq@buaa.edu.cn, Xuebin Chi (Director of the CNGrid Operation Center), chi@sccas.cn
Starting date and duration: 2002-2005 (first phase), 2006-2010 (second phase)
Maximum national contribution: 10 million RMB (first phase), 27 million RMB (second phase)
Website: http://www.cngrid.org

2) Grid Software

Short Description: The Grid software project was supported by the national high-tech program via the key project "High performance Computer and Core Software" from 2002 to

2005. A second round of support comes from the new 863 key project "High Productivity Computers and Grid Service Environment" from 2006 to 2010. The Ministry of Science and Technology (MOST) contributed 13 million RMB during the first phase. In the second phase, funding from MOST amounts to 23 million RMB. The team has developed a Grid software, CNGrid GOS, to support CNGrid operations and the applications. The latest version is CNGrid GOS 2.5 which supports IPv6 protocol. The CNGrid GOS implementation is based on Web Services. New features and concepts such as Grid Community (Agora) and Grid Process (Grip) are developed to create Grid services and virtual organizations. Major services include jobs, data, information, security, etc. The user interface is provided by a Grid portal and language such as GSML. A Grid resource monitoring system is developed which can monitor the resources from the physical network up to layer services.

Partners: Institute of Computing Technology (ICT) of CAS, Tsinghua University, National University of Defence Technology, Beihang University

Funding agency: Ministry of Science and Technology (MOST)

Contact: Prof. Zhiwei Xu, zxu@ict.ac.cn, Prof. Han Yanbo, yhan@ict.ac.cn, ICT, CAS.

Starting date and duration: 2002-2005 (first phase), 2006-2010 (second phase)

Maximum national contribution: 13 million RMB (first phase), 23 million RMB (second phase)

3) Scientific Data Grid (SDG)

Short Description: The SDG project was supported by the national high-tech program via the 863 key project "High performance Computer and Core Software" from 2002 to 2005. A second round of support comes through the new 863 key project "High Productivity Computers and Grid Service Environment" from 2006 to 2010. Scientific Data Grid is an application grid aiming to boost the sharing, exploitation and utilization of scientific data resources. Based on the computing infrastructure and grid platform of China National Grid and mainly supported by the mass data resources of scientific databases distributed in more than 40 institutes of the Chinese Academy of Sciences, the Scientific Data Grid sets up a science-oriented and practical application Grid environment for scientific research. Currently, SDG is equipped with a 50TB tape system and tera-scale computing capability. Scientific data resources, composed of 388 specialty databases, 322 online, come from 45 institutions participating in the Scientific Database Project funded by the Chinese Academy of Sciences. Scientific data resources reach 16.7TB. A virtual database is established by means of metadata technology. Middleware for information services, data access services, security infrastructure and storage services is developed.

Application systems for three disciplines including astronomy, high energy physics and Chinese herbal medicine, are developed in the Scientific Data Grid. Typical applications include a virtual astronomical observatory and cosmic ray data processing.

Partners: Institute of Computing Technology (ICT) of CAS, Tsinghua University, National University of Defence Technology, Beihang University

Funding agency: Ministry of Science and Technology (MOST), Chinese Academy of Sciences (CAS)

Contact: Prof. Baoping Yan, CNIC, CAS, ybp@cnic.ac.cn, Dr. Kai Nan, CNIC, CAS, nankai@cnic.ac.cn

Starting date and duration: 2002-2005 (first phase) 2006-2010 (second phase)

Maximum national contribution: Funding from MOST was about 2.8 million RMB (first phase), 4 million RMB (second phase)

4) Drug Discovery Grid (DDG)

Short Description: The DDG project was supported by the national high-tech program via the key project "High performance Computer and Core Software" from 2002 to 2005. A second round of support comes through the new 863 key project "High Productivity Computers and Grid Service Environment" from 2006 to 2010. Virtual drug screening using simulation on high performance computers is a brand-new approach in drug discovery. By initial computer screening of a vast compound database, a large amount of the real world compound screening becomes unnecessary and the success rate of finding effective compounds is also increased. Since the application of computer drug screening has extremely good prospects and is very cost effective, there is an increasing demand.

The aim of developing the Drug Discovery Grid is to set up a grid environment to provide new drug screening services. Computing resources in DDG are used in P2P mode. This means that any idle computing resources in the environment, regardless of whether it is a supercomputer or a cluster computer, will be used for drug screening. A simple user interface is developed so that once the user is authorized to log in, all he needs to do is to submit the job and eventually retrieve the result.

Research on new drugs for curing diabetes has been supported by DDG.

Partners: Shanghai Institute of Materia Medica, Chinese Academy of Sciences (CAS)

Funding agency: Ministry of Science and Technology (MOST), Chinese Academy of Sciences (CAS)

Contact: : Prof. Kunqian Yu, Shanghai Institute of Materia Medica, yukunqian@gmail.com

Starting date and duration: 2002-2005 (first phase), 2006-2010 (second phase)

Maximum national contribution: Funding from MOST was about 2.8 million RMB (first phase), 4 million RMB (second phase)

Website: http://www.ddgrid.ac.cn

5) Bioinformation Application Grid (BAGrid)

Short Description: The BAGrid project was supported by the national high-tech program via the key project "High performance Computer and Core Software" from 2002 to 2005. BAGrid is built to tackle the massive information data resulting from biology research. First, it is able to solve problems connected with the high volume of information requiring classification, conformity and storage under different conditions in biological research. Secondly, it designs better algorithms and more efficient pipelines to match the need of information processing. Thirdly, it provides cooperation schemes for collaborative projects.

Major functions of BAGrid include: aggregation and sharing of heterogeneous data resources, integration and sharing of computing resources, collaboration and cooperation among projects, packaging common bioinformatics software into grid services, and enabling cooperation among different project teams.

Major achievements include:

- Building databases for rice, silk worm, and domestic chicken genomes, using the results of national research together with those of international cooperation projects
- Developing a bioinformatics computing grid with a rich set of bioinformatics software (Blast, BGF, etc.) and deploying the software to multiple computing centers located in Beijing, Shanghai, etc.
- Performing the sequencing of the silk worm and domestic chicken genomes on the genome sequencing collaboration platform built within the project
- Completing a full-scale annotation of the rice genome by using the gene annotation functions developed by the project

Partners: Beijing Institute of Genome (BIG)

Funding agency: Ministry of Science and Technology (MOST), Chinese Academy of Sciences (CAS)
Contact: Prof. Jun Wang, BIG, wangj@genomics.org.cn
Starting date and duration: 2002-2005 (first phase)
Maximum national contribution: Funding from MOST was about 1.6 million RMB in the first phase. There will be no further support from MOST for this project in the second phase.
Website: http://biogrid.genomics.org.cn

6) Geological Survey Grid (NGG)

Short Description The NGG project was supported by the national high-tech program via the key project "High performance Computer and Core Software" from 2002 to 2005. The national Geological Application Grid (NGG) has been developed for national geological survey applications. This system realizes resource interconnections, sharing, and coordination at the application level by introducing Grid technologies and web services.
As a data information service application grid system, NGG offers basic data and information services for researchers and public users. The system is based on the three-layer network infrastructure in China Geological Survey, and is designed in such a way that China Geological Survey acts as the portal to resource sharing and service providing. It monitors and coordinates all system operations. As regional centers for data-sharing, the regional geological survey centers deploy databases and software environment. The provincial geological surveys provide raw data service, deploy professional research centers with high performance computing capabilities, process mass data, and share application software. NGG helps the China Geological Research Bureau to develop its basic platform for information services and to establish a comprehensive digital framework for geological research.
The deliverables of NGG include groundwater resource evaluation and mineral resource assessment. These applications demonstrate basic services such as data integration, resource aggregation, and information processing. There will be no funding for the second phase.
Partners: Development Center of China National Geological Survey
Funding agency: Ministry of Science and Technology (MOST), China National Geological Survey
Contact: Prof. Yongbo ZHANG, Development Center of China National Geological Survey
Starting date and duration: 2002-2005 (first phase)
Maximum national contribution: Funding from MOST was about 3.2 million RMB in first phase. There will be no further support from MOST for this project in the second phase.
Website: http://www.ngg.cgs.gov.cn/nggportal/

7) Digital Forestry Grid (DFG)

Short Description The project was supported by the national high-tech program via the key project "High performance Computer and Core Software" from 2002 to 2005. The Digital Forestry Application Grid DFG aims at supporting the construction of a national digital forestry and at meeting the needs of forestry and eco-construction projects. Based on the most current achievements in Grid technologies, it is directed at establishing a domain application grid for forest resources and forestry eco-projects. Sharing forestry information resources can provide an effective support for management and decision-making processes.
Major tasks include:
- Establishing the architecture and standards of a grid-based digital forestry application grid

- Integrating and encapsulating resources including data, computing power and software on national, provincial, and county levels
- Applying results from this project to provide guidance and support to national forestry projects such as turning farmland back into forests

Partners: Institute of Forest Resource Information
Funding agency: Ministry of Science and Technology (MOST)
Contact: Mr. Xu ZHANG, Institute of Forest Resource Information
Starting date and duration: 2002-2005 (first phase)
Maximum national contribution: Funding from MOST was about 1.8 million RMB (first phase). There will be no further support from MOST for this project in the second phase.

8) China Meteorological Application Grid (CMAG)

Short Description: The CMAG project was supported by the national high-tech program via the key project "High performance Computer and Core Software" from 2002 to 2005. A second round of support comes through the new 863 key project "High Productivity Computers and Grid Service Environment" from 2006 to 2010. The China Meteorological Application Grid (CMAG) uses Grid technology to build a platform for the Chinese numerical weather forecasting services.

CMAG's major components include the grid portal, GRAPES mesoscale NWP system, NWP control interface GridWeather, user management system, code management system CVSExplorer and visualization system. Using the CMA dedicated communication system and distributed computing resources, the CMAG represents a platform which covers regional centers in Beijing, Guangdong, Shanghai, as well as Wuhan and Guangxi provincial meteorological offices. Thus it achieves interconnection and sharing of computing resources and NWP software among the Chinese Academy of Meteorological Sciences, the National Meteorological Information Center, and the regional centers. CMAG will eventually become an environment for operational NWP services and for cooperative NWP research and development.

At present the GRAPE mesoscale NWP system is running routinely on CMA. Authorized users can access the CMAG portal (via http://grid.cma.gov.cn:8080/) to inquire about NWP products and to perform daily weather forecast services.

Partner: Institute of Meteorological Research
Funding agency: Ministry of Science and Technology (MOST), China Meteorological Bureau
Contact: Prof. Xuesheng YANG, Institute of Meteorological Research
Starting date and duration: 2002-2005 (first phase), 2006-1010 (second phase)
Maximum national contribution: Funding from MOST was about 3 million RMB (first phase), 4 million RMB (second phase)
Website: http://grid.cma.gov.cn:8080/

9) Aviation Grids (AviGrid, SimGrid)

Short Description: The AviGrid project was supported by the national high-tech program via the key project "High performance Computer and Core Software" from 2002 to 2005. Grid technology provides effective support to optimize resource allocation and use as well as the R&D process for the aviation manufacturing industry. This project, undertaken by AVIC II of China, has constructed a grid platform for companies. AviGrid is built on AVIC II's WAN network and integrates computing resources in different institutes and enterprises to form a distributed virtual computing center. It establishes mechanisms to share software, hardware

and data resources, and provides tools to optimize the topological structures and R&D workflows of aircrafts, thus improving the use of resources, reducing investment, and enabling distributed cooperation.

The major tasks of AviGrid are to:

- Create a grid platform suitable for the aviation manufacturing industry
- Build a service system for the sharing of software resources
- Build a service system for the sharing and storage of distributed data
- Establish services for the sharing of hardware resources and aircraft topological optimization
- Model the R&D process of aircrafts

Partner: AVIC II

Funding agency: Ministry of Science and Technology (MOST), AVIC II

Contact: Prof. Degang Cui, AVIC II, dgcui@vip.163.com

Starting date and duration: 2002-2005 (first phase)

Maximum national contribution: Funding from MOST was about 3 million RMB (first phase). There will be no further support from MOST for this project in the second phase.

10) Simulation Grids (SimGrid)

Short Description: The SimGrid project was supported by the national high-tech program via the key project "High performance Computer and Core Software" from 2002 to 2005. Based on the requirements of the aerospace industry, this project focuses on research and application of large-scale collaborative simulations in connection with space-related products. Following the principle that this research has to be application- and demand-oriented, focused on grids, using innovative cutting edge technology, the project has gradually enriched and perfected the Simulation Grid infrastructure. It has constructed the Simulation Grid portal, accomplished research on the five key technologies of Simulation Grid applications, developed a secure, open and universal Simulation Grid platform as well as developed and deployed large-scale simulation applications for manufacture. These efforts have helped to establish a mode for development, implementation and application of the Simulation Grid. The combination of simulation and grid technology resolves the restrictions of traditional technology and allows a dynamic sharing of resources and collaboration. In addition, Simulation Grid attempts to go through a process of industrialization in order to enrich the applications of Simulation Grid and give them a more extensive scope. Currently, this project is still in its development phase.

Partners: Chinese Academy of Science Information Center (CASIC)

Funding agency: Ministry of Science and Technology (MOST), CASIC

Contact: Prof. Bohu LI, CASIC, bohuli@moon.bjnet.edu.cn

Starting date and duration: 2002-2005 (first phase)

Maximum national contribution: Funding from MOST was about 1.2 million RMB (first phase). There will be no further support from MOST for this project in the second phase.

11) CROWN

Short Description: The CROWN project is supported by the National Science Foundation of China, via the key program, "Network Based Environment for Scientific Research" (2004 to 2008). It is one of two large projects supported by this program. The major task is to develop a Grid test-bed for research activities. The Grid middleware called CROWN has been developed and demonstration applications have been supported by the CROWN platform.

Partners: Beihang University, Tsinghua University, Peking University, National University of Defense Technology

Funding agency: National Science Foundation of China (NSFC)
Contact: Prof. Jinpeng Huai, Beihang University, huaijp@buaa.edu.cn
Starting date and duration: 2004-2008
Maximum national contribution: Funding from NSFC is 8 million RMB.

12) China Grid

Short Description: This project is supported by the Ministry of Education (MOE), and partly supported by MOST. Its major purpose is to build an education and research Grid for Chinese universities. Currently there are 20 nodes in China Grid. A Grid software, CGSP, has been developed and five applications have been supported by China Grid. The first phase of China Grid started in 2003 and ended in June 2006, with the second phase starting at the end of 2006 and running until 2010. During the second phase, a set of 20 new nodes will be added to China Grid. Currently the number of users of China Grid exceeds fifty thousand people per day. Major activities include the introduction of six Grid centres based on these nodes, and the creation of a selective course grid.
Partners: Huazhong University of Science and Technology, Tsinghua University, Peking University, Beihang University, and others. There are 20 universities in total, and another 20 universities will join in the second phase
Funding agencies: Ministry of Education (MOE), MOST
Contact: Prof. Hai JIN, Huazhong University of Science and Technology, hjin@mail.hust.edu.cn
Starting date and duration: 2003-2006 (first phase), 2007-2010 (second phase)
Maximum national contribution: Funding from MOE is 20 million RMB (first phrase), 150 million RMB (second phase)

13) Shanghai Grid

Short Description: This project is supported by the Shanghai City Government and creates a Grid environment composed of HPCs in major participating universities and institutes. A traffic information service grid has been developed, based on the cooperation between CNGrid Shanghai SSC Center and Shanghai Grid. At the end of 2005, the application grid became operational. Users can access services such as real-time route status, optimal dynamic travel schemes, and arrival time forecasts for buses from desktops, touch screens, and mobile phones. A grid middleware SHGOS 2.0 has been developed, which supports resource monitoring and task scheduling. The project team has developed version 2.1 of the prototype system.
Partners
Shanghai Jiaotong University, Shanghai University, Tongji University, Shanghai Supercomputing Center
Funding agency: Shanghai City Government
Contact: Prof. Minglu LI, li-ml@cs.sjtu.edu.cn
Starting date and duration: 2003- 2005 (first phase), 2006-2008 (second phase)

Three new grid projects and two new high productivity computing projects will be funded by MOST in the second phase of the 863 programme "High Productivity Computers and Grid Service Environment" which runs from 2006 to 2010. These are:

14) Chinese Traditional Medicine Scientific Data Grid Service Application

Partners: Institute of Information of Traditional Chinese Medicine, China Academy of Traditional Chinese Medicine
Funding agency: Ministry of Science and Technology (MOST), China Academy of Traditional Chinese Medicine
Contact: Meng Cui, Institute of Information of Traditional Chinese Medicine, China Academy of Traditional Chinese Medicine
Starting date and duration: 2006-2010
Maximum national contribution: Funding from MOST is about 4 million RMB

15) Grid-Based Railway Logistic Information Application System

Partners: Information Technology Centre, Ministry of Railway (MOR)
Funding agency: Ministry of Science and Technology (MOST), MOR
Contact: Zhiming Xing, Information Technology Centre, Ministry of Railway,
Starting date and duration: 2006-2010
Maximum national contribution: Funding from MOST is about 4 million RMB

16) HPC Chemistry Application System

Partners: CNIC, CAS
Funding agency: Ministry of Science and Technology (MOST), CNIC
Contact: Zhong Jin, CNIC, Chinese Academy of Sciences (CAS)
Starting date and duration: 2006-2010
Maximum national contribution: Funding from MOST is about 4 million RMB

17) Water Resource Grid

Partners: Information Center, Ministry of Water Resource (MWR)
Funding agency: Ministry of Science and Technology (MOST), MWR
Contact: Yang Cai, Information Center, Ministry of Water Resource
Starting date and duration: 2006-2010
Maximum national contribution: Funding from MOST is about 4 million RMB

18) Astronomical Grid Parallel Numerical Computing Platform

Partners: Shanghai Astronomical Observatory, Chinese Academy of Sciences (CAS)
Funding agency: Ministry of Science and Technology (MOST), CAS
Contact: Xinhao Liao, CAS
Starting date and duration: 2006-2010
Maximum national contribution: Funding from MOST is about 4 million RMB

D. Grid in South Korea

South Korea has set up a major initiative in Grid computing called K*Grid which is managed by KISTI. K*Grid is an initiative in Grid research supported by the Korean Ministry of Information and Communication (MIC). The main goal of this project is to provide an extremely powerful research environment for both, industry and academia. It includes the development of the national Grid infrastructure and Grid middleware; main research topics revolve around scientific applications and essential software. The total budget of K*Grid amounts to 45.5 M€ for a period of five years (from 2002 to 2006), with more than 50 participating organisations. Most of the projects dealing with middleware are based on Globus backed by US funding.

I. National Grid programs

1) Implementation Plan of the Next Generation Internet Infrastructure based on Grid

Short description: After the success of the national VSIN (Very high Speed Information Network) project launched in 1995 by the Ministry of Information and Communication (MIC), the Korean government has tried to improve the national Internet infrastructure. As a part of the program, an initiative for the comprehensive implementation of a Korean national Grid infrastructure (K*Grid) was launched.
Funding agency: Ministry of Information and Communication (MIC)

2) Construction of Advanced Collaborative Environments for Scientific Research

Short description: Constructing an advanced R&D environment to increase the competitiveness of science and technology by introducing Grid technologies to research in science and technology.
Funding agency: Ministry of Science and Technology (MOST)

II. List of Grid projects in South Korea

1) Korean Grid (K*Grid) Implementation Project

Short description: The objectives of the project are to establish a nation-wide Tera-scale Grid infrastructure for industrial production in South Korea, using advanced Grid technologies, as well as to develop Grid middleware for K*Grid, and to develop Grid applications for business and science.
Funding agency: Ministry of Information and Communication (MIC)
Partners: KISTI (Korean Institute of Science Technology and Information), Seoul National University, Pusan National University, GFK (Grid Forum Korea), GBA (Grid Business Association)
Contact: Dr. Jysoo Lee (Director of KISTI Supercomputing Center), jysoo@kisti.re.kr
Starting date and duration: 2002~2006 (first phase), 2007 – 2008 (second phase)
Maximum national contribution: US$32 million (first phase), funding for 2007 is US$2.5 million
Website: http://www.gridcenter.or.kr/

2) National e-Science Project

Short description: The objectives of this project are to
- Develop molecular simulations for e-Science research environments and e-Glycoconjugates
- Create an e-Science environment for HG2C based on service oriented architecture
- Construct a numerical wind tunnel in e-Science infrastructure
- Establish an e-Science environment using a high voltage electron microscope
- Construct an e-Science environment for weather information systems

Funding agency: Ministry of Science and Technology (MOST)
Partners: KISTI (Korea Institute of Science Technology and Information), Seoul National University, Konkuk University, Kyunghee University, Wayne State University, PRAGMA, LSU, Korea e-Science Forum
Contact: Dr. Jysoo Lee (Director of KISTI Supercomputing Center), jysoo@kisti.re.kr
Starting date and duration: 2005~2010
Maximum national contribution: US$60 million
Website: http://www.escience.or.kr/

3) Korean Construction Engineering Development (KoCED) Project

Short description: The objectives of this project are to:
- Build very large construction experiment facilities (12 systems)
- Develop systems to share experimental information and measured information
- Provide a service for remote learning, analysis, and collaboration
- Provide facilities for training and further education
- Set up a virtual lab based on Grid applications

Funding agency: Ministry of Construction and Transportation (MOCT)
Partners: Seoul National University, Network for Earthquake Engineering Simulation (NEES), KoCED consortium (KICTTEP, SNU, etc)
Contact: Prof. J. Kim (Seoul National University), koced@snu.ac.kr, Prof. Heon Y. Yeom (Seoul National University), yeom@snu.ac.kr
Starting date and duration: 2004~2008
Maximum national contribution: US$50 million
Website: http://www.koced.net/

4) Global Earth Observation System of Systems (GEOSS) Project

Short description: GEOSS is an effort to achieve a comprehensive, coordinated and sustained observation of the Earth system. Its aims are to improve the monitoring of the state of the Earth, the understanding of Earth processes, and the prediction of the behavior of the Earth. GEOSS will allow the collection and distribution of accurate and reliable EO (Earth Observation) data, information, products, and services. In daily life it will substantially benefit and contribute to areas such as early disaster warning systems, health care, energy supply, climate prediction, water supply, and ecosystems.
Funding agency: Ministry of Construction and Transportation (MOCT)
Partner: Financial Planning Division of KMA (Korean Meteorological Administration)
Contact: GEO Secretariat of KOREA (kgeo@kma.go.kr), Sangjin Yu (Administrative Officer), sjlvu@kma.go.kr

Starting date and duration: 2006~2015
Maximum national contribution: US$40 million

5) Global Ring Network for Advanced Application Development (GLORIAD) Project

Short description: GLORIAD is a high-speed computer network used to connect scientific organizations in Russia, China, the United States, the Netherlands, South Korea and Canada. It provides scientists around the globe with advanced networking tools which improve communications and data exchange, enabling active, daily collaboration on common problems. With GLORIAD, the scientific community can move unprecedented volumes of valuable data effortlessly, stream video and communicate through quality audio- and video-conferencing, GLORIAD provides bandwidth of up to 10 Gbit/s via OC-192 links, e.g. between KRLight in South Korea. GLORIAD Korea is funded by the Korean Ministry of Science and Technology (MOST).
Funding agency: Ministry of Science and Technology (MOST)
Partner: KISTI
Contact: Young Hwa Cho (President of KISTI), yhcho@kisti.re.kr; Jysoo Lee (Director of KISTI Supercomputing Center), jysoo@kisti.re.kr
Starting date and duration: 2005~2008 (first phase), 2009-open (second phase)
Maximum national contribution: US$17.6 million
Website: http://www.gloriad.org

E. Bilateral and multilateral international Grid projects between EU and Asian countries

I. List of EC funded projects

1) Grid@Asia – Advanced Grid Research Workshops through European and Asian Cooperation

Short Description: The Grid@Asia project is designed to foster collaboration in Grid research and technologies between the European Union and Asian countries with a particular focus on China and South Korea.
The project implemented through three principal steps:
  • Identification of Chinese and South Korea key players in Grid research and technologies
  • Organisation of focused workshops around EU/Asia research and industrial agendas
  • Establishment of sustainable cooperation and dissemination activities
Relying on a core of leading European Grid research institutes Grid@Asia will define a joint research agenda to address international Grid priorities. This initiative will rely on the local support of the Asian partners to ensure on-site organisation, enhanced visibility and the participation of high-profile industrial and scientific delegations.
By strengthening cooperation between both communities, Grid@Asia is expected to provide Europe with a clear picture of the Grid community in those two Asian countries and to prepare a reliable ground for sustainable and long-term collaboration.
Through weaving additional links with leading Asian Grid research communities, Grid@Asia will support long-term international cooperation, in particular through the integration of Asian expertise with leading European Grid initiatives within the 6th Framework Program of the

European Union (such as Networks of Excellence, Integrated Projects, STREPS, etc.) and later on within the forthcoming 7th Framework Program.

This will position the European Grid community as a leading Center of excellence, enrich European expertise in the field and support the adoption of common Grid standards worldwide.

Partners: GEIE ERCIM, INRIA, CNR, FhG, Beihang University, KISTI, Shanghai Jiao Tong University

Duration: April 2005 – October 2006

Funding Agency: European Commission

Amount of funding: 300 000 EUR

Contact: Bruno Le Dantec, bruno.le_dantec@ercim.org

Website: http://www.gridatasia.net

2) EchoGrid – European and Chinese Cooperation on Grid

Short Description: The project will foster collaboration between the EU and China in Grid research and technologies by developing short-, mid-, and long-term visions in the field, such as

- Establish a common Grid research agenda, relying on European and Chinese experts, both from academia and industry
- Consolidate this vision and promote cross-fertilisation between Grid-related projects and initiatives in Europe and China
- Exchange know-how and best practice examples by selecting Grid open standards for Grid middleware and applications interoperability and by promoting the identification of guidelines for building a standard quality assurance process

Support lasting cooperation and establish tangible partnerships in the field through support activities and tools, ranging from a mobility for researchers to a dedicated partner search engine

Partners: GEIE ERCIM, National Technical University of Athens, Atos Origin SAE, Engineering Ingegneria Informatica, Thales Services, Beihang University, Institute of Computing Technology of the Chinese Academy of Sciences, Computer Network Information Center of the Chinese Academy of Sciences, National University of Defense Technology, Huawei Technologies Co.

Duration: Jan. 2007 – Jan 2009

Funding Agency: European Commission

Amount of funding: 1 545 000 EUR

Contact: Bruno Le Dantec, bruno.le_dantec@ercim.org

Website: http://www.echogrid.eu

3) Bridge – Bilateral Research and Industrial Development Enhancing and Integrating Grid-enabled Technologies

Short Description: Bridge is a project funded by the EC under the FP6-IST program. The project will start in January 2007 and is scheduled for 2 years. It will demonstrate the benefits of GRID technology for international cooperation, in particular between Europe and the target country China. By joint research efforts of European and Chinese research teams, the Bridge project aims at enhancing the Grid technology for both scientific and industrial applications. Bridge is based on previous research and development achievements of European and Chinese projects. It addresses major technical issues, which result from the far distance of the

collaboration partners as well as from the conflicting goal of intense collaboration and protection of intellectual property rights.

Bridge objectives:

- To demonstrate the benefits of GRID technology for international cooperation
- To develop, enhance and interconnect European and Chinese GRID middleware technology
- To set up integrated GRID test bed using European and Chinese middleware components for application demonstration
- To set up joint application show cases using distributed workflow and data access technology
- To disseminate the results of the project to industrial and academic communities
- To provide a software platform supporting distributed product and process developments, respecting and protecting intellectual property rights.

Partners: FhG, LMS Internat., University of Southampton, European Center for Medium-range Weather Forecasts, Deutscher Wetterdienst, EADS Center Commun de Récherche, Inforsense Ltd., Computer Network Information Center of the Chinese Adademy of Sciences, Beihang University, China Aviation Industry Corporation II Science & Technology Committee, National Meteorological Information Center of China, Shanghai Institute of Materia Medica of the Chinese Academy of Sciences, Neotrident Technology Ltd.
Duration: January 2007 – January 2009
Funding Agency: European Commission
Amount of funding: 1 700 000 EUR
Contact: Eckart Bierdümpel, bridge@fraunhofer.de
Website: http://www.bridge-project.eu

4) EC-Gin – Europe-China Grid InterNetworking

Short Description: The Internet communication infrastructure (the TCP/IP protocol stack) is designed for broad use; as such, it does not take the specific characteristics of Grid applications into account. This one-size-fits-all approach works for a number of application domains, however, it is far from being optimal - general network mechanisms, while useful for the Grid, cannot be as efficient as customised solutions. While Grids are now emerging, the underlying network infrastructure is still in its infancy. Thus, based on a number of properties that make Grids unique from the network perspective, the EC-GIN (Europe-China Grid InterNetworking) project will develop tailored network technology in dedicated support of Grid applications. These technical solutions will be supplemented with a secure and incentive-based Grid services network traffic management system, which will balance the conflicting performance demand and the economic use of resources in the network and within the Grid.

Partners: University of Innsbruck, University of Zürich, Institut National de Récherche en Informatique et Automatique, University of Lancaster, Justinmind (ES), Exis IT Ltd., University of Surrey, Pekin University, Institute of Software Chinese Academy of Sciences, China Telecommunications Labs, Bejing P&T Consulting and Design Institute Co & Ltd.
Duration: November 2006 – October 2009
Funding Agency: European Commission
Amount of funding: 2 200 000EUR
Contact: Michael Welzl, michael.welzl@uibk.ac.at
Website: http://www.ec-gin.eu

5) EUChinaGRID

Short Description: 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 eScience 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 the EGEE-supported applications and will promote the migration of new applications on the Grid infrastructures in Europe and China by training new user communities and supporting the adoption of grid tools and services for scientific applications. A first set of existing Euro-Chinese collaborations in research, marked by strong requirements in terms of analysis of large quantities of data and needs for wide amounts of computing power, were already selected as pilot applications in order to validate the infrastructure.

The first result of EUChinaGRID will be therefore to facilitate the exchange and processing of scientific data: all the pilot applications, will immediately take advantage of the new Grid infrastructure and services, providing in the meanwhile a proof-of-principle approach to validate the EUChinaGRID infrastructure.

These "Grid aware" applications, together with the dissemination activities will be the driving force promoting the migration of new applications on the EUChinaGRID infrastructure. The project will exploit 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 inter- national research and education community with transparent access to a worldwide amount of storage and computing resources larger than currently available in separate environments.

Partners: Beihang University, CNIC, IHEP, Peking University, GRNET, Consortium GARR, Department of Biology, Università di Roma Tre, Jagiellonian University, CERN, ASGC.
Duration: January1st 2006 – 31st December 2007
Funding Agency: European Commission
Amount of Funding: EUR 1 299 998
Contact: Federico Ruggieri, po@euchinagrid.org
Website: http://www.euchinagrid.org

II. *List of Chinese funded projects*

1) Open Middleware Infrastructure Institute for Europe - OMII

Short description: These are joint activities with OMII-UK on Grid middleware and Grid technology. The major participants of OMII-China are Beihang University, CNIC and ICT who are also involved in the EU-FP6 project OMII-Europe (no funding).
Partners: OMII-UK and other EU institutes involved in OMII-Europe
Duration: 2005-2006 (First phase)
Amount of funding: 3.9 million RMB
Funding agency: Ministry of Science and Technology (MOST)

III. List of Korean funded projects

1) Partnership between EGEE-II & KISTI

Short description: KISTI is participating in the EGEE-II project (Enabling Grids for E-science) as a contracting partner. In the area of SA1 (Grid Operation), the objectives are to investigate the usability of EGEE infrastructure for researchers in South Korea and to facilitate joint research activities between South Korea and Europe based on the EGEE infrastructure.
Partners: EGEE, KISTI
Duration: April 2006 ~ March 2008
Funding agencies: Commission of the European Communities, KISTI is a non-funded partner in the EGEE project.
Contact: jysoo@kisti.re.kr

F. Conclusion

There is a raising consensus on the fact that a coordinated approach towards Grid research in Europe and in the rest of the world is crucial for reaching a critical mass, creating the potential for a more visible impact at an international level, and influencing adoption in industry and business. This is particularly true with respect to the relations between Europe and some Asian countries (e.g. China, India, and South Korea) which have been intensified in recent years due to an impressive economic growth within these countries and their increasing importance in the world.

The Grid@Asia project which started in April 2005, intended to create the basis for developing a stable and sustainable collaboration between the European Union (EU), China and South Korea in Grid research and technologies. This collaboration has to be seen within a broader Information Society framework, aiming to promote the cooperation between European and Asian research teams. Moreover, this project is directed towards establishing the basis of a much larger scientific collaboration between Europe and Asia, through the creation of a human network in the area of Grids technologies, in order to overcome fragmentation and duplication of efforts, preparing a common coordination Grid research program which is capable of aligning the individual approaches.

Even among large organizations (national research centers, industry, etc.) such an alignment could create focus and coordination, making it easier to identify and realize synergies, thus offering the chance to share experience and learn from each other, to collaborate for mutual benefit and to sample some of the new technologies and research possibilities.
In the Grid arena, this collaboration is considered essential to ensure exploitation of interesting research results at a global level and to build Grid interoperable technology solutions. This will be of high value, not only for science, but also for the competitiveness of the European, Chinese and South Korean industry.

In this framework, Grid@Asia is a gateway towards future collaboration with these communities. This is the first step to realise a broader ambition to implement Grid technology world wide through intensive technological cooperation, not only to promote EU expertise,

but also to define international Grid standards by offering the means to reach consensus on critical global issues such as security, resource management, programmability, dependability, etc. Grid joint research projects are key ingredients to create better business conditions and improved market access for China, South Korea and the EU in information and communication technologies.

The main intent of Grid@Asia was not only to bring European Grid (projects and networks) more into the international limelight, but it was also to help to establish global Grid technologies, while promoting the joint European and Asian position on Grid technology. In order to carry out its program, Grid@Asia addressed the global scientific concerns shared by the international Grid community.

Important steps taken by Grid@Asia have been (i) the identification of the Chinese and South Korean key players in Grid research and technologies; (ii) organisation of focused workshops around EU/Asian research and industrial agendas; (iii) the establishment of sustainable cooperation and dissemination activities. The workshops organized in Beijing, Shanghai and Seoul focused on Grid research activities. They helped to establish contacts and exchange information between the European and Asian teams in the field, with a particular emphasis on concrete and exploitable Grid applications.

By strengthening the cooperation with the Grid community in China and South Korea, Grid@Asia has provided Europe with a clear vision of the Grid community in these important Asian countries. Through weaving additional links with leading Asian Grid research communities, Grid@Asia has supported long term international cooperation, especially by introducing Asian expertise to major European Grid initiatives (Networks of Excellence, Integrated Projects, STREPs, ...) within the FP6 and the forthcoming FP7. The first steps of this cooperation were quite successful. In particular, the IST Call 5 on Grid Technologies resulted in a first set of Grid projects (XtreemOS, GRIDCOMP) with joint collaborations between European and Chinese partners, while the IST Call 6 which specifically addressed "International Cooperation on Grid Technologies with China", received a large number of proposals for collaborations between major EU and Chinese Grid initiatives. One of these (EchoGRID) was selected as a fundable project by European Commission.

We are confident that Grid@Asia initiated cooperation on Grid technology between the EU and Asia and prepared the ground for collaborations with countries on similar initiatives, in order to promote the European Grid vision worldwide. A start has been made: several Chinese and Korean partners have recently become involved in joint projects branching out to Australia, Canada, China, Hong Kong, India, Japan and Indonesia.

Most common abbreviations

ERA – European Research Area
ERCIM – European research Consortium for Informatics and Mathematics
FP 6 – Framework Programme 6
IST – Information Society Technologies
IP – Integrated Project
NoE – Network of excellence
SSA – Specific Support Action
STREP – Specific Targeted Research Project
VO – Virtual Organisation

CAS - Chinese Academy of Sciences
CASIC - Chinese Academy of Science Information Center
CNIC – Chinese Computer Network and Information Center
ICT – Chinese Institute of Computing Technology
MOE – Chinese Ministry of Education
MOST - Ministry of Science and Technology (this abbreviation is used in the Chinese and Korean context)
NSF - National Science Foundation of China
RMB - national Chinese currency and short for RenMinBi. The unit is Yuan. 1US$ around 7.8 RMB Yuan, and 1 Euro around 10.3 Yuan.
863 program – Chinese high-tech R&D Program in Information Technology

GFK - Grid Forum Korea
KISTI - Korean Institute of Science Technology and Information
MIC – Korean Ministry of Information and Communication
MOCT - Ministry of Construction and Transportation