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PRACE

Partnership for Advanced Computing in Europe

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Report on links with HPC Ecosystem
final

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Author(s): Kimmo Koski, Leif Laaksonen, CSC, Martin Polak, GUP
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Authorship	**Written by:**	Kimmo Koski, Leif Laaksonen, CSC; Martin Polak, GUP
	Contributors:	Pedro Alberto, Thomas Eickermann, Claudio Gheller, Eugene Griffiths, Peter Kunszt
	Reviewed by:	Iris Christadler, Dietmar Erwin
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Abstract:	The PRACE project has a mandate to lay out the foundations of a future pan-European HPC research infrastructure whose top layer consists of Petaflop/s-class supercomputers sharing resources with National/Regional HPC Computers. This infrastructure is expected to have a significant impact on the European research quality in forefront scientific areas that contribute decisively for both European scientific and economic competitiveness. A key ingredient to the success of this infrastructure is the strength of the links established to the whole HPC ecosystem through its stakeholders. This deliverable builds on the previous deliverable 2.5.1, which has identified the relevant stakeholders and analysed their importance to PRACE, dividing them into eight groups. This document performs a deeper analysis of the links to the stakeholders belonging to each of these groups, including tables listing the stakeholders and their contacts with PRACE members, and also reports on the contacts already been made and the existing feedbacks. Furthermore, the document presents the messages that should be carried across during those contacts that are suitable for each stakeholder group and also proposes the next steps to be taken in order to create links or strengthen the links already existing. To make this dissemination and outreach effort towards stakeholders more effective, the document presents material like message content, FAQs and an electronic Communication Kit which is available for the PRACE members who will be contacting each stakeholder.

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References and Applicable Documents

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List of Acronyms and Abbreviations

AHTP	Advanced HPC Technology Platform. To be created in this project as permanent groups to identify and work on future technologies for multi-petaflop/s systems.
BCO	Benchmark Code Owner
BSCW	Basic Support for Collaborative Work, Prace Project internal document tool
DEISA	Distributed European Infrastructure for Supercomputing Applications. EU project by leading national HPC centres.
EC	European Commission
ECP	Ècole Centrale Paris
EGEE	Enabling Grids for E-sciencE; EU Grid project lead by CERN and successfully completed in 2004. Follow-up is EGEE-II and EGEE-III.
EGI_DS	European Grid Infrastructure Design Study; FP7 project for building a sustainable European Grid Infrastructure
ERC	European Research Council

ESF	European Science Foundation
ESFRI	European Strategy Forum on Research Infrastructures; created roadmap for pan-European Research Infrastructure.
EXEComm	Executive Committee
FAQ	Frequently asked questions
HET	High Performance Computing in Europe Taskforce; Taskforce by representatives from the European HPC community to shape the European HPC Research Infrastructure. Produced the scientific case and valuable groundwork for the PRACE project.
HPC	High Performance Computing; Computing at a high performance level at any given time; often used synonym with Supercomputing.
HPC-E(uropa)	Consortium of six leading (HPC) infrastructures and five centres of excellence providing transnational access; EU project.
IPR	Intellectual Property Rights
ISC	International Supercomputing Conference; European equivalent to the US based SCx conference. Held annually in Germany.
ITER	Joint international research and development project that aims to demonstrate the scientific and technical feasibility of fusion power. Also used as the name for the reactor.
LoS	Letter of support
MB	Management Board
MoU	Memorandum of Understanding.
NDA	Non Disclosure Agreement. Typically signed between vendors and customers working together on products prior to their general availability or announcement.
NGI	National Grid Initiative
NORDUnet	Nordic Infrastructure for Research & Education; an international collaboration between the Nordic NRENs
NREN	National Research and Educational Network
GÉANT	Collaboration between National Research and Education Networks to build a multi-gigabit pan-European network, managed by DANTE. GÉANT2 is the follow-up as of 2004.
OGF	Open Grid Forum; open community committed to driving the rapid evolution and adoption of applied distributed computing.
OMII-Europe	Open Middleware Infrastructure Institute. EU-funded project which has been established to source key software components that can interoperate across several heterogeneous Grid middleware platforms.
PRACE	Partnership for Advanced Computing in Europe; Project Acronym.
Tier-0	Denotes the apex of a conceptual pyramid of HPC systems. In this context the Supercomputing Research Infrastructure would host the tier-0 systems; national or topical HPC centres would constitute tier-1.
R&D	Research and Development
rep	Representative
RI	Research Infrastructure

SME	Small and Medium Enterprise
SCx	Supercomputing Conference, annual and biggest related event, located in the US
SOX	Sarbanes-Oxley Act. A United States federal securities law
UNICORE	Uniform Interface to Computing Resources. Grid software for seamless access to distributed resources.
WP2	PRACE Workpackage: Organisational Concept of Research Infrastructure
WP3	PRACE Workpackage: Dissemination, Outreach and Training
WP4	PRACE Workpackage: Distributed Systems Management
WP5	PRACE Workpackage: Deployment of Prototype Systems
WP6	PRACE Workpackage: Software Enabling for Petaflop/s Systems
WP7	PRACE Workpackage: Petaflop/s Systems for 2009/2010
WP8	PRACE Workpackage: Future Petaflop/s computer technologies beyond 2010

Executive Summary

The PRACE project prepares a permanent pan-European Research Infrastructure (RI) for High Performance Computing (HPC), hosting world class supercomputers as its top layer and delivering high-end HPC services to the whole European scientific community in a sustained way. Other layers of the European HPC ecosystem will comprise the national and regional European computer centres of the countries that are or will be a part of the PRACE infrastructure. The European Strategy Forum has recognized these services for Research Infrastructures (ESFRI) as strategic to the competitiveness of European research worldwide as well as enabling high-quality scientific research on forefront scientific areas that are bound to have an important impact on the welfare of European societies as a whole.

To build such an RI and have it fulfil its expected impact, one has to ensure the collaboration and in some cases the commitment of a wide range of stakeholders of a very diverse nature. These stakeholders were identified and their importance to PRACE analyzed in the previous deliverable D2.5.1 [7]. Building on it, the present deliverable reports on the contacts established between PRACE and the various stakeholders groups, describing their importance, the actions taken so far, the messages carried, the feedback received and what further actions are needed to strengthen the links between PRACE and the stakeholders.

While for some stakeholders the contacts develop naturally almost without effort (e. g. with hardware and software vendors) because of mutual interest, others require an active engagement in a sustained way. These are the cases of the prospective user community for high-end HPC services, including both academic/research users through their respective RIs and industrial users, as well as the funding bodies and policy setting organizations/bodies. The engagement of these stakeholders is vital to the success of the PRACE RI, since the former are the final users of the RI and the latter the entities that finance it and assure its sustainability in the long run. In both cases, this involves an important dissemination and outreach effort spanning a period of time that goes beyond the project duration.

In other cases, like other European Grid and HPC projects the contacts must assure their effective cooperation by building trust and good will, especially in areas like Grid computing whose community may view PRACE as a competitor rather than a partner in promoting and establishing crucial IT services in Europe. The message here is that HPC and Grid services are complementary to each other.

To make the contacts of PRACE members with the stakeholders more effective and present a uniform message throughout all the HPC Ecosystem, PRACE WP2 and WP3 have prepared a Communication Kit, together with a message document which includes a set of FAQ and where care is taken in order to ensure that the message content is appropriate to each specific stakeholder. This material is included in Annexes 5.1 and 5.2.

1 Introduction

The PRACE project has a mandate to lay out the foundations of a future pan-European HPC research infrastructure whose top layer consists of Petaflop/s-class supercomputers sharing resources with National/Regional HPC Computer Centres. Such an organization drives high expectations about its role of advancing top-level research needing to perform highly complex simulations, which in turn may have a high impact on the welfare of European societies. In order to accomplish these goals it has to develop strong permanent links with the whole HPC Ecosystem represented by its stakeholders. The previous deliverable D2.5.1 [7] identified and provided a description of the stakeholders, which were grouped in eight categories: providers of HPC services, European HPC and grid projects, networking infrastructure providers, hardware vendors, software vendors and the software developing academic community, end users and their access through related Research Infrastructures and finally funding bodies on a national and international level. It also performed an analysis of each stakeholder group and its importance for PRACE.

This deliverable builds on that work, describing further the nature and the relevance for PRACE of those links as well as reporting their current status. For each group of stakeholders the relevant message to carry across is presented, the feedback received up to this moment, problems identified and suggestions for future steps. However, this document goes beyond the simple description of the links, their nature and importance, by also providing concrete steps and actions to be taken to effectively connect to the stakeholders. To this end, material is provided that can be used by PRACE members in their contacts with the different stakeholders to effectively engage them into collaborating and when appropriate committing themselves to the PRACE initiative.

Chapter 2 and its sections describe the links with the HPC ecosystem for each group of stakeholders, addressing in particular the importance of the stakeholder group, aims and objectives, message transmitted, and also provides a summary of contacts, the feedback received and its use by the PRACE project, and finally suggesting the next steps to be taken. Chapter 3 deals with the sustainability of the contacts beyond preparatory phase, and in Chapter 4 the conclusions are drawn. Annex 5.1 lists the messages that PRACE members should carry across in the contacts with the stakeholders and a set of FAQs to help in these contacts. Annex 5.2 presents a communications kit prepared together with WP3 which includes electronic material like slides for presentations, document templates, brochures and logos which can be downloaded from the project's internal collaboration tool BSCW [2].

2 Links with HPC Ecosystem

This chapter documents the planned links and the actions taken so far by PRACE to address stakeholders in the HPC Ecosystem. The work is based on the plans indicated previously in the Deliverable D2.5.1 [7]. In addition, there is a strong connection to the dissemination work of WP3.

Stakeholders are divided in eight different categories and are defined in detail in D2.5.1 as:

- Providers of HPC services;
- Related European projects;
- Networking infrastructure providers;
- System manufacturers;
- Software vendors and the software developing academic community;
- End users and their access through related Research Infrastructures;
- Funding bodies on a national and international level;
- Policy setting organisations directly involved in developing the research infrastructure and political bodies like parliaments responsible for national and international legislation.

In each of the stakeholder categories the planned contacts and actions taken so far have been indicated. Some of the planned contacts are in process, and some of the actions by the responsible PRACE person are planned for the coming weeks. This is indicated by two states: in process and pending. In some cases the status is explained in greater detail.

The stakeholder contacts will be continued in 2009 and beyond. The planned actions for next year have been indicated, and the stakeholder activities will be reported in periodic management reports, dissemination reports and other related documents and the status of the interactions will be monitored by the project management.

Supporting material for stakeholder contacts has also been designed to help several PRACE partners to deliver a customised message. PRACE WP2 and WP3 have together prepared a Communication Kit for this purpose, which includes a set of PRACE slides for different audiences, the PRACE message document to support discussions concerning for example interoperability issues or collaboration with other projects, templates for stakeholder contacts and guidelines through D2.5.1. In addition the scientific case document [4] prepared by HPC in Europe Taskforce (HET) is used for background information in discussions with the different research communities.

2.1 Providers of HPC Services

2.1.1 *Importance of the Stakeholder Group*

The PRACE members are not included here since they are internal to the project, and have also working connections to other Tier levels in their countries. The providers of HPC services here consist of the other non-PRACE member EU countries, plus accession countries and those on the waiting list to open negotiation with the EC. Some of the countries have already signed the PRACE Memorandum of Understanding (Ireland, Turkey, Cyprus), but most of the providers of HPC services representing their countries are still at an early stage of analysing the PRACE offer. For successful European coverage of the future PRACE services it is very important to create ties to these remaining HPC service providers in non-PRACE countries.

2.1.2 *Aims and Objectives*

The objectives of contacting providers of HPC services are to make PRACE targets known to the countries (outreach activities), discuss how the users of the HPC services in that country can utilize PRACE services in the future, investigate the technical challenges to connect with the PRACE infrastructure, gather political support for the project and possibly sign the PRACE Memorandum of Understanding. The end result will be to provide a critical mass for European supercomputing, to better coordinate HPC activities and to avoid duplication of work in providing leadership resources to European researchers.

2.1.3 *Message transmitted*

The message PRACE is transmitting to HPC service providers focuses on opportunities to collaborate through joint activities, such as enabling access from the computing centre's HPC infrastructure to PRACE services, training activities or collaboration in scaling application codes. For that purpose PRACE needs information about the targets of HPC service providers, the potential needs of their customers and the goals of the providers for international HPC collaboration. This requires the stakeholder's interest towards European HPC collaboration resulting them to allocate suitable contact persons to further discuss the topics.

2.1.4 *Summary of Contacts*

Country	Contact Person	comment
Belgium	Rosette Vandenbroucke, Member of the (future) Flemish Supercomputing Center Steering Committee	Sent MoU in October 2008, making arrangements to become official Belgian rep and to sign MoU.
Bulgaria	Luben Boyanov, Institute for Parallel Processing, Bulgarian Academy of Sciences	Waiting for official letter of support from Bulgarian Government
Cyprus	Prof. C. Alexandrou Chair, Interim Governing Board, CSTRC	Signed PRACE MoU on Oct 29, 2008. PRACE Initiative Member
Czech Republic	Jan Gruntorad, Cesnet	Email sent to e-IRG rep on 24/11/2008 also contact with Martin Duda, who is contacting Ministry for a LoS.
Denmark	René Belsø, DCSC	Email sent to e-IRG rep on 24/11/2008
Estonia	Jaak Anton, Ministry of Education and Research	Email sent to e-IRG rep on 24/11/2008
Hungary	Lajos Bálint, NIIF/Hungarnet, Tamás Máray, NIIF	Email sent to e-IRG rep on 24/11/2008

Country	Contact Person	comment
Ireland	James Slevin, ICHEC	Member of initiative since May 29, 2008
Latvia	Ilmars Slaidins, Riga Technical University	Email sent to e-IRG rep on 24/11/2008
Lithuania	Laimutis Telksnys, LITNET/Institute of Mathematics and Informatics	Given contact details by Initiative Chair in September 2008, we are waiting to hear from them
Luxembourg	Antoine Barthel, Restena	Email sent to e-IRG rep on 24/11/2008
Malta	Robert Sultana, University of Malta	Email sent to e-IRG rep on 24/11/2008
Romania	Dorin Carstoiu, Polytechnical University of Bucharest	Email sent to e-IRG rep on 24/11/2008
Serbia	Aleksandar Belic, Scientific Computing Laboratory Institute of Physics, Belgrade	MB vote positive Oct 29 2008 – PP written confirmation received, due to sign MoU on Dec 16th 2008
Slovakia	Ladislav Hlucý, Ústav informatiky SAV Tomáš Lacko, Computing Centre of the Slovak Academy of Science	Email sent to e-IRG rep on 24/11/2008
Slovenia	Andreja Umek Venturini, Ministry of Higher Education, Science and Technology	Email sent to e-IRG rep on 24/11/2008
Turkey	Serdar Celebi, UYBHM	Member of initiative since May 29, 2008
Croatia	Ivan Marić , SRCE, University of Zagreb	Email sent to e-IRG rep on 24/11/2008, reply from Ivan Maric 04/12/2008, he will discuss with ministry and with CRO NGI partners

Table 1 Contacts made with European providers of HPC services

An e-mail was sent to the e-IRG representative of all EU and candidate countries not already in PRACE on 24/11/2008 inviting them to contact the PRACE Initiative chair to discuss joining the initiative. Detail of the official process for joining PRACE was included as well as references to further information about the project and the aim of including more countries in the Initiative. Namely: "to provide critical mass for European supercomputing, to better coordinate HPC activities and to avoid duplication of work in providing leadership resources to European researchers."

2.1.5 *Feedback received*

Considerable interest for collaboration and potential participation in the PRACE Initiative by signing the MoU has been expressed. Since the project started, three new countries have already joined (Cyprus, Ireland and Turkey). Serbia has been invited to sign the accession agreement to the MoU at the MB meeting on December 16 and Belgium and Bulgaria are expected to join very soon. The Czech Republic is also starting contacts with the government to gain their support to join PRACE.

2.1.6 *Use of Feedback by PRACE Project*

In September 2008 the PRACE Project MB decided that Initiative partners would be able to attend the Project MB meetings. Within the project MB these partners can make their voice heard and give their feedback about both PRACE initiative and project issues. This feedback will be considered before the MB takes decisions. One of the ways of participation, which is currently being explored, is by promoting access by the initiative partners to the PRACE prototype systems selected by WP7 and deployed by WP5. This is currently being discussed between the relevant work packages.

2.1.7 *Next Steps*

To further increase the involvement of the new Initiative members, the project MB has decided on December 16 to grant access to all project documents unless they contain confidential information received under NDA. Options to allow simplified access to prototypes for the purpose of application porting and petascaling are investigated as a reach-out activity to the scientific communities in these countries.

The PRACE initiative will continue to remain open to participation from the countries listed in the table and the project will be presented at various events like SC2009 or ISC2009 attended by the HPC and user communities from these countries. As all have been contacted, it is up to these countries to take the next steps in following up on the invitation to join the PRACE initiative. PRACE members are available to give further advice.

2.2 Related European Projects

The PRACE member states, participating institutions (hosting sites) and user communities are involved in a multitude of other computing-related projects. Most of them will therefore at least indirectly interact with PRACE, and with some of them PRACE needs to establish contacts and partnerships.

2.2.1 *Importance of the Stakeholder Group*

All PRACE member states and partner institutions are involved in other national, regional and European computing-related projects. Especially the European HPC and Grid computing projects are closely linked with PRACE and in many cases use the same technologies and provide services to the same user communities as PRACE. They need to be considered as important stakeholders for successful deployment of the PRACE centres and services, which need to interoperate with these projects. In addition to the involvement by virtue of the PRACE partners being also partners in those related projects, we identify here a set of stakeholders that are at the time of writing of this document the most relevant projects to consider. This list will of course need to be adapted in time as new projects are established and current projects reach their end of life.

2.2.2 *Aims and Objectives*

Closely related projects need to be actively contacted in order to explore possible joint activities, for example technical and user-level collaboration, sharing of best practices, joint application development, sharing of prototyping results, joint prototyping of new high-end computing technology (both software and hardware), training and education courses and similar topics. The scale of mutual interests may vary depending on the project.

Most importantly, PRACE needs to cooperate with other projects in the establishment and application of standards and best practices where overlaps exist, in order to assure smooth interaction and interoperability.

PRACE actively seeks collaboration with the most relevant projects, in search for synergies in building the European HPC Ecosystem. This requires openness on both sides and an honest intention to join forces to solve common problems, establish standards and policies. Once partnerships have been established, the workload allocated to activities involving cooperation with other projects (like outreach) can be made use of to pursue more concrete actions.

There are several ongoing European HPC and Grid projects that have mostly complementary objectives but of course are also overlapping in certain areas. A common understanding about the focus of the different projects in the HPC ecosystem is required including especially the areas where interoperability plays a key role. A common terminology needs to be established what is exactly meant by HPC, Grids, supercomputing, capacity computing, capability computing, etc. These areas have already been addressed in the PRACE Message document (Annex 5.1).

The space the relevant projects occupy can be visualized by the performance pyramid, often referred to by HPC projects like DEISA2 and PRACE.

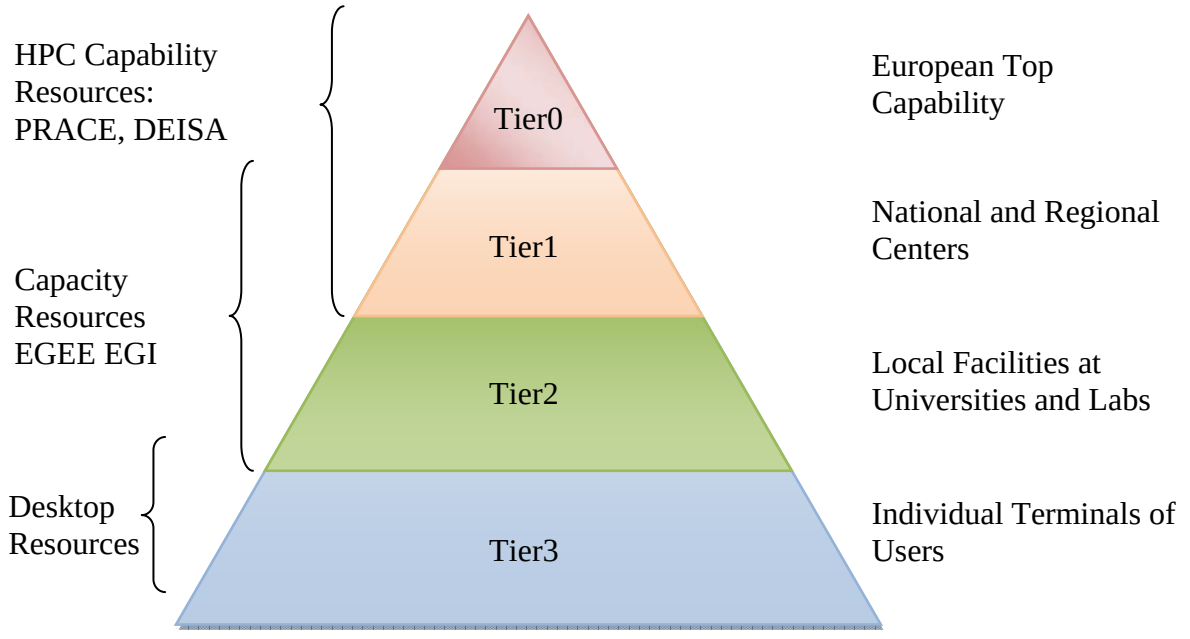

Figure 1: *The performance pyramid cited by PRACE and DEISA, with its different layers. The horizontal axis represents the aggregate number of user at the given level; the vertical axis represents the computing power (for example in Teraflop/s) of the individual resources*

Relevant projects in the HPC ecosystem are those providing complementary resources (i.e. capacity Grids, by EGEE-III, EGI_DS, networks by GÉANT) or complementary services (visitor exchange program by HPC-Europe, software sharing by OMII-Europe). The most relevant complementary project is DEISA2, which will provide the services and tools necessary to integrate the PRACE tier-0 systems into the lower layers of the pyramid.

2.2.3 *Summary of Contacts*

Organization Name	Contact Person	Main Interlocutor in PRACE	Objectives & Expected Results	Status
DEISA2	Stefan Heinzel, (MPI)	Achim Bachem (FZJ)	Collaboration, interoperability, joint activities, shared activities in many areas	Collaboration est., Observer in ExeComm
EGI_DS	Dieter Kranzl-müller (LRZ), Ludek Matyska (CESNET), Per Öster (CSC)	Peter Kunszt (CSCS)	Collaboration, interoperability, information sharing, standardization, establishment of joint policies	Observer in Management Board
EGEE-III	Bob Jones, Steven Newhouse (CERN), Per Öster (CSC)	Peter Kunszt (CSCS), Kimmo Koski (CSC)	Interoperability, information sharing, working collaboration, standardization	Joint meetings with DEISA2, EGEE-III and EGI_DS held in ICT08 Lyon and next ones scheduled for March and May 09
OMII-Europe	Alastair Dunlop (University of Southampton)	Achim Streit (FZJ)	Software development, Information sharing, code development	Project finished, Middleware work is continued in EGI_DS, indirect cooperation through DEISA
HPC-Europe	Sanzio Bassini (CINECA)	Sergi Girona (BSC)	Collaboration, resourcing visiting researchers HPC Europe researchers to use PRACE services	Discussions started with CINECA, HPC-Europe presented in PRACE networking session in Lyon at ICT2008
EUFORIA	Pär Strand (Chalmers)	Kimmo Koski, Leif Laaksonen (CSC), JM Cela (BSC)	Collaboration, political support, potential PRACE customer Joint activities	Meeting in Gothenburg agreed for January 15.-16, 2009
GEANT	Dai Davies (DANTE)	Leif Laaksonen (CSC)	Network usage models, network optimization	Discussion held during ICT Lyon 2008. See section 2.3.
OGF-Europe	Silvana Muscella (TRUST-IT)	Peter Kunszt (CSCS)	Standardisation, interoperation, industry contacts	Initially indirect involvement through DEISA for middleware issues. On further topics of interest discussions are in progress

Table 2 Contacts made with European Projects

Concrete steps to develop relations between the projects have already been taken by PRACE. For example, a meeting between PRACE, EGI_DS, DEISA2 and EGEE-III was organized in Lyon on November 26th, 2008 during the ICT2008 conference. More such meetings are foreseen for early 2009. Another common meeting – including also related US projects – was organized during the Supercomputing Conference (SC08) in November 2008 in Austin, USA.

2.2.4 *Feedback received and given*

DEISA

The PRACE and DEISA projects have closely cooperated from the beginning with DEISA2 starting May 2008, specifying in great detail their different and joint responsibilities. Coordination between the projects is straightforward, as many partners of PRACE are also involved in DEISA2. The focus of both projects is complementary by construction. The technological interface is coordinated in PRACE through WP4. There have been several joint meetings held already to establish an optimal interface between the projects and clear descriptions of duties and responsibilities. It has been agreed that:

- DEISA2 and PRACE set up a joint mailing list for coordination and discussion of topics of joint interest, which is the prace-deisa2@fz-juelich.de mailing list.
- DEISA2 and PRACE set up a joint secure document server to exchange relevant internal information, at https://work.deisa.org:444
- In the WP4/technology context, PRACE focuses on the integration of Tier-0 systems while DEISA2 focuses on the integration of the Tier-1 systems.
- PRACE uses the technology provided by DEISA2 unless there are compelling reasons not to do so.
- If there are gaps in the services provided by DEISA2, PRACE WP4 provides requirements to DEISA2. The two projects will jointly decide how to fill the gap, meeting the deadlines of both projects.
- PRACE will scout for technologies relevant to the tier-0 integration, DEISA2 will test and integrate chosen solutions wherever possible, and PRACE will perform the integration if necessary.

These agreements are documented in the minutes of the joint meetings between the relevant technical work packages of DEISA2 and PRACE. The dialog between the two projects is already very active and well established.

EGI and EGEE

The EGI Design Study project has called for feedback on the initial versions of their Blueprint document, describing the future layout of a European Grid Initiative. The PRACE project is present as an observer in the EGI_DS Management Board and was asked to provide comments on the two documents released, which are deliverables D3.1 (EGI Functions[6]) and D4.4 (EGI Blueprint[5]) of the Project. PRACE has provided detailed comments and a very active dialog has been established with the EGI_DS project. EGEE-III is the largest current Grid infrastructure in the world, working very closely with the EGI_DS project on a detailed transition plan to the proposed EGI infrastructure.

The added value of Grids as perceived by PRACE lies mostly in the sharing of resources and enabling collaborations. How this is to be done in detail between EGEE, EGI, PRACE and DEISA has still to be worked out. Many of the PRACE user communities are developing complex workflows and need additional services that might be provided in the future through EGI. For example, many HPC simulations produce large quantities of data that need to be made available for further analysis (visualization, data mining, etc) also on local clusters or

Grids. PRACE and DEISA2 are in the process of establishing the rules how European supercomputers can be accessed by the various user communities and they are already actively participating in standardization efforts through OGF or directly with the middleware providers (mostly Unicore) to assure that the user interfaces are interoperable to the other Grid infrastructures. EGI_DS and also the future EGI.org Research Infrastructure will have to work together with the supercomputing community to assure that the users will be able to easily navigate across these technology boundaries and that the access policies are compatible between PRACE and EGI. A large difference today is the basic assumption on how users are getting access to the resources offered by PRACE and EGI: while PRACE assigns time to research projects based on a peer review process on PRACE or state-owned hardware, EGI expects the user communities to bring in their own resources and share it among themselves. These models are inherently incompatible and both EGI and PRACE will have to work closely with their common user communities to adjust their models.

In many smaller countries the interaction between EGI and PRACE Research Infrastructures will be straightforward where there is already a close cooperation or even a large overlap between the National Grid Initiatives (NGI) and the national supercomputing centres, while in some larger countries additional effort is needed as there are very different organizations involved. It is important that the user communities needing both classes of resources are well served in all countries and that the resource allocation processes between supercomputing centres and the EGI are compatible.

Terminology

A very important point that has been raised by all projects is the difference in the usage of terms among the various projects, which is the source for some misunderstandings and confusion. E.g. the pyramid model used by the HPC community (see **Fehler! Verweisquelle konnte nicht gefunden werden.**) can be misinterpreted depending on the context. EGEE suggests to avoid using the pyramid model altogether. Another example is the usage of the term 'regional': while for PRACE a ‘regional center’ means a national centre inside a country which serves the needs of a national region (like in Germany or France), for EGEE the same term describes an international region of Europe, like South-Eastern Europe. There are several more terms that need to be clarified and their usage standardized.

Even more importantly, there are a lot of misunderstandings and issues around the usage of the terms 'HPC', 'Grid', 'capacity' and 'capability' – where does HPC stop and Grids start? When is a workload in the capability and when in the capacity domain? Often people try to compare Supercomputers and Grids or talk about a 'virtual' supercomputer provided by Grids, which in the terminology of PRACE is an oxymoron. These terms mean different things to different people so it is essential to use them carefully and qualify their usage with examples. The careless use of these terms leads to many wrong assumptions and confuses the users.

Timing and Transitions

Another important topic is the planning of the transition from the EU-funded projects to the sustained European Research Infrastructure organizations to be established by PRACE and EGI. The transition from EGEE to EGI is already being carefully planned, while the transition from DEISA to PRACE or to EGI and the future relationship between EGI and PRACE still a substantial amount of work has to be done. The establishment of National Grid Initiatives and their relation to the PRACE tier-0 and tier-1 centres is also not at all understood. Also, the future EC programmes need to relate to these transitions in order to develop the next-generation infrastructure and related tools.

HPC-Europa 2 (HPCE2)

The HPCE2 project is about to start in January 2009, therefore only preliminary contacts with the project coordinator took place. HPCE2's main objective is to maintain the persistency of high quality transnational access to the most advanced HPC infrastructures available in Europe for the European computational science community. The entire project is organized around the core activity which is the Transnational Access (TA) HPC service provision. However, a specific Network Activity in HPCE2 ("WP3-NA2 Facilitate the HPC Ecosystem") is dedicated to define the interplay with other major HPC related EU funded projects like PRACE, in order to facilitate the sharing of best practice in terms of HPC access service provision, selection procedures, training and consultancy. The interaction between PRACE and HPCE2 will offer an ideal opportunity to enlarge the HPC user community across a larger number of European countries and new modes of access.

2.2.5 *Next Steps*

EGEE, EGI, DEISA

The next joint meetings have been set for the EGEE User Forum and the DEISA Symposium in the first half of 2009. As already explained before, the establishment of a joint terminology and a common model of resources needs to be discussed, as well as the plans for the transition to a sustained European infrastructure and the future relation between the two organizations, leaving open the path to a further evolution. This will be a long process, which will have to involve also the user communities very strongly.

HPC-Europa2

The synergy with the HPCE2 project will encompass several activities, with the object of improving the effectiveness of the two projects and their impact over the scientific and research community.

As a first step, PRACE representatives will be invited to participate and contribute to the HPCE2 Kick-off meeting, which will be held in Bologna in the second half of January. Then, the PRACE members will be periodically invited to the HPCE2 meetings to assist in analyzing the wider applicability of the HPCE2 selection procedure (application process, technical reviews, host evaluation and the Scientific User' Selection Panel). These representatives will be asked to review the selection and verification activities and assess the extendibility of the model to the PRACE environment and its applicability to the project needs, finding out possible adaptations, enhancement and corrections. This analysis will be also used by the HPCE2 project in order to improve its service. PRACE representatives will be invited to the annual HPCE2 main conference, held in conjunction with the TAM Users Group Meeting. Within that conference, focussing on a different scientific and HPC-related issue every year, PRACE will be invited to bring its HPC knowledge and deep experience to the HPCE2 consortium and audience and, again, to absorb some hints about the HPCE2 models and procedure.

Other Projects

The OMII-Europe, OGF-Europe and EUFORIA projects still need to be contacted for feedback, or no feedback has been received yet.

PRACE will also need to keep active interaction with the network providers: Both with GÈANT and the National Research and Education Networks (NREN), as there will be large amounts of data created by petascale simulations to be run on the PRACE infrastructure. These data will need to be transferred to national centres for further analysis and long-term

storage, which will be only possible by connecting the PRACE sites with the best high-speed networks available. The next section elaborates in more detail about this interaction.

Transcontinental Relations

There have already been several meetings between the European and projects from around the World, especially from the U.S.A, Japan, China and India. In the Open Grid Forum (OGF), there is a working group dealing with Grid middleware interoperability [12], where the interoperability issues between the various middleware services relevant to all these projects are being addressed.

In a recent meeting with the American and Asian projects at the SC08 conference, discussions on topics other than middleware have started – funding, similarities and differences, timelines, comparison of each other's structures, interactions with user communities. However, this was only the start of a dialog, which needs to be continued in the years to come.

2.3 Networking Infrastructure Providers

2.3.1 *Importance of the Stakeholder Group*

Communication networks, such as light paths between the centres and connections to various sources of data, have a major impact to the efficiency and effectiveness of the pan-European HPC services. Dedicated links are often required to sustain the necessary data transfer speeds. High-speed networking with sufficient bandwidth is a requirement for successful PRACE service.

2.3.2 *Aims and Objectives*

The objective is to discuss the technical and economical options for connecting PRACE centres themselves and with different user communities to PRACE. The intention of PRACE is to make the networking infrastructure providers to know PRACE requirements and the impact of PRACE for the HPC ecosystem.

2.3.3 *Message transmitted*

It is probable that specific dedicated network connections between major PRACE sites and between PRACE centres and the main user communities will be needed. For that reason PRACE needs to maintain close contacts with network providers and the GÈANT organisation to be able to discuss the required developments. The message we want to deliver is the need for close collaboration between network providers and high performance computing centres to enable efficient connections for demanding computations.

2.3.4 *Summary of Contacts*

Organization Name	Contact Person	Main Interlocutor from PRACE	Objectives & Expected Results	Status
GÈANT	Dai Davies, Hans Döbeling, Klaus Ullmann	Ralph Niederberger (FZJ), Leif Laaksonen (CSC)	Network requirements for PRACE networking understood	Discussions between Laaksonen / Davies and Eickermann / Döbeling held. GÈANT interested in joining the meetings with European Grid/HPC projects
DANTE	Dai Davies, Hans Döbeling, Klaus Ullmann	Ralph Niederberger (FZJ), Leif Laaksonen (CSC)	Information sharing	Discussions with GEANT/Dai Davies also concern DANTE, see above

Table 3 Contacts made with network infrastructure providers

2.3.5 *Feedback received*

GÉANT is highly aware of the fact that PRACE will have huge networking demands both in capacity and reliability, which go beyond the normal best-effort IP service provided as the default connectivity today. GÉANT is ready to discuss PRACE's requirements and propose solutions for the sophisticated needs. PRACE has also received initial information about activities planned in the context of GÈANT3, which will extend and generalise the model of interconnection between GÉANT and the NRENs. This will most likely also have an influence on the range of options that will be available for PRACE.

The networking demands for the PRACE initiative have also been discussed from a Nordic point of view with NORDUnet at various occasions. These discussions very well support and complement the current Nordic efforts to enhance the e-Science infrastructure and NORDUnet is a key component in enabling this effort. These discussions also serve as input for the direct negotiations carried out between GÉANT and NORDUnet.

2.3.6 *Use of Feedback by the PRACE Project*

PRACE is relying on the GÉANT state-of-the-art data communications in providing the PRACE services to the European research and education community. Connecting the PRACE centres as well as the researchers is of uttermost importance to PRACE to fulfil its commitments. Special care in terms of planning has to be taken in the deployment of dedicated connections, where GÉANT will typically need a few months up to about half a year to arrange solutions. The feedback received has showed the strong need for a close dialog between the whole HPC ecosystem and GÉANT to provide reliable network solutions.

2.3.7 *Next Steps*

The next steps are to finalize the discussions with the mentioned network providers about PRACE requirements in terms of networking infrastructure. The collaboration with DANTE in employing the GÉANT multi-domain services and NORDUnet services among the Nordic countries will provide reliable and cost efficient connections between the PRACE centres and

will connect the scientists to the PRACE services. At a later stage, also the NRENs peering with GÉANT will be involved.

These discussion will be carried forward both at dedicated meetings between the HPC ecosystem e-Infrastructure initiatives and GÉANT and at e-Infrastructure conferences providing the facilities for a broader participation and discussion including also the researchers. The relationships established in the PRACE project are expected to last throughout the lifetime of the permanent Research Infrastructure.

2.4 System Manufacturers

2.4.1 *Importance of the Stakeholder Group*

System manufacturers are the key stakeholders who will have an essential role in developing the technology to meet the Petaflop/s computing target and beyond. PRACE has selected two sets of prototypes (one targeting the initial deployment of the PRACE infrastructure, the second more focus on long term issues) using technology of several system manufacturers, and intends to work together in demonstrating Petaflop/s capability. Since the future Petaflop/s production systems will consist of commercial products, the role of vendors will be essential throughout the whole project and beyond.

2.4.2 *Aims and Objectives*

One objective is to demonstrate the capability to provide systems at the highest performance level in Europe, matching or exceeding those of USA and Japan. Other objectives include raising the interest among the vendors for European HPC activities, possibly stimulating European activities and increasing the vendor participation in Europe.

2.4.3 *Message transmitted*

The message PRACE is delivering to the system manufacturers includes:

- PRACE partners represent the majority of European HPC resources (indicated by TOP500 list for example) and form a major market potential in Europe.
- PRACE partners target to establish a set of world-class HPC centres with major contributions to HPC development.
- PRACE partners are established in Europe and funded by the EU and national funding agencies and the volume of European activities improving European economy, employing people and increasing the level of Europe-based R&D activities of each vendor is important for the collaboration.

2.4.4 *Summary of Contacts*

System Providers

Table 4 System providers contacted by PRACE

Organization Name	Contact Person	Main Interlocutor from PRACE	Status
Bull	Jean-François Lavignon	François Robin (GENCI)	In process. This company manufactures two of the PRACE prototypes.

Organization Name	Contact Person	Main Interlocutor from PRACE	Status
Cray	Ulla Thiel, Vincent Pel	Kimmo Koski (CSC)	In process. This company manufactures a PRACE prototype.
Dell	Mellenbergh Bart	Lennart Johnsson (KTH)	Meeting held in Oct 2008
Fujitsu	Philippe Haye	François Robin (GENCI)	Meeting held in Oct 2008
Hitachi	(void)[1]	Kimmo Koski (CSC)	PRACE presented on November 14th
HP	Dominique Gillot	Kimmo Koski (CSC)	Participated WP7 meeting in Lugano Oct 2008. Discussions held between Koski / Gillot, Robin / Gillot
IBM	Philippe Bricard	Sergi Girona (BSC), Thomas Lippert (FZJ); Axel Berg (NCF)	In process. This company manufactures three of the PRACE prototypes.
NEC	Philippe Gire	Stefan Wesner, HLRS	In process. This company manufactures a PRACE prototype
SGI	Robert Uebelmesser	François Robin, GENCI	Meeting held in Oct 2008
SUN	Philippe Trautmann	Thomas Lippert, FZJ	Meeting held in Oct 2008.

Technology/Components

Organization Name	Contact Person	Main Interlocutor from PRACE	Status
AMD	François Challier	Kimmo Koski (CSC)	AMD contacted in Nov 2008, waiting for reply
Intel	Marc Dollfus	Thomas Lippert (FZJ) Herbert Huber (LRZ)	In progress. Several meetings held in 2008. Intel will deliver Nehalem-EP, Nehalem-EX processors as well as Larrabee accelerators for BAdW/GENCI-CINES WP8 prototype
nVIDIA	Jean-Christophe Baratault	François Robin (GENCI), Thomas Lippert (FZJ)	In progress. nVIDIA accelerator technique is part of one WP8 prototype proposal
BlueArc	Thomas Seuchter	Herbert Huber (LRZ)	Participated in WP7/WP8 vendor meeting. Discussions held between BlueArc and LRZ
DDN	Toine Beckers	Herbert Huber (LRZ)	Participated in WP7/WP8 vendor meeting. Discussions held between Beckers/Huber

[1] With reference to D2.7.2[1][10] and WP8 results, Hitachi seems to have withdrawn from the European market and no useful contact could be established so far.

Organization Name	Contact Person	Main Interlocutor from PRACE	Status
Isilon	Zeljko Dodlek	Herbert Huber (LRZ)	Participated in WP7/WP8 vendor meeting.
LSI	Werner Wassink	Herbert Huber (LRZ)	Participated in WP7/WP8 vendor meeting. Discussions held between LSI and LRZ
NetApp	Lothar Uhl	Herbert Huber (LRZ)	Participated in WP7/WP8 vendor meeting. Discussions held between NetApp and LRZ
Panansas	Dario Schmidt	Herbert Huber, LRZ	Participated in WP7/WP8 vendor meeting. Discussions held between Schmidt/Huber
Quadrics	Duncan Roweth	Herbert Huber, LRZ	Quadrics parent company Alenia Aeronautica decided to disintegrate Quadrics Ltd. Presently Quadrics Ltd. Is not allowed to sell any products.

Table 5 Technology / Components providers contacted

Associations / Group of interest

Organization Name	Contact Person	Main Interlocutor from PRACE	Status
PROSPECT	Francesc Subirada (BSC), Thomas Lippert (FZJ)	Industry relations, Industry contacts, integration to PRACE work	Formal collaboration with PROSPECT being established through STRATOS initiative
Ter@Tec	Christian Saguez (ECP), Thomas Lippert (FZJ)	Industry relations, Industry contacts	Formal collaboration with Ter@Tec being established through STRATOS initiative[2]

Table 6 Associations and groups of interest

2.4.5 *Feedback received*

The interaction with system manufacturers has created an enormous amount of interest at their side. Even before the official start of the PRACE project, most manufacturers attended an information meeting about PRACE held during SC07. All major companies were also met by a team of PRACE partners in February 08 (Paris/CDG) during a review jointly organized by WP7 and WP8. Information gathered at this time was updated in October 08 by a *"Request for Information"* sent by WP7 in order both to get more precise information about technologies and prices for Petaflop/s systems in 2010 and to understand the installation requirement for such systems.

[2] The STRATOS initiative as being the implementation of the AHTP concept has been established by December 2008[16]

The interaction with technology providers is led by WP8. Reviews jointly organized by WP8 and WP7 include: one in September 08 about compute elements, one in October 08 about networks and IOs, and one planned for 2009 about memories.

Since PRACE is dealing with confidential material, all information is gathered under PRACE NDA level 2 agreements. Some companies are still unsure about the protection of information within the PRACE project but this should improve in the future as more mutual trust should grow with time.

In all cases, the IT companies are very interested in getting information about PRACE and are willing to work with PRACE. They are very open to collaboration and establishing/ strengthening such collaboration, either through WP7 or WP8 activities, is important in the future. Meanwhile, keeping close contact with major companies as done by WP7 and WP8 through formal or informal meetings and discussion is also important and will be continued.

2.4.6 *Use of Feedback by PRACE Project*

Feedback from the IT companies is very important for several major deliverables. For WP7:

- D7.1.1[8], D7.1.2[9]: (1) possible technologies and architectures for Petaflop/s computers according to vendor roadmaps, (2) expected costs for such systems. (3) Provide data to PRACE to decide what architectures should be deployed in priority. (2) Make possible for PRACE to plan budgets coherent with the goal of deploying starting in 2010 Petascale systems.
- D7.3[11]: installation constraints for Petaflop/s computer. Make it possible for PRACE to understand whether existing or planned computer centres will be able to host these systems.

This feedback and information gathered during meetings with companies has been also very useful for selecting the WP7 prototypes.

For WP8, this feedback is very important as well for both WP8 prototypes selection and in the perspective of starting the future AHTP (STRATOS).

2.4.7 *Next Steps*

Keeping a close and focused relationship with major HPC companies (both systems and technologies) is very important for PRACE since PRACE is targeting the deployment of a sustainable HPC RI starting in 2010.

For WP7 and WP8 the next steps are:

- On a regular basis updating information gathered from companies, which is also needed for the planned work
- Organising precise feedback from prototype evaluation to the companies; this involves WP5

As a result this will increase the trust of companies into the ability of PRACE to respect confidential material, which is essential for getting really important information from vendors and to establish real collaboration on advanced topics.

2.5 Software vendors and the software developing academic community

2.5.1 *Importance of the Stakeholder Group*

Software is the key enabler for Petaflop/s level results. Scalability beyond tens of thousands of processors is required to efficiently utilise the Petaflop/s systems – at least for most of the

architectures. Collaboration with software vendors is important for PRACE, both with developers of scientific software and with developers of middleware and other tools that improve the usability of the systems.

2.5.2 *Aims and Objectives*

The objectives are similar in part to the ones for system manufacturers: demonstration of capability in providing scalable applications for the highest end computing systems in Europe, raising the interest among the software vendors for European HPC activities, stimulating European software development and increasing the software vendor involvement in Europe.

2.5.3 *Message transmitted*

The key messages PRACE is delivering to the software vendors and the major expectations by PRACE from them are similar to what is mentioned in the previous section for system manufacturers. However, the message to the academic community can be deepened to the level of collaboration in individual cases. If for example the academic community is developing software with the potential of scaling to the Petaflop/s level, the community and PRACE can work together in benchmarking or optimisation of the code (WP6). This requires the academic community to invest expertise to pursue the joint targets. Some of these activities have already taken place in WP6.

2.5.4 *Summary of Contacts*

PRACE work in WP6 includes scaling and benchmarking activity for multiple software packages. The following software will be tested and at the same time contacts with related software developers established. Within WP6 there are 20 benchmark application codes that are being used to assess the performance of the PRACE petascale prototypes and to investigate petascale techniques for future systems. Each application has a single person (BCO – Benchmark Code Owner) responsible for all tasks, including contact with the software developers. The table below lists the software developer(s) and the BCO responsible for that code. More details on the benchmark codes can be found in the respective deliverable D.6.3.1[17]

Application Name	Contact Person(s)	Main Interlocutor from PRACE	Status
Astronomy and Cosmology			
Gadget	Dr. V. Springel, Max-PlanckInstitute for Astrophysics	Orlando Rivera (LRZ)	Contact established
Computational Chemistry/Condensed Matter Physics			
CP2K	Dr. Joost VandeVondele, University of Zürich	Pekka Manninen (CSC)	Close contact with CP2K developers
CPMD	Alessandro Curioni, IBM	Albert Farres (BSC)	Contact established
GROMACS	Erik Lindahl, Stockholm Center for Biomembrane Research	Sebastian von Alfthan (CSC)	Frequent contacts
GPAW	Jens Mortensen, Technical University of Denmark	Jussi Enkovaara (CSC)	Frequent contacts
VASP	Dr. Doris Vogtenhuber vasp.materialphysik@univie.ac.at	Miquel Català (BSC)	In contact
Computational Engineering			
TRIPOLI_4	Jean-Christophe Trama, CEA Saclay SERMA R&D unit	Jean-Christophe Trama (CEA)	Code developed by BCO

Application Name	Contact Person(s)	Main Interlocutor from PRACE	Status
Computational Fluid Dynamics			
ALYA	G. Houzeaux, M. Vázquez, BSC-CNS	Raúl de la Cruz (BSC)	In contact
AVBP	Gabriel Staffelbach, CERFACS (Toulouse, FRANCE)	Betrand Cirou (CINES)	Frequent contacts
Code_Saturne	Marc Sakizc, C. Moulinec, A.G. Sunderland, EDF-R&D	Andrew Sunderland (DL)	In contact
N3D	Tillmann Friederich, University of Stuttgart	Harald Klimach (HLRS)	Close contact with development team
Earth and Climate Sciences			
BSIT	M. Araya, M. Hanzich, F. Rubio, BSC-CNS	Mauricio Araya (BSC)	Code developed by BCO
ECHAM5	Luis Kornblueth, Max-Plank Institute of Meteorology.	Mark Cheeseman (CSCS)	Initial contact
NEMO	Rachid Benshila, Laboratoire d'Océanographie et du Climat: Expérimentations et approches numériques	John Donners (SARA)	In contact
Life Sciences			
NAMD	Jim Phillips, University of Illinois at Urbana-Champaign	Joachim Hein (EPCC)	Contact attempted. No response.
Particle Physics			
QCD Benchmark	Paul Gibbon, FZJ Hinnerk Stueben, ZIB Kari Rummukainen, Univ.Helsinki Bjoern Leder, Trinity College Carsten Urbach, Univ Liverpool Stefan Krieg, FZJ	Lukas Arnold (FJZ)	Most contact has been for source code request, which were successful. Good contact with PEPC developer, Paul Gibbon
Plasma Physics			
PEPC	Paul Gibbon ,FZJ	Lukas Arnold (FZJ)	Frequent contact
Torb	R. Kleiber, R. Hatzky, V. Kornilov, Max-Planck Institut für Plasmaphysik	Xavi Saez (BSC)	In contact
Other			
HELIUM	Ken Taylor , Queens University Belfast	Xu Gou (EPCC)	In contact

Table 7 Contacts made with the software developing community

The applications listed below have potential for PRACE collaboration, and they will be discussed during the project. WP6 and WP8 are actively working with the software vendors. In addition, RapidMind is involved as a prototype provider in PRACE.

Application Name	Contact Person, affiliation	Main Interlocutor from PRACE
DDT	Michael Rudgyard, Allinea	EPSRC
CAPS	Laurent Bertaux François Bodin, CAPS Entreprise	GENCI
CEA-DRT-LIST	Didier Juvin, CEA	GENCI

Application Name	Contact Person, affiliation	Main Interlocutor from PRACE
PARAVER	Jesus Labarta, BSC	BSC
SCALASCA	Felix Wolf, Scalasca	FZJ
Unicore	Achim Streit, Unicore	FZJ
ParaStation	Hugo Falter, ParTec	FZJ
Vampir	Wolfgang E. Nagel, TU Dresden	CINECA
TotalView	Brian Bonenfant, TotalView	CINECA, BSC
RapidMind	Kevin Boon, RapidMind	CINECA
IPM	David Skinner, NERSC	CSCS
PBSPro	Altair	LRZ

Table 8 Contacts to software vendors and promising applications

It is also important to point out, that the first eight companies listed are European companies

2.5.5 *Feedback received*

The BCO for each application has been in contact with the application's developers where appropriate. In some cases this has been a deep involvement with the development team, ensuring the optimisation and scaling effort within PRACE is fed back into the development of the code which is currently done on a best effort basis without any formal agreements. In some cases, there has been no response form the developers. Most development teams have shown an interest in the PRACE activity as the uptake of their codes by PRACE might have a great impact on their usage in the community.

2.5.6 *Use of Feedback by PRACE Project*

The feedback received from the developers has been used to provide input for tasks 6.4 and 6.5, optimisation and scaling of the benchmark applications.

2.5.7 *Next Steps*

The next steps with regards to the applications codes will be on a case-by-case basis. Where appropriate, the BCO will contact and work with the developers to ensure that the effort being spent on petascaling of the benchmark codes is used by the development teams. Where contact has been less successful, many BCOs intend to continue informing the development team of their progress.

2.6 End User Communities

2.6.1 *Importance of the Stakeholder Group*

Ultimately, the end users are the decisive stakeholder group for PRACE as the aim of PRACE is to provide a world class HPC service to these European scientists and engineers. End users include the research infrastructures defined in the ESFRI Roadmap – most of them representing a specific scientific discipline – and other groups such as existing European Research Infrastructures, scientific communities, individual scientists and industry. These groups have been presented in D2.5.1, in which also priorities have been assigned; this is mandated due to the large number of potential end users for PRACE.

The EC sees the involvement of European industries in high performance computing essential for their future success. This involvement not only covers the usage of high performance computing but also the development of highly parallel program codes. One objective of the

PRACE project is therefore the establishment of a close cooperation between scientists in academia and industry for grand challenge applications. PRACE is committed to supporting the projects of European industry from an early stage.

2.6.2 *Aims and Objectives*

The objective is to involve those end users to PRACE, who do high quality research and who can benefit from extreme computing resources. In addition, an objective is to increase the industry involvement for HPC activities through dissemination and outreach. Collaboration with other research infrastructures by providing them the high-end computational resources is another target for PRACE work.

The First Industry Seminar has been designed for CEO (Chief Executive Officer), CTO (Chief Technical Officer), CIO (Chief Information Officer) and R&D Managers, responsible for research and development infrastructures in business sectors that are likely to benefit from the use of future HPC infrastructure deployed by PRACE. One objective of this seminar was to inform the participants about the planned PRACE services and the potential benefits. At the same time the access options were discussed. A second objective was to learn more about the industrial requirements and to understand under which conditions the use of Tier-0 HPC services which PRACE plans to offer, will be of interest to industry.

Furthermore a first PRACE scientific conference has been held November 26, 2008 in Lyon France alongside with the ICT08 conference and a focussed programme on themes of applications, architectures and training needs for the petascale regime, covering these topics from multiple perspectives targeting policy makers to application scientists.

2.6.3 *Message transmitted*

The message PRACE is delivering to end users – both academic and industrial – is to benefit from the opportunity to access systems with extreme computing performance and utilize available competence to support research using these complicated systems. A scientific case for petascale computing[4] has already been prepared during the previous HET project[3]. This is addressed by contacts made by WP6 for scientific applications and benchmarking. In addition PRACE work for discussing peer review process and establishment of scientific advisory committee help in end user collaboration. All these issues target to involve users and deliver a message about willingness to integrate the European scientific community with solid links to benefit from PRACE work.

PRACE showed the wish to be engaged in cooperation with industrial users and to help the European Industry to use high-end supercomputing facilities (Tier-0 systems). Already existing examples were used to demonstrate the tremendous possibilities in using simulation methods on Tier-0 systems. The European industry is invited to contribute their ideas of accessing and using these resources.

2.6.4 *Summary of Contacts*

The ESFRI-list projects have been contacted during the events organized by EU. Preceding the ESFRI concentration meetings PRACE has sent out two letters proposing discussions concerning HPC needs and collaboration possibilities. The contacts have been made according to the interest of the ESFRI list projects. More work with ESFRI projects is planned for 2009, particularly through the *new RI-forum e-community*.

PRACE has approached ESFRI-list projects as a group to create interest in further discussions. In some projects the continuation of discussion has been agreed. PRACE also

gave a presentation at the e-IRG conference (October 21st, Paris), in which seven ESFRI-list projects were present as well and at a meeting of ESFRI project in Versailles (Decembert 8th 2008) where nine projects were present.

PRACE has prioritized 11 ESFRI-list projects based on their expected HPC needs, as listed on the top of Table 9.

- Physical sciences and engineering: PrepSKA, HIPER, ELI, PRINS
- Environmental sciences: ICOS, Lifewatch, EMSO
- Biomedical and life sciences: ECRIN, ELIXIR
- Social sciences and humanities: CLARIN, SHARE

The ESFRI-list is being updated in December 2008. The new list will be evaluated by PRACE and actions planned accordingly.

ESFRI Project	Contact Person	Status/Feedback given
Physical sciences and engineering		
PrepSKA	Keith Mason, Philip Diamond	No feedback given yet
HiPER	Mike Dunne	No feedback given yet
ELI-PP	Gérard Mourou	No feedback given yet
PRINS	n.n.	No contact established
Environmental Sciences		
ICOS	Philippe Ciais, Cécilia Garrec	Waiting for reply to letter. HPC needs probably not within 4year timeframe of prep project
LIFEWATCH	Wouter Los	Met Dec 08, No HPC needs declared
EMSO	Paolo Favali	No feedback given yet
Biomedical and life sciences		
ECRIN-PPI	Jacques Demotes-Mainard	No feedback given yet
ELIXIR	Janet Thornton	Met Dec 08, No HPC needs declared
Social sciences and humanities		
CLARIN	Steven Krauwer	Met Dec 08, No HPC needs declared
SHARE-PREP	Axel Börsch-Supan	No feedback given yet
Non prioritized projects		
NeutronSource ESS	Peter Allenspach	
ILC-HiGrade	Eckhard Elsen	
INSTRUCT	David Ian Stuart	
E-ELT Prep	Roberto Gilmozzi	
IRUVX-PP	Joseph Feldhaus	
FAIR	Juergen Eschke	
INFRAFRONTIER	Martin Hrabé de Angelis	
ESRFUP	Michael Krisch	
EURO ARGO	Pierre Yves Le Traon, Ramiro Gonzales	
PRE-XFEL	Massimo Altarelli	
ERICON-AB	Paul Egerton	
ILL20/20	Richard Wagner	
BBMRI	Kurt Zatloukal	
SLHC-PP	Lyn Evans	
IAGOS-ERI	Andreas Volz-Thomas	
COPAL	Jean-Louis Brenguier	
CESSDA-PPP	Hilary Beedham	

ESFRI Project	Contact Person	Status/Feedback given
ESSPrep	Roger Jowell	
EATRIS	Rudi Balling	
KM3NeT-PP	Emilio Migneco	
SPIRAL2PP	Marek Lewitowicz	

Table 9 Contacts to user communities

Eleven existing research infrastructures have been prioritized and contacted with information on the aims and progress of PRACE project. Objectives in all cases will be to understand the RI's HPC needs, discuss possible access routes for their usage of PRACE and potential collaboration opportunities.

The organizations listed in the next table have either been approached by a letter from PRACE coordinator in November 2008 (CERN, EMBL, ESA, ESO, ICOS, ICTP) or contacted by a PRACE person who has previous contacts with the organization (EBI, ECMWF).

Organization Name	Contact Person	Main Interlocutor from PRACE	Status
CERN	Robert Aymar	Achim Bachem (FZJ)	Letter sent on Nov 11th, 2008, waiting for a reply
EBI	Janet Thornton	Kimmo Koski, Leif Laaksonen (CSC), Modesto Oruzco (BSC)	Letter sent on Nov 22th, 2008, waiting for a reply
ECMWF	Walter Zwiefelhofer	Kimmo Koski, Leif Laaksonen (CSC)	Letter sent on Nov 23th, 2008, waiting for a reply
EFDA	Jerome Pamela, Frank Jenko	Thomas Lippert (FZJ)	Meeting agreed together with EUFORIA on January 15.-16.2009 in Gothenburg
EMBL	Iain Mattaj	Achim Bachem (FZJ)	Letter sent on Nov 11th, 2008, waiting for a reply
ESA	Maurici Lucena	Achim Bachem (FZJ), Francesc Subirada BSC	Letter sent on Nov 11th, 2008, waiting for a reply
ESO	Tim de Zeeuw	Achim Bachem (FZJ)	Letter sent on Nov 11th, 2008, waiting for a reply
ESRF	Alain Lichnewsky	Catherine Riviere (GENCI)	Meeting held with Manuel Rodriguez Castellano, Chief of Staff, July 28th 2008
ICOS	Philippe Ciais	Achim Bachem (FZJ)	Letter sent on Nov 11th, 2008, waiting for a reply
ICTP	Katepalli R. Sreenivasan	Achim Bachem (FZJ)	Letter sent on Nov 11th, 2008, waiting for a reply
ITER	L. Crouzet	Catherine Riviere (GENCI)	

Table 10 Contacts attempted with existing research infrastructures

Contacts with the discipline-specific user communities will be coordinated through two lines of action:

1. The review of the scientific case established by the HET Project is being coordinated through the moderators of the original five areas (see table below).

2. The planning for the Scientific Steering Committee (SSC) will start soon. The SSC will consist of experienced scientists or engineers spanning all scientific and technological areas, which may benefit from the Tier-0 HPC Infrastructure. Its members will be designated for their achievements and status in the scientific community or HPC user industries.

The user communities have been prioritised and are being re-contacted with information on the aims and progress of the PRACE project. Objectives in all cases are to understand their HPC needs, discuss possible access routes for their usage of PRACE. In all cases, the PRACE WP2 Task2 leader will follow up on the contact.

User Community	Contact Person	Status
Engineering	Ken Badcock (University of Liverpool)	e-mailed 27/11/08 and telephone conversation held 01/12/08
Life sciences	Modesto Orozco (UB/BSC)	e-mailed exchanged since 27/11/08 and appointment made for discussion in January 2009.
Materials science, chemistry and nanoscience	Gilles Zerah (CEA-DAM)	e-mailed 04/12/08, awaiting reply.
Astrophysics, HEP and plasma physics	Wolfgang Hllebrandt (MPI für Astrophysik)	e-mailed 04/12/08, awaiting reply.
Weather, climatology and earth sciences	Vicky Pope Meteorological office	e-mailed 04/12/08, awaiting reply.

Table 11 Prioritized user communities and their contact points

Official dialogue with industry was begun when preparing the industrial seminar on September 3rd, 2008. Exchange of views and information during the seminar and the feedback received after it have been very useful in transmitting to industry the potential that PRACE will offer them and in transmitting to PRACE the needs and concerns of industry. This was done both in the talks given by industrial users, through conversation, and through an evaluation form which was competed at the end of the seminar as part of WP3. This contact will be extended and deepened over the following months and in the next industrial seminar. The main interlocutor from PRACE in all cases will be the industry seminar organization committee. There was a final participation the day of the seminar (03 September 2008) of **93** attendees from 13 European countries representing 35 European companies with 6 SMEs (Small and Medium Enterprises). There were also 10 representatives from the academic domain. A detailed report on the event can be found in D3.2.1[18]

User Community	Contact
Automotive	PORSCHE, SCANIA
Aerospace	AIRBUS, EADS, SNECMA, BAE, VOLVO AERO
Materials	ARCELOR MITTAL, HUTCHISON
Biotech	NOVARTIS, SCHERING PLOUGH, AKZONOBEL
Energy	EDF, TOTAL, ENI, CEA, IBERDROLA, REPSOL
Finance/Insurance	BNP PARIBAS, SOCIETE GENERALE
Electronics	PHILIPS, NXP
IT/SMEs	CS, TSYSTEMS, EDS, NUMTECH, NAG, MEDIT

Table 12 Contacts made to industrial user communities

The first scientific conference held November 26th 2008 was attended by 40 participants from 16 countries featuring sessions aimed at facilitating discussion and collaboration between researchers, technical experts, and policy makers, towards PRACE's goal of establishing an HPC infrastructure in Europe. By organising the workshop during ICT 2008, PRACE was

able to connect closely with other European ICT projects, such as DEISA and EGEE, enhance collaboration and identify areas of overlapping effort.

2.6.5 *Feedback received*

Feedback received from the five user communities includes ideas on how users would best like to access the PRACE resources. Various users have expressed a preference for calls for proposals from consortia of top users from a particular field which would contain various projects and allocate a large block of time for this community. This facilitates contact with peers and encourages the dissemination and discussion of the results of the CPU hours used. This would also facilitate feedback to the Scientific Steering Committee as representatives of these consortia could be used to coordinate feedback at the meetings of the planned user forum as they would represent a larger community. Users have also expressed a concern contact with HPC infrastructure projects could be more regular.

In industry seminar an evaluation form was distributed to all the attendees. On 93 total attendees, 59 evaluation forms were collected with 33 answers for the industry attendees (representing 28 companies) and 10 answers for the academic domain and the EC and affiliates (one representative from EC and 2 persons from ICT REGIE). The other evaluations are coming from PRACE partners or European HPC Centers. The 33 industry answers are representing 80% of the total number of industry attendees and also 80% of the total number of companies. Anonymous answers have been dropped.

The industry seminar participants asked PRACE to receive further information and news from the PRACE project to build up a close cooperation. The most of the attendees wanted also to stay in touch with PRACE and to be contacted for a follow up as well as to attend the next seminar in 2009. The attendees from industry also gave some hints for coming seminars and the cooperation with PRACE in general:

Need to work on parallel sessions; Focus on automotive and telecom industry requirements; cognitive science & applications; How to scale industry applications and how PRACE will help industry; network issues, security and trust issues; legal issues, SOX; Licensing problems; possible business models and IPR; Involvement of SMEs; How PRACE can boost European HPC technologies; Directory of European industry HPC success stories on PRACE Website; Programming models available, debugging Petascale software; Training, Stimulating Petascale computing in schools and undergraduate courses; Which kind of software is usable within PRACE? Is it Open Source?; Which industrial users are targeted first by PRACE?; Is there Peer review access for industry?

The feedback received from the scientific conference in some cases overlaps with the one from the industrial event but also includes questions like: availability/accessibility of the infrastructure, access to prototype systems, collaboration options from non member/outside Europe countries and differentiation/compatibility to other projects like DEISA, EGEE, EGU and TeraGrid.

2.6.6 *Use of Feedback by the PRACE Project*

The feedback from the industrial seminar will be used when designing the second industrial seminar in 2009; it will also be considered within the task on the governance structure when considering industrial involvement.

Feedback from the user communities will be used when designing the peer review system for PRACE, particularly concerning the idea of calls for proposals from consortia of user communities. It will also be used for the governance structure when designing the most effective way for the users to give feedback to the project.

Feedback from the scientific conference has shown that the conference was successful in showcasing PRACE in the context of other European ICT projects and demonstrating its fundamental role in the creation of a persistent HPC Ecosystem in Europe. It was less successful in bridging the gap between the PRACE project and the academic community, most probably due to the fact, that firstly the PRACE infrastructure is not yet in place so it would be difficult for presenters to show how their science has been advanced by PRACE. Secondly, scientists typically attend only a small number of very well established and domain specific conferences each year. It is unrealistic to expect top computational scientists to present work at a conference organized by PRACE with limited academic credibility and international standing. However it still showed that there are computational scientists in Europe ready or nearly ready to exploit a European tier-0 infrastructure, and who as of today rely on computational resources outside of Europe to remain at the forefront of their research fields. Thus, in order to increase the awareness of PRACE in the scientific community and foster relationships with key academic groups WP3 suggests that PRACE should send delegates to the scientists' own conferences; and that giving talks and presenting posters at such events would be an effective way of interacting with the scientific community.

Feedback has also led to a greater effort on the part of PRACE to ensure that its dissemination materials reach key stakeholders for example, by including them in the mailing lists for our Newsletters and occasional mailings and in terms of communicating to figure out the FAQs that need to be answered through dissemination material.

2.6.7 *Next Steps*

Follow up meetings

As discussed during the conference and as asked by many of attendees when they filled in their evaluation form, one of the next steps will be to arrange dedicated follow-up meetings with each interested attendee.

It will allow for more in depth discussions about the content and the deliverables of the PRACE project and about the needs and expectations of the attendee.

Online survey

Quickly after the first industrial seminar (in a two months timeframe) an online survey will be conducted among all the participants of the first industry seminar plus all the potential contacts gathered during the invitation process. As complement of the follow up meeting the online survey will allow to create a coherent and suitable offer of PRACE project to the European industry. The outcome of this survey has not been available at the time of writing this document.

Second Industry Seminar

One year after the First Industry Seminar a second seminar will be organised by GAUSS and GENCI. The goals of this seminar will be to present an industrial offer of PRACE after one year of discussions with the European industry and the EC.

The first industry seminar was presenting testimonials of big European companies (EDF, Repsol, Schering Plough) how the use of HPC can increase their competitiveness, boosting their productivity, and accelerate their innovation.

The second one will try to address the same benefits to SMEs, which represent a big reservoir of potential HPC users and providers of value-added HPC services in Europe.

Second Scientific Workshop

As the co-location of the first scientific conference with ICT2008 has proven a good concept, a second scientific workshop is already planned in Amsterdam for May 2009 together with the DEISA symposium with a proposed agenda comprising eight sessions over three days, including sessions dedicated to scientific communities (Fusion, Astrophysical Sciences, Climate Research and the Life Sciences), and sessions outlining PRACE and DEISA achievements. It will also include an international component to discuss a path forward with the US and Japan and Asia-Pacific.

2.7 Funding Bodies

2.7.1 *Importance of the Stakeholder Group*

Funding bodies are naturally one of the most important stakeholder groups. Although the PRACE funding models are not yet finalized, it is necessary to prepare the ground by establishing contacts and evaluating possible different options for funding. The level of funding, as also the type of it – in money or in kind – needs to be agreed.

2.7.2 *Aims and Objectives*

The objectives for discussions with funding bodies include convincing the governments and research councils about the necessity to promote European competitiveness in computational science through establishment of European high end computing centres and related collaboration in pan-European coverage.

2.7.3 *Message transmitted*

The message PRACE is delivering to funding organisations and governments includes the benefits created through investments in computational science, such as social and economic development and increased competitiveness of the European industry and better cost efficiency achieved through synergy in multinational collaboration. It is expected that to convince funding bodies requires solid proof, thus success stories and cost/benefit calculations need to be included.

2.7.4 *Summary of Contacts*

In the case of all the principal partners the status is that there is ongoing contact with information on developments in the PRACE project regularly passed to ministries. For the general partners there are existing contacts to the ministries and the intensity of discussions between ministries and PRACE general partner organisations vary case by case.

PRACE partners have been mandated by national authorities to represent their country in the project, thus the connection is also formally established.

Organization Name	Contact Person	Main Interlocutor from PRACE
Austria	Peter Kowalski, Austrian Ministry of Science and Research	Jens Volkert, GUP
Finland	Anita Lehikoinen, Ministry of Education, Markku Mattila, President of Research Council	Kimmo Koski, CSC
France	Dany Vandromme, Research Ministry	C. Riviere GENCI
Germany	BMBF will assign a new person	Achim Bachem, GAUSS
Greece	Prof. Tsoukalas, Ministry of Development	Fotis Karayannis GRNET
Italy	Dr. Mari Alí, Ministry of University and Research	Sanzio Bassini, CINECA

Organization Name	Contact Person	Main Interlocutor from PRACE
Netherlands	Paul 't Hoen, ICTRegie Advisory Council	Patrick Aerts, NCF
Norway	Gudmund Høst, Research Council of Norway	Jacko Koster, UNINETT
Poland	Krzysztof Jan Kurzydlowski, Ministry of Science and Higher Education	Norbert Meyer, PSNC
Portugal	Joao Sentieiro, Fundação para a Ciência e Tecnologia	Pedro Alberto, UC-LCA
Spain	Montserrat Torne, Directora General de Cooperación Internacional, Ministry of Science and Innovation	Francesc Subirada, BSC
Sweden	Pär Omling, Swedish Research Council	Lennart Johnsson, SNIC
Switzerland	Fiorenza Scaroni, SBF	Peter Kunszt, CSCS
UK	Jane Nicholson, EPSRC	Jane Nicholson, EPSRC
Ireland	James Slevin ICHEC	James Slevin ICHEC
Turkey	Serdar CELEBI UYBHM	Serdar CELEBI UYBHM
Cyprus	Andreas Moleskis, Planning Bureau of the Republic of Cyprus	Prof. C. Alexandrou, CSTRC

Table 13 Contacts to funding bodies

2.7.5 *Feedback received*

The feedback received so far has been very positive. Contact with the ministries and funding agencies has resulted in all of the principal partners being re-confirmed in October 2008. Each principal partner is committing to fund the PRACE entity with 20-25M Euros annually.

2.7.6 *Use of Feedback by PRACE Project*

Feedback received from the ministries is used to produce a funding model for PRACE which allows PRACE to fulfil its aim of providing sustained world class HPC services to Europe in a way which is acceptable to and compatible with government funding possibilities.

2.7.7 *Next Steps*

At the start of 2009, a three day WP2 meeting will take place where the specifics on the working group between PRACE and representatives of the national ministries will be created to coordinate the final funding plan and agreement.

2.8 Policy Setting Organisations

2.8.1 *Importance of the Stakeholder Group*

PRACE will work as one actor in the European research area, which includes a large number of policy setting organisations. PRACE needs to align its work to optimally address the various policies and through that process interoperate with other European initiatives. Communication and collaboration with policy setting organisations is thus important for the PRACE success.

2.8.2 *Aims and Objectives*

PRACE targets to sustain an open and constructive discussion with policy setting organisations. PRACE aims to contribute to the standardization efforts and participate actively to the related policy meetings.

2.8.3 *Message transmitted*

The message PRACE is delivering to policy making organisations is the willingness by PRACE to collaborate with them and the expectation to include the PRACE targets in the policy group's agenda and enter the discussion about HPC benefits within the domain of each policy group. From the policy group we need in return their opinion pointing out the possible challenges and opportunities to strengthen PRACE.

2.8.4 *Summary of Contacts*

Organi-zation Name	Contact Person	Main Interlocutor from PRACE	Objectives & Expected Results	Status
e-IRG	Leif Laaksonen	Kimmo Koski, CSC Patrick Aerts, NCF Sergi Girona, BSC	Policy, outreach, standardization High end computing to e-IRG roadmap	PRACE covered in most e-IRG workshops, PRACE presentation held in e-IRG workshop in Oct 2008 Paris, PRACE documentation provided for e-IRG
ESFRI	Carlo Rizzuto	Leif Laaksonen, CSC	Policy, user communities, scientific case HPC visibility in ESFRI, concrete collaboration projects	Leif Laaksonen informed about PRACE in ESFRI meetings; PMO participates in ESFRI forum
EU DG INFSO	Mario Campolargo, Antti Peltomäki, Kyriakos Baxevanidis	All	Policy, support, funding	Constantly in connection
EU DG Research	Herve Pero, Anneli Pauli	All	Policy, support, funding, scientific case	Initial steps taken, PRACE referred in a discussion Pauli/Koski spring 2008
TERENA	Dorte Olesen	Leif Laaksonen CSC	Networking policies and requirement PRACE requirements understood by TERENA, PRACE visibility	Discussion with TERENA management held on Dec 4th 2008 (Laaksonen)
ESF	Marja Makarow	Leif Laaksonen, Kimmo Koski, CSC	Political support, funding issues PRACE impact understood, ESF support for PRACE	Letter sent Nov 26th 2008, waiting for a reply
ERC	Fotis Kafatos	Achim Bachem, FZJ	Political support, funding issues PRACE impact understood, ERC support for PRACE	Letter sent Dec 15th 2008, waiting for reply

Table 14 Contacts to policy setting organisations

2.8.5 *Feedback received*

Since PRACE has been visible in European collaborations and also attracted the relevant organisations in computational science, there has been significant interest. e-IRG has been actively involving PRACE input to the workshops and work agenda, such as white papers and roadmaps. ESFRI is closely following PRACE development.

2.8.6 *Use of Feedback by PRACE Project*

PRACE uses the feedback from ESFRI and e-IRG meetings in planning the further collaboration with stakeholders in multiple ways, for example by scheduling more detailed meetings with selected user communities and relevant funding bodies. Feedback from ESFRI projects (for example during the e-IRG workshop) has also been valuable.

2.8.7 *Next Steps*

PRACE will continue communicating and working with the relevant policy setting organisations with high priority for user communities such as the different ESFRI research infrastructures. In addition, the target is to start discussions with ERC and ESF about the PRACE impact for European research area.

2.9 Activities addressing multiple Stakeholder Groups

2.9.1 *European Activities*

The following activities address multiple stakeholder groups in Europe:

- Participation in ISC08 (Dresden) in June 2008
- Participation in the ICT2008 conference (Lyon) in November 2008, including a networking session and scientific conference
- Multiple other events, listed in the dissemination plan (WP3)

2.9.2 *Overseas Activities*

PRACE has also approached the related projects and organisations outside Europe in order to establish contacts and discuss collaboration possibilities. This has been done by several actions:

- Dissemination work, especially at SC08 conference where all major stakeholders are present. The conference was held in Austin in November. PRACE was visible through a PRACE booth and a number of booths of PRACE partners in which PRACE related information were available.
- Collaboration meeting between the major US infrastructures and PRACE project, which was held during the supercomputing conference (SC08).
- Multiple events in which non-European stakeholders participate. These activities are listed in dissemination plan (WP3) and dissemination reports.

The outreach and dissemination activities are described more in detail in Deliverable D3.1.4[13].

3 Sustainability beyond the Preparatory Phase

The contacts that have been established during the PRACE preparatory project will have to be carried on through to the permanent Research Infrastructure entity after the end of the PRACE project. The details on how this needs to be done are closely tied with the governance model of the future PRACE legal entity, which is detailed in the deliverable D2.2.2[14]. The stakeholders identified in this document can be mapped in the following way to the bodies described in the Governance deliverable D2.2.2:

HPC Service Providers

The providers of the HPC services are the members of PRACE and will therefore be represented directly in the PRACE council. Providers of services outside of PRACE (outside of Europe or in the industry) will interact with PRACE directly through the Director or the Executive Committee.

Related Projects

Projects and other research infrastructures that are relevant to the PRACE Research Infrastructure will have different channels for interaction with PRACE, depending on their nature. If the projects represent user communities, then the interaction will go mostly through the User Forum, except for strategic interactions which go directly to the Council or the Executive Committee. With other research infrastructures like the future EGI, the interaction will be with the Director. If the projects also provide resources that need to be interfaced with PRACE, the interaction might also involve the Operating Committee.

Networking and Infrastructure Providers, Hardware Manufacturers

Providers of hardware and network services will interact mostly with the Operating Committee. The Financial Advisory Commitee will need information about the current pricing of these infrastructure providers as well as about their future plans to be able to assess incurring costs for PRACE.

Strategic partnerships with vendors might also be interesting, these would need to be negotiated by the Director and approved by the Executive Committee or the Council (depending on the value of the agreement).

Software Vendors and Software developed in Academia, open source support Communities and Companies

The interaction with software providers will also be mostly through the Operating Committee, and maybe in some cases through the Users Forum, since we anticipate that it will be the users asking for specific codes to be deployed, or they are even providing the software and tools themselves.

End Users

End users are well represented directly in the Users Committee, in the Scientific Steering Committee and also indirectly through the Council.

End user organizations that are not represented yet will need to seek interaction with PRACE through the Director or Executive Committee first.

Funding Bodies

Funding bodies will be directly or indirectly involved through the government organizations of the member states of PRACE, having a representation directly in the Council. They will most probably play an important role also in the Financial Advisory Committee.

The Funding bodies might also seek full accountability in the distribution of the PRACE resources to the users through the peer review process, which has to be completely transparent to them.

Policy Setting Organisations

Policy setting organizations like the e-IRG will have indirect interactions with the PRACE member states and their organizations. Depending on the organization, more direct interaction channels can be set up, either directly with the council or through the PRACE Director.

Multiple Stakeholder Activities

The Director and Executive Committee will represent PRACE in organizations or at events where PRACE can interact with multiple stakeholders simultaneously.

4 Conclusions and next Steps

PRACE has put substantial emphasis to stakeholder relations. This is the key factor in building an efficient European HPC service and the shaping of a European HPC ecosystem, in which the involvement of key user groups, funding bodies and other related infrastructures have a major impact on the successful implementation. For that reason PRACE has created two documents, a first one for an analysis of the HPC ecosystem (D2.5.1[7]) and second one reporting the links in the ecosystem (D2.5.2). In addition the work with stakeholders is further pursued by the dissemination and outreach activities (WP3) and relations with hardware and software vendors (WP6-8).

The planning for contacting stakeholders was documented in Deliverable D2.5.1, in which eight different stakeholder groups were identified:

- Providers of HPC services;
- Related European projects;
- Networking infrastructure providers;
- System manufacturers;
- Software vendors and the software developing academic community;
- End users and their access through related Research Infrastructures;
- Funding bodies on a national and international level;
- Policy setting organisations directly involved in developing the research infrastructure and political bodies like parliaments responsible for national and international legislation.

All of the groups have been addressed or are scheduled to be addressed later by different PRACE members. This deliverable (D2.5.2) documents the contacts made so far and lists the planned actions for the future work. The work is further supported by the activities listed in the dissemination plan provided by WP3.

During the first year of the PRACE preparatory phase project a number of stakeholder groups have been addressed. The outcome of these discussions is presented in Chapter 2 of this document. PRACE has gained a reasonable amount of publicity during its first year of operation, and stakeholder relations have proceeded well. New national partners have signed the PRACE MoU and the group will be increasing further with more EU countries expressing their interest to join the future PRACE Research Infrastructure. Relations with other European HPC and grid projects have been established and are working actively. Industry has been approached through a dedicated seminar in September 2008 addressing the HPC needs for industrial users. The focus in the future work will increasingly be in user involvement including active dialogue with user communities and research infrastructures, and funding bodies.

Even though PRACE is already known by most of the HPC stakeholders, there is considerable work to be done in 2009. There is a need to carry on discussions with key stakeholder groups with more concrete targets for collaboration. Dissemination work in WP3 and work on governance and funding model (WP2) supports these discussions. Technical work, such as prototyping, future technology evaluation and application scaling create concrete partnerships with vendors and communities.

5 Annex

5.1 PRACE Message Document: draft Proposal to be used in Stakeholder meetings

Kimmo Koski
September 26th

This document contains guidelines for stakeholder discussions concerning the following areas:

- PRACE attitude towards collaboration
- PRACE interoperability
- Relations with other initiatives
- Frequently asked questions and some possible answers to them

The document can be used as a background material in discussions, and how to apply this in practice is a responsibility of the person(s) carrying out the particular discussions. Some of the items do not have one correct answer, for example due to the fact that different partners/countries have different kind of systems for infrastructures or services.

PRACE Context

Stakeholders need to understand the proper context of PRACE. The performance pyramid with its many tiers is a concept that not many know of. In simple terms we can say that

- PRACE aims to provide very large computing power to European science to keep up competitiveness w.r.t. the U.S. and Asia. These will also be the largest supercomputers in Europe, so-called tier-0 systems. The PRACE tier-0 systems are larger than the national supercomputers in the individual countries, the tier-1 systems. PRACE considers both tier-0 and tier-1 systems to be part of its infrastructure.
- PRACE resources are mainly for high capability computing needs (i.e. optimally a single user is making use of all of the best available machine to solve the computationally most demanding problem of his domain)
- There are also tier-2 and tier-3 systems and services that are orthogonal to PRACE (like capacity computing and data management services) which all are part of what we call the HPC ecosystem.
- PRACE resources can be accessed upon request, there will be ‘grants’ given to researchers where the currency is measured in CPU hours. The grants are assigned through a peer review process. Every European scientist can apply, there are no restrictions.

PRACE Position towards Collaboration

Some general guidelines

- PRACE is open to collaboration
- PRACE concentrates to the top of the pyramid, but needs to be integrated to the full ecosystem
- PRACE partners have different starting points (big country with many centers, small country with centralized model and everything in between), and thus the partners way to address ecosystem may differ from each other

- PRACE aims at providing services addressing multiple disciplines (horizontal ICT services)
- PRACE should be proactive towards collaboration with priority stakeholders, such as governments and research councils, in order to seek commitment for funding, but also with potential user communities (ESFRI, Scientific case document by HET, International organisations etc.) and related initiatives in HPC field (for example DEISA2).
- PRACE should be open and willing to discuss collaboration activities with all of the stakeholders in global, European, regional or national level. It is possible that in many cases there is not more direct result from the collaboration than just exchange of information, but still it is important to have a positive attitude – one of the tasks in PRACE is to spread the message about the need for HPC and importance of computational science also to a wider public.

PRACE Interoperability Statement

The target for PRACE is to prepare for building the European Petaflop/s centres and respond to the global competition in research and development using high-performance computing (HPC) infrastructure. Within PRACE it is well understood that to utilize high-end computing centres effectively it is necessary to develop the whole HPC Ecosystem, e.g. have a constant interaction with all levels of the performance pyramid. The key targets PRACE is trying to advance include scalable software development, competence development in HPC and integration and interoperability with existing infrastructures. The infrastructures consist of both national or regional stakeholders, such as computing centres and other providers of HPC services, and existing and planned European Grid projects and research infrastructures.

The interoperability can be seen in various levels, for example:

1. Technical interoperability (middleware work together etc.)

2. User level interoperability (the same user groups can use different resources depending on their needs)

3. Synergy and collaboration between research infrastructures, including all possible areas from information sharing to common activities

PRACE acknowledges the Interoperability in all the three levels is important.

Technical interoperability depends on the user needs and it is obvious that the same middleware is not suitable for all type of usage. However, technical interoperability should be taken into account in the implementation phase and is a good target to maximize. As an example the technical interoperability need is high and synergy benefits are obvious in the HPC area, such as between the PRACE and DEISA projects. Concerning technology, PRACE reuses as many components as possible from other providers especially DEISA.

User level interoperability between research infrastructures is an obvious benefit for the whole European HPC Ecosystem. The needs of the user communities that have to make use of several research infrastructures will drive the interoperability in terms of technology and policies. PRACE will take an active role in advancing user level interoperability, working together with its user communities and increasing synergy and collaboration between research infrastructures.

In the preparatory project PRACE has set up a Work Package for dissemination, outreach and training. Among the most important duties of this Work Package is outreach to and collaboration with other HPC stakeholders, which is a prerequisite for interoperability. PRACE is open to discuss the practical collaboration possibilities with other activities to increase interaction and find ways to collaborate.

PRACE bases its proposal and the work on European strategy published by the HPC in Europe Taskforce (HET, www.hpcineuropetaskforce.eu) in January 2007, complemented by the numerous discussions in various levels after it. One of the major conclusions in HET was that instead of focusing only to the top-end systems, it is necessary to develop the whole HPC Ecosystem. This is an obvious strong statement about advancing interoperability. Most of the HET documentation available from the above mentioned Web address recommends various ways of development in the full HPC Ecosystem, which also equals direct support of interoperability. PRACE supports the strategy work of HET and its recommendations.

We feel that this all gives a solid base for developing, together with other HPC stakeholders, an efficient, interoperable HPC Ecosystem in Europe.

Relations with other Initiatives

European HPC Ecosystem includes various initiatives which are working in different layers of the performance pyramid (computing part) or with services linked with or related to HPC, such as data management, networks, software development etc. Together with many of those actors, PRACE forms a set of horizontal ICT services targeted to serve multiple disciplines and user communities. Some guiding principles include: search for cost efficiency (synergy through sharing services and best practices), better utilization of resources (joint systems and services) and ensuring continuity (integrating with national computing centres, training of competent people).

The following initiatives in Europe are prioritized in this document:

- ESFRI-projects in general
- DEISA2
- EGI_DS
- EGEE-III

It is very important to note that the local mechanisms in the PRACE member countries addressing all these initiatives differ. For example in Finland everything is concentrated in a single company (CSC), which is a member in PRACE, DEISA2, EGI_DS, EGEE and a few preparatory projects of the ESFRI-list. The similar approach is used also by some other smaller countries. Such concentration makes it natural for a small country not to make much difference between the various initiatives, but to handle them all with similar concepts (= maximum integration within the country). On the other hand, many of the larger countries have several organisations involved in these projects and their participation is split between them. Depending on the case and national system it might not be possible or not even make sense to integrate activities too closely together, but rather seek for interoperability and workload division within the country. However, it is ultimately up to each country to resolve the local issues stemming from the diversification.

It is important to note that PRACE can not dictate how the country is organizing the participation in different initiatives and it is not even necessary to try to influence it, as long as the partner fulfils the commitments in the project.

Due to the fact that various activities are competing for excellence and funding in many levels – in Europe and nationally – there is argumentation between the ‘HPC’ and ‘grid’ approaches. Since no clear definition is available to state where the ‘grid’ ends and ‘HPC’ starts, and since very few users really care as long as they can do their work, this kind of separation of different level of systems should be left in the background. The comparisons between ‘cheap clusters’ and ‘expensive supercomputers’ are also not very fruitful and usually include a lot of biased and incorrect arguments for both directions. PRACE partners as also partners in other

initiatives are usually very cost conscious and know their user needs, resulting that we can leave the system architecture selection issues to each initiative themselves and concentrate in building the collaboration in all levels. As a guiding principle of the ecosystem, the best resource needs to be chosen for each application individually, and this choice needs to be constantly re-evaluated. In general it can be said that all of these components are essential in the HPC ecosystem, they are not competitive but complementary, and that it does not make sense to argue with one part against the other.

Some comments from each of the related initiatives:

ESFRI

- 34 projects in preparatory phase, many of them potential PRACE customers
- PRACE should profile to be the high end computing service provider (service = more than just hardware) for European user communities including all ESFRI list items
- Important to merge PRACE work with scientific communities
- Outreach
- Scientific case update and related contacts
- Building up the Scientific Advisory Group

DEISA2

- A lot of synergy through the same partners, but still a different initiative from PRACE
- Integration in technical level, as also in political/practical level
- Utilization of DEISA technology and concepts, and vice-versa
- An unresolved question is how the current efforts will be combined after both projects come to an end.
- DEISA-2 ends 1 year after the PRACE design study (mid-2011 vs. end 2009)

EGI_DS

- EGI is one of the major activities in grid infrastructure side, aiming at setting up a sustainable Research Infrastructure entity
- EGI Blueprint is still on-going work to which PRACE has provided comments
- Only one among the nine EGI_DS partners is also a PRACE partner (CSC)
- How the Research Infrastructures of EGI and PRACE will interact in the future is an open question.
- According to PRACE, the interaction should be driven by the user community in need of both infrastructures
- How integration and/or interoperability is achieved should be decided individually and on a case by case basis driven by user needs and local policies.

EGEE-III

- Different in scope, but some synergy through user communities and same participants in both projects (SARA, CSC, KTH, Uninett, PSNC, GRNET, CSCS, …)
- The dialog has been established, especially concerning the transition from EGEE-III to EGI and their relation to DEISA and PRACE. Openness and positive attitude to interoperability are important to PRACE and EGEE-III alike.
- The largest differences exist in the approach to user communities and access management, which will need to be addressed.

The stakeholder analysis is described more in detail in PRACE WP2 Deliverable D2.5.1.

Frequently asked questions and some possible answers to them

Q: How does PRACE differentiate from the other initiatives (DEISA, EGEE, EGI …)?

A: PRACE is aiming at a legal entity which can provide services in a sustainable manner, making it different from the project based initiatives (EGEE, DEISA2,…). PRACE works also in a different level (petaflop and beyond) in terms of focus than most of the other initiatives. The big difference between DEISA and PRACE is PRACE's focus on the joint provisioning of competitive high-end systems in Europe while DEISA is about integration of individual centers. The big difference to the Grid infrastructures is how resources are allocated: peer review process as opposed to Virtual Organization agreements. However, since all of these are building the HPC Ecosystem together, the question is not only 'how to differentiate', but mainly 'how to complement each other'.

Q: What is the level of integration/collaboration with other infrastructure projects or sustainable entities? How does PRACE address interoperability?

A: See the integration statement above.

Q: Which user groups have priorities in PRACE work?

A: The usage of PRACE services will be determined by many factors, such as peer review process, scientific steering committee terms, ownership defined by funding ratio etc. These systems are being defined and implemented during PRACE preparatory phase project (2008-2009).

Q: What is the relation with other ESFRI projects?

A: Until now PRACE has been the only horizontal ICT projects in ESFRI-list. In principle PRACE is looking at offering the high end computing services to those ESFRI-list projects that require such capability. PRACE has only recently started a more active discussion with other ESFRI-projects and this will be a priority task during the second half of 2008.

Q: How does PRACE address data intensive computing?

A: Many of the PRACE partners are involved in various data intensive projects and in general do address data challenges at the same time than computational challenges – the two areas are closely linked. There are EU funded projects for data infrastructures running from the first FP7 call since early 2008 and a second call deadline was in September 2008. After the results of it are available, PRACE will be active in contacting the data initiatives which have possibilities for synergy.

5.2 Stakeholder Communication Kit

This section lists the content of the communication kit produced to support PRACE partners in delivering their message to the stakeholders as mentioned in the introduction. All material is available for download in the shared project web space BSCW. The kit includes basic material, presentations targeted for different purposes and additional supporting material.

The basic material includes:

- PRACE Power Point (.ppt) and Word (.doc) templates
- PRACE brochure and flyer in high resolution (suitable for printing)

- PRACE posters in high resolution (suitable for printing), see Figure 2 The PRACE Prototpye poster
- PRACE logo in .jpg format

Ready-made posters and other print material can be requested from CSC as WP3 leader.

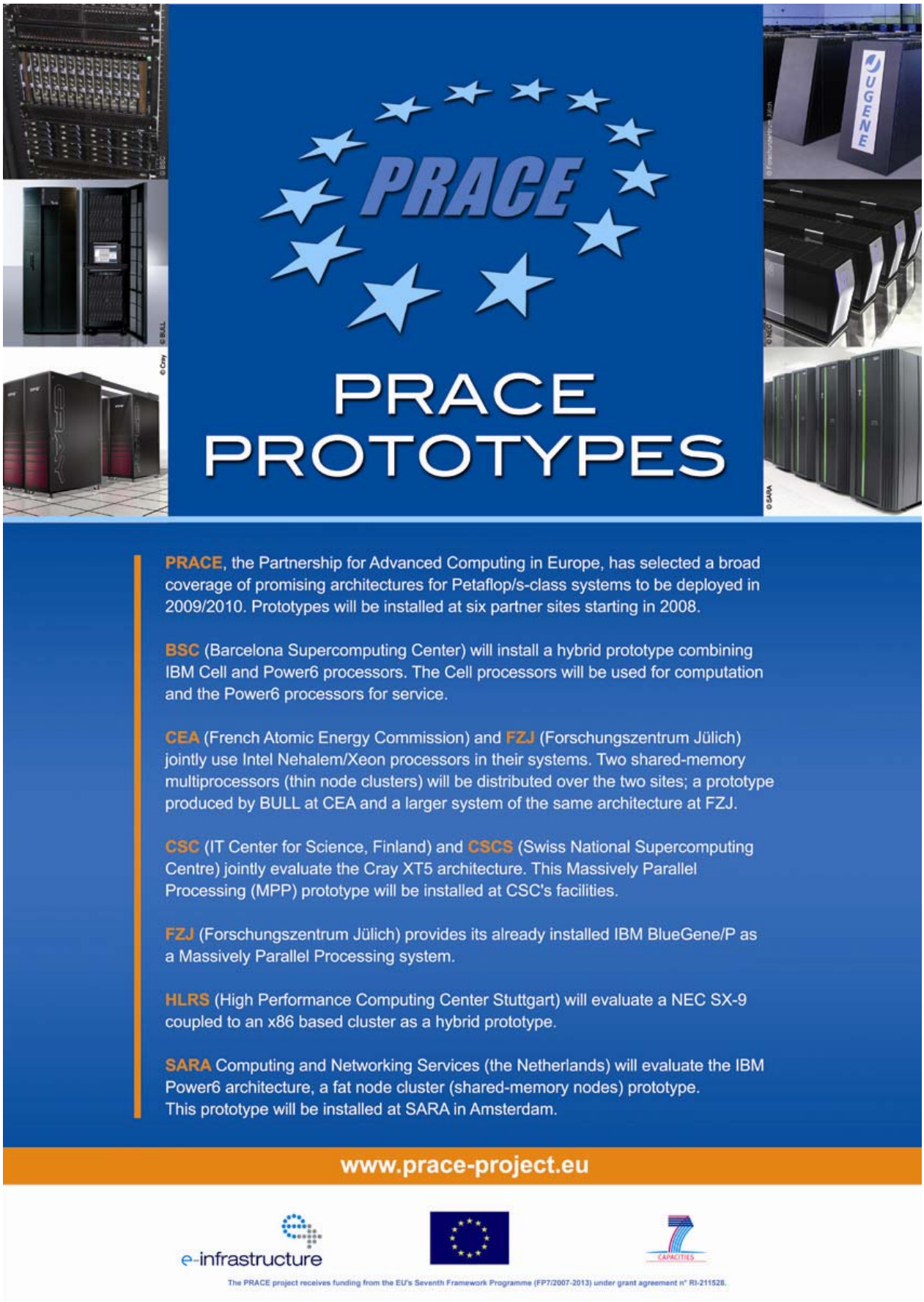

Figure 2 The PRACE Prototpye poster

There are five PowerPoint presentations (.ppt) suitable for people external to the project. They focus on the following topics:

- Applications
- Project
- Prototypes
- Strategy
- The education and training needs survey

These presentations have been made by several people in PRACE. The process was organised by WP3.

The Communications kit includes the following additional material:

- Deliverables D2.5.1 Analysis of the HPC Ecosystem and D3.1.1 Dissemination plan
- ”PRACE Message” – a proposal to be used in stakeholder meetings.
- Draft template letter for stakeholders
- Scientific case for European infrastructure HET
-

5.3 WP8 Vendor Point of Contacts

Vendor	Point of Contact (PoC) - LRZ			
	First Name, Name	Title/Position	Phone	Email
Allinea www.allinea.com	Michael Rudgyard	CEO	Tel +44 1926 623 231 Cell +33 6 0976 8014	michael@allinea.com
	Jacques Philouze	Vice President Sales & Marketing		jacques@allinea.com
Altera www.altera.com	Jean-Michel Vuillamy		Tel +33 1 3463 0755 Cell +33 6 1001 7465	jmvuilla@altera.com
BlueArc www.bluearc.com	Thomas Seuchter	Key Account Manager	Tel +49 (0)8106 236 559 Cell +49 (0)170 544 7029	tseuchter@bluearc.com
Bull www.bull.com	Auke Kuiper	HPC BU Manager	Tel+49 (0)2203/305-1204 Cell+49 (0)173/588-7656	a.kuiper@bull.de
	Jean-François Lavignon	Large scale HPC infrastructure project Director	Cell +33 6 71 70 39 08	jean-francois.lavignon@bull.net
CAPS caps-entreprise.com	François Bodin	Chief Technical Officer	Cell +33 6 1074 4814 Tel +33 1 4975 1703 Cell +33 6 1732 6851	francois.bodin@caps-entreprise.com
Cisco www.cisco.com	Hermann Demian	Account Manager Higher Education	Tel +49-(0)811-554-3260 Cell +49-(0)175-5656969	hdemian@cisco.com
Clearspeed www.clearspeed.com	Simon McIntosh-Smith	VP of Applications	Tel +44 117 317 2132 Fax +44 117 317 2002	simon@clearspeed.com
	Michal Harasimiuk	Sales, EMEA	Tel +44 117 317 203 Cell +44 778 718 5248	michal@petapath.com
Convey www.conveycomputer.com	Hans Heideman		Tel +31(0)235295022	hheideman@conveycomputer.com
Cray www.cray.com	Ulla Thiel	Vice President, Europe	Tel +49 6221 825 690	ulla@cray.com
DDN www.datadirectnet.com	Toine Beckers		Cell: +49 (0)162 2371444	tbeckers@datadirectnet.com
DELL www.dell.com	Bart Mellenbergh	EMEA HPC Business Manager	Tel +31 20 674 5289 Cell + 31 620560320	Bart_Mellenbergh@Dell.com

Vendor	Point of Contact (PoC) - LRZ			
	First Name, Name	Title/Position	Phone	Email
Fujitsu www.fujitsu.com	Takeo Igarashi	Senior Director, Operations	Tel +33 (0)1 49 75 85 29 Cell +33 (0)6 89 44 59 92	takeo.igarashi@fr.fujitsu.com
Fujitsu www.fujitsu.com	Philippe Haye	Director, Strategic Sales Fujitsu Systems Europe	Tel +33 1 49 75 85 39 Cell + 33 6 80 63 89 76 Fax +33 1 49 75 85 40	philippe.haye@fr.fujitsu.com
Gnodal www.gnodal.com	Matt Hatch	VP Marketing and Business Development	Tel +44 (0)117 911 8408 Cell +44 (0)78 999 56284	matt@gnodal.com
HP www.hp.com	Dominique Gillot	HPC Life Science and Scientific Research manager	Tel +41 79 217 12 37	Dominique.Gillot@hp.com
IBM www.ibm.com	Jörg Stadler	Senior Client Representative Science and Research	Tel +49-(0)711 785 2238 Cell+49-(0)15112644120	jstadler@de.ibm.com
	Philippe Bricard	Strategic Growth Business Executive EMEA STG SouthWest	Tel +33-467-346-244 Fax +33-467-343-440 Cell + 33-608-765-310	bricard@fr.ibm.com
Intel www.intel.com	Markus Widmer	Business Development Manager - HPC	Tel +49 89 99143 690 Cell +49 162 406305 5	Markus.widmer@intel.com
Isilon www.isilon.com	Zeljko Dodlek	Systems Engineer	Cell +49 151 12055507	zdodlek@isilon.com
LSI www.lsi.com	Werner Wassink			Werner.Wassink@lsi.com
M2000 (Aboundlogic) www.aboundlogic.com	Frederic Reblewski	CEO	Tel +46 46 286 25 93 Fax +46 46 286 26 00 Cell +46 (0)70 300 66 08	freblewski@m2000.com
	Gabriele Pulini	VP Sales		gpulini@m2000.com
Mellanox www.mellanox.com	Marc Lehrer	Director of EMEA,India, Russia	Tel +44 (0) 7768 604246	MarcL@Mellanox.com
Mitrionics www.mitrionics.com	Stefan Möhl	VP CTO and Co-Founder	Tel +46 46 286 25 93 Fax +46 46 286 26 00 Cell +46 (0)70 300 66 08	stefan.mohl@mitrionics.com
Myricom www.myri.com	Charles L. Seitz	CEO		chuck@myri.com
NEC www.nec.com	Phillippe Gire	Operations Director HPCE Division, Western Europe	Tel +33 1 39 30 66 02 Cell +33 6 07 43 24 86 Fax +33 1 39 30 66 01	philippe.gire@hpce.nec.com
NetApp www.netapp.com	Lothar Uhl	Account Manager Öffentliche Auftraggeber	Tel +49-89-900594-179 Cell +49-151-12055566	luhl@netapp.com
Panansas www.panasas.com	Dario Schmidt		Cell +49 (170) 455 15 99	dschmidt@panasas.com
Rapidmind www.rapidmind.com	Glenn Koehler	Director of Global Sales	Tel (519) 579 7369 Tel (519) 885 5455 x 107	glennk@rapidmind.net
	Dr. Michaem McCool	Chief Scientist and Co-founder		mmccool@rapidmind.net
SGI www.sgi.com	Detlef Labrenz	Account Manager	Tel +49 (0)89 46108-209 Cell +49 (0)176 1461 0809	dol@sgi.com
	Robert Uebelmesser	Director Strategic HPC Projects SGI EMEA	Tel +49-89-14610844 Cell +49-176-14610844	rue@sgi.com
SiCortex www.sicortex.com	Matt Reilly	Chief Engineer	Tel +1 508 846 8305	matt.reilly@sicortex.com
	Fabrizio Magugliani	European Business Development Director		fabrizio.magugliani@sicortex.com
	Philip Mucci	Performance Tool Development Leader		phil@sicortex.com

Vendor	Point of Contact (PoC) - LRZ			
	First Name, Name	Title/Position	Phone	Email
STMicroelectronics www.st.com	Eric Flamand	Director of Advanced Computing	Tel +33 4 7658 6720 Cell +33 6 7716 3702	eric.flamand@st.com
SUN www.sun.com	Philippe Trautmann	HPC Business Development Manager Global Government, Education and Healthcare	Tel +33 1 34 03 05 38 Cell +33 6 85 52 76 97	philippe.trautmann@sun.com
Voltaire www.voltaire.com	Jürgen Windler	Sales Manager Central Europe	Tel +49 (6123) 97 50 86 Cell +49 (171) 9769584	juergenw@voltaire.com