SEVENTH FRAMEWORK PROGRAMME
Research Infrastructures

INFRA-2007-2.2.2.1 - Preparatory phase for 'Computer and Data Treatment' research infrastructures in the 2006 ESFRI Roadmap

PRACE

Partnership for Advanced Computing in Europe

Grant Agreement Number: RI-211528

D2.4.2
Final Report on the Peer Review Process

Final

Version:	1.0
Author(s):	Ana Bela Dias (NCF), Susie Douglas (EPSRC)
Date:	24.06.2009

Project and Deliverable Information Sheet

PRACE Project	**Project Ref. №: RI-211528**	
	Project Title: Partnership for Advanced Computing in Europe	
	Project Web Site: http://www.prace-project.eu	
	Deliverable ID: D2.4.2	
	Deliverable Nature: Report	
	Deliverable Level: PU *	**Contractual Date of Delivery:** 30 / June / 2009
		Actual Date of Delivery: 30 / June / 2009
	EC Project Officer: Maria Ramalho-Natario	

* - The dissemination level are indicated as follows: **PU** – Public, **PP** – Restricted to other participants (including the Commission Services), **RE** – Restricted to a group specified by the consortium (including the Commission Services). **CO** – Confidential, only for members of the consortium (including the Commission Services).

Document Control Sheet

Document	**Title: Final Report on the Peer Review Process**	
	ID: D2.4.2	
	Version: 1.0	**Status:** Draft
	Available at: http://www.prace-project.eu	
	Software Tool: Microsoft Word 2003	
	File(s): D2 4 2v04.doc	
Authorship	**Written by:**	Ana Bela Dias and Susie Douglas
	Contributors:	Matthias Brehm (LRZ), Manuel Fiolhais (University of Coimbra), Jacko Koster (UNINETT), Agnieszka Kwiecien (Wroclaw University of Technology), Martin Polak (GUP), J.-C. Desplat (ICHEC), Michele De Lorenzi (CSCS), Angelo Mangili (CSCS)
	Reviewed by:	Norbert Meyer; Florian Berberich
	Approved by:	

Document Status Sheet

Version	Date	Status	Comments
0.1	11/05/2009	Draft	
0.2	21/05/2009	Draft	Comments
0.3	05/06/2009	Draft	Team comments
0.4	07/06/2009	Draft	Formatting
0.5	08/06/2009	Draft	Team comments
0.6	10/06/2009	1st version	Reviewer comments
1.0	24/06/2009	Final version	

Document Keywords and Abstract

Keywords:	PRACE, HPC, Research Infrastructure
Abstract:	PRACE will operate an evaluation process based on peer review in order to ensure the scientific quality of proposals and that its resources are allocated in an effective and efficient manner. This deliverable focuses on the detailed process for peer review within PRACE, covering different types of proposals, the personnel involved and the procedures to be followed. The deliverable closely adheres to those principles that were established in D2.4.1 and has engaged in consultation with many HPC sites across Europe.

Table of Contents

Project and Deliverable Information Sheet i
Document Control Sheet i
Document Status Sheet i
Document Keywords and Abstract ii
Table of Contents iii
List of Figures iv
List of Tables iv
References and Applicable Documents iv
List of Acronyms and Abbreviations iv
Executive Summary 1
1 Introduction 1
2 Basic assumptions 2
3 Methodology 3
3.1 Principles revisited 4
3.2 Questionnaire 6
3.2.1 *Questionnaire set up* 6
3.2.2 *Results of the survey* 7
3.2.3 *Conclusions from the survey* 8
4 Peer review process 9
4.1 Introduction 9
4.2 Workflow 10
4.3 Role of PRACE peer review Office 11
4.4 Application 12
4.4.1 *Types of proposals* 13
4.4.2 *Calls* 14
4.4.3 *Eligibility* 15
4.4.4 *Application criteria* 15
4.4.5 *Application form* 16
4.4.6 *Terms and conditions* 17
4.4.7 *Final report* 17
4.4.8 *Granting acknowledgement* 17
4.5 Assessment 18
4.5.1 *Technical Assessment* 20
4.5.2 *Scientific Assessment* 21
4.5.3 *Prioritisation Panel* 22
4.5.4 *Allocation Decision* 23
4.5.5 *Allocation times* 24
5 Integration and Collaboration with the Ecosystem 24
6 Conclusions 25
7 Annex 26
7.1 List of contacts 26
7.2 Peer review survey 26
7.3 Survey results 31

List of Figures

Figure 1: Graphical donut showing the principles and the main steps of the peer review process for PRACE. 5
Figure 2: Flowchart for PRACE peer review process …….....10
Figure 3: Detailed Peer Review Workflow for preliminary proposals.....18
Figure 4: Detailed Peer Review Workflow for project and programme proposals.....19

List of Tables

Table 1: Overview of the questions included in the Internet survey 7
Table 2: Best practices for the peer review process for PRACE and the corresponding principles..... 8
Table 3: The different categories of proposals that may be assessed through PRACE peer review 13

References and Applicable Documents

[1] PRACE deliverable D2.3.2, Usage Model Document
[2] PRACE deliverable D2.2.2, First Draft of Governance Document
[3] PRACE deliverable D2.1.2., Draft Contract for the Legal Entity
[4] PRACE deliverable D2.4.1, Initial Report on the Peer Review Process, http://www.prace-project.eu/documents/public-deliverables/D2.4.1.pdf
[5] PRACE deliverable D2.2.1, Report on Analysis of Adequate Governance Structure
[6] http://www.deisa.eu/science/deci
[7] http://www.hpc-europa.eu/
[8] http://www.esf.org/
[9] http://erc.europa.eu/
[10] PRACE deliverable D2.5.2, Report on links with HPC ecosystem

List of Acronyms and Abbreviations

BSC	Barcelona Supercomputing Center. Spanish national supercomputing facility
CINECA	Italian Consortium of Universities, including also the largest Italian computing centre
CSC	Finnish IT Center for science. Non-profit company providing IT support and resources for academia, research institutes and companies
CSCS	Swiss National Supercomputing Centre
DECI	DEISA Extreme Computing Initiative. HPC access for European grand challenge applications in all areas of science and technology
DEISA	Distributed European Infrastructure for Supercomputing Applications. EU project by leading national HPC centres
EPSRC	Engineering and Physical Sciences Research Council. UK agency for scientific research and HPC funding
ERC	European Research Council
ESF	European Science Foundation

GCS	Gauss Supercomputing Centre. Alliance of three German national supercomputing centres: NIC – Juelich, LRZ – Garching and HLRS – Stuttgart
GENCI	Grand Equipement National de Calcul Intensif. Legal entity funded by the French Government, CEA, CNRS and French Universities for promoting HPC usage in fundamental and industrial research
GUP	Institute of Graphics and Parallel Processing, University of Linz, Austria
HeC	High-end Computing
HET	High Performance Computing in Europe Taskforce. Taskforce by representatives from 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_Europa	Consortium of six leading (HPC) infrastructures and five centres of excellence providing transnational access; EU project
ICHEC	Irish Centre for High-End Computing, Dublin, Ireland
ICM	Interdisciplinary Centre for Mathematical and Computational Modelling, University of Warsaw, Poland
IT	Information Technology
ITC	Information Technology and Communication
NERC	Natural Environment Research Council. UK agency for funding and managing research, training and knowledge exchange in the environmental sciences
NCF	Netherlands National Computing Facilities. Foundation for promoting technical and scientific development through HPC usage
PRACE	Partnership for Advanced Computing in Europe; Project Acronym
PSNC	Poznan Supercomputing and Networking Center. One of the Polish supercomputing centers, also in charge of the scientific network and grid infrastructure
RAP	Resource Allocation Panel
RI	Research Infrastructure
TASK	Academic computer center in Gdansk. One of the Polish supercomputing centres
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
UC-LCA	University of Coimbra – Laboratory of Advanced Computation. Portuguese HPC Center
UNINETT	Norwegian Research Network. UNINETT Sigma coordinates the Norwegian infrastructure for computational science

Executive Summary

In order to maximise the impact of the major hardware investments in Tier-0 centres that PRACE will make, it is vital that these systems are used for projects with the potential to generate the highest possible scientific impact. Hence the guiding principle for resource allocation will be the **scientific quality** of the proposal and the **need** to use the Tier-0 system(s).

This deliverable follows on from D2.4.1 and as such is based on the principles for peer review that were defined in that deliverable:

- Transparency
- Expert Assessment
- Confidentiality
- Prioritisation
- Right to Reply
- Managing Interests
- No Parallel Assessment
- Ensure Fairness to the Science Proposed

The focus of D2.4.2 has been to define a process for the peer review in order that these principles are met. It has also been essential to formulate a process which, besides fulfilling the principles, is also flexible and efficient.

The main steps of the peer review process – application, assessment (technical and scientific) and allocation – are analysed in detail. The responsibilities of the committees and panels involved in the process have been defined as has the role of the PRACE peer review Office. The process for the submission of proposals has also been determined.

Throughout the document it has been essential to ensure that there is fairness to the science proposed and for this reason each step has been carefully evaluated to make sure that there are procedures in place to avoid any favour being conferred or (as importantly) being perceived to be conferred on any individual, area of science or country.

Possibilities for integration and collaboration with other European and national entities running other peer review processes and with Tier-1 computer centres are also discussed.

This deliverable will primarily be implemented and monitored by the PRACE Office with regular input from the Council, the Scientific Steering Committee, the Access Committee and the Operations Committee.

1 Introduction

The PRACE project aims to prepare for the creation of a persistent pan-European High-end Computing (HeC) Research Infrastructure. In the context of Work package 2 *"Organisational Concept of the Research Infrastructure"*, task 2.4 focuses on the establishment of the peer review process for PRACE. This deliverable is the second one in task 2.4 and proposes and describes the major steps necessary to achieve a peer review process that is transparent and fair to the science proposed.

This deliverable is based on the first deliverable of task 2.4 – *D2.4.1, "Initial Report on the Peer Review Process"*, and also on other deliverables produced by Work package 2, in particular those regarding the legal form of the research infrastructure, the governance structure, the funding and usage strategies and the links with the ecosystem. Some of the results presented in these deliverables are used in the present deliverable with a simplified explanation given in the form of footnotes and making reference to the original source.

The following document is divided into six sections. Section 1 describes the purpose, the scope and the structure of the document. Section 2 presents the background of the deliverable and discusses the different possibilities which can be foreseen for the peer review process. The third section focuses on the methodology used for the various steps of the peer review process. This methodology includes the re-analysis of the principles defined in deliverable D2.4.1, explains the reasons and the procedure used for the internet survey, and finally, analyses and draws conclusions from the internet survey. Section 4 is entirely dedicated to the description of the peer review process, beginning by analysing the three main steps – application, assessment and allocation, discussing the workflow in general terms and the role of the PRACE peer review Office, and finally discussing in detail all the necessary components of the peer review process from application to allocation, passing through the assessment of the proposals. Section 5 outlines the future steps which need to be taken in order to integrate PRACE peer review into the ecosystem. It is proposed that this could be achieved either by seeking collaborations with existing trans-European peer review procedures and those that already exist in the national countries involved in PRACE and by establishing cooperation with the Tier-1 centres of national countries. Finally, section 6 includes the annexes: a synopsis of the questionnaire used for the internet survey, those people contacted and the answers received.

This deliverable is a proposal of the peer review process to be used by the PRACE Research Infrastructure and is intended for discussion and eventual approval by the PRACE Management Board.

2 Basic assumptions

The peer review for PRACE is very much dependent on the funding and usage models that will be used. These models have not yet been completely decided upon, but within work package 2 (*Organisational Concept of the Research Infrastructure*), a lot of work has been done on the analysis of various models and recommendations regarding best practices for the future European HPC Research Infrastructure. Because of this, the main focus of this document is for a peer review process that will be valid for any funding and usage model envisaged so far for PRACE. This means that the described peer review process will apply to both the Cycles[1] and the Operator[2] model [1] and even to the possible transition from the Cycles to the Operator model if PRACE decides to initiate operations with the Cycles model and at a later stage evolve to the Operator model.

The amount of HeC resources to be allocated will be decided by the Council[3] upon advice of the Steering Scientific Committee[4]. This will mean that there will be no quota restrictions and

[1] In the Cycles model procurement, installation and operation of each system is mainly funded by the host state with contribution from EC and the general partners. Principal partners give cycles to PRACE.
[2] In the Operator model all funding from the PRACE partners will be managed by the PRACE organisation that will be responsible for procurement, installation and operation of each system.
[3] The Council determines PRACE policy in scientific, technical and administrative matters [2].

the PRACE peer review is independent of the country of origin of the proposals. All proposals will be accessed and prioritised, taking into account only their scientific merit and their contribution to the advancement of science in Europe.

The distribution of resource allocation among the countries will be monitored by the PRACE peer review Office and will be regularly communicated to the Council, the Director[5] and all other Committees for which the information is of relevance. If there is a case that there is a significant imbalance in the overall resource allocation compared to the contributions for countries having signed the Convention[6], the Council can consider appropriate measures to be implemented by the Access Committee[7] and the Director, based on a principle of juste retour (Article 20 of the Statutes [3]). The main consequence of an imbalance in the overall resource allocation among the countries contributing to PRACE would be the adoption of allocation quotas dedicated to each country and for which the PRACE peer review may not apply. This is described under proportional peer review below.

At present two possibilities for the peer review of PRACE proposals can be foreseen:

- **Single peer review**, i.e. there are no quotas, and access to the PRACE systems is granted on the basis of scientific merit using the PRACE peer review process regardless of the country in which the science will be done;
- **Proportional peer review**, i.e. part of the allocation of computer time for PRACE will be peer reviewed (X%[8] of each PRACE system) and part of the allocation will be reserved to match the resources invested by individual countries (quotas). The parts of the allocation reserved for quotas will be managed by national peer review systems so only the X% of each PRACE system will be peer reviewed for use by the best science.

Both possibilities were envisaged in the first report on the peer review process [4], and it was concluded that the PRACE peer review process will be valid for both cases. The difference rests only in the amount of allocated computer time dedicated to PRACE peer review. In the case of the single peer review all (100%) of the computer time is allocated through the PRACE peer review process and in the proportional peer review only part (X% of each system) will be allocated through the PRACE peer review process.

3 Methodology

Having decided on the basic assumptions it was necessary to establish the methodology to be used for the peer review process for PRACE. It seemed appropriate to begin by revisiting the principles established in the initial report on the peer review process [2] and to establish if they were still valid. In the initial report the principles identified for PRACE were mapped against an overview of the peer review processes for various European countries. The conclusion then was that, in general, the peer review processes from these countries were in line with the principles. Nevertheless, it proved essential to extend this consultation procedure to acquire detailed information about the peer review processes used. This was done by distributing an internet survey covering most details of peer review to all members of the

[4] The Scientific Steering Committee makes recommendations on adoption and implementation of the PRACE scientific programme [2].
[5] The Director manages the PRACE RI and implements the Council guidelines [2].
[6] The Intergovernmental Convention will be signed by representatives from the national ministries and describes the relation and duties of the participating countries towards the PRACE RI [3].
[7] The Access Committee will advise on scientific usage of the Tier-0 resources dedicated to PRACE [2].
[8] Note that X most probably will take a different value for each PRACE system. The Council decides on this value for each PRACE system.

PRACE project. The results of this survey were then analysed and conclusions and best practices were used to feed into the analysis of PRACE peer review. Some of the results are discussed in the text below and the full results of the survey are presented in Annex 7.2.

3.1 Principles revisited

The following principles were defined in the initial report on the peer review process for PRACE. They ensure that the process is open to European researchers in an equal and non-discriminating manner:

- Transparency;
- Expert Assessment;
- No Parallel Assessment;
- Confidentiality;
- Prioritisation;
- Right to Reply;
- Managing Interests;
- Ensure Fairness to the Science Proposed.

In the initial report, overviews of the procedures used in Finland (CSC), France (GENCI), Netherlands (NCF), Norway (UNINETT Sigma), Poland (combined process for three Polish computing centres – WCNS, PSNC and ICM), Portugal (UC-LCA), Spain (BSC), Switzerland (CSCS), UK (EPSRC), DEISA and HPC_Europa were presented. From analysis of these procedures it was concluded that though there were some differences between the various processes, they were all commonly divided into three main steps:

- Application;
- Assessment;
- Allocation.

It proved useful to identify the connection between the main steps of the peer review process and the principles proposed for the PRACE peer review process. This effort resulted in the chart shown in Figure 1, where the graphical donut shows that the peer review process embraces all the principles and that the principles apply throughout the peer review procedure from application until allocation. The principles of transparency, ensuring fairness to the science proposed, no parallel assessment and managing interests can be viewed as pillars for building the peer review process for PRACE. These terms are defined in more detail below.

- **Transparency** ensures the peer review process is open and clear to all participants in PRACE, from the funding agencies of all participant countries to the end users from research institutions and industry, by way of everybody involved in assessment and allocation. This means that the goals and criteria for usage of the PRACE systems must be well defined and publicised to fulfil the principle of transparency.
- **Ensure fairness to the science proposed** is an important criterion to enable the PRACE infrastructure to support innovation projects of scientific excellence and to promote scientific and economic development of Europe.
- **No parallel assessment** will be fulfilled by having a single European peer review system recognised by all European countries. It is key that the peer review process for PRACE must be trusted and seen to have integrity by all users and therefore it is

essential that the process builds on the experiences and best practices already used by national and international institutions.
- **Managing interests** ensures that conflicts of interest from applicants, reviewers, and allocation makers are managed.

The other principles also apply to the peer review in general but are more specifically connected with one or other of the peer review steps. These are more clearly defined below:

- **Expert assessment** applies to the full peer review sequence but in practice the focus will be during assessment and allocation;
- **Confidentiality** applies primarily during submission and assessment but will have less emphasis during allocation;
- **Prioritisation** applies during the final part of assessment and as such will be visible in the outcome of allocation.
- **Right to reply** applies mainly to assessment, by allowing applicants to reply to the peer reviewers' comments, but could be extended to allocation, if necessary.

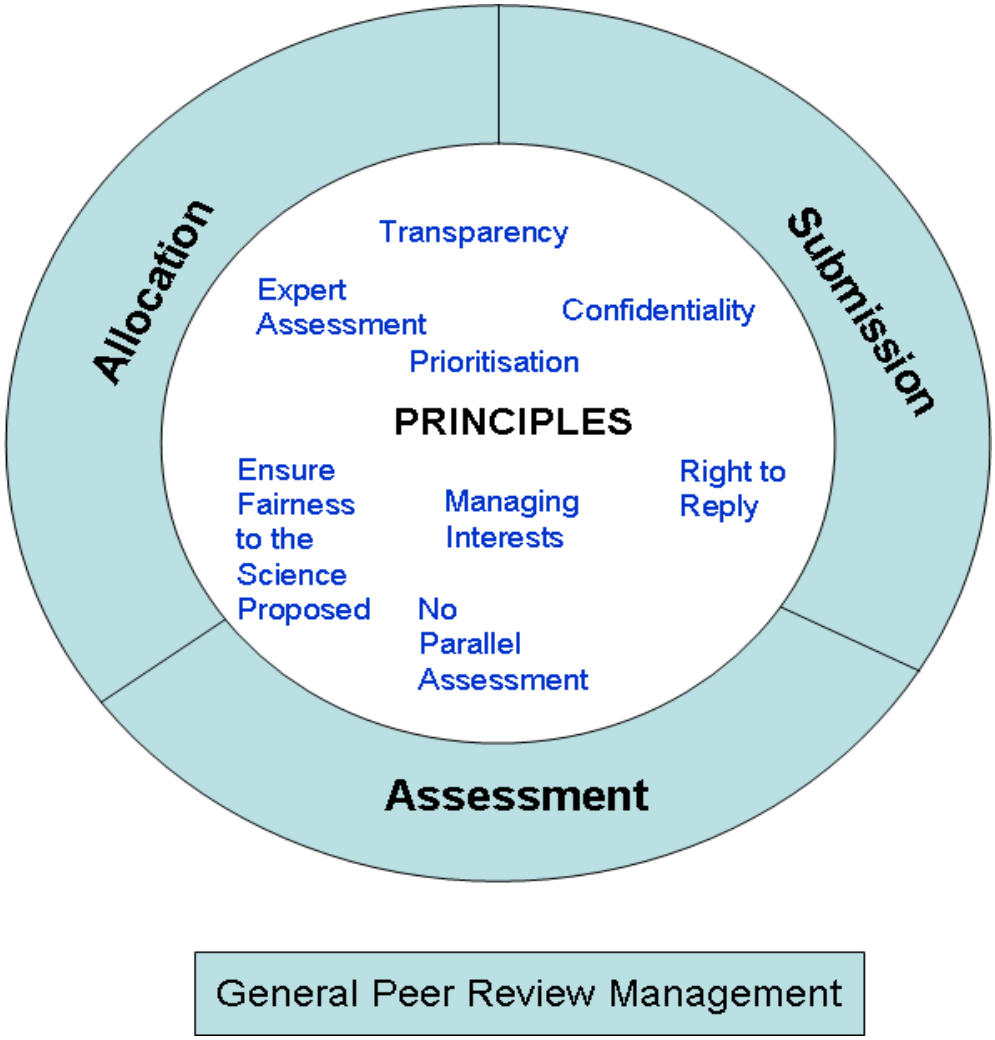

Figure 1: Graphical donut showing the principles and the main steps of the peer review process for PRACE.

In conclusion, all the principles defined in the first report on the peer review for PRACE are very well integrated into the steps proposed in this document on the final report for the peer review process for PRACE.

3.2 Questionnaire

In order to decide on the full peer review process for PRACE, it was necessary to examine the various peer review processes used in Europe in more detail. A questionnaire was developed which investigated the main steps of the peer review, i.e. application, assessment and allocation.

3.2.1 *Questionnaire set up*

The questionnaire was intended to determine the details of the main steps of the peer review process for all PRACE project partners in order to draw conclusions on best practices and general procedures to be used for PRACE. A list of questions covering specific aspects of application, assessment and allocation was drawn up and brought together in the form of an internet survey. A request to complete the internet survey was sent to the person responsible for the peer review process in the supercomputing centres of all the PRACE project partners[9] and HPC European projects (DEISA and HPC_Europa).

The questionnaire used for the survey (see Annex 1) had a total of 41 questions and was divided into five parts:

- Respondent details;
- General questions;
- Technical assessment;
- Scientific assessment;
- Application procedure.

The questions asking for details of the respondent were intended to identify the country and organisation the respondent worked for, and their role within that organisation.

The general questions aimed to gain an overview of the peer review processes, including the identification of the computer system used, the existence or not of a single national peer review procedure, industrial usage and overarching questions regarding peer-reviewing of proposals. The questions regarding the main steps of the peer review, i.e. application, assessment and allocation, were also included. Assessment was divided into sections on technical and scientific assessment. The latter also included some questions on allocation. This structure was determined from the conclusions reached during analysis of the overview of the peer review processes presented in the initial report on peer review process for PRACE.

The questions on **technical assessment** aimed to identify the criteria used for technical assessment, which is in charge of the technical assessment, what requirements are considered necessary for performing the technical assessment, and the consequences of the technical assessment in terms of proposal acceptance, rejection or consultation.

[9] Austria (GUP), France (GENCI), Finland (CSC), Germany (Gauss consortium – FZJ, LRZ and HLRS, Greece (GRNET), Italy (CINECA), Netherlands (NCF), Norway (UNINETT), Poland (PWR and PSNC), Portugal (UC), Sweden (SNIC), Switzerland (CSCS), Spain (BSC) and UK (EPSRC).

The questions on **scientific assessment** covered items regarding the Prioritisation Panel (or equivalent (including. existence, composition, membership duration)), the assessment criteria used, prioritisation, referee reports, guidelines for referees and confidentiality issues.

The questions on the application procedure (submission) were strategically placed at the end of the survey because they are generally much more straightforward than the questions regarding assessment. These questions focused mainly on publicity of assessment criteria, submission media (online or hardcopy), number of calls per year, types of proposals according to CPU requested (or any other criteria) and corresponding evaluation differences, proposal withdrawal, timelines of the different peer review steps, right to reply to referees' comments, right to appeal to allocation decisions, allocation duration, final report and number of proposals assessed per year.

All in all the questions covered the most relevant items that are envisaged for the peer review process for PRACE.

Table 1 gives an overview of the questions included in the internet survey.

Section	Technical Assessment	Scientific Assessment	Application Procedure
Questions asked	Criteria used	Existence of Panel	Publicity of assessment criteria
	Who is in charge	Composition of Panel	Submission media
	Consequences of assessment	Membership duration of Panel	Calls per year
		Assessment criteria	Types of proposals according to CPU requested and differences in assessment
		Prioritisation	Proposal withdrawal
		Referee reports	Timelines
		Guidelines for referees	Right to reply
		Confidentiality issues	Right to appeal
			Allocation duration
			Final report
			Number of proposals assessed per year

Table 1: Overview of the questions included in the Internet survey.

3.2.2 *Results of the survey*

In total 18 replies to the survey were received from 16 national institutions and 11 different countries including all PRACE Principal Partners, DEISA in general and DEISA Extreme Computing Initiative (DECI). Explicitly, the replies to the survey came from Austria (GUP, University of Linz), Finland (CSC), France (GENCI), two institutions in Germany (Juelich Supercomputing Centre and Leibniz Supercomputing Centre), Norway (UNINETT), four institutions in Poland (Academic Computer Center in Gdansk – TASK, Poznan Supercomputing and Networking Center, Wroclaw Centre for Networking and Supercomputing, University of Warsaw – ICM), Portugal (University of Coimbra), Spain (BSC), Switzerland (CSCS), The Netherlands (NCF), two institutions in UK (EPSRC and

NERC). The type of organisation the respondents belong to are mainly funding agencies, Research and Education institutions, HPC centres, and HPC and Networking centres.
A summary of the results of the survey is given in Annex 7.3 along with the number of answers received for each question.

3.2.3 *Conclusions from the survey*

From the survey, a set of best practices for the peer review process for PRACE has been identified. These best practices with indication of the corresponding principle(s) defined for PRACE peer review are presented in Table 2.

Best practices	**Principle**
Single peer review	No parallel assessment
Assessment criteria for application must be made public to applicants and referees	Transparency
Applicants can be informed about the progress/state of the process	Transparency
All proposals from scientific researchers must be peer reviewed	Ensure fairness to the science proposed
All proposals must be prioritised	Prioritisation; Ensure fairness to the science proposed
Proposals reviewed by experts	Expert assessment; Managing interests
Applicants can reply to referees' comments	Right to reply
Referees' identity not made known to applicants	Confidentiality

Table 2: Best practices for the peer review process for PRACE and the corresponding principles.

Besides the best practices, the following conclusions for the three main peer review steps (application, assessment and allocation) can also be drawn from the answers to the survey:

Application

- Proposals can be submitted online;
- Hardcopy of proposals is not required;
- Proposals can be withdrawn during the peer review process;
- There are different categories of proposals;
- Applicants must submit a report at the end of the project;
- Applicants can be informed about the progress/state of the process;
- The assessment criteria for application are public;
- There are fixed timelines for the peer review process;
- The number of proposals has, in general, increased in the last 5 years.

Assessment

- Technical assessment is separate from scientific assessment;
- All proposals undergo technical assessment;

- The results of the technical assessment can be approval, rejection or consultation;
- All proposals (except proposals for code, scalability and/or software testing) are peer-reviewed and prioritised.
- Proposals from industry are not peer-reviewed and fees are charged for industry usage.
- Evaluation of the different categories of proposals depends on the proposal type;
- Small proposals for testing and code development only undergo technical peer review;
- All respondents use a RAP (Resource Allocation Panel) or a similar panel with fixed membership;
- Referees are given assessment criteria for peer-reviewing of proposals.

Allocation

- The duration of time for the project can be extended upon request but granted resources[10] cannot;
- During allocation granted resources (PRACE systems for which the applicants have been allocated computer time) can be changed.
- The RAP can cut or alter the allocation time requested and can also decide if the work proposed can be done in a less costly system;

The best practices and the conclusions reached from analysis of the survey are a very good starting point for elaborating on the peer review process for PRACE.

4 Peer review process

4.1 Introduction

The peer review for PRACE is intended as to be an independent peer review system based on scientific excellence and technical suitability to allow for the best and most efficient use of the PRACE system(s).

It is also proposed that in PRACE the allocation decisions will be separate from the peer review process, i.e. those acting as peer reviewers will not be responsible for authorising the allocation decision. This will make the peer review process more transparent and will also be in line with the principle of managing interests.

The peer review process for PRACE will aim at a responsive review and allocation process in order to be able to respond in a timely manner and exploit scientific opportunities as they arise. This is strictly connected with the effectiveness of the peer review process and will involve a swift assessment of all proposals.

The peer review process for PRACE will be divided into three main steps.

- Application
- Assessment (including technical and scientific assessment)
- Allocation

This is schematically presented as a flow chart in Figure 2.

[10] Granted resources is defined as the amount of allocated computer time to the project.

It is proposed that the peer review process for PRACE will be managed by the **PRACE peer review Office**[11]. The peer review Office should manage all aspects of the peer review process, from preparation and opening of calls, through submission of proposals, assessment, servicing of committees/panels to informing all applicants about the final allocation decision. The peer review Office can be viewed as the administrative centre of the PRACE peer review process.

One of the first tasks of the peer review Office will be to decide on all internal administrative procedures for making the peer review process as efficient as possible. The peer review Office will need to set up a website for electronic submission of all proposals and to design electronic forms for submission of proposals, referees' comments, applicants' replies and project final reports. As these forms will very much depend on the type and the layout of the website, we will only refer to the information necessary for inclusion in these forms in this document. The design and elaboration of the forms will be left at the discretion and responsibility of the PRACE peer review Office. The role of the PRACE peer review Office is discussed in more detail in section 4.3.

Before going into the details of the peer review process we will discuss it in general with the support of the flow chart shown below (Figure 2).

4.2 Workflow

The envisaged workflow for the PRACE peer review process is presented together with the main steps in Figure 2. This is used to give a general overview of the PRACE peer review process before going into the details of each step. The yes and no labels refer to whether the proposal progresses or not.

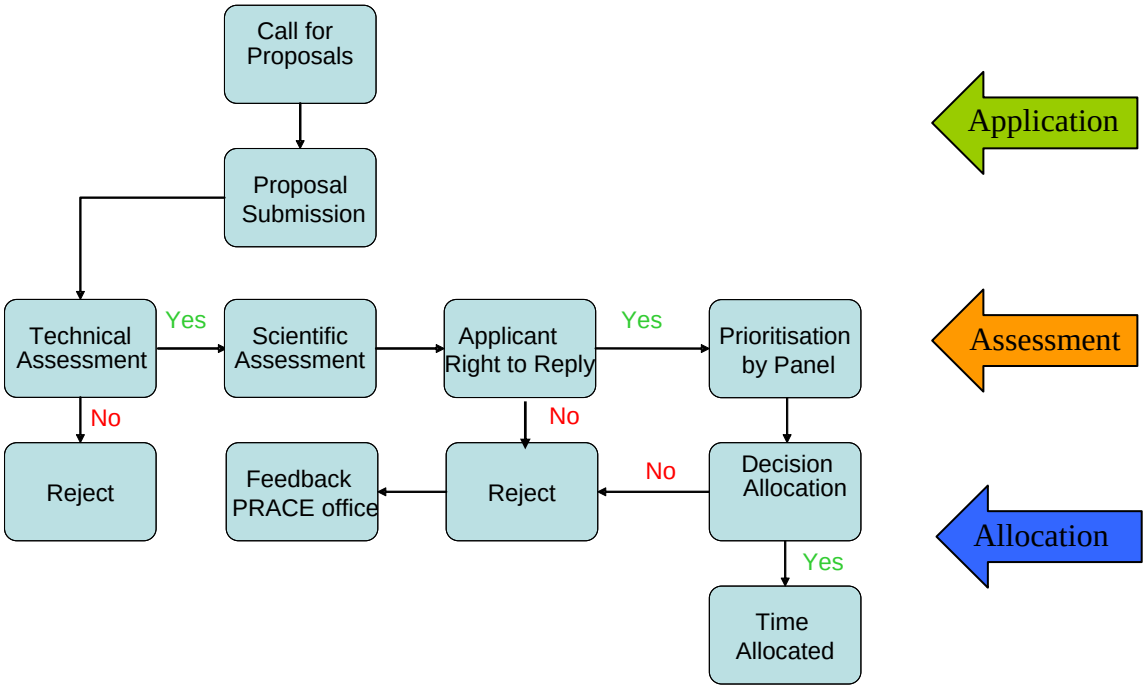

Figure 2: Flowchart for PRACE peer review process.

[11] The PRACE peer review Office will be the administrative centre for the peer review. It is part of the central PRACE Office which is discussed in deliverable 2.4.1 [4].

The first step of the peer review process will be the publication of a call for proposals followed by proposal submission. After submission all proposals will have to be peer reviewed according to technical criteria. The technical assessment can result in formal rejection with only the proposals that are considered to be technically suitable for running in the PRACE systems considered for the scientific assessment. During the technical assessment there will be a consultation phase (not depicted in Figure 2) between the technical reviewers and the applicant for clarification of technical issues. The technical assessment can also result in a decrease or increase of allocation time requested. This would have to be agreed by the Technical Assessment Panel as a whole. The advice regarding the change of allocation time requested during the technical assessment must be passed through to the scientific assessment and ultimately made known to the Prioritisation Panel.

Both types of assessment (technical and scientific) will be performed by experts and the applicants will have the right to reply to the comments of both the technical and the scientific reviewers. During the scientific assessment an increase or decrease of allocation time requested can also be advised. This advice needs to be made known to the Prioritisation Panel. The proposals with positive assessment (both technical and scientific) will then be prioritised (ranked) by the Prioritisation Panel. The Prioritisation Panel should also analyse the advice of the technical and scientific assessments regarding the allocation time requested and a final decision should be taken on the amount of allocation time to be assigned to each proposal. This will be presented alongside the ranking of the proposals.

The Director will work down the prioritisation list awarding allocation time until the time is used up or the quality of the proposals is not good enough to warrant the allocation of time. It could happen that not all highly ranked proposals will be allocated time if the total allocation necessary is higher than the computer time dedicated to the call. This once again justifies the use of a prioritisation system to ensure that the proposals considered scientifically more important will be fully granted.

The proposals to which allocation is granted are automatically allowed access to the computing centre in charge of operation of the allocated system. The computing centre shall proceed with the necessary formalities (such as distribution of access forms, account numbers and passwords, etc.) for making access available to the applicants.

It is envisaged that some proposals will request allocation time in more than one PRACE system. In terms of a ranking decision there will be no change, because the ranking will be based on scientific merit. However, allocation could be complicated because computer time from different machines needs to be allocated and there is the possibility that, due to the ranking, there would still be enough computing time to give to the proposal from one machine but not from another (because the allocation has been consumed by proposals with higher ranking). Finding a solution for these cases is by no means easy and will need some reflection and experience that can be gained during the initial peer review process run for a single system. It is foreseen that these proposals will be discussed with the Director and the Access Committee, and some consultation with the applicants can also be expected.

4.3 Role of PRACE peer review Office

The PRACE peer review Office will be the administrative centre for the peer review process. The initial task of the peer review Office will be to set up the full peer review process, including the design and set up of the peer review website for PRACE with all the necessary information and forms for a full online peer review process. This should be discussed and coordinated in cooperation with the PRACE Director and the Access Committee before being proposed for Council approval. After the initial installation of the peer review process, the main tasks of the peer review Office are:

- Updating and maintaining all the information in the peer review website;
- Issuing the calls;
- Checking all proposals for completeness and validation of the proposals in terms of the guidelines issued for the calls;
- Coordination of the technical and scientific peer review assessment including all contacts between technical and scientific reviewers and the applicants, until approval or rejection decision is reached;
- Updating and maintaining a pool of international scientific reviewers, using a database system;
- Preparing and servicing the meetings of the prioritisation panel(s);
- Creating and maintaining a database with information on granted projects for internal and external use;
- Informing the applicants about the granting decisions;
- Informing the applicants about the status of their applications;
- Coordinating regular meetings (every half-year) with the main players in the peer review process to collect, share and discuss best practice and therefore continually improve the peer review process;
- Preparing any necessary proposals and reports regarding the peer review process for the Council, the Scientific Steering Committee, Access Committee, User Forum, PRACE Director and any other PRACE committees;
- Disseminate the PRACE peer review process and collaborate with National and European Institutions involved in peer review activities.

The structure of the peer review Office should be decided by the Council following proposals from the Scientific Steering Committee, the Access Committee and the Director [2]. The head of the Office should report directly to the PRACE Director [2].

The information in the following sections of this deliverable describes the guidelines and the information that needs to be posted in the part of PRACE website dedicated to the peer review process (from here on called PRACE peer review website).

4.4 Application

Following the internet survey it became clear that on-line submission is a very common procedure in the various European countries with 66.7% of the respondents using it. This provides a strong case for using an online application system and for disseminating all information regarding the PRACE calls through the PRACE peer review website. The online application system will also be the appropriate basis for creating a database with information on all submitted proposals, the status of past and present granted proposals and for generating real-time statistics necessary for allocation reports for the PRACE Council and Committees.

In the following, we will first analyse the types of proposals, calls, eligibility, scientific and technical criteria in detail. Afterwards, we will elaborate on the information that needs to be included in the application form and the form for submitting the final report. Finally we will make brief reference to the terms and conditions for using the PRACE facilities.

4.4.1 *Types of proposals*

There are likely to be three different types of proposals. These have been suggested previously in the PRACE deliverable D2.3.2 Usage Model [1]. These three models will be subject to slight variation in the peer review process. This is summarised in the text and table below:

Preparatory access: limited allocation of computer time for code, scalability and/or software testing. This type of access should have a quick turn around on its assessment not longer than 1 month (preferably 3 weeks); should not be limited to the normal calls, i.e. could be submitted all year round and should only undergo technical assessment, i.e. allocation will be granted immediately after positive technical assessment without undergoing scientific assessment. The maximum allocation time will be 6 months. A final, technical report will be required.

Project access: this will be the most common type of proposal and access will be based on technical evaluation of the suitability and compatibility of the project with the PRACE resources followed by scientific evaluation of the project. The allocation time will be 1 year. A final report will be required.

Programme access: will allow a small number of large blocks of computing resources to be allocated to grand challenge projects of major scientific interest for Europe proposed by major research teams or consortia who can manage the use of the computing time themselves between a number of individual projects or parts of a large project aiming at achieving a high scientific impact. This access route will be important for national or multi-national groups tackling major research challenges and has the potential to enable and promote European research with significant impact. The proposals for programme access will need endorsement of Tier-1 national centres to support the computational experience of the applicants. Applicants can show evidence that they have been granted an award from their national Research Council. The proposals for programme access could be subject to an additional level of peer review (i.e. extra reviewers) in order to give a more thorough assessment of the entire proposal. The allocation time will be 2 years. There would be the possibility for these proposals to be subject to a mid-term review if it was felt to be necessary by the Prioritisation Panel and/or the peer review Office. This could result in resources for the second year of the project not being granted. A final report will be required.

	Preparatory	**Project**	**Programme**
Technical Assessment	Yes	Yes	Yes
Scientific Assessment	No	Yes	Yes
Additional Assessment	No	No	Potentially
Mid-term Review	No	No	Potentially
Duration	6 months	12 months	24 months
Final Report	Technical	General	General

Table 3: The different categories of proposals that may be assessed through PRACE peer review.

Having different categories of proposals based on the amount of CPU requested are supported by the results of the internet survey as this type of categorisation is used by approximately 50% of the systems managed by the respondents.

4.4.2 *Calls*

There will be two types of calls:

- **All year round:** for proposals for preparatory access.
- **Regular calls:** Six monthly calls for proposals for project access and programme access.

From the survey, it can be seen that the types of calls vary for different centres across Europe. However, for a large multi-site entity like PRACE it will be more manageable if there are regular calls for project access and programme access. Only those proposals for preparatory access do not have deadlines.

The opening and closing dates of the calls need to be made very clear from the outset as the first rejection stage will automatically apply to proposals submitted after the closing date. These proposals will be automatically rejected by the peer review Office and excluded from the assessment procedures. The most efficient way of doing this would be to automatically prevent any more applications via the on-line submission process after the cut off date and displaying a standard message statement that the call has closed.

The Council is responsible for all policy decisions regarding allocation of HeC resources including the annual scientific programme. The scientific programmes need to include directives regarding the calls and the allocation of computer time to each call. In this deliverable recommendation will only be made regarding policy issues. These recommendations focus mainly on the first PRACE call for proposals and the information to be drawn from this call for future calls.

The first regular call should be considered as a benchmark. We advise the first call should be a general call open to all scientific fields. The amount of computer time for allocation to the first call will be decided by the Council. The peer review Office could then provide a report to the Scientific Steering Committee and the Access Committee [3], stating the number of proposals per scientific field and the allocation of computer time granted per scientific field. This information could then be used when deciding future calls dedicated to specific scientific fields. The final decision regarding these future calls and the respective allocation of computer time will be taken by the Council upon advice of the Scientific Steering Committee and eventually the Access Committee. Clear reasoning for the Council decision(s) to promote a particular area of science as well as the amount of computer time allocated to each call will need to be published alongside the call in order to make the process transparent. The process for setting the research priorities is outside the scope of this deliverable and will need to be decided by Council upon advice of the Scientific Steering Committee.

Calls dedicated to industry can also be issued, following a decision from the Council, if the number of applications from industry proves it to be necessary or if there is a specific scientific need. The Council will also give directives to the PRACE peer review Office regarding the amount of computer time dedicated to industry either for regular calls or for calls specifically dedicated to industry. This allocation may be subject to charges.

Another kind of call that could be envisaged would be those dedicated to technical support. This would be given by experts from PRACE centres and could be used for technical fine-tuning of codes to Tier-0 systems. This support will be in technical man power (mostly from the PRACE computer centres). It is not within the scope of the deliverable to determine the details of this but it is advisable that PRACE discuss this possibility and envisage supporting this type of call. An appropriate method of peer review should be selected, and potentially simplified, for peer review on technical support proposals.

Applicants will be allowed to withdraw their proposals at any time during the process, based on sufficient justification.

4.4.3 *Eligibility*

In principle all researchers who can prove their connection to universities, institutes and not-for-profit research organisations will be eligible for application to the PRACE calls. Whether these applications will be restricted to members of the PRACE consortium, EU member states and associate states, European countries or whether applicants can be based anywhere will be a decision for the PRACE Council. There will be restrictions to usage by citizens of countries banned by the export regulations of the country of the vendor of the machine(s). These restrictions may not be the same for all PRACE systems and will need to be defined and published for each PRACE system.

Members of industry can also apply to PRACE computing time but if usage is intended for industrial development with a possibility of obtaining profit, fees can be charged. The fees for industrial usage as well as the amount of supercomputer time allocated to industry will be discussed and decided upon by the PRACE Council. Services to industry may not be available in all PRACE systems but these restrictions will need to be discussed by Council.

4.4.4 *Application criteria*

The application criteria are divided into technical and scientific criteria and should be made public through the peer review website for PRACE. Both these procedures seem to be common practice in European centres already, based on the results of the questionnaire.

The proposals should conform to the following technical criteria:

- Proposals should prove the need to run in a Tier-0 system;
- The codes necessary for the project must be available in the system requested and/or, in case of codes developed by the applicants, they should have been sufficiently tested for efficiency and suitability (either in proposals for preparatory access or in similar PRACE systems). Proof of previous tests in Tier-1 systems must be submitted together with the preparatory access proposals;
- The project proposed should be most suitable to run in the architecture of the machine requested.

The projects must fulfil the following scientific criteria:

- The research proposed in the project must demonstrate scientific excellence, i.e. should include novelty, be well integrated in the context of the proposal and be timely;
- The project should aim at developing an important scientific topic, i.e. should include elements of ambition, adventure and transformative aspects;
- The methodology used should be appropriate to the goals of the project;
- It is advisable that within the project appropriate routes and resources for dissemination and knowledge exchange will be identified.
- There must be a solid management structure that will ensure that the project will be completed successfully. The applicant and the collaborators must include their CVs in the application form.

These criteria resulted from analysis of the initial report on the peer review process for PRACE and discussions with several PRACE members. Particular and more specific criteria connected to individual calls must be made public at the time of issuing the respective calls.

The applicant should be able to specify the architecture on which they would prefer the application to be run. In addition they can express the wish to run the project on a specific PRACE system. These wishes will be considered but may not be fulfilled.

4.4.5 *Application form*

The application form should include full identification of the applicant and all necessary items for technical and scientific evaluation. The following items must be included:

- Complete identification of the applicant and all collaborators to the project with a list of recent[12] publications relevant to the proposal.
- Short description of the project including a summary of the applicants' previous experience in the scientific field of the proposal and in other projects involving supercomputer usage with a clear indication of recent achievements.
- Demonstration of the need for using the requested systems focusing on suitability of the project for the architecture of the system requested.
- Technical specifications of the project including the amount of CPU, memory, and storage required, software codes and libraries necessary for the project, specification of the various parts of the project with indication of the number of CPU hours necessary to their completion and the amount of nodes/processors necessary for each part of the project.
- Indication of possible reviewers[13] for the project (reviewers indicated by the applicants will be used at the discretion of the PRACE Office and at most only one will be used) and, any particular scientific competitors who the applicant would not want to be used. The applicant must provide justification for this and their request will be adhered to at the discretion of the Office.
- Abstract of the project for publication on the PRACE website.
- Proof of software efficiency and scalability, especially for software developed by the applicants.
- CVs[14] of the applicant and all collaborators.

The abstracts of all granted projects will be made public on the PRACE website unless the applicants request confidentiality and this is properly justified (e.g. competition issues, product testing, etc.). The peer review Office must then make sure that these proposals are not publicly disseminated on the PRACE website, until further disclosure by the applicant.

[12] Not older than 3 years.
[13] In the PRACE website it should be explained that the possible reviewers indicated by the applicant must not be: an employee from the same organisation as the applicant or any collaborators on the project; or from any organisation involved in a direct collaboration with the organisation of the applicant or any collaborators in the project.
[14] The length of the CVs should be limited to 1 A4 page.

4.4.6 *Terms and conditions*

The terms and conditions for usage of PRACE resources can be divided into two groups: general terms and conditions that will be decided by PRACE and terms and conditions that will be specified by the centres operating the PRACE systems.

The first type, consisting of an agreement between PRACE and the applicants including responsibilities and duties for both parties, still have to be decided upon by PRACE on the basis of the discussions and recommendations presented in deliverable D2.3.2 [1]. The second type of terms and conditions will be agreed between the applicants and the supercomputing centres responsible for operation of the PRACE systems. Among these terms and conditions are the usage restrictions to citizens of countries banned by the exportation rules of the country of the vendor of the system(s). The applicants will have to agree with both types of terms and conditions before being granted access to their allocation.

4.4.7 *Final report*

The applicants should be informed on the peer review PRACE website that they are required to submit a final report after conclusion of the project. This procedure is followed by 55.6% of the respondents and it will be important for informing and supporting future decisions of the PRACE Research Infrastructure. The final report should be submitted no later than three months after the end of the project. It is advisable to mention on the PRACE website that non-submission of the final report in due time may have consequences for future grants.

Some of the aspects that the final report must cover are the following:

- General description of the experience with the supercomputer system(s) in terms of accessibility, hardware, software available, etc.
- List of publications submitted or to appear where the results of the project have been used.
- Information on any patents or potential patents obtained from the results of the project.
- Goals and expectations for future developments derived from the project achievements.
- Reference to potential industrial applications, if any.

As an exceptional case, the applicants may request confidentiality due to competitiveness issues or any other properly justified reasons. In this case the peer review Office must make sure that the results described in the report are not made public. The PRACE peer review Office is responsible for collating and publishing these reports on the PRACE website and in other media. It is anticipated that the results in the reports be broadly disseminated to the scientific community and the general public. The final reports will be approved by the Director on the recommendation of the peer review Office.

4.4.8 *Granting acknowledgement*

The applicants should accept (for instance in the terms and conditions to be signed before validation of the allocation grant) that they must acknowledge the PRACE grant in all publications, reports, presentations and any other material where project results are published or presented. The peer review Office should propose guidelines and a standard text for the acknowledgement to be approved by the Scientific Steering Committee and/or the Access Committee. This text together with guidelines of when to use it should be made public through the PRACE website.

4.5 Assessment

It is essential that throughout the PRACE peer review process, the principles that have been established are followed. The over-riding principle throughout this process is transparency, which will ensure that the process is carried out in fairness to the science proposed and not with any bias towards the status, nationality or research area of the applicant. A single peer review process and a central PRACE peer review Office will ensure that there is no parallel assessment of proposals.

The flow charts in Figures 3 and 4 illustrate the assessment process for the preparatory proposals (Figure 3) and the project and programme proposals (Figure 4) which the following text explains. The technical assessments shown for each will be performed together when necessary.

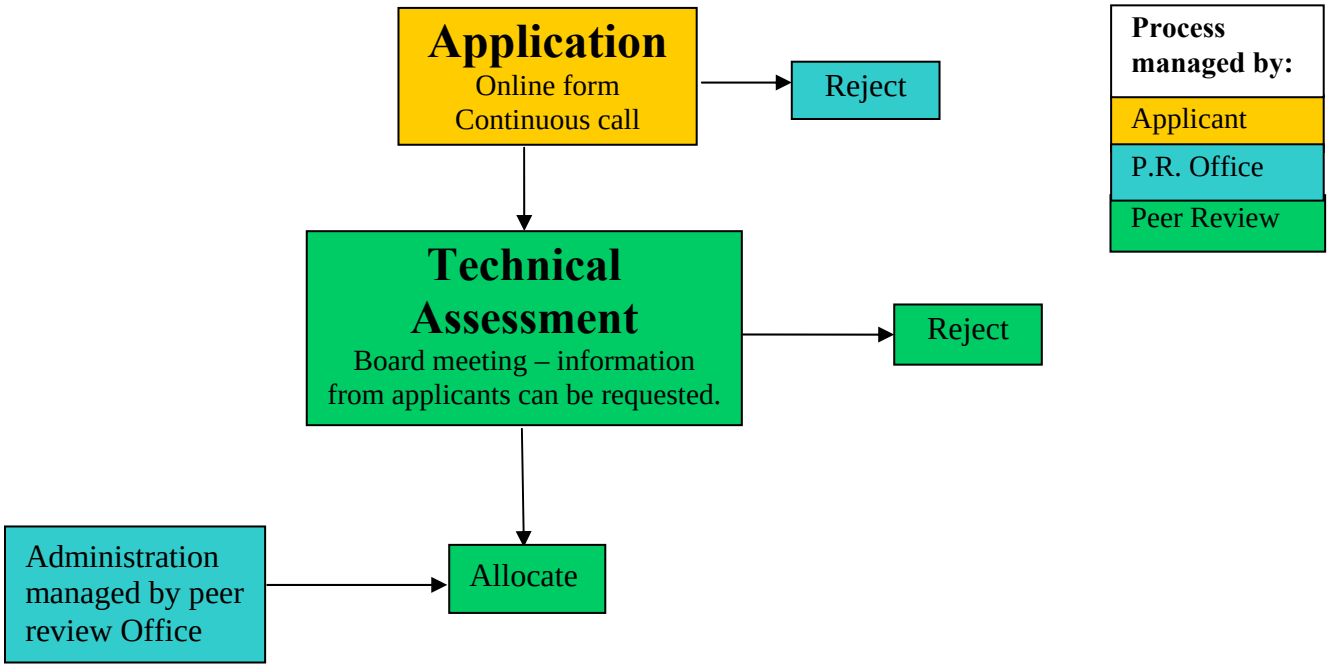

Figure 3: Detailed Peer Review Workflow for preparatory proposals.

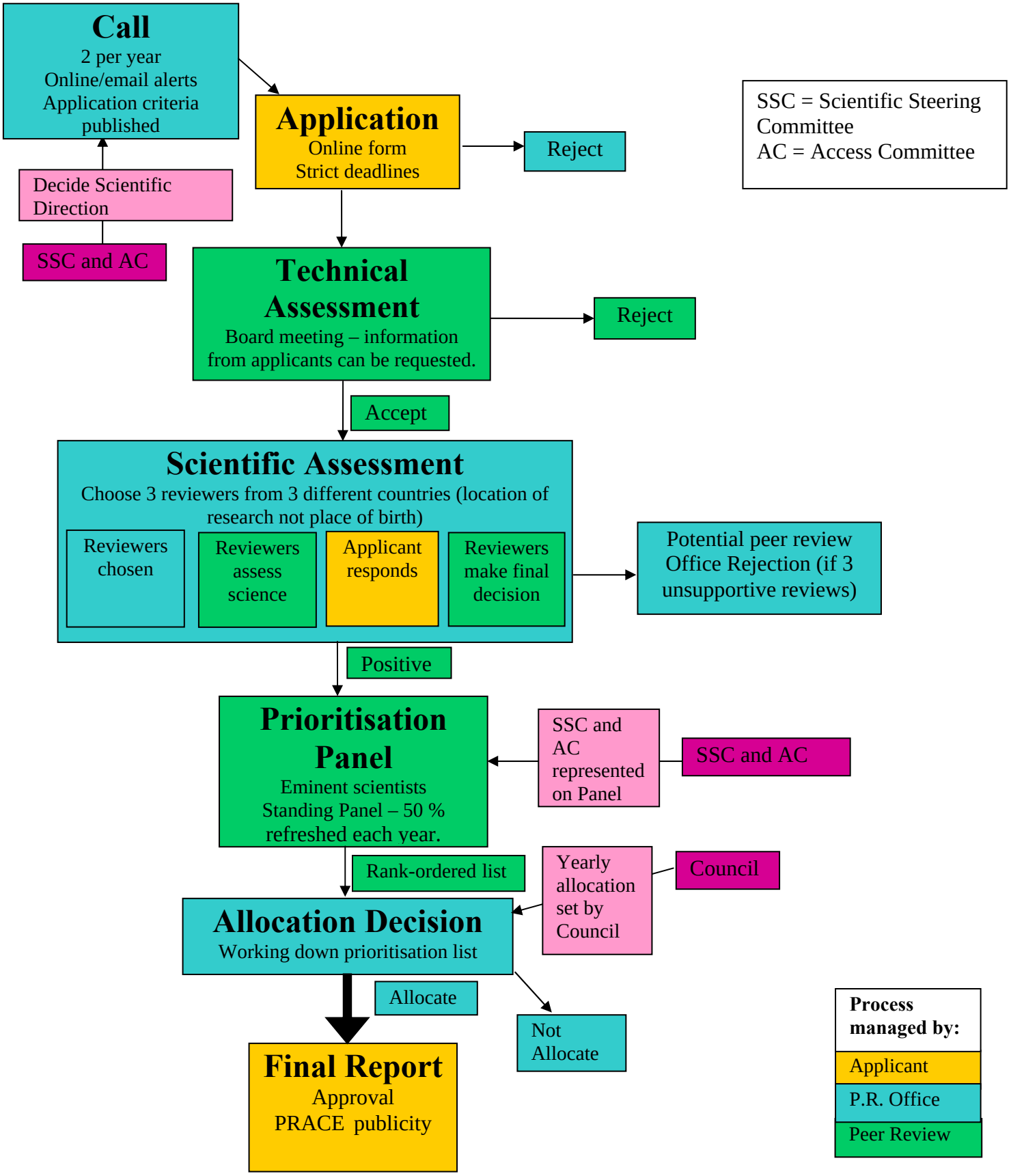

Figure 4: Detailed Peer Review Workflow for project and programme proposals.

4.5.1 *Technical Assessment*

Once a proposal has been accepted by the PRACE peer review Office, it will be sent to a meeting of the **Technical Assessment Panel**. The Technical Assessment Panel will be comprised of experts from each of the PRACE Tier-0 computing centres and experts from outside the PRACE consortium. The exact form should be determined by the Operations Committee[15].

The Technical Assessment Panel will look both at proposals that have come in *via* a call and those that are small, preparatory access proposals and assess them all for their feasibility and their suitability for a Tier-0 system. The Technical Assessment Panel may request information from the applicants regarding the technical issues of the application and the proof of efficiency and scalability of software developed by the applicants in Tier-1 systems. If necessary, demonstration by the applicants of the validation of particular software can be requested. The Technical Assessment Panel will be able to suggest changes in allocation time or reject a proposal altogether. In the case of a rejection of a proposal for technical reasons, the Technical Assessment Panel would be expected to give feedback to the applicants. This feedback can be in the form of advising a Tier-1 system suitable for running the project or advising on how to increase software efficiency and/or scalability. In any case the reasons for rejection should be made formally known to the applicants together with some advice aimed at helping the progress of the project proposed.

If a proposal for preliminary access is successful through the Technical Assessment Panel then it can be immediately granted. The technical assessment for preliminary access proposals should be swift, allowing granting decisions to be made within 1 month of application. This is to avoid the possibility of delays or the loss of opportunities for future work.

For larger proposals (i.e. project access or programme access) that come through calls, the proposal (which can be modified after taking into account any comments from the Technical Assessment Panel) will then proceed to a further peer review stage – namely scientific assessment.

Currently, from respondents to the survey, most centres do carry out a technical assessment (83.3%) and this is separate from the rest of their peer review (80%). The technical assessment is carried out by experts at the computing centres. All of this fits well with the model that is proposed here for PRACE. The timing of the technical assessment during the process does vary between centres with 7 respondents saying that it occurred before scientific assessment, 8 saying it was carried out at the same time and 4 having the technical assessment after the scientific assessment. In the case of PRACE, it is logical to carry out the technical assessment before the scientific assessment as those proposals which are more suitable to be run on a Tier-1 system will be identified during the technical assessment and will be rejected from the PRACE system.

It is envisaged that the Technical Assessment Panel would meet monthly to review preparatory proposals. Every six months a bigger review would need to be held which includes all project and programme proposals that have been received (e.g. two weeks after the closing date of the call). It is not essential that these meetings are face-to-face. They could be carried out via tele- or video-conferences. If additional information is needed on any of the proposals then the Technical Assessment Panel can request this *via* the peer review Office and this will be produced in time for the next meeting of the Technical Assessment Panel in order for them to make their decision.

[15] The Operations Committee will provide advice to the PRACE governing bodies and the Director on technical issues associated with the operation of the distributed infrastructure and the integration of the PRACE infrastructure into the European HPC ecosystem. [2]

4.5.2 *Scientific Assessment*

This will consist of four main parts and the process will be overseen by the PRACE peer review Office. Even though the majority of respondents to the survey do not have an office overseeing the peer review process, this is the only way the process can be guaranteed to be transparent and fair to the science proposed as the peer review Office will manage the allocated time from all PRACE centres. All parts of the process detailed below will be carried out electronically (via email or an automated online form) unless there is a good reason why hard copies need to be employed.

Reviewers

The peer review Office will be responsible for obtaining at least three reviews per proposal including, if possible, a reviewer that has been nominated by the applicant (no more than one of the applicants' nominated reviewers will be used). The names of the reviewers will be known only to the peer review Office and not to the applicant or anyone else involved in the process. This is consistent with the approach taken by most of the respondents to the survey (77.8 % keep reviewers' identities secret from the applicants).

The reviewer will be asked to keep the details of the applicants (such as the names of the institutions which the applicants belong to and any other personal details) and the proposal (such as description of the proposal and the methodology proposed) confidential until the results of the call are made public through the PRACE peer review website. If the proposal is subject to confidentiality clauses, the reviewers will be alerted and should not disclose any information regarding the applicants and the proposal at any time. In exceptional cases it may be necessary for all personnel and reviewers handling a particularly sensitive proposal to sign a Non Disclosure Agreement (NDA). Confidentiality is a principle of the PRACE peer review system and care should be taken to maintain this throughout the entire process.

During peer review of the proposal, the reviewers will be asked to specify their level of confidence on their assessment on a scale of high, medium or low. This will give an indication to the peer review Office about the suitability of the reviews received. The peer review Office staff will be able to use their judgement in order to approach more reviewers if they feel it is necessary.

It is envisaged that the reviewers will be from **three different countries** (place of research not place of birth) and will be experts (between them) on the whole of the scientific case presented. They will provide a report on the novelty and quality of the science and on the applicant's ability to carry it out as well as commenting on the match to the other pre-defined criteria for the call (see section 4.1). Reviewers will be provided with guidance on the assessment criteria (which is also currently done by 66.7% of survey respondents) and how to write an effective reviewer's report and will be given a deadline (of three weeks) to respond.

For larger programme proposals, it may be necessary to give the reviewers a scoring system so that they are better able to assess the scientific merits of the grant based on a numerical system (e.g. 10 means the proposal is outstanding in all respects and likely to lead to very high-impact publications (Science, Nature, etc.) 1 means the proposal is very poorly written or with little scientific merit and should not be funded). This is something that the peer review Office would have to determine. This scoring system will also allow the peer review Office to take adequate measures (e.g. sending the proposal to an extra reviewer) if the scores of the reviewers differ by more than 20%.

Applicant response

Once three good quality reviews have been received these will be sent to the applicant so that they can respond, correcting any factual inaccuracies or providing any necessary further information in response to issues that the reviewers may have raised. It was a surprise to find from the survey that 83.3% of respondents did not currently have a procedure where the applicant could respond to reviewers' comments prior to a Panel meeting. This is an integral part of the PRACE peer review based on the principle of right to reply. It seems that the reason that applicants do not have a right to reply at most centres is based on trying to speed up the process, which is something that PRACE would find less of a problem as the process would be centralised and would therefore have set dates for Panel meetings, which would be known well in advance.

The applicant will be given a deadline of two weeks to respond to the reviewers' comments. The applicant will also be able to use this opportunity to update and inform the Reviewers and Prioritisation Panel of any significant developments that have occurred over the period of time during which the peer review is being carried out.

Reviewer reassessment

If necessary the applicant's response to the reviewers' comments can be sent back to the reviewer so that they can refine their initial assessment. All contact between the reviewers and the applicants will go through the peer review Office. Reviewer reassessment is not widely implemented in the centres which responded to the questionnaire (only one) but the broad nature of the projects that will be carried out on the PRACE system(s) will mean that the task of the Panel will be easier if there is a final evaluation from the reviewers of the proposals.

Rejection by the peer review Office

If an application is of very poor quality, as judged by the reviewers, it will be possible for the peer review Office to reject it without sending it to the applicant for a response and without it going to the Prioritisation Panel. This decision will be made by the peer review Office and will be based on the reviewers' being generally unsupportive of the proposal by indicating that the proposal is not sound enough to be granted and it therefore being unlikely to succeed at the Prioritisation Panel. This decision will be made by the peer review Office only in the case that all three reviewers advise that the proposal should be rejected.

4.5.3 *Prioritisation Panel*

The Prioritisation Panel will be made up of:

- eminent scientists from across the remit of PRACE scientific applications (from both within PRACE partner countries and from outside the group) in order to assess the **scientific merits** of the proposals;
- Members from a potential PRACE user group not submitting a proposal to the current call;
- Members from the Scientific Steering Committee and the Access Committee.

The membership will be fixed, as it is for 94.4% of the survey respondents' Panels. Some of the members of the Scientific Steering Committee and the Access Committee[16] will sit on each Prioritisation Panel in order to monitor the process. After the second year of PRACE operation, 50% of the membership of the Prioritisation Panel will be refreshed. Thereafter, each member will serve for three years, meaning that the make-up of the Prioritisation Panel

[16] How many and which members will be decided by Council and may vary for each Prioritisation Panel.

will change regularly. The Chair of the Panel will also rotate in order to spread the workload for Panel members and to ensure fairness to the science proposed.

The Prioritisation Panel will meet twice a year, approximately four months after the applications from a call have been received in the peer review Office. Their task is to produce a **ranked list of the proposals** for each call that have been sent to the Panel with the highest quality at the top and the lowest at the bottom. There will be a single and unique ranked list for each call, including the project and programme calls, i.e. there will be no separate ranked lists for different types of proposals. Currently 66.7% of respondents to the survey prioritise proposals before awarding the allocation although only 50% of these use a Panel to do so. This is an essential principle of the PRACE peer review system and so must be implemented strictly. Guidance will be provided to the Prioritisation Panel (by the peer review Office and endorsed by the Council, the Scientific Steering Committee and the Access Committee) on how to prioritise proposals based on the reviewers comments and the applicant's responses and on their own assessment of the suitability of the reviewers. The Prioritisation Panel should not re-review proposals. The Prioritisation Panel will be able to refer to the advice given by the technical and scientific assessment regarding any possible increases or decreases of potentially allocated computer time on a particular proposal. They will be able to decide on the eventual amount of time to be allocated to these proposals, if they are successful. Currently 44.4% of respondents to the survey do allow their Panels to review proposals but this is often where no prior assessment has been carried out using external[17] reviewers. In 50% of survey respondent's centres, Panels prioritise to published criteria. Once a ranked list has been produced, the Panel will draw a line above those proposals they would not want to be successful even if there was enough time that could be allocated to them.

4.5.4 *Allocation Decision*

After the Prioritisation Panel has taken place, the Director of PRACE, or his nominated budget holder, will meet with the member of the peer review Office staff who coordinated the Prioritisation Panel and the Chairs of the Scientific Steering Committee and the Access Committee[18] to determine which proposals will be allocated time. This will be done by working strictly down the rank-ordered list until the amount of time available is exhausted or the quality cut-off line is reached. The Council will not need to approve the final granted proposals as by signing off the peer review process they agree that the process will be effective, will decide the best quality proposals based on publicised criteria and will allocate time to those proposals in a prioritised order as determined by a Panel. Half of the respondents use their Panels to make their allocation decisions as well as prioritising the proposals. In PRACE this cannot be the case as it contradicts the principles of transparency, managing interests and ensuring fairness to the science proposed.

A potential difficulty that could arise from employing only one rank-ordered list for all of the proposals would be that the allocation time could run out for one PRACE centre quite early on in the list. This could mean that the allocation of time would have to be stopped whilst there is still a lot of time remaining at other centres. This is something that would have to be managed by the peer review Office but in fairness to the science proposed there should only be one rank-ordered list. Many of the projects proposed would be able to be carried out at more than one centre so this is a potential solution.

[17] External reviewers are not involved in the Prioritisation Panel, or any other PRACE committees.
[18] The Chairs should not be members of the Prioritisation Panels.

If the aggregate level of resources requested by projects passing the acceptance threshold does not exceed the resources to be allocated then it will be up to the Access Committee to decide if and how these additional resources will be allocated.

The applicants will be able to formulate a wish for a preferred location. However, the definitive location will be selected by the Director. If there are not sufficient systems with a particular architecture, then only the scientific merit should decide who gets the resources.

4.5.5 *Allocation times*

The allocation times depend on the type of proposals submitted, as defined in deliverable D2.3.2 [1] and above (see section 4.4.1), and are as follows:

Preparatory access: limited access allocation for code, scalability or software testing with allocation of six months.

Project access: this will be the main route for accessing the computing resources and the allocation time will be one year.

Programme access: small number of large blocks of computing resource to be allocated to major research groups with two year allocation time.

The thresholds in terms of allocated computer time for each type of proposal will be defined by the Council following advice from the Scientific Steering Committee and the Access Committee. Due to system upgrades or complete replacement, these thresholds need to be periodically reviewed. To ensure full utilisation of all available system resources it is advisable to oversubscribe by a percentage between 5% and 10%. In practice this will mean that the amount of allocated time will be higher than the amount of computing time available to compensate for possible user delays regarding the utilisation of the granted resources. This seems to be common practice in most computer centres to maximise the investment and the associated costs (e.g. electricity, operation and maintenance).

Requests for the extension of allocation time need to be fully justified and will be analysed by the peer review Office for each case. The maximum extension will be not more than 1 month for preparatory access proposals, 3 months for project access proposals, and 6 months for programme access proposals. The granted resources cannot be extended.

5 Integration and Collaboration with the Ecosystem

So far the focus of this deliverable has been on the principles and procedures for the PRACE peer review process. However, it is also important to briefly discuss the integration of the PRACE peer review into the European ecosystem and the possible collaborations resulting from this integration. This can be considered in conjunction with the deliverables of work package 2.5 (*Links with the Ecosystem*) [10]. It is important that the PRACE peer review process will reflect the thoughts and needs of most European researchers (from academia and industry) regarding the European HeC represented by the Tier-0 systems of PRACE and also that PRACE will support the collaboration and interchange of know-how between Tier-1 and Tier-0 users, operators, system designers and vendors. The PRACE peer review can have a role in consolidating collaborations at European and even at worldwide level.

The PRACE peer review should aim at establishing contacts with important European organisations involved in technical and scientific peer review activities to allow for the feasibility of the PRACE peer review process to be monitored in terms of involvement of qualified reviewers. Some examples of possible contacts include DEISA Extreme Computing

Initiative (DECI) [6], HPC_Europa2 [7], ESF [8], ERC [9] and future initiatives as the planned HPCWorld initiative[19], as well as established Research Councils of European countries represented in PRACE.

Another point that also needs to be taken into account is the integration and collaboration between Tier-0 and Tier-1 operations in Europe. This is extremely important for the successful integration of PRACE across Europe. The PRACE peer review will have an important role in this collaboration at the level of the technical assessment by maintaining a good communication channel between the members of the Technical Assessment Panel and Tier-1 representatives (some could be even be invited to join the Technical Assessment Panel). The collaboration between Tier-0 and Tier-1 can also be facilitated by the advising role expected from the Technical Assessment Panel regarding proposals that will not be deemed suitable for running in a Tier-0 system and could be directed to Tier-1 systems. However, it must be recognised that not all National Centres will have access to the same scale of resources and expertise and therefore there may be discrepancies in the amount of preparatory work that can be achieved. Another point where communication between PRACE and Tier-1 centres is important is regarding duplication of requests. It is undesirable that national proposals that were not granted in national systems due to insufficient technical and scientific quality will be resubmitted to PRACE. One possibility to avoid this duplication is to request a declaration from the applicants for PRACE grants that a similar proposal has not been rejected by national centres on the grounds of lack of technical and/or scientific quality.

6 Conclusions

There is a lot of information included within this deliverable, and justifiably so as the process of peer review for PRACE is a complex and important topic and one that will have a great bearing on the success of the project as a whole. Thoughout the deliverable, the 8 principles for PRACE peer review (Transparency, Expert Assessment, Confidentiality, Prioritisation, Right to Reply, Managing Interests, No Parallel Assessment, Ensure Fairness to the Science Proposed) have been considered. It has also been essential to make sure that the peer review route proposed not only avoids any conflicts of interest but also any perceived conflicts of interest.

Following the analysis of the results of a European-wide survey on current peer review practices for HPC, a picture was built up of how most centres currently manage their peer review. Although not all of the common practices are suitable for inclusion within a PRACE peer review system, because they either do not fit the principles or they are not possible to implement for a multi-site system, the peer review process described here follows the general lines of all European processes. The main differences arise when there is no single national peer review process and/or when there is no prioritisation of proposals, which are fundamental for fulfilling the principles defined for the PRACE peer review.

The main work of instigating the peer review system for PRACE falls to the peer review Office. Within the procedure laid out within this deliverable there should be enough scope and flexibility so that this procedure can be adapted, if necessary, based on particular circumstances or strategic directions, and also on the experience gained running the PRACE peer review.

[19] WPCWorld is an initiative with the objective of identifying a standard set of criteria and procedures and an associated methodology to drive the largest HPC e-Infrastructure initiatives in the deployment of services, in the allocation of resources and in the support to users' access.

7 Annex

These two annexes describe the peer review questionnaire that was send to a representative of each member of the PRACE consortium. The list of contacts that the questionnaire was sent to is below. Contacts were encouraged to pass the questionnaire on if they were the not the correct person to fill it in or if they knew of someone else who could contribute.

7.1 List of contacts

Name	Affiliation
Dai Jenkins	EPSRC, UK
Jacko Koster	UNINETT, Norway
Agnieska Kwiecien	WCNS, Poland
Radek Januszewski	PSNC, Poland
Manuel Fiolhais	UC, Portugal
Martin Polak	GUP, Austria
Matthias Brehm	LRZ, Germany
Horst Dieter Steinhöfer	LRZ, Germany
Stefan Wesner	HLRS, Germany
Thomas Lippert	FZJ, Germany
Thomas Eickermann	FZJ, Germany
Eugene Griffiths	BSC, Spain
Sergi Girona	BSC, Spain
Alain Lichnewsky	GENCI, France
Juha Fagerholm	CSC, Finland
Ulf Andersson	SNIC, Sweden
Dominik Ulmer	CSCS, Switzerland
Fotis Karayannis	GRNET, Greece
Sergio Bernardi	CINECA, Italy
Sergio Bassini	CINECA, Italy
Stefan Heinzl	RZG, Germany
Andy Parsons	NERC, UK
Alison Kennedy	DEISA
David McAllister	BBSRC, UK
Ana Bela Dias	NWO, NL

Those who replied are detailed in section 3.2.2

7.2 Peer review survey

The questions included in the questionnaire are presented in WORD version to minimize the length (memory space) of the document. The internet version had a more professional multiple-choice layout provided by Bristol Online Surveys, University of Bristol. The questions were in a variety of formats including multiple choice where the answer was yes or no, multiple choice where options were provided and questions that required the respondent to input a text answer.

The internet survey had an introduction followed by the set of questions as presented in the following.

Peer Review for HPC proposals across Europe

This survey has been produced in order to get an idea of how Peer Review operates for various HPC centres across Europe. The results will be used to inform the Peer Review processes which will be implemented during the PRACE project.

Respondent details

1. Please state the organisation that you work for.

2. What country are you based in?

3. What is the primary role of your organisation?

4. What is your role in the organisation?

5. What percentage of your time is spent dealing with the Peer Review of HPC facilities?

General questions

6. Do you have a single national Peer Review process? (Yes/No)

a. If yes, what is the name of the organisation in charge of Peer Review?

b. If no, please state the names of the organisations and the names of the HPC systems for each Peer Review process.

c. Please state the name of the system for which you are answering the following questions.

7. How often are the HPC systems used by industry?

- More than 50 % of the time
- 25 - 50 % of the time
- 10 - 25 % of the time
- 5 - 10 % of the time
- Less than 5 % of the time
- Not at all

a. Which systems does industry use?

b. Are proposals from industry Peer Reviewed? (Yes/No)

c. Do you charge fees for industry usage? (Yes/No)

d. If so, how much do you charge?

8. Are all submitted proposals Peer Reviewed? (Yes/No)

a. Which proposals are not Peer Reviewed?

b. Do all proposals receive the same level of Peer Review? Please explain.

Technical Assessment

9. Do you carry out a technical assessment of proposals? (Yes/No)

a. If no, go to question 14.

b. If yes, is the technical assessment separate from the scientific assessment? (Yes/No)

c. If yes, in what way?

10. What criteria do you use to determine technical feasibility?

11. At what stage is the technical assessment carried out? (select all that apply)

- Before the scientific assessment
- At the same time as the scientific assessment
- After the scientific assessment

12. What is the result of the technical assessment process? (select all that apply)

- Rejection
- Approval
- Consultation
- Other (please specify):

What are the main reasons for rejection?

13. Who performs the technical assessment and what specific expertise is required?

Scientific assessment

14. Do you have a resource allocation panel (RAP) or equivalent to determine which proposals should be given priority for funding? (Yes/No)

a. If no, what process is used for awarding time on HPC systems?

15. Does the RAP (or equivalent panel) carry out the scientific Peer Review assessment of a proposal themselves? (Yes/No)

a. If yes, how is this done and under what conditions?

b. If no, how does the RAP (or equivalent panel) make their decision?

- Provided with independent, written referees' comments.
- The RAP do not re-referee the proposals.
- Carry out their own assessment of the proposal with the aid of written referees' comments. The Panel can re-referee.
- Other (please specify)

16. Where written referees' comments are used, who chooses the referees? (select all that apply)

- RAP
- Office/funding agency
- Applicants
- Other (please specify)

17. Are the referees given assessment guidelines? (Yes/No)

a. If yes, when and how do they receive these?

18. Are the referees' identities kept secret? (select all that apply)

- From the Panel
- From the applicant
- From the office/funding agency

- Not at all

19. Are the proposals prioritised? (Yes/No)

a. If yes, on what criteria are the proposals prioritised?

20. Does the RAP (or equivalent panel) prioritise proposals according to published criteria? (Yes/No)

21. Does the RAP (or equivalent panel) have the power to cut/alter the requested time allocations? (Yes/No)

22. Does the RAP (or equivalent panel) have the power to decide that the proposal is suitable for running in a less costly system (e.g. cluster)? (Yes/No)

23. Is the RAP (or equivalent panel) responsible for making the funding decision? (Yes/No)

a. If no, who is responsible for the funding decision?

24. Does the RAP (or equivalent panel) make recommendations on the funding decision? (Yes/No)

a. If yes, to whom does the RAP (or equivalent panel) make recommendations?

25. Is the RAP (or equivalent panel) a standing panel with fixed membership? (Yes/No)

a. If yes, how long do members serve for?

b. How many members are there and how are they selected?

c. How often is membership changed and how is this done?

Application procedures

26. Are the assessment criteria publicly available? (Yes/No)

a. If no, are applicants made aware of the criteria prior to submission? (Yes/No)

27. Do you operate an online submission process? (Yes/No)

a. If yes, please state the website address?

b. Do you also require proposals in hard copy? (Yes/No)

28. Do you allow proposals to be withdrawn during the process? (Yes/No)

a. If yes, under what circumstances do you allow proposals to be withdrawn?

29. Do you have different categories of proposals according to the amount of CPU requested? (Yes/No)

a. How do you categorise the proposals?

30. Does the evaluation depend on the proposal type? (Yes/No)

a. If yes, in what way?

31. How frequently do you run calls for proposals? (select all that apply)

- All year round
- Periodically
- Other (please specify):

a. How many periodic calls are there a year?

b. Do the periodic calls apply to all types of proposals and subject areas (please give details)?

32. Do you have fixed timelines for all Peer Review steps? (Yes/No)

a. If yes, please describe.

33. How long is the length of time during which the applicants can use their allocated computing time?

a. Do you have the same allocation time frames for all types of proposals? Please explain your answer.

b. Do you extend the allocation time frame, if necessary? (Yes/No)

i) How do you do this?

ii) Who takes the decision?

34. Do you request a report at the end of a project? (Yes/No)

a. If yes, what are the requisites for these reports?

b. If no, do you perform any form of evaluation at the end of the project?

35. Is it possible to change the granted resources? (Yes/No)

a. If yes, what is the procedure? Does it require a separate proposal?

b. Is this by the applicant's request or based on available resource?

c. Are the new funds subject to further Peer Review?

36. Is there any interaction between the assessing body/Peer Reviewers and the applicant during the assessment process? (Yes/No)

a. If yes, in what way?

37. How many proposals, on average, are assessed each year?

a. Has this increased or decreased over the past 5 years?

38. Do you inform the applicant about the progress/state of the assessment? (Yes/No)

a. If yes, how is the information passed on?

39. Is the applicant able to respond to the referees' comments prior to the Panel meeting? (Yes/No)

a. Who sees the applicant response? (select all that apply)

Reviewers

Panel

Office/funding agency

40. Is there a right to appeal? (Yes/No)

a. If yes, to whom do applicants appeal and how?

b. Are there fixed deadlines for the appeals and if so what are they?

41. Do you have any further information that you would like to add?

Thank you
You have completed and submitted this survey.

7.3 Survey results

A brief summary of some of the pertinent results of the survey is given below[20]. The numbers between parentheses correspond to the number of respondents choosing the corresponding answer.

General questions

6. Single national peer review system:

Yes – 38.9% (7), No – 61.1% (11)

7. How often are the HPC systems used by industry?

5–10% of the time – 5.6% (1);

Less than 5% of the time – 66.7% (12),

Not at all – 27.8% (5)

b. Proposals from industry are peer-reviewed:

Yes – 33.3% (6), No – 66.7% (12)

c. Fees for industry usage are charged:

Yes – 72.2% (13), No – 27.8% (5)

8. All submitted proposals are peer-reviewed:

Yes – 61.1% (11), No – 38.9% (7)

a. Which proposals are not peer-reviewed:

Proposals for testing, code development and very small proposals.

Technical assessment

9. Technical assessment is carried out:

Yes – 83.3% (15), No – 16.7% (3)

b. Technical assessment separate from scientific assessment:

Yes – 66.7% (12); No – 16.7% (3), No reply – 16.7% (3)

11. Technical assessment carried out:

Before scientific assessment – 6, at same time – 8, after – 4

12. Result of technical assessment:

Rejection – 8, approval – 9, consultation – 12

Scientific assessment

14. Existence of RAP (Resource Allocation Panel) or similar:

Yes – 88.9% (16), No – 11.1 % (2)

15. Does RAP carry out assessment of proposals?

[20] Only the answers to the questions that can be translated in numerical values have been included to avoid making the document very lengthy.

Yes – 50% (9), No – 50% (9)

16. Who chooses the referees?

RAP – 5, Office – 6, Applicants – 2, other – 7

17. Referees are given assessment criteria:

Yes – 66.7% (12), No – 33.3% (6)

18. Referees are kept secret:

From panel – 3, from applicant – 14, from funding agency – 2, not at all – 2

19. Proposals are prioritised:

Yes – 66.7% (12), No – 33.3% (6)

20. Does RAP prioritise?

Yes – 50% (9), No – 50% (9)

21. Does RAP have the power to cut/alter requested allocation time?

Yes – 88.9% (16), No – 11.1% (2)

22. Can the RAP decide that the proposal is suitable for running in a less costly system?

Yes – 78.8% (14), No – 22.2% (4)

23. Is the RAP responsible for the funding decision?

Yes – 50% (9), No – 50% (9)

24. Does the RAP recommend funding?

Yes – 38.9% (7), No – 55.6% (10), No reply – 5.6% (1)

25. Is the RAP a standing panel with fixed membership?

Yes – 94.4% (17), No – 5.7% (1)

a. Duration RAP membership:

From 1 year to 6 years

b. Number of members in the RAP:

From 3 to 44

Application procedure

26. Assessment criteria are public:

Yes – 83.3% (15), No – 16.7% (3)

27. Online submission:

Yes – 66.7% (12), No – 33.3% (6)

b. Are proposals in hardcopy also required?

Yes – 22.2% (4), No – 50% (9), No reply – 27.8% (5)

28. Can proposals be withdrawn during the process?

Yes – 94.4% (17), No – 5.6% (1)

29. Different categories of proposals according to the amount of CPU requested:

Yes – 50% (9), No – 50% (9)

a. Different types of proposals:

If there are, most depend on the number of CPU hours requested.

30. Evaluation depends on proposal type:

Yes – 55.6% (10), No – 44.4% (8)

31. Calls: all year round – 11, periodically – 9 (1 to 3 times per year)

32. Fixed timelines for peer-review steps:

Yes – 61.1% (11), No – 38.9% (7)

33. Allocation time:

Majority 1 year

b. Can allocation time be extended?

Yes – 83.3% (15), No – 16.7% (3)

34. Report at the end of the project:

Yes – 55.6% (10), No – 44.4% (8)

35. Can granted resources be changed?

Yes – 77.8% (14), No – 22.2% (4)

36. Interaction between the assessing body/Peer Reviewers and the applicant during the assessment process:

Yes – 33.3% (6), No – 66.7% (12)

37. How many proposals are assessed per year:

The answers are from 100 to 600

a. Has the number of proposals increased in the last 5 years:

Yes (majority)

38. Information to applicant about progress/state process:

Yes – 55.6% (10), No – 44.4% (8)

39. Is the applicant able to respond to referees' comments prior to Panel meeting?

Yes – 16.7% (3), No – 83.3% (15)

a. Who sees the applicant response?

Reviewers – 2, Panel – 3, Office – 2

40. Right to appeal:

Yes – 55.6% (10), No – 44.4% (8)