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# EchoGRID

European and Chinese Cooperation on Grid

**SSA Project**

**Information Society Technologies**

**D6.3 – Final Report**

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Responsible Partner: Patricia Ho-Hune, GEIE ERCIM

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**Deliverable manager**

- Patricia Ho-Hune, GEIE ERCIM
- 

**List of Contributors**

- WP1 – ICT : Zhiwei Xu, Taoying Liu, -NTUA: Gregory Katsaros, -CNIC: Luo Ze, -HUAWEI: Niranth Amogh
- WP2 – CNIC: Luo Ze, -NTUA: Gregory Katsaros, -HUAWEI: Niranth Amogh
- WP3 – ERCIM/INRIA: Denis Caromel, Yu Feng, -CNIC: Luo Ze, -HUAWEI: Niranth Amogh
- WP4 – ERCIM-TRUST-IT Stephanie Parker
- WP5 – BUAA: Depei Qian, Zhongzhi Luan, -ICT: Zhiwei Xu, Taoying Liu, -HUAWEI: Niranth Amogh, INRIA: -Thierry Priol, Denis Caromel, Yu Feng
- WP6 – ERCIM: Patricia Ho-Hune

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## **PUBLISHABLE EXECUTIVE SUMMARY**

The EchoGRID project fostered collaboration between the European Union and China in Grid research and technologies by defining short-, mid-, and long-term vision in the field.

The project

- developed a collaboration roadmap that identifies common areas of interest and opportunities for collaboration on Grid technologies between the EU and China;
- consolidated this vision and promote cross-fertilisation between Grid-related projects and initiatives in Europe and China by interacting with the GRID research and industrial communities;
- exchanged experiences and best practices 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;
- supported lasting cooperation and establish tangible partnerships in the field through support activities and tools, ranging from a mobility programme to a dedicated partner profile database.

The project organised a set of thematic workshops on strategic topics defined by the group of experts in the first year. These workshops were open to researchers and engineers from both academia and industry to define a better view of the research and development activities both in China and Europe. A research exchange programme and a fellowship programme was also continued to encourage exchange of personnel across countries and institutions.

### **Achievements**

Relying on its core members, EchoGRID rapidly federated and integrated many of the leading European and Chinese Grid stakeholders within its activities, as well as the main Grid programmes.

EchoGRID has focused on boosting interactions between researchers in Europe and China by creating gateways, defining common approaches, developing shared visions, and testing interoperability for standards development through a series of Plug-Tests.

The final outcome is the EchoGRID Roadmap (<http://echogrid.ercim.org/>) proposed for 3, 5, and 10 year stages. It addresses issues identified as being of mutual interest to researchers from academia and industry in China and Europe with New Programming Paradigms, Grid Architectures, Grid Management, Virtual Organisations, Component Models, Workflow – Business Processes highlighted as the top-level technological challenges for future collaborative developments in the drive towards the interoperability of open Grid services. Additionally, specific recommendations are targeted at EU and Chinese funding and research players, with the aim of facilitating the development of future research initiatives.

The consortium also organised several workshops and two conferences which reinforced the alliances within partners of the project as well as with external interested parties and initiatives.

In addition, EchoGRID organised two Grid PlugTests events in October 2007 and 2008 to test and improve interoperability mechanisms of Grid middleware. These PlugTests showed the active involvement of the Chinese counterparts.

Efforts also aimed at disseminating the final roadmap and exchanging about the next research perspectives both on the academic and industrial aspects.

Finally, owing to its mobility Programme including (i) a Fellowship Programme for young researchers and (ii) a Research Exchange Programme for experienced researchers, the project

facilitated the cooperation between the two continents and gave the opportunity to several computer scientists to enrich their experience in many ways.

### **Dissemination**

#### OGF23, 2-6 June 2008, Barcelona, Spain

The main goal was to disseminate EchoGRID outcomes increase outreach in an international setting, liaise with standardization, business and eScience communities, such as OGF, OGF-Europe, and BEinGRID communities, as well as showcase successful international partnerships with reference to industrial and eScience applications.

#### EchoGRID at ICT2008, 25-27 November 2008, Lyon, France

- *Exhibition in the International Village, 25-27 November*: The EchoGRID exhibition within ICT2008 was jointly organised with BRIDGE and GridCOMP. The exhibition offered a gateway to EU-China co-operation by highlighting the main objectives and outcomes of EchoGRID, including the roadmap. Particular value-add was brought by demos from both BRIDGE and GridCOMP.

- *Networking Session dedicated to “Priorities for Future Research on Grids: EU & International Perspectives”, Thursday 27 November 2008*. The session brought together representatives from BRIDGE, 3S, Challengers and NESSI-GRID, with the aim of fostering endorsement of strategic research agendas for Europe and future collaborative developments.

### **Project partners**

- GEIE ERCIM                      FR  
    GEIE ERCIM members contributing to the project
  - INRIA                              FR
  - STFC                                UK
  - CNR                                 IT
  - FhG                                 DE
- NTUA                                GR
- Atos Origin                        SP
- ENG                                 IT
- THALES                             FR
- Beihang University                CN
- ICT                                 CN
- CNIC                                CN
- NUDT                                CN
- HUAWEI                            CN

**Project number** - 045520

**Type of project** - Specific Support Action

**Project coordinator** - GEIE ERCIM

Ms Patricia Ho-Hune – [patricia.ho-hune@ercim.org](mailto:patricia.ho-hune@ercim.org)

**Project web site** – <http://www.echogrid.eu>

# 1 Project objectives and major achievements during the reporting period

The EchoGRID project fostered collaboration between the European Union and China in Grid research and technologies by defining short-, mid-, and long-term vision in the field. In this respect a set of activities were identified such as

1. the writing of a 3, 5 and 10 years roadmaps developing a shared European and Chinese vision of future GRID research perspectives for both research and industrial communities;
2. the organisation of a series of conferences and workshops open to both European & Chinese participants from research, industry, government, SMEs and user communities;
3. the organisation of EU-China Interoperability Grid PlugTests to test and improve interoperability mechanisms of Grid middleware;
4. the availability of a collaborative Multilingual Portal for grid-related resources;
5. the setting up of a staff exchange and a fellowship programme to encourage exchange of personnel across countries and institutions.

## Workshops & Conferences

- The first Strategic workshop was organised in February 2007 in Beijing hosted by Beihang University.
- The first conference, jointly organised by two EC funded projects, EchoGRID and EUChinaGrid, was successfully held on April 24-25 at the Institute of Computing Technology, Chinese Academy of Sciences (ICT, CAS) in Beijing.  
The second workshop was organised and hosted at CNIC, CAS, in October 2007. This event was organised in cooperation with two EU-funded projects, GridCOMP and Bridge, and was run in parallel with the Fourth Grid PlugTests jointly organised by ETSI, INRIA and ERCIM
- The third Strategic workshop took place in June 2008 in Athens hosted by NTUA. The workshop was completed successfully, providing useful feedback from the Research community and Industry.
- On 28 October 2008, an EU-China Cooperation workshop was held at the Conference centre of Beihang University, in Beijing.
- The 2<sup>nd</sup> EchoGRID International Conference took place within a key annual grid-focused event in China, GCC'08, 24-26 October 2008, attended by a large pool of representatives from Chinese organisations and international players and experts.
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## The final roadmap

All partners participated to the identification of the strategic topics that form the core of the EchoGRID roadmap. The EchoGRID Roadmap proposed for 3, 5, and 10 year stages addresses issues identified as being of mutual interest to researchers from academia and industry in China and Europe with New Programming Paradigms, Grid Architectures, Grid Management, Virtual Organisations, Component Models, Workflow – Business Processes, spotlighted as the top-level technological challenges for future collaborative developments in the drive towards the interoperability of open Grid services. Additionally, specific recommendations are targeted at EU and Chinese funding and research players, with the aim of facilitating the development of future research initiatives.

## **Grid PlugTests**

The Grid PlugTests is an interoperability event for Telecommunication, Internet and Information Technology Standards. During the event, by using the ProActive open source middleware, the participants have been able to deploy over a very heterogeneous grid, demonstrating the strong progress of grid technology both in efficiency and interoperability.

- The 2007 event, jointly organised by ERCIM, INRIA and ETSI (co-hosted by EchoGRID partner CNIC) was based on the GRID “N-Queens & Flowshop” contests in 29th Oct -2nd Nov 2007 in Beijing, China. This was the first time that PlugTests was held in China.
- The second annual EU-China interoperability Grid Plugtests was held from 20-24<sup>th</sup> Oct 2008 in Sophia Antipolis, France. The objective was to test and improve interoperability mechanisms of Grid middleware, especially, to test the ETSI TC Grid standard: GCM Deployment, as implemented in the open source reference implementation in ProActive. This 2008 Grid Plugtests event, co-organized by INRIA and ETSI, has attracted not only EchoGRID partners, i.e.BUAA, and NUDT, but also other Chinese teams. Their participation helped increase collaboration between EU and China on Grid middleware interoperability.

## **EchoGRID Mobility Programme**

A research exchange programme and a fellowship programme was set up to encourage exchange of personnel across countries and institutions, between China and Europe.

### 1. The Fellowship programme

Young researchers were hosted at one partner facilities for a 6, 9 or 12 months period to closely interact with major researchers and leading industrial communities. The Fellows participated in regular in house discussions and seminars and contributed to the EchoGRID effort to promote scientific and industrial activities and exchanges across Europe and China.

Four fellows benefited of the 2 year Fellowship programme of EchoGRID.

### 2. The Research exchange programme

The visit of a permanent staff (mostly researcher) or a PhD student from one EchoGRID member to another, was settled for a period ranging from two to ten weeks. Four researchers took the opportunity to initiate and build lasting cooperation with another partner.

## 2 Project Execution

### 2.1 WP1 – Ground for the Grid vision

#### Contribution from ICT

##### Achievements

- research topics were identified as important in the area of Grid and net computing systems:
  - Programming models and tools;
  - supporting large-scale data;
  - debugging and testing tools for application codes;
  - application domain libraries;
  - operating system kernel/core improvement;
  - connection to SOKU and semantics.
- Benefits were identified of EU-China cooperation in Grid and net computing systems:
  - utilizing complementary technology and expertise;
  - understanding large software project R&D by international teams;
  - enhanced impact in the World and in China;
  - expanding human resource pool that know EU-China collaboration in net computing systems;
  - Establishing open-source software policy suitable for both sides.
- 2 deliverables were published
  - D1.1 EU and Chinese research and industrial initiatives and Grid strategic orientations
  - D1.2 Market analysis
- 2 international conferences and 3 technique workshops were organized for the communication between Chinese and European Grid researchers in order to clarify the current vision and future roadmaps:
  - First International conference, 2007, Beijing, China
  - Second international conference, 2008, Shenzhen, China
  - Rome workshop, 2008, Italy
  - Athens workshop, 2008, Greece
  - Beijing workshop, 2008, China
- Changing usage patterns and techniques were identified to adjust new visions:
  - identified the emergent techniques and business models of Cloud computing, and indicated that the programming paradigm and virtual organization of Grid computing should benefit from the usage pattern of cloud and the virtualization technique, and also adjust to those new visions
  - Strongly recommended that cloud computing technologies should be added to the state-of-the-art sections in each part of D1.2, and should be included in the future roadmap of 3-year, 5-year and 10-year

##### Feedback

Partners from academia and industry took part into the drafting, discussion, modification, and the final delivery of D1.1 and D1.2. Deliverables D1.1 and D1.2 probe in details the current status of Grid research, applications, business models and marketing. The numbers and charts and typical cases in the reports give a whole perspective on the current vision, and also reveal the future



direction. The process is still somewhat sensitive to the emergent techniques like cloud-computing, and indicating it as a major change and adjustment for future developments.

### **Technology / Academic / Specifications & features**

As a result of the collaboration sponsored by EchoGRID Fellowship Program, research in Grid programming models is getting processed towards a more practical status. The collaboration research examines the real applications of recently proposed programming model, including HOCL and GSML, and specifies the advantages and drawbacks of those models for data-intensive computing scenarios. This is quite important for Grid technologies to be adjusted in new visions.

### **Contribution from NTUA**

The main achievements of this WP were the research, identification and recording of all the research but also the industrial activity related with Grid technologies within Europe and China.

NTUA/ICCS successfully shared its knowledge and expertise on Grid technologies with the consortium by expressing the experience gained from previous as well as ongoing European project that is participating in. Specifically, NTUA/ICCS members presented the work done at GRIA, NextGRID, BEinGRID and IRMOS projects as well as contributed to the respective deliverables.

From another perspective, our involvement within this WP has been beneficial in terms of the co-operation and the information provided by the Chinese partners. The identification of the Chinese research activities and the current status in industry and academia, indicated the similarities and differences and helped NTUA/ICCS to direct its activity regarding the global trends of the field.

As an outcome (or a lesson), we can indicate that the activity that is taken place in Europe in the fields of Grid services and Infrastructures is in many ways aligned with the effort of Chinese researchers, so there is a straightforward opportunity for future collaboration between the two regions.

### **Contribution from CNIC**

CNIC was involved in the WP1.4-Definition of Grid strategic orientations. To achieve this purpose, we have shared our Chinese grid experience with partners. We introduced the Chinese Grid effort such as 863, NSFC etc, and explored the similarities and differences between the two sides. We contributed on our experiences on Scientific Data Grid (SDG).

CNIC also contributed to the second workshop agenda in October 2007. We organized the Chinese partners participation and collected the information from them. We managed the location and invited VIP, etc.

### **Contribution from Huawei**

#### **Achievements**

From Telco perspective, the WP1 deliverable achieved to bring forward the efforts in the state of the art of Grid computing in Europe and China which was not visible until date.

#### **Feedback**

- the benefits

For Telco Industry, participation in this work package brought us face to face with the actual problems being solved by academic and industries of both China and Europe.

- the problems

Most of the problems solved do not impact the needs of the Telco Industry in near future, while some problem domains like Cloud Computing gathered some critical interest by few industry players.

### Contribution from ENG

#### **Achievements**

ENG contributed to highlight industrial cooperation actions and perspectives between EU and China. For ENG itself, it was extremely important to better understand a new potential market and the main actors with which to cooperate for further research and business initiatives.

In particular regarding the convergence of TELCO and IT, with respect to specific topics such as VO, and the cloud computing initiatives, the company got a clearer understanding of positions and perspectives with on these issues.

#### **Feedback**

A comprehensive and deep state-of-the-art analysis is often difficult due to the type of very-far collaboration. Desk analysis should be complemented with on-the-field gathering of information, interviews of main actors and leveraging on national and international institution aiming at fostering the collaboration between EU and China (ranking from national embassy to joint cooperation and supporting initiative even and better if co-founded by EC – see. EU-China (<http://www.eu-china-infso.org/>)).

## 2.2 WP2 – Collaboration Roadmap

### Contribution from CNIC

#### Achievements

The objective of this WP was to drive the series of strategic workshops. The main goal was to gather the workshop discussions, to extract and to synthesize the recommendations and findings (technological and societal) and to finally consolidate common roadmap cooperation for China and Europe focusing on future work programs. This WP was in charge of necessary logistics (meeting room, accommodation, registration, etc) of the workshops ensuring visibility and the participation of relevant institutions. Finally, this WP also collaborated with similar initiatives to validate and synchronise the roadmap.

3 workshops and 2 conferences were organized to (i) provide opportunities for face to face discussion and debate on the topics of strategic orientation and roadmap study conducted by all partners, and (ii) to collect and summarize the results of the workshops, and (iii) write the roadmap and collect feedback from Chinese and EU research and industrial communities about it.

The first workshop held in Beijing on 7-8 February 2008 was hosted by BUAA. The workshop established the state of the art in both Europe and China and to analyze similarities and differences, thus leading to first indications of a roadmap for further work. The workshop concentrated on 3 major topics: (i) Grid Open Standards; (ii) Grid Programming; (iii) Grid middleware. The roadmaps of importance in Europe and China were described to improve participants' knowledge on existing grid activities and visions. An overview of Running R&D projects, Industrial and Research initiatives and experiences, and a general situation of the market in Europe and China were also presented. The Information about the first EchoGRID workshop could be accessed from <http://echogrid.ercim.org/content/view/42/34/>.

The 1st Joint EchoGRID & EUChinaGRID International Conference was held on 24-27 April 2007 at the ICT, Chinese Academy of Science in Beijing, China. EchoGRID organized this conference to promote cross-fertilization between Grid-related projects and initiatives in Europe and China by interacting with top Grid research and industrial communities, exchange experiences and best practices for Grid middleware and applications interoperability. More than 200 scientists and experts from Europe and China attended the event. This conference was of significant importance in promoting grid research and grid infrastructure deployment in both Europe and China. The information about the first International conference can be accessed from <http://echogrid.ercim.org/content/view/11/18/>.

The second EchoGRID Workshop took place in Beijing from 29 to 31 October 2007, hosted by CNIC, CAS. Researchers and engineers from both academia and industry better illustrated their view of the research and development activities both in China and Europe. Four major topics were discussed: (i) New programming Paradigms; (ii) Trust & Security; (iii) Grid middleware Grid Workflow; (iv) Grid Middleware for Industrial Applications. The project took the opportunity of this event to invite two other EC funded projects, namely the Bridge and the GridCOMP projects and organized the first Grid PlugTests with the participation and the support of the European Telecommunications Standards Institute (ETSI). The information about the first International conference can be accessed from <http://echogrid.ercim.org/content/view/43/33/>.

After two workshops and one conference in China and numerous presentations in the first year of project, the consortium was engaged in the drafting of the document. A roadmap drafting meeting was hosted by Engineering Ingegneria Informatica S.p.A from 14 to 15 January 2008. The goal of the meeting in Roma was to draft a first version of the EchoGrid roadmap. The workshop ran six parallel sessions to tackle most of the subjects identified during the first workshop, namely:

Session 1: New Programming paradigms;  
Session 2: GRID Architectures;  
Session 3: Management;  
Session 4: Virtual organization;  
Session 5: Component model – what is needed to use in GRIDs environment;  
Session 6: Workflow / Business Process.

22 attendees from both EU and China attended the workshop and a roadmap draft was achieved by the workshop.

The third workshop took place in Athens from 9 to 10 June 2008, hosted by [National technical University of Athens](#). After the roadmap draft was distributed to grid-related contacts both in EU and China for feedback and comments on the roadmap draft, one of goals of the workshop was to improve the roadmap according to the comments from grid experts, the other one was to invite industry experts to participate in a discussion on grid roadmap and general concerns on grid related to Industry. The [perspectives from industry](#) are one important part of the roadmap. Six sessions were organized according to the perspectives and structure of the roadmap document: Session 1: New programming paradigms; Session 2: GRID Architectures – SoA; Session 3: GRID Management; Session 4: Virtual organization; Session 5: Component model; Session 6: Workflow / Business Process. 38 attendees from both EU and China, including the experts from industry like Huawei, Nissan-Renault, AVIC II of China, attended the workshop. Feedback from workshop 2, roadmap topics and roadmap perspectives from industrial view point were discussed and exchanged. The agenda of the workshop can be accessed on EchoGRID website: <http://echogrid.ercim.org/content/view/37/>.

The [second international conference took place in Shenzhen, China, on 24-26 October 2008](#), in conjunction with the [7th International Conference on Grid and Cooperative Computing](#) (GCC 2008). Cloud computing was discussed both on its academic and industrial perspectives within two separate sessions. The panel discussed how Cloud computing could impact Grids and what were the new research challenges behind Cloud, and how Cloud and Grids can be merged together to let computing be a true utility. The discussion also highlighted examples of best practices, evaluated how these could be transformed into standards, and discussed opportunities for future collaborative developments between China and Europe. 30 attendees from both EU and China attended the conference and the agenda of the conference can be accessed on EchoGRID website: <http://echogrid.ercim.org/content/view/41/31/>.

After the [second international conference](#), [an EU-China Cooperation workshop was held on 28 October 2008 in Beijing](#). This workshop was organized by ERCIM and Beihang University. It took place at the Conference Center of Beihang University and promoted research collaborations between China and Europe in the Grid, as well as Services and Software Technologies areas. Both European and Chinese representatives, including the European Commission, the Chinese Ministry Of Science and Technology, EU projects such as EchoGRID, BRIDGE, XTreemOS, GridCOMP, EU-ChinaGrid, Qualipso and several other projects involving Chinese partners, Chinese and European Industries (Huawei, China Mobile Research, Thales, ENG...), were present at the workshop. The participating projects presented their initial objectives and their achievements in terms of cooperation between both continents. This workshop was also an opportunity for fostering relationships with European and Chinese partners who are interested in EU projects, for developing future FP7 proposals and for networking. This was a good opportunity for project dissemination and collaboration activities. About 100 participants attended the workshop and the agenda of the workshop can be accessed on EchoGRID website: <http://echogrid.ercim.org/content/view/45/35/>.

## **Feedback**

- the benefits:

- (1) Showcase research developments, approaches and future initiatives in Grid to counterparts.
- (2) Network & create future co-operation with community members and event participants.
- (3) The developed collaboration roadmap identifies common areas of interests and opportunities for collaboration on Grid technologies between the EU and China;
- (4) Consolidate common vision and promote cross-fertilization between Grid-related projects and initiatives in Europe and China by interacting with the GRID research and industrial communities.

- the problems

(1) Linguistic barriers are still one obstacle for effective and seamless cooperation between the two geographical areas.

- the lessons learnt

(1) More in-depth communication and cooperation on developing grid technologies, policy, standards to promote the interoperability is required.

- the Recommendations for future projects

(1) Continuity and sustainability especially for the exchange on grid projects of both EU and China are extremely important. Therefore, additional funding should be available also after the end of the project.

## **Contribution from NTUA**

NTUA/ICCS although its small planned effort in this WP had been really active by participating in all Strategic Workshops, hosting and organizing the Third Strategic Workshop and finally contributing to the roadmap document produced.

The impact of the workshops first of all on the collaboration of all partners and secondly on the effective roadmap definition and information consolidation was really important.

In detail, NTUA/ICCS contribution to this WP was focused on the technical fields of:

- Grid Workflows
- Service Oriented Architectures
- Virtual Organizations

As an overall conclusion, we suggest the enforcement of such collaboration activities on future projects while the F2F meetings and workshops boost the co-operation and effectiveness of all partners involved in the action.

## **Contribution from Huawei**

### **Achievements**

Huawei led the Grid management topic to draft the 3, 5 and 10 years for the collaboration roadmap.

### **Feedback**

- the benefits

Huawei was able to share the industrial perspective for Grid management to be considered as part of the roadmap.

## **Contribution from ENG**

### **Achievements**

ENG contributed to VO management and Grid Management topics

### **Feedback**

Positive feedback especially with respect the identification of specific topics to be further developed with specific partners (e.g. Huawei on VO management).

## 2.3 WP3- EU-China grid harmonisation

### Contribution from INRIA-Sophia Antipolis

#### Achievements

Open standards have been an important means of achieving interoperability between different Grids. One of the goals of EchoGRID was to exchange experiences and best practices by selecting Grid Open Standards for Grid middleware and application interoperability and by promoting the identification of guidelines for contributing to set up a Standard Quality Assurance Process. A shared vision of Grid open standards and quality assurance approaches was provided; it included the analysis of Grid standardization activity in the international standardization bodies and identified relevant cooperation path for the EU-China. Vision and analysis result of strong networking activities done by EchoGRID partners aiming at identifying a shared vision for further research cooperation on Grid and Quality Assurance.

#### Feedback

- the benefits

EchoGRID partners have been successfully working on Grid standard with ETSI and have collaborated with other standardization bodies.

EchoGRID partners attended OGF conference and discussed with other Grid organization, co-organised common workshops and sessions. The focus of the OGF workshop was to bring together Grid experts and quality assurance experts to cross-fertilise the two worlds and promote further joint initiatives. The initiative has been an important attempt to establish liaisons with other projects sharing experiences on the common objectives and to select the most interesting of them.

Cooperation with Chinese partners is a long term goal based on common research interests and activities; knowing each partner through some joint projects is definitely a good start. INRIA has setup very close relationship with Beihang University through EchoGRID project and will have to continue the cooperation through another joint proposal of FP7.

- the problems

Communication has been the major problem with some partners during this project, often, late response or misunderstanding were the main difficulties to keep the efficiency between partners. Another problem with Chinese partners was that the initial agreed cooperation activities could not be implemented directly as scheduled due to several factors, i. e. funding limitation, budget problem.

Culture differences could be another minor problem during the project cooperation.

- the lessons learnt

The relationship between partners should not only work during the project period, but also in the future. A long term cooperation plan should be kept in mind for all partners. For example, Plugtests will continue to be held to keep attraction of grid researchers

Standardization process always need long procedures, it needs to be continued after the project ends.

– the Recommendations for future projects

The more joint projects between European and Chinese partners, the more understanding and cooperation will be achieved.

Thanks to the EchoGRID project, we have opportunities to meet with European and Chinese partners working on Grid area and understand the Chinese grid research initiatives. We hosted visitors from Chinese partners, Beihang University, NUDT and CNIC.

#### Contribution from CNIC

CNIC was involved in the WP3.3-Shared vision on Grid Open Standards and Quality Assurance approaches. We have discussed this with ENG. We provided our QA experience on our Scientific Data Grid (SDG); describe our method on system design, testing, software lifecycle etc.

CNIC held the Plugtest 2007. We provided dedicated machines for supporting the GRID Plugtests. With the help from INRIA, CNIC built an appropriate Grid testbed between EU-China. CNIC also provided the room and PC for the contests.

#### Contribution from Huawei

##### **Achievements**

Huawei was able to network with Grid computing researchers in Europe and China through EchoGRID. Through this network and with INRIA support, Huawei was able to setup an exchange of thoughts with ETSI TC GRID officials. This further led Huawei to join ETSI TC GRID efforts and participate in the Grid standardization process.

##### **Feedback**

- the benefits

Huawei was able to bring and introduce the concept of Carrier Grade Data Grid to ETSI TC GRID and it also participated and supported other work items of TC GRID.

#### Contribution from ENG

##### **Achievements**

ENG contributed to animate the debate on quality in the grid area. Very few responses were received in the beginning of the project, but that have been double at the very end.

##### **Feedback**

Quality aspects are still devoted to some specialists and few initiatives. It is required to reinforce this community well behind the group of experts dealing with quality. The task 3.2 was a first attempt while other initiatives are very welcomed in the future.

## 2.4 WP4 – Dissemination and Communication

### Contribution from TRUST-IT

#### Achievements

**International Conferences:** EchoGRID has successfully delivered **two international conferences** set in China.

EchoGRID's **1<sup>st</sup> International Conference** was jointly organized with the EC-funded project EUChinaGRID and took place 24-25 April 2007 in Beijing, China. The conference components comprised welcome addresses, five keynotes, dedicated plenary tracks, live demos and interactive panel discussions. The main achievements are:

- Over 180 participants from academic, research, commercial and governmental organizations from both China and Europe coming together to discuss Grid research developments, academia and industrial uptake in both regions and to showcase state-of-the-art Grid technologies through live demos.
- Active participation from key policy-makers in China and Europe, in keeping with the top-bottom/bottom-up approach of the EchoGRID project:
  - European Delegation to China Representative - Welcome Address.
  - Chinese Ministry of Science and Technology (MOST) representatives: Deputy Director General, Department of High and New Technology and Industrialisation - Welcome Address.
  - EU Scientific counsellors: Counsellor of Science and Technology & Scientific Assistant, Division of Science & technology, German Embassy in China; Scientific Project Executive, French Embassy in China.
  - Representative from the Division of Information; Unit Director of International Co-operation – Keynote Speech.
- Participation of distinguished academicians in attendance include Bohu Li, Chinese Academy of Engineering, President of the Institute of Automation, Science and Electron Engineering (Beihang University) and of the Chinese Association for System Simulation).
- The conference offered an important opportunity to network and exchange knowledge on Grid development experiences, evaluate top-level technical challenges, explore benefits and opportunities for enterprises and scientific researchers, as well as highlight the key role of standards in driving forward Grid adoption. Additionally, participants benefited from networking opportunities aimed at strengthening existing relations and forging new collaboration in scientific domains and enterprise alliances.

Activities performed to organize the conference and conference outcomes are provided in D4.2.1 Evaluation Report.

**EchoGRID's 2<sup>nd</sup> International Conference** took place within a key annual grid-focused event in China, GCC'07, 24-26 October 2008, in Shenzhen, China, which was attended by a large pool of representatives from Chinese organisations and international players and experts. The objective of the conference was to present the main outcomes of the Roadmap and evaluate future research perspectives from the perspectives of academia and industry.

- The EchoGRID conference components included a keynote talk delivered by Thierry Priol, Scientific Co-ordinator of EchoGRID on 24 October 2008 and a 1-day event with dedicated tracks on Academia and an Industry Track on 25 October.



- The tracks were dedicated mainly to cloud computing and virtualisation, in order to understand how future EU-China co-operation might leverage current technology trends by advancing these developments and bringing tangible benefits. For this purpose, the Academia and Industry Tracks brought together project partners and a focused group of experts to assess the impact of cloud computing on grids and new research challenges, how clouds and grids may merge to create a true utility, and the role of industrial partnerships of future collaborative developments between Europe and China.

Outcomes of the conference are provided in D4.2.2 Evaluation Report.

### **Additional international events attended and organized by EchoGRID**

- **23<sup>rd</sup> Open Grid Forum (OGF23), 2-6 June 2008, Barcelona, Spain**

OGF23 was attended by over 550 participants from government, enterprise and research institutions from all over the world. EchoGRID organized a joint stand in the international exhibition with two EU projects, BRIDGE and EU-IndiaGrid, with the aim of sharing knowledge on developments and potential across Asia and demonstrate the benefits of international co-operation on grids. Specific achievements include new contacts, particularly with enterprise in both regions, knowledge exchange through active participation in OGF23 sessions and dissemination activities, such as circulating articles during OGF23 and ad-hoc articles afterwards.

- **Beijing Workshop, 28 October 2008, Beijing, China**

The Beijing Workshop brought together over 100 representatives from academia, government and industry from China and Europe to showcase successful international partnerships, highlight the focus of on-going co-operation and explore challenges and themes of mutual interest in terms of future grid developments. This 1-day Workshop featured talks by the policy-makers and funding agencies, such as the Chinese Ministry of Science and Technology (MOST) and the European Commission (EC), as well as by funded initiatives, such as: GridCOMP, BRIDGE, EU-ChinaGRID, EC-GIN, CROWN, iVCE, Qualipso, and XtremOS, sharing experiences on EU-China co-operation, such as success stories, challenges addressed and lessons learnt. All participants were invited to take part in an interactive discussion on specific themes of mutual interest, with the Workshop concluding with the main outcomes and next steps needed to foster future collaboration.

The workshop was also an opportunity for fostering relationships with European and Chinese partners who are interested in EU projects, for developing future FP7 proposals and for networking, as well as for project dissemination and collaboration activities.

- **EchoGRID Exhibition and Networking Session at ICT2008, 25-27 November 2008, Lyon, France**

**Exhibition in the International Village, 25-27 November:** The EchoGRID Exhibition within ICT2008 was jointly organized with BRIDGE and GridCOMP, with the primary goal of showcasing EU-China co-operation success stories and the benefits of grid to a mainly EU audience, thus with a particular focus on EU value-add and potential for technology transfer. The Exhibition offered a gateway to EU-China co-operation by highlighting the main objectives and outcomes of EchoGRID, including the Roadmap. Particular value-add was brought by demos from both BRIDGE and GridCOMP demonstrating the business benefits of grid in diverse sectors, and by ultimately fostering technology transfer.

Networking Session dedicated to “Priorities for Future Research on Grids: EU & International Perspectives”, Thursday 27 November 2008. The session brought together representatives from BRIDE, 3S, Challengers and NESSI-GRID, with the aim of fostering endorsement of strategic

research agendas for Europe and future collaborative developments. During the selection process, the dedicated Session page attracted over 50 comments from business and research organizations, one of the highest rankings for Networking Sessions, illustrating interest in exploring new opportunities for co-operation on grids, assessing the differences and similarities of grids and clouds and their business value-add, as well as in understanding the focus of EU research agendas.

### Community Building

During the life time of the project, partners have endeavoured to create and connect representatives from a broad spectrum of organizations in both regions through a dedicated database, targeted messaging and event organization and attendance, building up a considerable pool of contacts over the 24-month period. The current database is outlined in the Feedback section below.

The table below offers a sample of dissemination and outreach activities in Europe and China over the 24-month period, with the specific goal of building an EU-China community for grids.

Target	EU	China
<b>1<sup>st</sup> International Conference, April 2007</b>	Over 1800 invites: Grid & e-Infrastructure projects; Grid users from research & industry. Invite to the EC Delegation to China. Invite to the EU Chamber of Commerce (Beijing). Press & media: 58 pertinent contacts	150 business contacts for EU and international companies operating in China. VIP invites and raising awareness of the conference to pertinent government officials, business and scientific communities. National press contacts such as Science Times.
<b>1<sup>st</sup> International Conference: survey of outcomes, June 2007</b>	Feedback on the EchoGRID 1 <sup>st</sup> International Conference was collated through two surveys with the aim of evaluating outcomes, Grid research development from diverse perspectives and overall value as perceived by the attendants. The survey was circulated by Trust-IT, ICT and BUAA, outcomes of the survey are summarized in D4.2.1 Conference Evaluation Report.	
<b>3<sup>rd</sup> EchoGRID Workshop, June 2008, Greece</b>	Representatives, such as experts from industry and research, were identified and targeted with the aim of ensuring broader perspectives to the Workshop. Additionally, targeted messages were circulated to an EU pool of contacts, specifically stakeholders in grid, as well as to associations, who could invite members with areas of interest and expertise pertinent to the Workshop goals.	
<b>QA Survey, August-September 2008</b>	The circulation of the Survey was supported by targeting pertinent contacts with expertise in QA. Experts were recruited from both EU and China through targeted messages. The overall goal was to raise interest in the survey and assist in obtaining the objectives set.	
<b>2<sup>nd</sup> International Conference &amp; Beijing Workshop</b>	Targeted message to the EU and China networks circulated in branded HTML, highlighting the main features. The messages were circulated to contacts in both EU and China.	
<b>EchoGRID at ICT2008, 25-27 November 2008, France</b>	Targeted messaging to business and research communities in China and Europe with the aim of drawing attention to both the Exhibition Stand and Networking Session, for which endorsements and expressions of interest were explicitly requested. An eNewsletter was circulated to target audiences during ICT2008 and print versions distributed from the stand.	

- **Interaction with business, government and research organizations**

EchoGRID has interacted with a variety of business, government and research organizations at its international conferences, workshops, event attendance and through the exhibition and networking session at ICT2008. Where appropriate, contacts have also been drawn from additional databases owned by partners, for example, EU media and press channels and enterprise networks. The table below indicates achievements by way of a sample of specific interaction at events.

<b>Target Audience</b>	<b>Organizations in China &amp; Europe</b>
<b>Academic and research institutions</b>	<p>CERN (CH), GARR (IT), GRNET (EL), ICCS/NTUA (GR), INFN (IT), INRIA (FR), NTUA (EL), SINA (DE-China), IT Innovation, Southampton University (UK) Umea University (SE), New University of Lisbon, Systems Research Institute of Polish Academy of Science, Italian National Research Centre (CNR).</p> <p>Beihang University, Chinese Academy of Science (ICT/CNIC/Institute of Software), Cluster and Grid Computing Lab, NUDT, Peking University; Shanghai Supercomputer Centre, Tsinghua University, Beijing Jiaotong University, Beijing University of Post and Telecommunication, Center for Earth Observation and Digital Earth, Academy of Meteorological Sciences, Harbin Institute of Technology, Huazhong University of Science and Technology, Institute of Water Resource, Xi'an University of Technology, National University of Defense Technology, Shandong University, Shanghai Supercomputer Center, Shanghai Institute of Materia Medica, Shenzhen Institute of Advanced Technology, South China University of Technology, Tsinghua University, University of Science and Technology of China, and Xi'an Jiaotong University.</p>
<b>Business Communities</b>	<p>ATOS Origin (SP), Engineering (IT), Centre for Scientific Visualisation (SL), GridwiseTech (PL), Inforsense (UK), Thales (FR), Activeeon (FR), Trust-IT Services Ltd (UK), Platform Computing, BT.</p> <p>Intervision Software (CN), eStarCom (CN), Intervision Software (CN), China Mobile Group Design (CN); CVIC Software Engineering (CN); HP Lab China; Huawei Technologies (CN); Intel China Ltd; Lenovo Research (CN); SAP Labs China; TongTech (CN); UfSoft Ltd (CN), China Aviation Corporation (CN), Datang Telecom Technology &amp; Industry Group (CN), Inspur Group (CN)</p> <p>Association of Enterprises Korea.</p>
<b>Government, Funding &amp; Policy-makers</b>	<p>EC, EC Delegation to China, MOST, French Embassy to China in Beijing, German Embassy to China in Beijing.</p>
<b>Standardization Development Organizations (SDOs)</b>	<p>OGF (HP Lab China); Chinese e-Government Project Standard Committee (eStarCom), specifically National Information Resource Directory &amp; Exchange Standard Development; State Department Information Sharing &amp; Exchange Architecture Standard &amp; Reference Guide; Standard Steering Group (Lenovo Research), ETSI (Huawei Technologies and INRIA)</p>

- **Synergies and Strategic Alliances**

For the 1<sup>st</sup> International Conference, EchoGRID developed an effective synergy with the EU Chamber of Commerce ([www.europeanchambercom.cn](http://www.europeanchambercom.cn)), Beijing, China. The Chamber circulated a targeted message to their enterprise members and to the members of the Energy and Utility Working Group. Additionally, the Chamber sent EchoGRID a copy of its *Executive Summary* of the seventh European Business in a Position Paper (2006-2007), which provides information on the EU companies operating in China, as well as on the benefits of operating there and the steps involved. Support mechanisms of the Chamber were communicated and passed on to EU companies interested in attending the event.

The table below illustrates the strategic alliances that have been developed mainly in the second year of the project, in order to foster exchange of mutual objectives and bring EU value-add, in addition to fostering industry links, for example, with China Mobile.

Aim of Strategic Alliance	Examples
Showcasing successful EU-Chinese and EU-India partnerships and demonstrating the business benefits and potential of grid in the commercial sector.	BRIDGE & EU-IndiaGrid synergies through a joint Exhibition Stand at <b>OGF23</b> . BRIDGE presentations at <b>2<sup>nd</sup> EchoGRID Conference (Industry Track)</b> ; <b>Beijing Workshop</b> ; and <b>ICT2008 Networking</b> . GridCOMP talk <b>Beijing Workshop</b> and <b>ICT2008 Exhibition</b> .
Knowledge exchange on future technology trends & priorities with trans-regional and academia-industry focused research perspectives.	CoreGRID, SOA@SOI, NESSI-GRID, RESERVOIR, BRIDGE, SCOVIS projects at <b>2<sup>nd</sup> EchoGRID Conference</b> .
Knowledge exchange with EC-projects focusing on strategic research agendas, roadmaps and white papers targeting both EU stakeholder communities, policy makers and funding agencies.	3S and Challengers – Against Mainstream Research and NESSI-GRID <b>ICT2008 Networking</b> with BRIDGE serving as a starting point highlighting the achievements to date and future potential.

- **Project-to-Project Networking**

EchoGRID has synergized with the following Chinese and European initiatives and projects: CNGrid, CROWN, EU-ChinaGrid, EGEE-II & EGEE-III, ETICS, GridCOMP, K-Wf, NESSI & NESSIGrid, XtreamOS, CoreGRID, SOA@SOI, NESSI-GRID, 3S, Challengers and RESERVOIR.

### **Dissemination Outcomes: Media releases and articles**

The tables below summarize the main outcomes for dissemination achievements over the lifetime of the project with particular reference to event announcements, media releases and ad-hoc articles produced and published.



<b>Post-conference Article</b> (based on conference press releases).	<i>ERCIM News</i> , 70, July 2007, Conference Report, p. 66. <i>Science Times</i> (Chinese journal, 27 April '08)
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<b>Date and Type</b>	<b>Details</b>
<b>2<sup>nd</sup> EchoGRID Workshop Announcement &amp; Press Release, September 2007</b>	<p>EC-Gin Website (Event Announcement)  <a href="http://www.ec-gin.eu/corpsite/display/dsp_Entity.asp?EN_ID=515">http://www.ec-gin.eu/corpsite/display/dsp_Entity.asp?EN_ID=515</a>            EC-GIN Website (link to Press Release)  <a href="http://www.ec-gin.eu/corpsite/manage/assets/echogrid_beijing%20october%20workshop_v2.0.pdf">http://www.ec-gin.eu/corpsite/manage/assets/echogrid_beijing%20october%20workshop_v2.0.pdf</a>            XtreamOS Website (event announcement)  <a href="http://www.xtreemos.eu/events/forthcoming-events">http://www.xtreemos.eu/events/forthcoming-events</a>            Grid Plugtests Website (event announcement)  <a href="http://www.etsi.org/plugtests/grid/conference.htm">http://www.etsi.org/plugtests/grid/conference.htm</a>            LIAMA Sino-French Lab (CN) (event announcement)  <a href="http://liama.ia.ac.cn/wiki/project.news:more">http://liama.ia.ac.cn/wiki/project.news:more</a>            GridComp website (event announcement)  <a href="http://gridcomp.ercim.org/content/view/22/1/">http://gridcomp.ercim.org/content/view/22/1/</a>            CETIC website (French) (event announcement)  <a href="http://www.cetic.be/article670.html">http://www.cetic.be/article670.html</a>            EGEE-II (Related events section)  <a href="http://www.eu-eg ee.org/eg ee_events/events/2nd%20EchoGRID%20Strategic%20Workshop/">http://www.eu-eg ee.org/eg ee_events/events/2nd%20EchoGRID%20Strategic%20Workshop/</a>            EGEE-II (Latest News section)  <a href="http://www.eu-eg ee.org/news/2nd-echogrid-strategic-workshop-29-30-october-2007-beijing-china/">http://www.eu-eg ee.org/news/2nd-echogrid-strategic-workshop-29-30-october-2007-beijing-china/</a>            BELIEF project (news &amp; events)  <a href="http://www.beliefproject.org/">http://www.beliefproject.org/</a>            Technology Blog (post-event overview)  <a href="http://www.my-e-site.com/technology-news-blog/science-technology/topic-technology-echogrid-workshop-strengthens-links-between-china-europe-gridtoday/">http://www.my-e-site.com/technology-news-blog/science-technology/topic-technology-echogrid-workshop-strengthens-links-between-china-europe-gridtoday/</a></p>
<b>Focused post-event Articles on 2<sup>nd</sup> EchoGRID Workshop, October-December 2007</b>	<p>GRIDtoday article:            ‘EchoGRID Workshop Strengthens Links between China &amp; Europe’,  <a href="http://www.gridtoday.com/grid/1917898.html">http://www.gridtoday.com/grid/1917898.html</a>            ERCIM News portal (article on highlights)  <a href="http://ercim-news.ercim.org/content/view/297/480/">http://ercim-news.ercim.org/content/view/297/480/</a>  <i>Sci-Tech Report</i> (article in Chinese journal)  <i>Science and Technology Daily</i> (article in Chinese journal)  <i>Science Times</i> (article in Chinese journal)</p>

### Dissemination Outcomes Year 1

<b>Joint Dissemination Articles, March 2008</b>	<p>“Building Bridges between China and Europe”, International Science Grid This Week (iSGTW), 12 March 2008, <a href="http://www.isgtw.org/?pid=1000861">http://www.isgtw.org/?pid=1000861</a>. This article focused on the synergy between BRIDGE and EchoGRID, with references to the applications developed and the Roadmap fostering a shared vision for future research co-operation.</p>
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<b>Ad-hoc articles on event outcomes – OGF23</b>	<p>“International Partnerships Shine at OGF23”, GridTODAY, 16 June 2008.</p> <p>“EchoGRID at Open Grid Forum”, ERCIM News, June 2008. This article is a summary of the article for GridTODAY cited above.</p>
<b>eNewsletters, November 2008</b>	For ICT2008, a special eNewsletter was produced, with the aim of bringing into sharp focus the achievements of international co-operation on grids, for example through BRIDGE and GridCOMP, with particular reference to the benefits of grids demonstrated, as well as the Networking Session. Outcomes of the 2 <sup>nd</sup> International Conference and Beijing Workshop were also highlighted. The eNewsletter was circulated at ICT2008 and to pertinent contacts in EU and China.
<b>Ad-hoc articles on event outcomes – ICT2008</b>	“EchoGRID and GridCOMP at ICT2008, 25-27 November 2008, Lyon, France”, ERCIM News, January 2009.
<b>Ad-hoc articles for journals targeting government and policy-makers</b>	<p>“European and Chinese Co-operation on the Grid”, <i>Parliament Magazine</i>, July 2008.</p> <p>“EchoGRID”, <i>Parliament Magazine</i>, November 2008.</p>
<b>Ad-hoc articles on overall project outcomes</b>	<p>EchoGRID – <i>eStrategies Projects</i>, April 2008, article highlighting the main focus of the project and outcomes to date.</p> <p><i>ERCIM News</i>, April 2009 entitled “Eye to the Future – EchoGRID Roadmap: A Shared Vision for EU-China Co-operation on next-generation Grid Research”</p>

### **Dissemination Outcomes Year 2**

## **Feedback**

### **Benefits of Dissemination**

Dissemination is undoubtedly an important benefit for EU-funded initiatives as it offers an essential means to raise and sustain awareness of the project, connect and catalyze target communities, as well as report on outcomes to a broader audience. While dissemination leaders should be communication experts with a good knowledge of the field and capable of effectively interacting with representatives from diverse media channels, it is paramount that **all** partners appreciate the importance of dissemination and actively support dissemination activities.

### **Problems**

Dissemination from the perspective of international co-operation projects needs to cater for linguistic and cultural barriers that may impede common understanding not just of the importance of dissemination per se but also of what information can and should be communicated. This issue should not be underestimated as it impacts on both dissemination activities and, perhaps more even more important, motivation. Additionally, such projects need to take into consideration the often very different opportunities for dissemination that exist across world regions. These opportunities include not only the number of pertinent dissemination outlets but also real possibilities to provide articles and promote events bearing in mind any discrepancies that may exist between regions.

### **Lessons learnt**

Under present circumstances a sway towards EU-focused news channels seems inevitable, as the region boasts a considerably higher number of possible media channels that can be targeted. However, projects should focus on leveraging the real opportunities that exist through an analysis of possible media channels and project outputs right from the outset. Such an analysis would enable partners to gain an understanding of the plans made and expected outcomes, at least to a reasonable extent, as a means to encourage all-partner participation by providing

quotes, testimonials, . One possible way of overcoming the different dissemination opportunities would be to foster strategic alliances with other initiatives in the target region for joint events and dissemination, as well as encourage all partners to circulate eNewsletters and articles to all pertinent contacts.

Events should be vehicles not only to interact and exchange knowledge but also to foster effective, two-way dialogue through dedicated break-out sessions or post-event side meetings with selected experts where more probing questions can be asked and further sources of information (e.g. quality business and government reports, white papers, etc) can be identified. Requesting Position Papers before an event could offer a way of defining key questions during the event itself and side-meetings immediately afterwards.

While English should be the lingua franca, more effort should be made in translating articles and short reports into other languages.

**Recommendations for future projects**

There is an increasing need to develop more strategic approaches to dissemination and outreach by leveraging communication expertise, as well as to overcome any cultural and language barriers that may impede effective communication to the wider community. A general suggestion for the future is that project dissemination activities integrate new communication tools that are being made available particularly dynamic, interactive tools that would help gain the interest and engagement particularly of the younger generation. Another general suggestion would be to increase outreach and engagement with SDOs so as to ensure grid development and deployment is aligned with best practices and open standards, as well as the validation of specifications through compliance testing.

EchoGRID proposes three key recommendations for dissemination within future EU projects particularly with an international focus.

**Recommendation One: Dissemination Strategy & Communication Guide**

<b>Recommended Focused Activities</b>	<b>Rationale</b>
<p>Communication experts from both regions should work together to develop a communication strategy from the outset based on an evaluation of target audiences, cultural and linguistic barriers, so that core messaging can respond to real-world needs by adapting the messaging as necessary.</p> <p>The Guide would serve as a reference point for different audiences and enable all partners to actively contribute by identifying new communities/media channels, providing quotes, reference documents and ideas on how best to effectively convey project goals and outcomes.</p>	<p>By setting dissemination goals and metrics early on, future projects will be able to develop a more strategic approach to dissemination while also ensuring all-partner buy-in.</p> <p>Where dissemination opportunities are lower, partners from that region can offer insight for EU media channels, so as to ensure multiple perspectives in articles and dissemination material.</p> <p>Projects should also encourage the production of shorter, focused reports summarizing key deliverables and outcomes for time-pressured audiences.</p> <p>The Guide would also serve to enable a more effective delivery of project-focused talks at international events.</p>



## Recommendation Two: Strategic Alliances

Recommended Focused Activities	Rationale
Identification of potential strategic alliances with pertinent initiatives with the aim of organizing joint events and dissemination activities. The co-ordination or support action would serve as the main point of reference and create eNewsletters with contributions from the strategic alliances. Funding bodies should actively support the alliances.	Such activities would help create economies of scale by offering a key information outlet and opportunities for networking and knowledge exchange, helping to build a critical mass around the initiatives through multiple circulation of eNewsletters and articles.

## Recommendation Three: Community Building

Recommended Focused Activities	Rationale
An analysis of current networks across sectors and organizational types early on in the project so as to pinpoint strengths and gaps. As appropriate, the attendance of events where pertinent audiences are expected, particularly for projects targeting the business community.	The initial analysis would assist projects in identifying targeted actions to build on current networks and define a strategy to this end. Regular analyses of new contacts would help gauge success and define alternative approaches, as necessary. Event attendance, both through invited talks and networking, would enable projects to reach out to new target communities.

## Information

### 1. Sharing, Dissemination

EchoGRID has been a very valuable project in terms of sharing knowledge on grids between Europe and China, and of conveying that knowledge through dissemination activities, events and deliverables. Indeed, one of the most striking aspects of international conferences and workshops has been the enthusiasm around grids and related technologies that has emerged from interactive discussions. Chinese audiences particularly have proved to be active knowledge seekers about EU initiatives.

Strategic alliances for the first EchoGRID conference and particularly with BRIDGE, GRIDCOMP and NESSI have further underpinned the sharing and dissemination of knowledge and should be considered a success factor for the project on which to build in the future.

### 2. Knowledge and Know-how acquisition

The project has provided an important vehicle for capturing knowledge on current and future development of grids in enterprise and research through events, focused discussions, dissemination activities, such as joint articles, and the various documents produced. The project has helped to shed light on current collaborative developments between Europe and China through conferences and workshops in both regions. In particular, the project has acquired knowledge through cases studies (e.g. BRIDGE), use cases and trends (e.g. OGF23; international conferences), as well as on development challenges (e.g. conferences & workshops), and strategic research agendas (e.g. conferences and ICT2008 networking sessions).

### 3. Databases, glossary, waiving of ambiguities

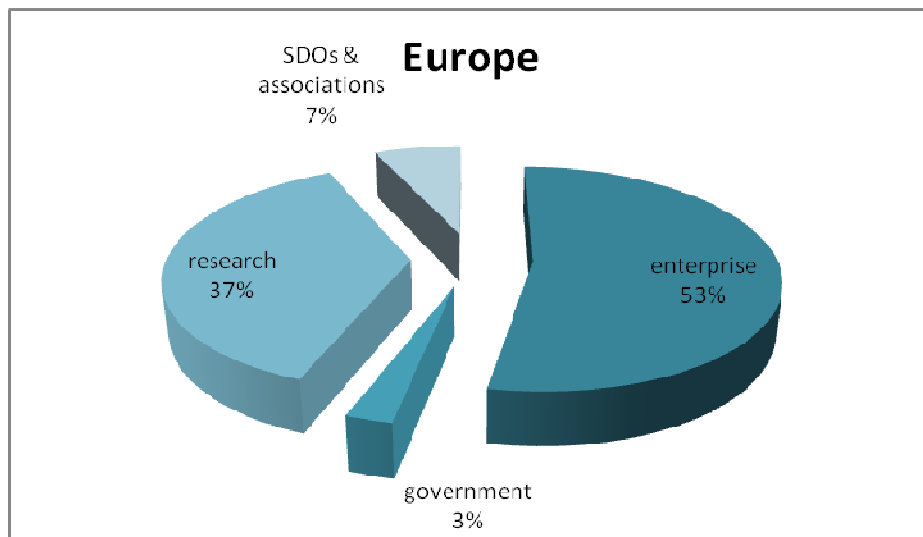
EchoGRID has developed both a dissemination database, which is detailed below, and a profiling database that would serve as important tools in any future initiatives. Future initiatives would benefit from building on profile databases to provide an “Who’s Who” in the EU-China grid arena.

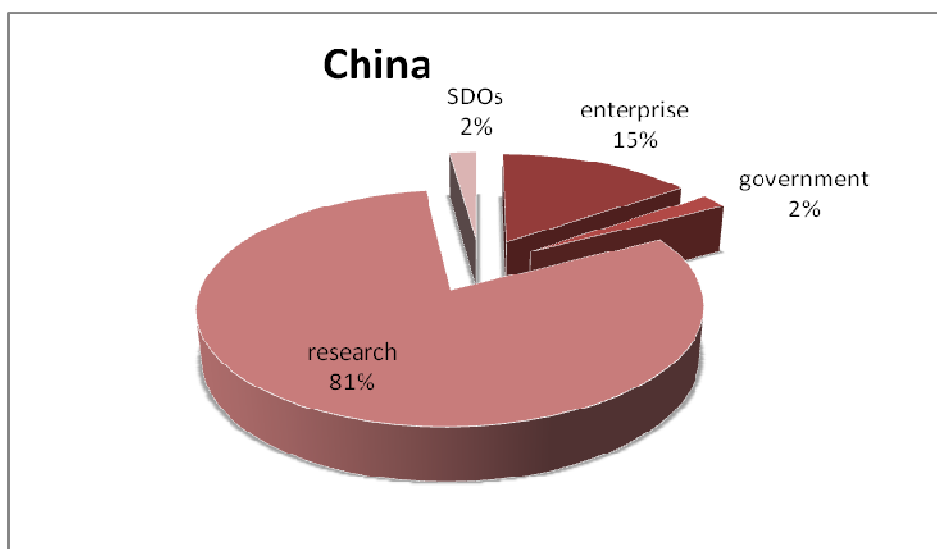
Glossaries in various deliverables have enabled the project to gain a shared understanding of technical terminology. These glossaries have also proved valuable as general guides to current and emerging grid and related technologies.

Close interaction between partners from EU and China has helped diminish a number of ambiguities related to grid developments through knowledge exchange and focused discussions. One minor challenge regards spelling conventions (e.g. grid or GRID), where some inconsistency remains.

### 4. Current databases

The EchoGRID core community database at project end comprises 51% EU contacts and 49% contacts for China. While EU contacts show a sway towards enterprise, contacts for China are predominantly from research. This is partly due to the more pervasive adoption of grids by enterprise in Europe. Current contacts by region and organization types are showed in the graphs below.





## 5. Uncertainties

Based on project experiences, the main uncertainty lies in the ability to capture buy-in from enterprise particularly in China in terms of future initiatives, as this has proved challenging during the project in question. General challenges regarding outreach to enterprise include corporate policies and strategies when it comes to gaining insight into medium to long-term research objectives, as well to long-term plans in general.

While future initiatives could leverage networks with EU and multinational businesses as well as EU chambers of commerce and trade associations operating in China, it would be important for partners from China to seek to create a critical mass around research links with industry and to evaluate future adoption trends in commercial sectors. Future initiatives could draw on the outcomes of projects like BRIDGE and GRIDCOMP as well as identify sectors where adoption is expected to increase.

General uncertainties are connected with understanding how the current economic situation and perceptions of China in Europe will impact not only on the broader outcomes of EchoGRID but also on future initiatives in general.

## 6. Media

The Economist has recently (8 April 2009) introduced a special section on Asian (broadly defined) affairs illustrating increasing interest in economic and financial issues, as well as political matters and their social impact in the region targeted at the journal's European and international

audiences: [http://www.economist.com/world/asia/displayStory.cfm?story\\_id=13446191&fsrc=nwlgafree](http://www.economist.com/world/asia/displayStory.cfm?story_id=13446191&fsrc=nwlgafree). Depending on continuation, the journal, its eNewsletters and website could offer valuable insight for future projects, as well as a possible source to debate issues of interest through dedicated articles produced by future initiatives.

Additionally, a business-focused website, BizChinaUpdate (<http://www.bizchina-update.com/content/view/53/49/>) has recently (March 2009) been brought to the attention of EchoGRID. Founded by a British journalist, the website is an independent on-line information resource with a regularly published newsletter. This resource could provide both information and support for future projects that include or aim to reach out to EU and Chinese enterprises.

Specialized journals and future projects focusing on government and eInclusion could also prove to be valuable resources and effective information outlets in the future.

### Contribution from CNIC

During the first EchoGRID conference, CNIC provided two notable posters which show the infrastructure of the CNGrid and SDG.

During the second workshop, we helped INRIA and BUAA to print the flyers and deliverables out. We also set-up the propaganda platform to enlarge the influence in the participation. We also invited the press and media to publish the workshops. Some of them are very famous in China, such as the science and technology daily.

## 2.5 WP5 – Mobility programme

### Contribution from ICT

#### Achievements

ICT was involved in FP program and got great benefits from the programme.

There are 3 people related with ICT who won the REP and FP programmes from EchoGRID. They are listed as follows:

- Dr. Yann Radenac from INRIA, who paid a one-year long visit to ICT, from Oct. 2007 to Sept. 2008, focusing on new programming paradigm of Grid system.
- Dr. Xingwu Liu from ICT, who visited INRIA from March 2008 to Dec. 2008. Dr. Xingwu Liu focused on formal analysis of new programming models for Grid, including HOCL and GSML.
- Dr. Chengchun Shu from ICT, who visited STFC from Aug. 2008 to Dec. 2008. Dr. Chengchun Shu focused on Grid security policy facility.

#### Feedback

The aim of sending newly graduated Ph.D to the institutions in Europe is to get them trained for a better research skills and academia communication ability. The goal of receiving FP candidates is to get a much deeper collaboration in a specific research topic.

The three FP fellows published or submitted 2 papers on relevant international conferences.

The research outputs of an FP fellow depends on the degree of his/her involvement in the research activities of the receiving partner/institution. We suggest that future mobility programmes give more detailed rules and instructions for the recipient partner/institution of FP candidates.

### Contribution from BUAA

-the reasons why you sent and received REP or FP candidates:

The REP and FP programme supported by EchoGRID provided the BUAA team a good opportunity to exchange research experiences with other EU partner teams, and to understand the R&D system in European countries.

- the benefits of the exchanges (REP or FP):

During the EchoGRID project period, BUAA team sent three staff and PhD students under the REP programme to work in EchoGRID partner institutes such as INRIA and STFC, and Bridge partner institute IT Innovation Center at Southampton University, UK. BUAA also hosted one visitor from STFC for three weeks. The benefit of the REP is obvious. First, our staff and PhD students achieved higher efficiency in research by working in the EU institutes for a short period of time, which allowed a more effective face to face communication with the partner. For example, the visit of Mr. Yongjian Wang to IT Innovation Center greatly helped the final stage of the interoperability work conducted by the Bridge project. Secondly, REP gave us an good opportunity to learn the R&D system and the way of conducting research in European countries. Thirdly, the researcher exchange programme helped to set up personal relationship, and enabled us to establish a long-term cooperative relationship with EU partners by better mutual understanding.

- the problems

The major problem was the kind of persons who could qualify as the candidates of REP and can take the advantage of the exchange programme. It was difficult to limit the candidates of REP to only staff members. For many reasons, the staff at BUAA cannot leave their teaching position during the semester. It is a little bit difficult to send the staff abroad to work in the EU partner

institutes for 5 to 10 weeks. On the other hand, PhD students are the major R&D forces and to send them abroad for a short period of time is feasible. At the beginning, REP was only open to the staff members, which restricted the involvement of the PhD students. Though it was re-structured and open to PhD students, the time left was limited.

Also, opening REP to all EU funded relevant projects was a good decision. We benefited from this policy change since it allowed us to use REP to conduct the research of the Bridge project.

- the lessons learnt

We believe the REP and FP are extremely important and benefit all partners involved. This practice should be followed in the future EU FP7 projects whenever possible.

- the Recommendations for future mobility programmes

We wish the funding between REP and FP could be re-allocated in the future projects, with more funding allocated to REP than FP. The time period of each REP visit should be flexible, from 4 weeks to 12 weeks. REP ought to open to PhD students.

### Contribution from CNIC

- the reasons why you sent and received REP or FP candidates:

(1) The Fellowship Programme was aimed for post graduate students who want to work with research groups involved in EchoGRID related activities. The purpose of EchoGRID Fellowship programme (FP) was to enhance cooperations among EchoGRID partners. CNIC, as a member of the EchoGRID, has the responsibility to send FP candidates.

(2) The aim of Grid Computing is not only to take advantage of both large computing infrastructures and distributed resources, but also to integrate various kinds of application to build comprehensive and multi-disciplinary systems. Lots of research works have been implemented by OASIS team from INRIA via the "Active Object" programming model provided by ProActive.

(3) Supercomputing Centre (SCCAS) of CNIC, as the china national grid operation centre and the north main node, has the second largest super computer in China, the Lenovo DeepComp 7000. We provide with all necessary services of high performance computing for Chinese Academy of Science (CAS). Thus we have developed the super computing grid environment for CAS. In the past 10 years, our supercomputing center has made some achievements in the area of high performance computing. However, we are still just in start level in some research area, such as the reliability and stability of high performance computing, and reliability of computing environment by software. So we made the attempt of sending phd students to INRIA, which has been superior in the field of high performance computing reliability. We hope that our fellow's visit there will provide CNIC with experiences in the area of reliability and fault-tolerant of large scale computing, and also help establishing reserve of talents for the future development of our centre.

- the benefits of the exchanges (REP or FP):

(1) CNIC sent a PhD student to INRIA in France for a visit under the EchoGRID Fellowship Programme. INRIA is famous for its substantial experiences and advantages in the field of fault-tolerance in large scale distributed computing. This cooperation has laid a solid ground work for the further cooperation between CNIC and INRIA; and it has also help developing the reserve of talents for CNIC, especially for SCCAS, in the area of fault-tolerance in large scale distributed computing. After his visit in INRIA, our fellow has showed his capabilities during his involvement in international cooperation and related research domain, from which we can see his efforts and progress during the Fellowship programme.

(2) Our fellow did excellent research work in fault-tolerance topic based on the Master/worker Model during the Fellowship Programme with the help of INRIA. After the end of the visit, he and some INRIA fellows wrote a paper titled “A Task-Based Fault-Tolerance Mechanism to Hierarchical Master/Worker with Divisible Tasks”, which has been accepted by the 2009 International Workshop on Parallel Algorithm and Parallel Software in the 11th IEEE International Conference on High Performance Computing and Communications (HPCC-09) being held in Korea on June 25th-27th.

(3) With our fellow's efforts, CNIC, as a member of EchoGRID, sent a team to the 5th Plugtests competition held in France in October 2008. During the competition, we met many competitive rivals from both abroad and China. Their high level performances made us more aware of our disadvantages. This will advance the development of our team in the future.

- the problems

We want to give our fellow a credit for his great efforts in his work and study during his whole visit there. But we also need to point out his imperfection in the work of enhancing further research cooperation between the two institutions. By taking the chance of FP and REP, we need to make more efforts to deepen and reinforce communications and cooperation between EchoGRID members and us.

- the lessons learnt

(1) There are lessons that we need to draw from our fellow's own experiences. One thing we could have done better is time arrangement. The research process took too long a time at the beginning which led to a limit of time for later programming. And the final codes were submitted without a necessary test. Consequently, these problems affected the quality of the paper because of the lack of abundant data and experimental results.

(2) Despite of the unconscionable arrangements, we still would say that the Fellowship Programme has been a positive attempt in the China-Europe cooperation in the field of network. But CNIC has not given this programme enough importance. ICT has done better, however. On one hand, what we should do in the future is to take part in such programmes more actively and to pay stricter attention to details. So CNIC is now aware of the importance of more active participations in this program which may help us inviting senior research fellow to work in CNIC and to promote our development.

- the Recommendations for future mobility programmes

Mobility programmes are beneficial for both the hosting institutions and their partner institutions by enhancing mutual understandings among EchoGRID members. Meanwhile, the increasing exchanges in technical areas among members will in return promote their own developments. However, up until the present time, there have only been 4 people taken part in FP and 7 in REP. We would therefore propose that EchoGRID could provide with more such opportunities as mobility programs, in hopes of promoting further communications among members.

## Contribution from Huawei

### Achievements

Huawei was successfully able to host the REP conducted by EchoGRID with Engineering, Roma on the topic of Virtual Organizations.

### Feedback

- the reasons why you sent and received REP or FP candidates

Engineering, Roma is one of the key industrial entities in emerging technologies like Grid computing. Through EchoGRID Huawei had the opportunity to exchange thoughts on Virtual

Organization with Engineering, Roma. The exchanges included the current definition and scope of Virtual organizations and the implications of introducing it in industries. It became necessary to identify the current efforts in bridging this gap and try to introduce a practical and usable model for realizing virtual organization in Industry. This led Huawei to host the REP.

- the benefits of the exchanges (REP or FP)

A technical report detailing the current efforts in VO and suggestions for evolving VO to support innovative business models is proposed.

- the problems

The report prepared is a view based on specific industrial entities and to realize a broader perspective it is required that more industrial members provide feedback to the existing work. But gathering such a large feedback is difficult.

The outcome of the work conducted during the REP should be evaluated and the next possible steps should be initiated by EC.

- the Recommendations for future mobility programmes

I think some of the mobility programmes can conduct specific workshops within the member organizations of the project to better underline and solve the problem domain. Along with a single person exchange, additionally a team exchange for duration of 3 to 4 days should be considered.

### Contribution from ENG

Paolo Rocchetti's REP usefulness was two-fold:

- from one side we had the chance to get in touch with a big company (Huawei) with strong complementarities with ENG that may bring also commercial opportunities

- On the research side ENG has had the opportunities to realise that TELCO environment has its own peculiarities and needs, sometime diverging from the IT one. And this will help the R&D lab to develop better approaches to ICT solution that could be provided to our production department dealing with TELCO

However the specific activity was difficult to be set up because for one Industrial employee to leave for a while it's always an issue. Including some experts in the Engineering competence center were contacted to exploit some commercial project in China, but they kindly refused because they were unable to leave for such time.

### Contribution from INRIA Sophia Antipolis

– the reasons why you sent and received REP or FP candidates

The INRIA OASIS team has involved several FP6 project, and also co-organized with ETSI Grid Plugtests, the Grids@Work events, gathering both academic researchers and industrials every year. ([http://www.etsi.org/plugtests/GRID2008/VGRID\\_PLUGTESTS.htm](http://www.etsi.org/plugtests/GRID2008/VGRID_PLUGTESTS.htm)).

With the EchoGRID project, Oasis team has the opportunities to communicate with Chinese partners to explore the future cooperation and this is the main reason that we have hosted the Chinese visitors via the mobility programme.

– the benefits of the exchanges (REP or FP)



Through the mobility programmes, we have hosted 2 REP and 1 FP from different Chinese Universities and institutes. During the visits, a presentation/round table has been organised, and regarding the common interested research topics, a detailed further cooperation plan has been proposed and discussed. Finally, a technical report has been disseminated in the team.

Through the programme, we have organised Chinese teams to participate in the Plugtests in 2007 and 2008.

- the problems

Due to different culture and background, it took a chinese fellow a long while to adopt and get used to the management style at OASIS team. We found that it was very hard to monitor the fellow work progress, and specially, after the visit.

- the Recommendations for future mobility programmes

We think it is better to define the visit purpose in advance, i.e. distinguish the difference between staff exchange and the student exchange programme, and have a well-organised working plan if the fellow is staying over 6 months.

In addition, having taken many Chinese visitors at INRIA, visa was an issue for us. We spent a lot of time to communicate with French Embassy and prepare all the relevant documents. We hope this procedure can be easier for the future cooperation.

#### Contribution from INRIA Rennes

- the reasons why you sent and received REP or FP candidates

The objective was to start collaboration between ICT and INRIA Rennes to make progress in the area of Grid programming and in particular to investigate how an unconventional programming such as chemical programming can be used in the context of Grid computing. For that purpose, INRIA Rennes hosted Xingwu Liu from March 2008 to December 2008 and sent Yann Radenac to ICT for a one-year long visit.

- the benefits of the exchanges (REP or FP)

Thanks to these two fellowships, a paper was submitted and accepted for publication in scientific conference (GCC 2008). This collaboration is being pursued thanks to an associated team funded by INRIA and a proposal was submitted to the joint ANR-NSFC call for proposals in April 2009.

- the problems

There was no problem identified with the two fellowships.

- the Recommendations for future mobility programmes

It would have been more valuable to have the two fellowships to happen successively instead of doing them in parallel. It would have strengthened the collaboration.

## 2.6 WP6 – Management

<b>Responsible partner(s):</b> ERCIM, BUAA <b>Contributing partner(s):</b> ENG
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### **Achievements**

The Scientific Coordination was ensured by four coordinators:

Project Coordinator: Bruno Le Dantec, then Patricia Ho-Hune, ERCIM;

Scientific Coordinator: Thierry Priol, INRIA;

Industrial coordinator: Andrea Manieri, ENG;

International coordinator: Depei Qian, BUAA.

Bruno Le Dantec and Patricia Ho-Hune managed the day-to-day project activities as well as the administrative and financial duties.

Thierry Priol's main activity in the management of the project was to advise the project coordinator on all scientific activities of the project.

Andrea Manieri as industrial coordinator organised and chaired all industrial sessions organised within the workshops and conference held during the projects. He also ensured all industrial aspects were reported in the deliverables and contributed to establish and maintain liaisons with other industry-oriented people and organisations.

As the international coordinator, Prof. Depei Qian maintained a regular connection with the project manager and the project management office. He organized several internal face to face meetings among Chinese partners, where task leaders were assigned and the work and responsibilities were defined for each Chinese partner. The activities of Chinese partners were also monitored. Moreover, BUAA spent many efforts for the organization of the two EU-China cooperation workshops.

It was very useful to identify the four coordinators at the beginning of the project, in particular to have one main responsible person for the communication of information with the Chinese partners. It facilitated the coordination of the consortium.

## 3 Outcomes on Cooperation

### 3.1 International Cooperation

#### Contribution from BUAA

The basis for international cooperation activities carried out by EchoGRID is the common interests on Grid technologies. Grid is one of the research priorities in EU FP6, four calls were issued on this subject and a number of projects, including IP, STREP and SSA, have been supported, resulted in the building up of the “Grid House” in Europe. In China, the support to the Grid related subjects can be traced back to 2002 when an 863 key project on High Performance Computer and Core Software was launched by the Ministry of Science and Technology of China. The direct result of that project is China National Grid (CNGrid). Since 2006, the second phase of CNGrid was started under the umbrella of the 863 key project on High Productivity Computer and Grid Service Environment. Besides developing high productivity computers, the major objectives of this key project include development of Grid system software, extension of CNGrid by increasing the number of CNGrid sites and upgrading the resources, and development of Grid enabled applications. There are also other major R&D projects supported by other Chinese government agencies, for example, Networks Environment for Scientific Research Activities supported by the National Natural Science Foundation of China (NSFC), resulting in the CROWN testbed, and ChinaGrid supported by the Ministry of Education of China.

With the evolution of the Grid technology and emerging new technologies like cloud computing, both EU and China need to answer the question of what to do the next. With the above R&D activities as well as evolution of technologies as the background, EchoGRID has played a unique role in identifying the common research priorities for both EU and China and in coordinating efforts and activities of Grid-related projects and initiatives in EU and China. The major activities to fulfill the above objectives are the follows:

- Joint development of the roadmap on Grid technology R&D for guiding the future research in this field in both EU and China;
- Promote communication and cooperation between EU and China by conferences and workshops
- Interacting with EC and China government agencies for identifying the R&D priority;
- Setting up connection among academia and industry communities in EU and China to coordinate their R&D activities on Grid.

The activities on developing the road map will be described by WP2 of EchoGRID, here we mainly introduce activities in other three aspects.

#### **1. Promoting communication and cooperation between EU and China research teams by conferences and workshops**

During EchoGRID project execution, a series conferences and workshops have been held in Europe and China. Some of the major events are listed as the follows.

- The 1st international Conference in Beijing in April 2007. This conference was jointly organized by EchoGRID and EUChinaGRID projects, more than 150 European and Chinese researchers and scientists participated in this conference.
- The GRIDS@Works event in Beijing in Oct. 2007. This event was organized jointly by four EU FP6 projects together with their workshops, with EchoGRID as the leading party. More than 100 participants attended the event. A PlugTest event was also organized at the same time in Beijing.

- The 3rd workshop on roadmap validation in Athens in June 2008. The major purpose of this workshop was to get the feedback to the drafted roadmap from the external academic and industrial communities. Several external experts from research institutes, universities and industry were invited to present their opinions and comments to the roadmap.
- The 2nd international Conference in Shenzhen, China in Oct. 2008. This conference was associated with a major conference on Grid, GCC2008, in China to attract more participants and to achieve more extensive communication with Chinese Grid community.
- The EU-China Cooperation Workshop in Beijing in Oct. 2008. The purpose of the workshop was to identify common research priorities on Grid and service software in both EU and China, looking for government level cooperation. This workshop attracted more than 100 participants.

The above conferences and workshops attracted participation of major Chinese research teams on Grid and Chinese IT companies which are interested in those topics. The Face to face meeting among international participants enabled efficient exchange of ideas and opinions and provided a good opportunity for setting up cooperative relationship.



The GRIDS@Works event

## 2. Interacting with EC and China government agencies for determining the R&D priority

One of the major concerns from the first year review feedback is to strengthening the interface to the related government agencies. We have paid a great attention to this aspect. We have created interaction with the funding government agencies by inviting government officials to a series of conferences/workshops. Here we list some of the events that were attended by government officials.

- The 1st EchoGRID Conference in Beijing in April 2007. Dr. Xiaohan Liao, the Deputy Director of the Department of High and New Technology, Ministry of Science and Technology of China (MOST), gave the opening address. Mr. Chunheng Wang, Director of the Information and Space Unit of the MOST, gave a plenary speech on China's effort on HPC and Grid. Other EU and China official participants included Mr. Jijun Xing, Director,

Division of Europe, Department of International Cooperation, MOST, Dr. Matthias Hack, Counsellor, Science and Technology, German Embassy in Beijing, and the scientific officer from the French Embassy.

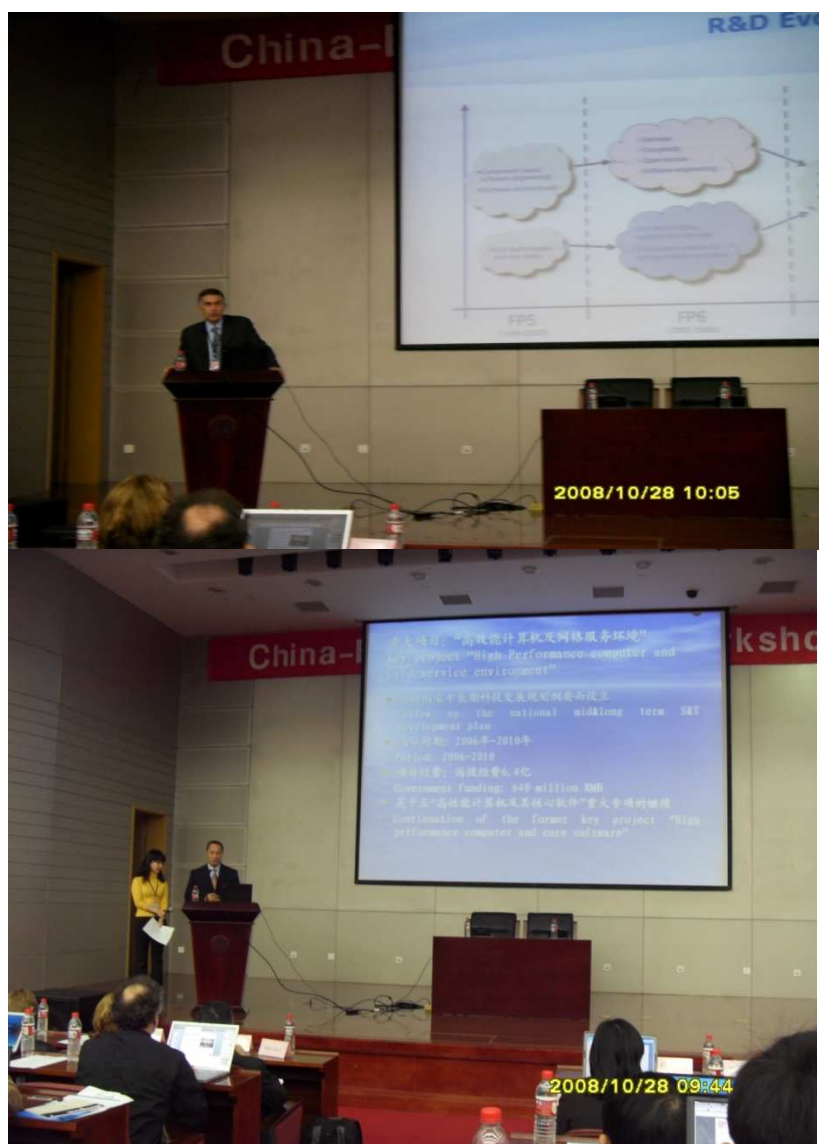
- The GRIDS@Works event in Beijing in October 2007. Dr. Jesus Villasante, Director of Unit D3 (Software & Service Architectures and Infrastructures), INFSO, EC, Mr. Jijun Xing, Director, Division of Europe, Department of International Cooperation of the MOST, and Dr. Alison Birkett, First Counsellor, Information Society of the EU delegation in Beijing, came to the event to present their support to the EU-China cooperation.
- The workshop on Sino-EU cooperation on Grid in BUAA in January of 2008 in Beijing. This workshop was sponsored by the MOST. The workshop was focused on identifying Grid as a research priority, looking for support from the MOST of China and the EC counterpart. More than 60 Chinese researchers participated in this workshop. Officials from the Dept. of International Cooperation of the MOST, Mr. Jijun Xing and Mr. Longchao Zhou, attended the workshop. Both of them gave talks on MOST's policies on international cooperation. They also listened to the presentation of other Chinese teams on China-EU cooperation on Grid.
- The EU-China Cooperation workshop in Beijing on Oct. 28, 2008. The workshop was sponsored by the MOST and EchoGRID project. Government official participants were from the MOST, ICFSO of EC, and several embassies of EU countries in Beijing. Mr. Jorge Gasos from the unit D3, EC participated in the workshop and gave a speech on FP7 agenda and international cooperation policies. Mr. Chunheng Wang from Dept. of High & New Technology of the MOST gave a speech on current HPC and Grid R&D activities in China and expressed support to China-EU cooperation in this field. Other official participants included Dr. Alison Birkett, First Counsellor, Information Society, EU delegation in Beijing, Mr. Jijun Xing, Director, Division of Europe, Department of International Cooperation, MOST, Dr. Matthias Hack, Counsellor, Science and Technology, German Embassy in Beijing, Dr. Rao, Counsellor, Science and Technology, Italian Embassy in Beijing, Dr. Robert Farhi, Vice Counsellor, French Embassy in Beijing, Dr. Patrick Nedellec, Officer on Innovation, French Embassy in Beijing, Ms. Ying Du, Scientific officer, UK Embassy in Beijing, and Dr. Baizhi Zhang, Scientific officer, German Embassy in Beijing.

The Chinese partners of EchoGRID have been trying to get financial support from the Chinese government. On December 4<sup>th</sup> of 2007, a reporting meeting was organized at the MOST to report the progress of related EU FP6 projects and EU-China cooperation on Grid to the Department of International Cooperation of the MOST. An immediate result of this meeting was the matching funding from the MOST to three EU FP6 projects including EchoGRID, Bridge, and EUChinaGRID, which was quite unusual.

EchoGRID helped in arranging Jorge Gasos's visit to relevant institutes and companies in Beijing in Oct. 2008. With this arrangement, Jorge Gasos visited CNIC of CAS, JSI at Beihang University, Datang Telecom Technology & Industry Group, and AVIC Corporation, Group, with extensive exchange to Chinese academic and industrial communities.

EchoGRID also helped in arranging meeting between EC and MOST officials. During Jorge Gasos's visit, a meeting involving Jorge Gasos, Alison Birkett, and Chunheng Wang was arranged in Beihang University. Those government officials discussed possible cooperation strategies and future opportunities face to face.

EchoGRID also promoted the visit of the MOST delegation to ICT 2008 in Lyon.



EC and MOST officials at the EU-China Cooperation Workshop

### 3. Coordinating R&D activities on Grid-related topics in Europe and China

EchoGRID has tried to coordinate R&D activities on Grid-related topics in Europe and China. First, EchoGRID emphasizes collaboration with China's 863 key project. We invited CNGrid teams to each conference and workshop on cooperation. Those conferences and workshops provided good opportunities for exchanging R&D experiences on this subject. The questionnaire for collecting comments on the roadmap was distributed among CNGrid teams. Comments were considered carefully and included in the final roadmap.

EchoGRID has played a unique role in coordinating efforts of other EU FP6 projects on Grid which involve cooperation with China. Those projects are Bridge, GridCOMP, XtremOS, and EUChinaGRID, etc. Joint conferences and workshops were organized as mentioned before and those vents increased the significance of those projects.

Through the practice of EchoGRID, we believe that networking among people working in this field has been set up for long-term cooperation. This relationship was established by knowing the leading R&D teams in EU and China and their activities, by sharing research knowledge and experiences, by identifying new research priorities, by coordinating R&D activities, and by planning for the future. This kind of networking is crucial for sustainable cooperation on scientific research between EU and China.

Also, as an immediate result of EchoGRID project, partnership has been set up between project consortium members. For example, INRIA of France and ICT CAS of China have set up a formal cooperation relationship by joint work on XtremOS and EchoGRID. Beihang University of China and INRIA have set up a close relationship on OW2 (ObjectWeb and OrientWare). INRIA and Tsinghua University of China have conducted effective cooperation on the grid component model. Thales of France and Beihang University have set up cooperative relationship and are leading the preparation of a new proposal to FP7.

#### Contribution from ICT

ICT team keeps tight contact with INRIA and STFC teams for EchoGRID and XtremOS project. Team members from these institutes are organizing the 1<sup>st</sup> International Workshop on Grid and Operating Systems, which will be held together with GCC 2009 in Lanzhou, China. This workshop focuses on the state-of-the-art research in grid operating systems and applications, and innovative work from researchers in academia, industry and government.

#### – Collaboration, Partnership & Momentum

In 2008, a collaboration project UNCONV between EchoGRID partner ICT and INRIA was proposed to investigate disruptive and unconventional approaches in the design of Grid systems and Grid programming paradigms. The first UNCONV meeting was held in 29 June 2008 at ICT, Beijing. Researchers from ICT and INRIA, and EchoGRID FP candidates gave presentations on innovative Grid programming models and new research results on Grid system.

In Oct. 2008, LIAMA, Sino French lab in computer science, automation and applied mathematics, officially became a consortium. EchoGRID partners ICT and INRIA signed on the contract, and will participate in the following research collaborations.

Both ICT and INRIA are involved in an application of an NSFC sponsored project in 2009, which is aimed to promote the academia collaboration between Chinese and French. The collaboration is a by-product from the EchoGRID FP plan. The applicants get to know each other when the ICT candidates stayed in INRIA in 2008.

#### Contribution from STFC

Chengchu Shu undertook a 6 month fellowship at STFC with Erica Yang, and Alvaro Arenas as a result of which they have submitted a paper to the IEEE Policy 2009 workshop.

## 3.2 Industrial Cooperation

#### Contribution from ENG

Industries participating into this project have initiated this cooperation with different perspectives and strategy. Since the initial proposal was merged with another with more academic approach, the industrial spirit was diluted.

Specific problems cannot be selected. In general the different culture and perspective between EU and China should be overcome by enforcing cooperation initiatives, promoting the culture of knowledge sharing and enlarging the cooperation topics to more market oriented and less technological ones.

Finally physical presence of industries to focused conferences is quite impossible even if economically supported; industrial people that move in another continent need to be driven

toward the country and supported in trying to cooperate as much as possible with any other companies to create new businesses. One trip per year is too much even if well organized and with plenty of opportunities.

The lessons learnt are many, in particular on the culture differences and the amount of opportunities for win-win collaboration between EU and Chinese industries. EUs have know-how and experiences, Chinese have extremely urgent needs and are keen to exploit EU knowledge.

As a unique recommendation for future projects is that consortium need to be sound and carefully selected, priorities set well before the project finding and cooperation goals clearly stated and monitored.



### 3.3 Project Meetings

<i>Title</i>	<i>Date and Place</i>	<i>Main conclusions</i>
Kick-off meeting	7 February 2007	All institutes introduced their teams and their reasons to join the project. WP leaders' presentations ensured a common understanding of the objectives and means to reach them.
First Strategic workshop	8-9 February 2007	The major objective was to establish the state of the art in both Europe and China and to analyse similarities and differences.
Second Strategic Workshop	29 October- 1 November 2007	Major overview and discussion about Grid infrastructures, Grid middleware, advances in Grid workflow and latest user experiences. Joint meeting with Bridge and GridCOMP EU- projects
Roadmap drafting meeting	14-15 January 2008, Rome, Italy	The roadmap was elaborated with all consortium partners
Third workshop	9-10 January 2008, Athens, Greece	Consolidation of the roadmap
Second International Conference	24-26 October 2008, Shenzhen, China	Dissemination of EchoGRID roadmap and perspectives
EU-China Cooperation workshop	28 October 2008, Beijing, China	Collaboration with European and Chinese Academia, government & industry

## 4 – Use and Dissemination

### 4.1 Conferences and/or Workshops organised by the project

Planned/ actual dates	Type	Type of audience	Countries addressed	Size of Audience	Partner responsible /involved
7 February 2007	<i>Kick-off</i>	Research	Europe and China		ERCIM, BUAA
February 2007	<i>Project Website</i> Launch of EchoGRID Web Site	General public	All		ERCIM
8-9 February 2007	<i>First Strategic Workshop</i>	Research	Europe and China	50	ERCIM, BUAA
24-25 April 2007	<i>First EchoGRID conference</i>	Research	China and Europe	200	ICT
April 2007	<i>EchoGRID flyers</i> In English and Chinese	General public	All		ERCIM
16 July 2007	<i>Conference 1 day workshop at STFC RAL</i>	delegation from the Institute of Scientific and Technical Information of China (INSTIC)	UK & China	10	ERCIM- STFC
August 2007	<i>EchoGRID Grid PlugTests Flyers</i>	General public	All		ERCIM
29 October 1 November 2007	<i>Second Strategic Workshop and Grid PlugTests</i>	Research	Europe and China	70	ERCIM, CNIC
4 March 2008		Research	Europe		ERCIM
June 2008	<i>OGF 23</i>	Research	Europe		ERCIM
20-23 October 2008	<i>Grid PlugTests and GridCOMP conference</i>	Research	Europe		ERCIM
24-26 October 2008	<i>Second EchoGRID conference</i>	Research	China and Europe		Huawei
25 January 2008, Beijing, China	<i>Chinese Cooperation Workshop</i>	government officials, academia & industry	China	More than 60	Beihang University
14-15 January 2008, Rome, Italy	<i>EchoGRID road mapping meeting</i>	Partners	EU & China	Consortium	ERCIM; ENG
02-06 June 2008, Barcelona, Spain	<i>OGF 23 conference Workshop on Quality for Grid</i>	Researchers from academia and industry	European and International	450	ERCIM, ENG, TRUST-IT

9-10 June 2008, Athens, Greece	<i>Workshop</i>	Partners & selected experts	EU & China	Partners and speakers	ERCIM; NTUA
22-23 September 2008, Brussels, Belgium	<i>Software &amp; Services Priorities for WP 2009-10 Workshop - Round table on International collaboration at the Collaboration meeting for FP6 &amp; FP7 projects of D3 Unit</i>	Researchers from academia and industry	European and International	300	ERCIM, ENG
24-26 October 2008, Shenzhen, China	<i>Second EchoGRID Conference</i>	Academia mainly, some industry	China and international audiences	300	ERCIM, Trust-IT, ENG
28 October 2008, Beijing, China	<i>Cooperation Workshop</i>	Academia, government officials, & industry	EU & China	100	ERCIM, BUAA, Trust-IT
25-27 November 2008, Lyon, France	<i>ICT Conference EchoGRID Exhibition &amp; Networking Poster</i>	Academia, government & industry	EU & international	4000+	ERCIM, Trust-IT, INRIA, ENG, BUAA

## 4.2 Scientific publications

Date and Type	Details
Aug 14-17, 2007; conference proceedings	Xiaobo Yang: From e-Learning to e-Research: Building Collaborative Virtual Research Environments Using Sakai, (STFC e-Science Centre, Daresbury Laboratory, Warrington, UK), Three Gorges Project Hotel, Yichang, Hubei Province, China
Journal Paper, 2008	CROWN: A Service-Oriented Grid Middleware System: Experience and Applications. ISORC 2008: 141-147
Journal Paper, 2008	RCT: A Distributed Tree for Efficient Range and Multi-attribute Query in Grid Computing. Journal of Future Generation Computer Systems, 24(7), pp 631-643, 2008
Journal Paper, 2008	A Negotiation-based Trust Establishment Service for CROWN Grid, Accepted for the International Journal of Autonomous and Adaptive Communications Systems

## 4.3 Results of the project

No Patents, Software prototypes, systems specifications to report.