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Research Infrastructures**

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Performance Computing (HPC) service PRACE**



PRACE-1IP

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References and Applicable Documents

- [1] Implementation phase deliverable D2.3.2: Funding scenarios for the long-term PRACE infrastructure
- [2] Preparatory phase deliverable D2.3.3: Document on Funding Agreement
- [3] Preparatory phase deliverable D2.2.1: Evolution scenarios for PRACE operational and procurement model

List of Acronyms and Abbreviations

BSC	Barcelona Supercomputing Center (Spain)
CINECA	Consorzio Interuniversitario, the largest Italian computing centre (Italy)
CSC	Finnish IT Centre for Science (Finland)
CSCS	The Swiss National Supercomputing Centre (represented in PRACE by ETHZ, Switzerland)
DEISA	Distributed European Infrastructure for Supercomputing Applications. EU project by leading national HPC centres.
EC	European Community
EPSRC	The Engineering and Physical Sciences Research Council (United Kingdom)
ESFRI	European Strategy Forum on Research Infrastructures; created roadmap for pan-European Research Infrastructure.
FZJ	Forschungszentrum Jülich (Germany)
GENCI	Grand Equipement National de Calcul Intensif (France)
HPC	High Performance Computing; Computing at a high performance level at any given time; often used synonym with Supercomputing
NCF	Netherlands Computing Facilities (Netherlands)
NCSA	National Centre for Supercomputing Applications (Bulgaria)
NDA	Non-Disclosure Agreement. Typically signed between vendors and customers working together on products prior to their general availability or announcement.
PRACE	Partnership for Advanced Computing in Europe; Project Acronym
PSNC	Poznan Supercomputing and Networking Centre (Poland)
RI	Research Infrastructure
SSC	Scientific Steering Committee
TCO	Total Cost of Ownership. Includes the costs (personnel, power, cooling, maintenance) in addition to the purchase cost of a system.
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

Executive Summary

In-kind contributions provide an effective and economically efficient mechanism to deliver products and services required by the PRACE Infrastructure. Indeed, while the development and delivery of many of those are (or will be) funded under the first two Implementation Phases (PRACE-1IP and 2IP), a number of them could not be addressed under this framework due to budgetary constraints, restrictions on eligibility of costs or because they encompass tasks or contributions for which the expertise or assets of the PRACE members are essential. It cannot be assumed that PRACE will always be supported with EC funding and therefore, in the future, in-kind contributions will underpin much of the work of the PRACE legal entity. In-kind contributions have the added benefit of providing an inclusive framework in which all PRACE partners should feel that they can receive value from PRACE, as well as providing value to PRACE.

In this report, in-kind contributions have been defined as “any non-monetary contribution to PRACE, and accepted by PRACE, for which it is possible to assign a nominal value for voting rights”. A set of key principles that any contributions will have to abide by in order to be acceptable to PRACE has also been proposed, including:

- Value for money;
- Relevance to PRACE goals;
- Ability to audit;
- Transparent and equitable accounting;
- Environmental considerations.

A review of the current frameworks for managing in-kind contributions at the X-Ray Free-Electron Laser (XFEL) and European Synchrotron Radiation Facility (ESRF) has been undertaken. This has been a useful exercise but these models are not entirely applicable to PRACE as the in-kind contributions are not yet focussed on the long-term provision of a service, which is PRACE’s primary goal. However, some of the good practises around accounting mechanisms, non-delivery and disputes provide a good foundation for PRACE to build on.

The relative merits of models for costing contributions, including models where the costs of a person-month is either fixed by the contributor(s), or by PRACE directly, and alternatives where PRACE would only suggest a maximum cost have been explored, and led to the view that PRACE would be better served by retaining the flexibility to select the most appropriate model on a case by case basis. Options for the determining the delivery of contributions have been classified under 3 models: the first based on the concept of “calls for proposals” where the PRACE Director issues internal calls based on PRACE’s actual needs (Model A); the second known as “Member Directed”, where only general guidelines are issued and partners propose the nature of their contributions (Model B); and finally the “PRACE Directed” model, where contributions are directed, with PRACE putting in place multi-partner teams (Model C).

The models are described in detail, and the advantages and disadvantages of each model for the PRACE association and the member(s) contributing the in-kind contributions are analysed. A summary of the advantages and disadvantages of each model is presented as a table in the document.

This deliverable builds on work undertaken in the preparatory phase of the PRACE project and described in its deliverables. It will also lay the foundations for deliverable D2.3.2 in the

1IP project. The authors understand that in-kind contributions need to be dealt with immediately within PRACE so the recommendation is that the PRACE Council and PRACE Director work with the options presented in this document, without choosing one option as preferred at this stage. The experience of working with in-kind contributions and in dealing with the issues that arise will be invaluable in determining some further recommendations in D2.3.2 which discusses the wider funding model for PRACE.

1 Introduction

The aim of this deliverable is to present a series of options to the PRACE Council on how in-kind contributions can be measured and managed. It is the suggestion of the authors that different mechanisms are employed depending on the size, nature and timeliness of the in-kind contribution being offered to PRACE. The decision on what type of method should be used to measure an in-kind contribution should be taken by the PRACE Director with the endorsement of the PRACE Council.

This document introduces the concept of in-kind contributions by referring to previous work undertaken in the Preparatory Phase project and comments on some underlying issues that will need to be considered by the PRACE Council before they formally implement a route for measuring in-kind contributions (section 1.2). Some discussion on why PRACE needs to deal with in-kind contributions follows in section 2.

Types of in-kind contribution that may be accepted by the PRACE legal entity are listed and categorised (section 3.1). A brief description is then given on other organisations that currently deal with in-kind contributions (section 3.2). In the subsequent deliverable D2.3.2 entitled funding scenarios for the long-term PRACE infrastructure [1], more detail will be provided on how in-kind contributions are handled by other large organisations in the context of their wider funding mechanisms.

Following these sections, options for PRACE are articulated. These include considerations of costing models (section 4.1) followed by descriptions of three example models of how a PRACE in-kind mechanism could be managed (section 4.2). These models present the extremes of how in-kind contributions could be delivered and they are not mutually exclusive of each other. The recommendation from the authors is that some elements of all the examples presented could be used to manage the variety of types of in-kind contributions that PRACE will be faced with.

The final sections (sections 4.3 and 0) discuss how these contributions could be linked to voting rights, the issues that will face PRACE in implementing a mechanism or mechanisms to deal with in-kind contributions and the work that will be needed in the future.

Where PRACE is referred to during this deliverable, this refers to the PRACE AISBL legal entity. The EC funded projects that support the PRACE AISBL legal entity are always explicitly referred to as such.

1.1 Previous work

In Deliverable D2.3.3: Document on Funding Agreement [2] from the preparatory phase project of PRACE, four options for valuing in-kind contributions were presented. These were:

Option 1: An in-kind contribution is valued based on the cost to the provider of the service. If the provider works in a currency that is not the currency of PRACE, it should be converted in to the PRACE currency¹.

Option 2: An in-kind contribution is valued based on the number of person months² contributed by the provider to the task. PRACE agrees a standard value for each person

¹ The PRACE currency is yet to be defined but is likely to be the Euro as this is the currency of a large number of members and is the working currency of the European Commission.

² A person month is the actual working hours (including holiday, sick leave and training) that are worked in a calendar month. This number will vary between different organisations depending on benefits and the contracted working week.

month. A small number of value levels may be needed to be defined in order to cover the level of expertise required to deliver individual tasks e.g. administrative, technical, highly specialist.

Option 3: A model where person months are accounted for on a fixed PRACE cost scale, but other costs are accounted for on actual cost in the PRACE currency³.

Option 4: A model where the in-kind contribution accounts for e.g. 50% of the value that would be attained compared to a direct cash contribution. This maintains the attractiveness of cash contributions to members which will increase the flexibility of PRACE in delivering the services it needs. This additional approach can be applied to any of the three options described above.

Options 1, 2 and 3 are incorporated into the cost models presented in this document. With the introduction of an annual cash contribution to PRACE from each member, option 4 is less attractive to members. It may still be a way forward for PRACE in the future, however, particularly after the end of the Initial Period when procurement and associated functions are likely to be centralised. At this point, it is expected that PRACE will have a clear future strategy as to where it invests its money and in-kind contributions. It also cannot be assumed that PRACE will still be receiving EC funding at this point. Option 4 can be applied to all scenarios presented within this document but it is not explicitly discussed at any point.

In-kind contributions should be considered in tandem with the operational and procurement models presented in deliverable D2.2.1: Evolution scenarios for PRACE operational and procurement model [3] of the implementation project and many of these concepts will be drawn together into D2.3.2: Funding scenarios for the long-term PRACE infrastructure [1].

1.2 Inherent issues for in-kind contributions

Because of the way that PRACE is currently working (with Tier-0 resources being contributed by members rather than procured centrally), there are some additional features (especially during the Initial Period) which should be considered when implementing any in-kind contribution process.

During the PRACE Agreement for the Initial Period, cycles will be contributed as an in-kind contribution from PRACE Hosting Members. Although these should be managed using the same principles as all other in-kind contributions, the nature of donating cycles, especially as a percentage of a national resource, does hold some additional subtleties such as needing to manage timescales to meet national needs as well as PRACE needs. These will not be discussed in detail here, but will be expanded upon in the second deliverable for this task, D2.3.2: Funding scenarios for the long-term PRACE infrastructure [1].

Once a process for measuring in-kind contributions has been established, it is going to be necessary for PRACE to deal with the in-kind contributions that have been made prior it being in place. Examples at the moment include the contribution of Tier-0 resource from GAUSS and GENCI and the staff, management and administration resources that have been contributed in order to implement and run the peer review process.

Another consideration, which needs to be discussed and implemented by PRACE Council as a priority and will then be detailed in D2.3.2, is to ensure there is an understanding of what mitigating actions will be taken if a member promises an in-kind contribution but does not

³ For example, if a workshop was run for PRACE as an in-kind contribution then the costs of venue hire would be charged to PRACE in whatever currency it chooses to work in (probably the Euro) but the effort that staff have put in for the organisation will be charged according to a fixed PRACE cost and not based on the actual cost that the member has incurred.

deliver. This becomes important where PRACE's credibility, reputation or capability is influenced due to a promised in-kind contribution not being forthcoming. To date, this has not been experienced by PRACE and therefore is deemed to be a low probability risk. However, if PRACE is relying significantly on any particular in-kind contribution, appropriate consideration should be given to the scale of this risk.

Although these points should be considered during the reading of the rest of this deliverable, they will not be discussed further here, nor should they have any bearing on the different models at this stage. Further, and more specific, issues are discussed at the end of this deliverable.

2 Description of the topic: rationale for in-kind contributions in the context of PRACE

As intimated above, the structure of PRACE as a partnership is a great strength to the organisation, meaning that in-kind contributions are possible whereas in other organisations external expertise would need to be bought in. Therefore in-kind contributions should be seen as a route to strengthen the mission and vision of PRACE⁴ and, if effectively managed, to bring added value that could not be achieved if services were merely bought from external sources.

Though much of the activity to date to determine the establishment and operation of PRACE has been funded by the European Commission as part of the PRACE Implementation Phase projects 1IP and 2IP, a number of key activities still remain to be addressed, either because they were considered as non-eligible costs under the xIP framework, or because of budget restrictions placed on xIP. Now, and in the future, in-kind contributions will be a legitimate route for PRACE to meet its needs.

For the purposes of this analysis, accepting that it may be refined during later work, the definition of an in-kind contribution is **any non-monetary contribution to PRACE, and accepted by PRACE, for which it is possible to assign a nominal value for voting rights.**

This definition encompasses four fundamental concepts:

1. the essential characteristic of an in-kind contribution (a non monetary contribution)
2. who the beneficiary of the contribution is (PRACE),
3. the existence of an authorisation process (PRACE has to accept the contribution), and
4. the possibility of a mapping of its qualitative characteristics to the quantitative measure of voting rights (it must be possible to compute a nominal value for voting rights).

It may not be necessary to agree the in-kind contribution in advance. For example, although it would be expected that items such as training courses always will be agreed beforehand, it could be foreseen that a code could be developed and its worth to PRACE only recognised after the work had been done.

⁴ The mission of the Partnership for Advanced Computing in Europe (PRACE) is to contribute to the advancement of European competitiveness in industry and research through the provision of a world-leading persistent high-end HPC infrastructure, which includes related support.

The vision of the Partnership for Advanced Computing in Europe (PRACE) is to fully support Europe in attaining global leadership in public and private research and development

It will be necessary to publish a framework of planned activities, which also takes into account unplanned activities, at least once a year.

When considering any in-kind contribution, there are a series of principles that should always be applied. These are described in the following table.

Principles for in-kind contributions

<i>Value for money</i>	This ensures that PRACE does not just choose the cheapest option but also considers what the best value to PRACE is. This should be based on the quality of the service offered, the potential impact that could be gained from the contribution and the way the contribution and resources will be managed.
<i>Relevance to PRACE goals</i>	Any activity must be in-line with the PRACE mission and vision and ensure that value is added to the PRACE organisation. If the relevance to PRACE cannot be articulated then the activity should not be endorsed.
<i>Ability to audit</i>	Members who undertake in-kind contributions must make sure that there is an audit trail which can be followed if PRACE decides to check the costs. This will involve keeping a record of staff time, storing receipts and maintaining a record of all hardware time used for the contribution.
<i>Transparent and equitable accounting</i>	It should be clear in any proposal made to PRACE for an in-kind contribution where the costs have come from. In any competitive process, all members should be required to list the same costs and justify why they ask for the resources they are requesting. Justification of the resources requested is essential for any application for an in-kind contribution.
<i>Efficient and effective costing</i>	It must be clear to PRACE that the costs that have been presented by the member to represent the in-kind contribution at its actual value and that these costs are representative of the resources that will be required.
<i>Environmental considerations</i>	Where a member can show that the contribution they are providing is less wasteful than another, this shall be taken into consideration when assessing the value of their contribution.
<i>Other considerations</i>	Although not a primary principle, the necessity to have in-kind contributions from a range of PRACE members should be considered.

Table 1: Principles of in-kind contributions to PRACE

3 Analysis of in-kind contributions

There are a variety of possible in-kind contributions which could be given to PRACE and it is likely that these will need to be considered in different ways. As a basis to determining the best way forward for PRACE to manage in-kind contributions, current practises employed by two other European organisations are presented.

3.1 Types of in-kind contributions

This section presents possible in-kind contributions to PRACE within different categories. This is not an exhaustive list and may not encompass all in-kind contributions

The most straightforward classification puts the in-kind contributions into groups according to how relevant they are for PRACE. Therefore, initially the set of contributions has been ranked according to three different qualitative values of relevance: essential, high impact and desirable.

Essential in-kind contributions

These in-kind contributions are provided by the Hosting Members to procure, deploy and operate the PRACE Tier-0 systems up to a total value of 100 Million Euro per Hosting Member for the first five years (committed as total cost of ownership in the Agreement for the Initial Period). These are essential contributions that in the current usage and funding model cannot be obtained by any alternative means.

- Hardware
- Staff
- Operating costs and power
- Facilities including buildings
- System Software
- Connectivity

Depreciation must be taken into consideration in some of these contributions and this will decrease their value over time.

High impact in-kind contributions

These contributions are of high value for PRACE since they address activities or products for the association. PRACE members would be the best suited to provide many of these contributions and they would be difficult to procure cost-effectively from outside of PRACE.

- Scalable software (licenses and applications)
- Staff training
- Code optimisation and porting (technology and system) for agreed or recognised codes
- Technology assessment for peer review
- Future technology assessment and evaluation
- User support. e.g. help desk service
- Middleware
- Data storage
- Certification of software

- Head office functions. e.g. communications, legal, procurement, coordination, and peer review coordination

Desirable in-kind contributions

These contributions will provide value to PRACE but either they are not critical for the association or they could be obtained with ease from providers outside the association.

- User training
- Code optimisation and porting (scientific)
- Scientific code development
- Research on interconnection and data sharing

The in-kind contributions above have also been classified both by the ability to measure their cost to PRACE (easy, medium or hard to measure costs) and the nature of the contribution (contribution of people, equipment, overheads or others). The following table provides a crossed classification of these two criteria.

Ability to measure cost	Type of contribution			
	<i>People</i>	<i>Equipment</i>	<i>Overheads</i>	<i>Other</i>
<i>Easy</i>	– Head office functions	– Access to hardware	– Operating costs and power (excluding staff) – Facilities including buildings	– System software – Connectivity
<i>Medium</i>	– Staff training – Technology assessment for peer review – Future technology assessment and evaluation – User support – Certification of software – Scientific code development – Research on interconnection and data sharing			– Scalable software (including licenses, applications, code optimisation and porting) – Middleware – User training (costs on staff effort can add difficulties in the measurement)
<i>Hard</i>	– Staff (overall – encompasses all other staff activities)			

Table 2: Classification of potential PRACE in-kind contributions by ease of measurement and type

This table shows that contributions using people have different degrees of difficulty in cost evaluation depending on the precision of the task to be accomplished: the more precise the task, the easier the evaluation. However, once a cost for staff has been quantified it should be possible to apply this to all staff-based activities so although the initial decision will be difficult, working with these contributions should become easier with experience. On the other hand contributions of equipment and overheads are usually easy to measure. The table also shows that the majority of contributions are concerned with the provision of human resources, although in monetary terms infrastructure costs are likely to dominate.

3.2 Current practises for handling in-kind contributions

There is currently no uniform way of providing and measuring in-kind contributions in Europe. The existing practices are influenced by the formal organisational structure (not for profit organisation, international organisation etc.) and depend on the nature (product/services) of the in-kind contributions. One of the main reasons is that in-kind contributions are hard to quantify and therefore be valued in a way that is acceptable to all parties. In some cases, the fair market value of the item is known. In other cases, the value must be assessed using commonly accepted methods or may need to be estimated (software development) and eventually reviewed following the execution of the task.

In addition, based on the majority of the examined in-kind contribution practices, it can be concluded that they are not always carefully documented and justified. Best practice suggests that they ought to be, so this is highlighted as an important issue for PRACE to consider. When an organisation is subject to audit, as PRACE will be, and the financial report is incomplete, the costs may be questioned if it is not clear how decisions have been made.

3.2.1. Collecting and presenting information

Information for several organisations that use in-kind contributions in their organisational and business models has been studied and gathered. This relied on publically available information, taking into consideration that the nature of these in-kind contributions is different to those that PRACE will handle.

Furthermore, due to the fact that the provision of in-kind contributions is strategically important to the sustainable development of PRACE, preliminary criteria were formulated for the inclusion of organisations in this report:

- High level of formal description and publically accessible information on the internal rules and procedures;
- Clear pan-European dimension of presented practices;
- Possibility of replication by PRACE.

Based on the above prerequisites and criteria, two practices were chosen as illustrations of multi-institutional approaches to in-kind contributions.

In the following deliverable D2.3.2: Funding scenarios for the long-term PRACE infrastructure [1], a wider analysis of relevant organisations will be considered. If appropriate, their approaches to in-kind contributions will be presented as part of their wider funding models.

3.2.2. *Examples of current practises*

In the text below two examples of multi-national research-based organisational approaches to in-kind contributions are given. Both X-Ray Free-Electron Laser (XFEL) and European Synchrotron Radiation Facility (ESRF) have publicly documented procedures for dealing with in-kind contributions. The level of accessibility to this information, the clear pan-European scope of the projects as well as the strong organisational model for the provision of in-kind contributions made them good candidates for the analysis of their approach to in-kind contributions.

X-Ray Free-Electron Laser (XFEL)

The European XFEL⁵ is a research facility currently under construction in the Hamburg area of Germany. From 2014 on, it will generate extremely intense X-ray flashes to be used by researchers from all over the world. The construction costs of the facility, which includes the commissioning, amount to 1082 million Euros (price levels of 2005). As the host country, Germany covers 54% of these costs. Russia bears 23% and the other international partners between 1 and 3.5%. To a great extent, the building of the European XFEL facility will be realised by means of in-kind contributions by shareholders and partners⁶.

In the XFEL project, there are formal procedures for accepting in-kind contributions involving a broad range of units. XFEL uses an **In-Kind Review Committee**, and has rules of procedure for this committee. It works closely together with the XFEL Management Board, the XFEL Council, the Administrative and Finance Committee (AFC), the Scientific Advisory Committee and the Machine Advisory Committee.

According to the internal provisions of XFEL, each Shareholder may provide only:

- technical components and/or
- personnel

as contributions in-kind.

According to the internal provisions on in-kind contributions, the in-kind contributions shall be credited on a yearly basis unless otherwise agreed. In-kind contributions must be designed against unambiguous specifications and clearly respect defined interfaces and standards and these interfaces and standards will be provided by XFEL in a timely manner.

The main steps in the process that XFEL will use for dealing with in-kind contributions are illustrated in figure 1, below.

⁵ <http://www.xfel.eu/>

⁶ http://www.xfel.eu/overview/in_brief/

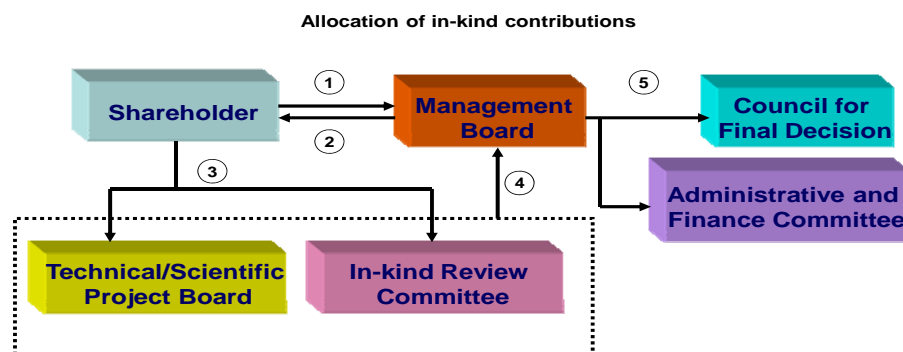


Figure 1: Scheme illustrating allocation of in-kind contributions to XFEL

During this process, a series of internal procedures are followed:

1. Each Shareholder may express their interest to the Management Board of XFEL in providing an in-kind contribution.
2. The Management Board of XFEL will discuss the details with the institute(s) who have the Shareholders indicate as being in charge of the in-kind contribution. They are also informed about the value of this contribution as set out in the XFEL cost book.
3. A Technical/Scientific Project Board and the In-Kind Review Committee shall assess the Shareholders' proposal.
4. Once a consensus is reached, they shall forward their proposal to the Management Board.
5. The Management Board transmits it to the XFEL Council for final decision. The Administrative and Finance Committee are also kept informed.

The Management Board shall regularly update a detailed list of the in-kind contributions that each Shareholder provides to XFEL. The list shall show the agreed attributed values per country, as well as the planned timescales, including delivery dates of the specific contributions.

In the event that more than one Shareholder is interested in contributing the same work package or overlapping subsets, a competitive bidding process shall take place or there shall be negotiations to try and establish a collaborative effort. As a result, an in-kind contribution may be allocated to a group of Shareholders.

Further in-kind contribution guidelines for XFEL are set out below.

In-kind Contributions Agreement

Each in-kind contribution shall be the object of a specific contract agreed between XFEL and the Shareholder(s).

Responsibility for production and delivery

The Shareholder(s) who contribute in-kind has/have the full technical, financial and commercial responsibility for the production and delivery of the in-kind-contribution.

XFEL has the overall responsibility for the correct and adequate functioning of the Facility and its various systems.

XFEL retains the right to monitor the progress of the in-kind contributions and shall therefore be accorded access to relevant information and data. This includes regular progress reports, meetings and visits of XFEL technical personnel for monitoring.

The Management Board shall report to the XFEL Council on the accruals of earned value for in-kind contributions in relation to the expected progress. XFEL can impose project management support if the need arises.

Adjustments to Allocations

After prior consultation with the Management Board and subject to the approval by the Council, a Shareholder may, in exceptional cases, renounce, transfer or receive an obligation to provide a specific contribution in-kind from another Shareholder.

Changes of costs and remedy

If unforeseeable and exceptional circumstances, not attributable to the Shareholder, cause an increase in costs, the Shareholder can request further funding from the Council.

Consequences of delayed and deficient delivery

If a Shareholder does not deliver the in-kind contribution as agreed upon, the agreed value of the respective contribution will not be counted towards the Shareholder's overall contribution to XFEL and, subject to the provisions set out in the following paragraphs, will have to be replaced, fully or partially, by contributions in cash.

If a Shareholder does not deliver the in-kind contribution according to the schedule set out in the contract, the Council, following recommendations from the In-kind Review Committee and the Management Board, will decide whether or not the delayed in-kind contribution can still be accepted and to what extent the Shareholder shall recompense XFEL for any financial losses resulting from the late delivery.

Assessment and passage of title

After a Shareholder has delivered the in-kind contribution as specified in the agreement, a formal evaluation shall take place, in which the respective project management units of the parties (e.g. work package leaders) evaluate the compliance of the delivered components with the quality criteria set out in the agreement.

Disputes

Any problems arising during the execution of the in-kind contribution or any disagreement concerning the compliance of the in-kind contribution with the contractual specifications and milestones are settled according to the special procedure set out in the XFEL Financial Rules.

European Synchrotron Radiation Facility (ESRF)

The European Synchrotron Radiation Facility (ESRF), located in Grenoble, France, is a centre of scientific excellence supported and shared by 19 countries. Since its opening in 1994, this "supermicroscope" produces the brightest X-rays in Europe to investigate everything from biological molecules, sustainable polymers and nanostructures to archaeological treasures and innovative components for fuel cells.

The programme for accepting in-kind contributions has not yet started in ESRF. The provisions for members' in-kind contributions to the Upgrade Programme (UP) will be managed to conform to the ESRF Convention and Statutes as well as the existing financial rules and internal financial regulations (IFR). They will apply to the duration of the Programme.

No Member will be able to contribute more than 25% of their total additional subscription cost to the UP in this manner and this 25% is an average figure across the complete UP and not 25% per annum.

According to the ESRF Council Resolution, each member may provide only the following in-kind contributions:

- Personnel made available to perform specific tasks related to the UP;
- The outcome of collaborations between the ESRF and organisations from the Member countries on specific technical developments not readily available on the market (e.g. prototypes) and necessary for the UP;
- The outcome of a call for tender procedure carried out following the ESRF IFR.

Each individual in-kind contribution will be subject to a specific agreement between ESRF, the Member and any other concerned parties.

The procedure for Members' in-kind contributions to the UP is as follows:

1. Notification of need
2. Personnel made available to perform specific tasks related to the UP
3. Collaborations between the ESRF and organisations in Member countries
4. In-kind contributions following a call for proposals procedure

In-kind contributions are going to be implemented under the control of the ESRF Management with the approval of ESRF Council via a written procedure. Approval will be by a qualified majority. Following the approval of the outcome, Members will be informed of the decision.

The Member's contribution in-kind is added to their cash contribution and details of these in-kind contributions will be provided as a separate annex for reporting purposes to the AFC (Acting as the Purchasing Committee) and ESRF Council.

It is planned that each Member's in-kind contribution will be covered by a separate agreement between the ESRF, the Member country and any other concerned parties as appropriate. Each agreement will contain a financial annex that details the schedule of payments to be made by the Member.

3.2.3. Points to consider for PRACE

Although both XFEL and ESRF are quite different organisations to PRACE and the likely in-kind contributions will be of a different nature, there are some key points that PRACE Council should consider when implementing a strategy for in-kind contributions.

- Both ESRF and XFEL Councils are the end point in the in-kind contributions review procedure.
- A financial log of all in-kind contributions from each member is kept and maintained.
- Regular monitoring of the in-kind contributions should be possible.
- A process is in place to deal with non-delivery or poor quality of an in-kind contribution.
- A disputes procedure is in place.
- Each in-kind contribution has its own individual agreement between the organisation and the contributing member(s) which outlines responsibilities and expectations on each side.

4 In-kind contributions for PRACE

In this section, handling in-kind contributions in relation to PRACE are discussed. Firstly, four models for how a contribution to PRACE could be valued are presented along with their advantages and disadvantages. Much of the detail in these options is based on personnel costs for executing a service which, as identified in section 3.1, will be the hardest part of the cost of an in-kind contribution to measure.

Following this, three models for how in-kind contributions could be handled within PRACE are presented. These options include discussion on the mechanism for working, the advantages and disadvantages of the scheme and how risk mitigation will be managed.

It will be necessary to find and articulate a way to deal with changes in the cost or in the programme of work of an accepted contribution. The options presented in section 4.2 below set out some of the risks associated with the proposed solutions and how these risks can be mitigated. In some instances, the risk lies with PRACE but primarily the risk lies with the contributing member and therefore, members need to be clear what their responsibilities are when agreeing to deliver an in-kind contribution.

4.1 Models for costing contributions

Four possibilities are considered for how the price for an in-kind contribution could be determined within PRACE. There is an obvious need for each model to be subject to a high level of quality assurance. It is not necessary to have just one solution to cover all in-kind contributions and exclude the other ones. It might make sense to apply different solutions to different cases. In any case any offer of an in-kind contribution to PRACE should always explicitly indicate the personnel costs and the material costs so that similar offers can be easily compared.

It is worth noting that in-kind contributions may consist of either pre-existing products or services adapted for the purposes of PRACE, or purpose-built (new) products or services developed specifically as an in-kind contribution to PRACE. It could be envisaged that better value can be achieved by leveraging existing investments, making use of pre-existing service or products available within the Partnership, rather than commissioning the development from scratch of new solutions but this will not necessarily be the case.

Type 1: Fixed Cost per Person Month

In this option PRACE sets the value (cost) of a person month (PM). The member offering the in-kind contribution indicates the number of PMs which will be needed in the proposal. Other costs are listed separately.

Advantages

- Simplicity, including in book keeping
- Easier to compare offers between the countries as only the number of PMs matters

Disadvantages

- Members with higher personnel costs are disadvantaged
- May lead to undesirable practices such as bidding for more PMs to compensate for too low a price or to maximise profit from too high a price
- There is still a question for this model about how a standard PM will cost be defined. It could be a simple value or a weighted average or something else entirely

Type 2: Actual Person Month costs (Price incurred by member)

When offering an in-kind contribution to PRACE, the member states the actual price that will be incurred for the offer.

Advantage

- All countries can indicate their real costs to provide the service

Disadvantage

- Competition between expensive and less expensive members could lead to difficulties in determining value for money

Type 3a: Price set by PRACE

PRACE names the total price it is willing to pay for a contribution and partners manage their costs within that. This solution might only make sense when the nature of the service or contribution is such that it can be easily quantified and PRACE wants to maximise the service delivered. For example, a call for the most powerful computer for a given price can be issued (after the Initial Period is over) but it might not make sense to name the price of a summer school in advance, especially if PRACE decides on a specific location.

Advantages

- Easy to budget and hence link to voting rights
- Members can decide in advance what offers are of interest to them
- Proposals can be evaluated based on quality alone

Disadvantage

- Must be applied carefully to avoid paying out more than the accepted contribution is worth – i.e. a partner could increase costs so that they are just below the threshold whereas if they had not been given a budget they may have been more frugal.

Type 3b: Maximum price set by PRACE

Instead of naming a fixed price, PRACE names the maximum total price it is willing to accept for an in-kind contribution.

Additional advantage compared to type 3a

- This option would still guarantee the competition between the members and therefore PRACE could get the contribution for a better price than initially suggested.

4.2 Options for PRACE

In this section, three models are presented for how PRACE could handle in-kind contributions. These do not cover in-kind contributions which are offered to PRACE after they have been completed (e.g. existing software development that can be considered of interest for PRACE) as this will need to be taken on a case-by-case basis. Each of these models is much more rigid than would be foreseen for use by PRACE but they set out the principle of the mechanism which can then be adapted to match the nature of the in-kind contribution. These are not stand-alone options and elements of each could be used when dealing with different types of in-kind contribution. Each option presented below provides a summary of the model and how it fits to the PRACE requirements and needs. Some advantages and disadvantages are articulated, both for PRACE and the members and the

process by which the option could be managed is described. Quality control, risk mitigation and the assessment of the service post-delivery are also discussed.

In section 4.2.4 a table is presented which summarises the key points of each model and allows easy comparison.

The names used for each model are succinct in order to be able to discuss them more easily in the future. They are not meant to describe the models themselves. This is done by the accompanying text.

4.2.1 Model A: Calls for proposals

A model for managing in-kind contributions according to the specific needs of PRACE is the so called Calls for Proposals model. In this model, PRACE defines the tasks needed and as such has full control over the required in-kind contribution. This implies that the risk mitigation lies mainly with the members.

Operational steps for model A

- a) PRACE establishes a plan for in-kind contributions to be delivered by the members on at least a yearly basis and will release calls for new contributions during the year. The call for proposals will include all the necessary information against which proposals can be made including whether PRACE will have a fixed cost or member costing for each requested in-kind contribution.
- b) Every member of PRACE makes offers for the requested in-kind contribution. If there is no offer from the PRACE member (or members), expertise will be obtained from outside of PRACE. This will lead to a contract with an external service provider and will no longer be treated as an in-kind contribution.
- c) The whole process is managed by the Director with the authorisation of the PRACE Council. The Director will implement all procedures to announce the required in-kind contributions and assess and select applications.
- d) Following the specific conditions in the call for proposals, applicants will either come up with their own costs for the activity (resources) or a fixed cost will apply (fixed costs only make sense if the cost of items can be measured and if PRACE wants to get as much value as possible for the allocated money). The competition between all PRACE members should be encouraged (but is not necessary every time). Members can make proposals individually or as part of a consortium. The decision as to the team making the proposal will come from the members themselves.
- e) The requested in-kind contribution is directed more precisely by the Director or the Council, imposing restrictions when necessary. For example, when calling for applications to run a summer or winter school, the accessibility of the location should be a key criterion.
- f) The principle of transparency is a key one for carrying out a successful process and ensuring members are satisfied. The decisions will generally be taken by the Director but a committee can also be involved to prepare the decisions if the Director feels that this is necessary. The committee could consist of PRACE members themselves and/or external members and will probably depend on the size and nature of the contribution. The Director will always make the final decision and will be responsible for the process itself.
- g) PRACE will decide on what contributions are released as calls for proposals. However, PRACE members will be able to suggest in-kind contributions to the Director, who can then decide, in consultation with Council and the advisory groups, whether this is a reasonable suggestion for an in-kind contribution. If so, this will then be put out as a call to all members.

- h) If there are no proposals received against a call, or if the quality of the proposals received is not sufficient, PRACE will be able to look to external organisations to provide the contribution.
- i) Decision on final overall programme for in-kind contributions. The Director finalises the programme for in-kind contributions (including the accepted contributions offered by members and those activities decided by a call for proposals).
- j) Voting rights. The Director calculates the corresponding voting rights per member according to the rules defined by PRACE and makes sure that the total amount of voting rights resulting from in-kind contributions does not exceed the cap defined by the PRACE Council. The Director passes the information on voting rights to the members.
- k) Council approval. The Director presents the final global in-kind contributions programme for approval by the Council
- l) Quality monitoring. The Director controls the execution quality of each contribution based on the success criteria and the milestones proposed by the member and accepted by the Director.
- m) Final report. The member presents a final report based on the proposed success criteria and milestones to the Director upon final delivery of the contribution.
- n) Award of voting rights. The voting rights corresponding to each contribution are only awarded after successful completion of the contribution.
- o) Final annual consolidated report. The Director prepares a final annual consolidated report (including voting rights) for all in-kind contributions to be presented to the Council for approval.

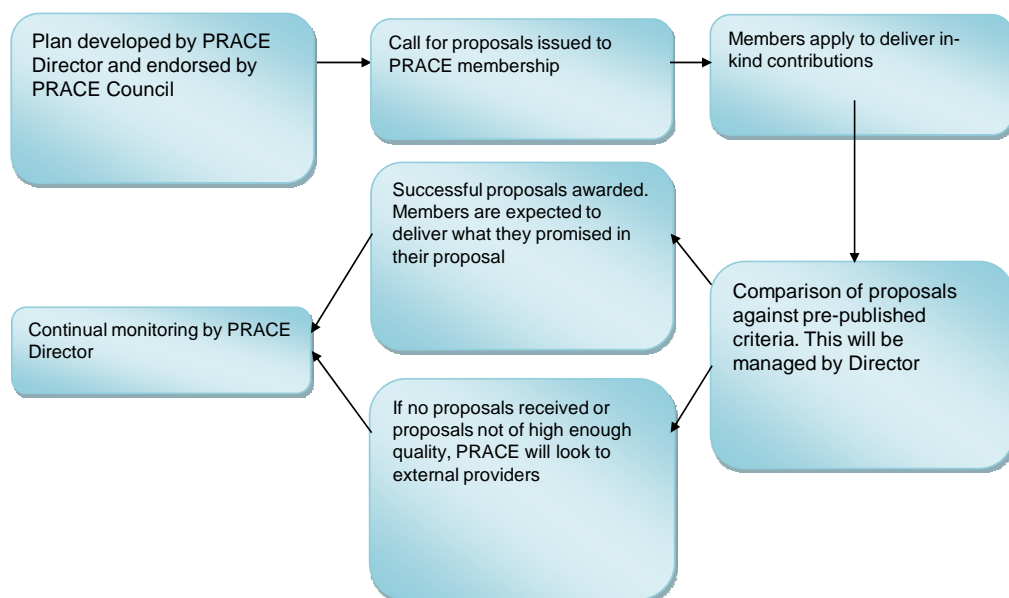


Figure 2: Scheme illustrating the major steps in model A

Advantages and disadvantages of model A

The advantages and disadvantages of model A for PRACE and its members are presented in the tables below.

PRACE	
Advantages	Disadvantages
<p><i>High-level of control over in-kind contributions</i> PRACE can plan and control the different in-kind contributions; this is especially true if the fixed cost model is applied.</p>	<p><i>Unequal spread of in-kind contributions</i> The requested in-kind contributions may end up being concentrated with a small number of members.</p>
<p><i>Competition will ensure best offer selected</i> The calls for proposals process with the competition of different proposals will help to get the best offer.</p>	<p><i>May be subject to additional administrative costs</i> Implementing such a rigorous process will necessarily mean that a lot of work needs to be done into setting up the process, maintaining it and settling any disputes.</p>
<p><i>Experience of members efficiently utilised</i> Members will only offer in-kind contributions where they have experience (quality assurance).</p>	<p><i>Possible problems with European procurement rules</i> In order to ensure that PRACE members are given the first chance to apply to provide services to PRACE, the process must be clearly exempt from European procurement procedure.</p>
<p><i>Alignment of national priorities</i> The need to meet the PRACE goals would encourage members to move their national strategies to align with the PRACE strategy which would strengthen the position of PRACE.</p>	
<p><i>The Director has more power</i> The Director manages the process and as the call for proposals process itself will clearly identify the preferred provider of an in-kind contribution, there is little role for the Council, who will just need to approve the initial plan and the process that will be used.</p>	

Table 3: Advantages and disadvantages of model A for PRACE

PRACE Members	
Advantages	Disadvantages
<p><i>Fair and open to all</i> The calls for proposals process is fair to the members and all members can apply for all contributions.</p>	<p><i>Inflexible methods of delivery</i> The in-kind contributions of PRACE members are limited to the PRACE task requirements.</p>
<p><i>Open competition</i> The competition for contributions will be equal and open to all members.</p>	<p><i>Concentration of members' contributions</i> There are potentially less opportunities for a variety of members to provide in-kind</p>

PRACE Members	
Advantages	Disadvantages
	contributions as the assessment criteria will be strict and it is likely that some members will more easily be regularly able to meet them than others.
	<i>Administratively costly</i> The calls for proposals process will lead to more overheads for the members.
	<i>The Director has more decision power</i> Members are not able to influence the type of in-kind contributions or their method of delivery.

Table 4: Advantages and disadvantages of model A for the PRACE members

Risk mitigation for model A

Quality control of the execution of in-kind contributions offered by the members and the risk mitigation during the carrying out of the contributions are both very important to ensure that all contributions are well executed. The Director bears the overall responsibility for the process and will have to closely monitor the in-kind contributions. The Director will also need to have a contingency plan to cover for non-delivery of a contribution or poor quality of execution. Risks can be mitigated early on in the process by establishing a very precise call for proposals, which takes into account all the necessary boundary conditions. This moves the onus on successful delivery from PRACE to the successful member or members who are awarded the contribution as they will be required to meet the original criteria set out in the call for proposals. Monitoring and a good set of measures for risk mitigation are essential for execution of contributions based on in-kind contributions and in the Calls for Proposals model, there is a clear expectation for what should be delivered and to what standard.

Confirmation of model A against the principles for in-kind contributions

It is important to check if this model meets the principles of in-kind contributions, which were articulated in section 2.

Value for money. As part of the calls for proposals process, the best value for PRACE should be considered as key criteria. After receiving offers from the members, PRACE can analyse them all and take decisions based on which offers the best value to PRACE. If no offers meet the value for money criterion PRACE can re-issue the call or look to external providers.

Relevance to PRACE goals. PRACE will only publish calls for proposals that are of relevance to PRACE.

Ability to audit. This will be part of the agreement between PRACE and the members when an offer is accepted and should be included in the on-going monitoring of the contribution by the Director.

Transparent and equitable accounting. This will be part of the general rules all members will have to comply with on accepting to provide an in-kind contribution. Members will have to take this into account when proposing offers to PRACE.

Efficient and effective costing. PRACE will need to check all offers against this principle and if PRACE finds that some members' offers do not comply with this principle, PRACE can decide to disregard these offers.

Environmental considerations. If this model is to be used, PRACE will have the opportunity to publish criteria on environmental considerations in the call for proposals and take these into account during the selection process.

Conclusions of model A

Model A, the PRACE Calls for Proposals process, focuses strongly on the PRACE requirements. All members are encouraged to contribute and to propose their offer for the specific calls for proposals but PRACE will always choose the member that best meets its needs and therefore it should be the best way to satisfy PRACE needs. With clear descriptions of the different services or goods required, PRACE will be in the position to get exactly what is needed. It may lead to an imbalance of engagement from the different members and specialities may be of less importance than cost. However the Director has the power to direct the calls and therefore there is the option to mitigate some of the potential imbalance. However, this would mean that the process would need to be carried out over a longer period of time so that the Director has time to assess where the gaps lie. It would be difficult for the Director to be too prescriptive in a call for proposals. The process should always be competitive, fair and transparent. This model will strengthen the power of PRACE and especially the role of the Director regarding in-kind contributions.

4.2.2 Model B: Member Directed

This model is based on having no direct commissioning of in-kind contributions. The PRACE members will be given general guidelines on the in-kind contributions of interest to PRACE and will be invited to make offers for execution of in-kind contributions. These offers may also cover contributions not included in the guidelines presented by PRACE. This differs significantly from the model A, above, where PRACE decides what it needs and asks members to provide it. In model B, the members can influence what they think the needs of PRACE are by proposing in-kind contributions.

Operational steps for model B

In order to be effective the model should follow the following operational steps:

- a) Guidelines for in-kind contributions. The PRACE Director prepares a document with guidelines for different in-kind contributions needed for PRACE classified into essential and desirable, for example. For year zero (the first year the model is used) the Council should approve the guidelines for the main activities. After year zero, the Council approves the activity report of in-kind contributions for the previous year and gives advice on the programme for the next year.
- b) Call for in-kind contributions. The PRACE Director issues an internal call for offers from all PRACE members once a year. Only PRACE members are eligible to apply to PRACE calls for in-kind contributions. Offers will be per activity and not per member (i.e. a member should put in a different document for each activity and not one document listing a suite of activities). This document should describe the work proposed, success criteria, milestones, pricing and risk assessment and mitigation using a standard format defined by PRACE. Members can offer in-kind contributions individually or as part of a team.
- c) Analysis of offers and definition of overall programme for in-kind contributions. The Director, assisted by a specially formed Advisory Committee and the Scientific Steering Committee (if necessary) analyses all the offers, negotiates with members (if needed) and decides on a proposal of an overall programme for in-kind contributions for the year and their assignment to the executing members. Gaps not covered by offers are identified.
- d) Additional call. The Director issues an additional internal call for gap activities following model A, above.

- e) Decision on final overall programme for in-kind contributions. The Director finalises the programme for in-kind contributions (including the accepted contributions offered by members and those activities decided by a call for proposals).
- f) Voting rights. The Director calculates the corresponding voting rights per member according to the rules defined by PRACE and makes sure that the total amount of voting rights resulting from in-kind contributions does not exceed the cap defined by the PRACE Council. The Director passes the information on voting rights to the members.
- g) Council approval. The Director presents the final global in-kind contributions programme for approval by the Council
- h) Quality monitoring. The Director controls the execution quality of each contribution based on the success criteria and the milestones proposed by the member and accepted by the Director.
- i) Final report. The member presents a final report based on the proposed success criteria and milestones to the Director upon final delivery of the contribution.
- j) Award of voting rights. The voting rights corresponding to each contribution are only awarded after successful completion of the contribution.
- k) Final annual consolidated report. The Director prepares a final annual consolidated report (including voting rights) for all in-kind contributions to be presented to the Council for approval.

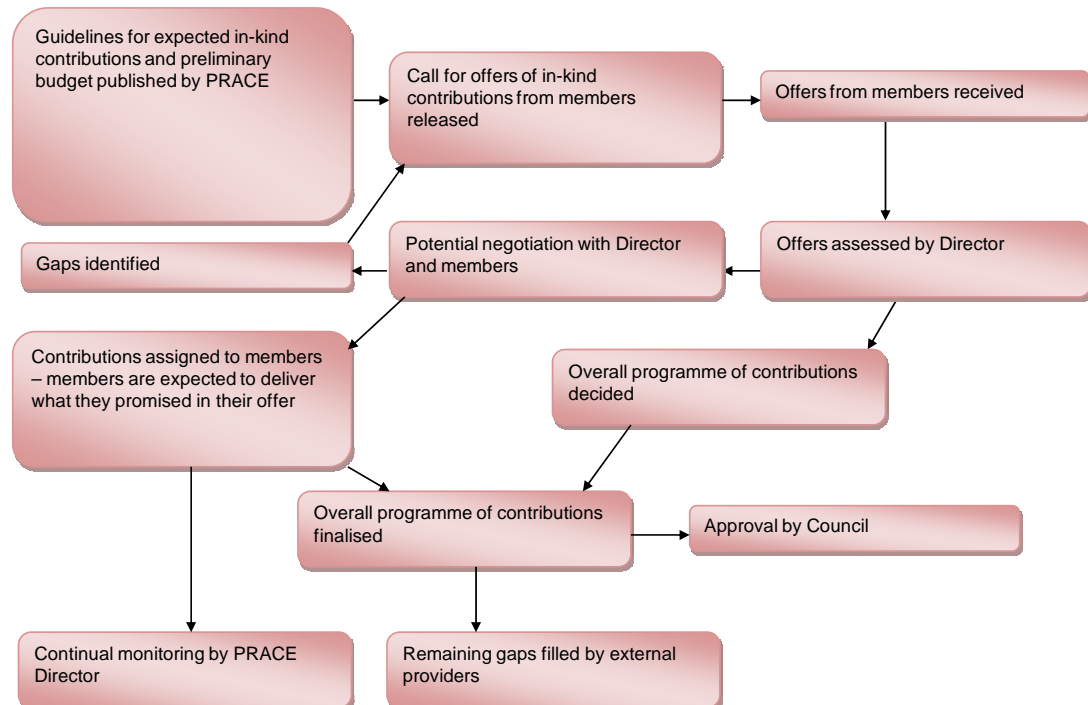


Figure 3: Scheme illustrating the major steps in model B

Advantages and disadvantages of model B

The advantages and the disadvantages of the model for PRACE and for the members are presented in the following tables and discussed in more detail below.

PRACE	
Advantages	Disadvantages
<p><i>May benefit from member creativity</i> The model is completely open to member offers and, as a consequence, members can use their creativity to offer services to PRACE that were not envisaged in the plan for in-kind contributions. These can be accepted and included in the final overall plan. Therefore, PRACE could receive offers with better specifications than what was initially envisaged.</p>	<p><i>Less initial control on setting up the in-kind contributions</i> As PRACE will issue a document with guidelines, rather than clear expected plans, for in-kind contributions, PRACE will not have the initial control on what is received as in-kind contributions. Members may not offer contributions according to the specifications envisaged by PRACE.</p>
<p><i>Engagement of all members</i> This model may help PRACE to foster engagement of all members in the annual activities. Freedom to suggest contributions may make members become more involved in the activities of PRACE.</p>	<p><i>Extra work to select the contributions</i> PRACE may have extra work to select in-kind contributions if there are more offered than expected. In this case the Director will have to analyse all the offers before producing the final plan for in-kind contributions to be presented to the Council for approval.</p>
<p><i>Could be offered more</i> PRACE could be offered more contributions than those initially included in the preliminary guidelines for in-kind contributions. The Director will have the opportunity to analyse those that were not foreseen and decide on their need for PRACE.</p>	<p><i>Call for proposals necessary for contributions not covered by member offers</i> After receiving all the offers, the Director may need to open a call for proposals or tender to external providers if there are tasks essential for PRACE that were not covered by member offers.</p>
<p><i>Less work to define in-kind contributions</i> The Director does not need to specify the detail of all anticipated in-kind contributions in advance of receiving them. Members will be responsible for specifying the activity plan for the contribution they intend to offer to execute.</p>	<p><i>Difficulty in selection process</i> The need to cap in-kind contributions will require the rejection of a number of offers. However, under Model B, the Director will have to assess potentially very different offers, and select a subset of those. The selection process will therefore become more complicated and more opaque as a consequence.</p>
<p><i>Contributions only evaluated on quality</i> The contributions offered by the members will mainly be evaluated based on the quality of the work plan proposed. PRACE will of course take into consideration the costs, especially if more than one member offers the same contribution with a similar work plan.</p>	
<p><i>Profit from members expertise</i></p>	

PRACE	
Advantages	Disadvantages
As members can decide which contributions they want to offer to carry out and even make offers for contributions not foreseen by PRACE, the members can focus on their in-house expertise for offering contributions to PRACE.	

Table 5: Advantages and disadvantages of model B for PRACE

PRACE Members	
Advantages	Disadvantages
<i>Can express creativity</i> This model allows PRACE members to use their creativity to offer contributions within or without the PRACE guidelines and to propose their own work plan for carrying out the contributions.	<i>No knowledge of cost limit per contribution</i> Members will not have prior knowledge of the PRACE expectations of the costs of each contribution. This may create difficulties in deciding on the implementation plans presented to PRACE.
<i>Members have a share in determining the overall in-kind plan</i> PRACE members can have more influence on the PRACE programme of work by being able to propose contributions that were not included in the initial guidelines or by proposing novel ways of carrying out contributions.	<i>Unclear understanding of what is required from contributions</i> The guidelines for the contributions requested by PRACE are likely to be very open and not prescriptive. This may bring about issues regarding the planning of the contributions by members. There may be proposals that do not fully cover the envisaged contribution or cover more than one contribution. This may cause uncertainty in the presentation of offers to PRACE.
<i>Open to all members</i> All members will receive the same guidelines from PRACE, can make offers for contributions included in the guidelines and may also offer to perform other contributions that are not included in the guidelines.	<i>May lead to culture of proposing "solutions in search of a problem".</i> Peer pressure may lead to the acceptance of products or services of limited value to PRACE.
<i>Freedom to propose contributions according to expertise</i> Members will have the freedom to propose contributions in accordance with their expertise, even if these contributions were not foreseen by PRACE.	<i>Possible waste of effort.</i> Members may prepare proposals which will be "out of scope" for PRACE, and as such rejected upfront.
<i>Open competition</i> The competition for contributions will be equal and open to all members.	<i>Limited competition.</i> As each partner will have the flexibility to define their own proposals, the likelihood of direct competition between similar projects will be fairly limited.
<i>No cost limit per contribution</i> There will be no cost limit per contribution and, as such, members can make offers based on how they can best be executed without the	<i>Cost analysis</i> PRACE will need to make a cost analysis of the proposals for in-kind contributions that will be deemed suitable for the PRACE

PRACE Members	
Advantages	Disadvantages
need to fulfil the cost limits set by PRACE (although PRACE will be able to reject offers that are not perceived as value for money).	programme.

Table 6: Advantages and disadvantages of model B for the PRACE members

Risk mitigation for model B

As in model A, quality control over the execution of in-kind contributions and the risk mitigation during these contributions are of key importance to ensure that all contributions are well executed. The Director will have to closely monitor the in-kind contributions and will need to have a contingency plan to cover the potential non-delivery of a contribution or a contribution that is delivered at low quality. Monitoring of individual contributions during the delivery and a good set of measures for risk mitigation across the whole suite of contributions are both essential to be in place.

Individual members should be performing to an agreed plan, based on what they proposed to deliver to PRACE. Therefore, the members each have a responsibility to ensure that they have risk-mitigation in place so that they are less likely to fail to deliver on time or to the required standard and thus potentially incur costs or sanctions.

Confirmation of model B against the principles for in-kind contributions

As for model A, model B must also be checked against the principles of in-kind contributions. Due to the similar nature of assessment, in many ways model B meets the principles in a similar fashion to model A. However, the route to meeting the PRACE goals is different in that in model A, this is done by pre-determining the offers received, whilst in model B this is done by deciding the relevance of the offers that are received.

Value for money. The best value for PRACE should be considered as a key criterion for assessing offers received. After receiving offers from the members, PRACE can analyse them all and take decisions based on which offers the best value to PRACE. There may only be one offer for an in-kind contribution in which case value for money could be more difficult to assess, especially as PRACE will not set a projected budget. However, there is the possibility that PRACE could get much more for its money than in a Calls for Proposals model such as model A, because PRACE could be offered in-kind contributions that could be of interest for the annual PRACE program and had not been initially foreseen.

Relevance to PRACE goals. PRACE will only endorse contributions that will be of relevance for PRACE. This principle will be fundamental for the selection of the offers presented by the members.

Ability to audit. This will be part of the agreement between PRACE and the members when an offer is accepted and should be included in the on-going monitoring of the contribution by the Director.

Transparent and equitable accounting. This will be part of the general rules all members will have to comply with on accepting to provide an in-kind contribution. Members will have to take this into account when proposing offers to PRACE.

Efficient and effective costing. PRACE will need to check all offers against this principle and if PRACE finds that some members' offers do not comply with this principle, PRACE can decide to disregard these offers.

Environmental considerations. If this model is to be used, PRACE will have the opportunity to publish criteria on environmental considerations and take these into account during the selection process.

Conclusions of model B

If using this model, it is very important that PRACE informs all members of how the principles for in-kind contributions will be applied during the analysis of the offers received. It would also be very helpful to all members if PRACE designed a standard form which members can use to present their offers. This will give a common basis for all members interested in sending in offers and will allow them to concentrate their offers on their expertise and on the best quality of services to PRACE. If PRACE is interested in the evolution of this model, there are also other possibilities that can be accommodated into this model. For example, in this model, there are no caps for costs and the members present the costs that they think are necessary to execute the contribution, but PRACE always has the right reject the contributions if they are found to be either too costly or not necessary for the annual PRACE programme. This model could also work in a way where PRACE decides the maximum costs for certain contributions. In this case the model will be less open from the point of view of the members, but members should still be allowed to present offers for contributions for which PRACE has not decided on a maximum cost.

4.2.3 Model C: PRACE Directed

In this model, the delivery of in-kind contributions is directed by PRACE with PRACE directing the forming of teams from amongst contributing members. Each member would inform the Director of how much resource they have available to contribute in-kind and the nature of this resource. This may necessitate the PRACE Director undertaking some extensive discussions with individual members to really understand their strengths. The PRACE Director would decide the programme of work, based on the available budget and the needs for the forthcoming period, and decide who will deliver it by forming multi country teams. The Director would then manage the delivery of the programme through coordination of contributions from members.

Operational steps for model C

The process for undertaking model C is as follows.

- a) Members identify the level and volume of resource for the following year that they are prepared to offer as in-kind contribution to PRACE against a set deadline. This is based on availability of personnel within the organisation.
- b) The Director of PRACE constructs a work plan for the following year and proposes a work plan of activities that fit the PRACE agenda including constructing teams for each activity drawing on the resources offered by the member.
- c) The Director takes advice on the proposed plan from the Scientific Steering committee if needed.
- d) The draft plan is shared with members whose contributions are included. Members at this point have an option to not participate in the allotted activity. If a members steps down the plan is refined to include the resources still remaining. This stage may need to be repeated if members are re-assigned to new contributions.
- e) The PRACE Council approves the plan and accepts the in-kind contributions against voting rights for each member.
- f) The PRACE Director and office implement the teams, identify task leaders and monitor the delivery of the activities against the plan.

- g) Decision on final overall programme for in-kind contributions. The Director finalises the programme for in-kind contributions (including the accepted contributions offered by members and those activities decided by a call for proposals).
- h) Voting rights. The Director calculates the corresponding voting rights per member according to the rules defined by PRACE and makes sure that the total amount of voting rights resulting from in-kind contributions does not exceed the cap defined by the PRACE Council. The Director passes the information on voting rights to the members.
- i) Quality monitoring. The Director controls the execution quality of each contribution based on the success criteria and the milestones proposed by the member and accepted by the Director.
- j) Final report. The member presents a final report based on the defined success criteria and milestones to the Director upon final delivery of the contribution.
- k) Award of voting rights. The voting rights corresponding to each contribution are only awarded after successful completion of the contribution.
- l) Final annual consolidated report. The Director prepares a final annual consolidated report (including voting rights) for all in-kind contributions to be presented to the Council for approval.

This approach would ensure that in-kind contributions are only directed towards PRACE requirements. PRACE would not have to accept all offers of in-kind resource if they did not fit into the programme. The implementation of contributions would need to conform to the PRACE in-kind principles.

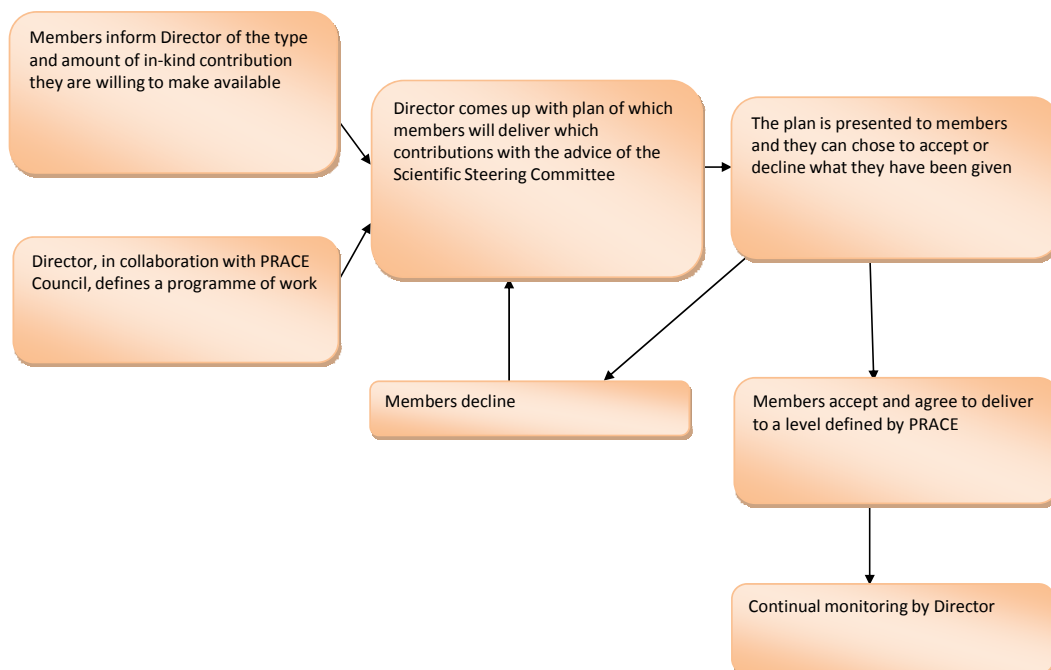


Figure 4: Scheme illustrating the major steps in model C

Advantages and disadvantages of model C

PRACE	
Advantages	Disadvantages
<p><i>Multinational</i> Would enable PRACE to build European activities by building multi country teams.</p>	<p><i>Complicated management</i> Management of effort may be more complex – multi-institution teams will need greater coordination and as not all participants may be experts some contributions may take a little longer.</p>
<p><i>PRACE manages resources</i> PRACE would have a high degree of control with the Director managing the activities</p>	<p><i>Lack of resource</i> Members may not like what they asked to do and thus may not be prepared to offer as much resource as if members were free to choose.</p>
<p><i>Director knowledge</i> It is essential that the Director clearly understands where the strengths of each member lie. This means that the Director will have an in-depth understanding of the groups that they are working with.</p>	<p><i>Consultation time</i> Success of this model will rely on the PRACE Director (and colleagues) having the time to be able to consult widely before putting together a proposal for Council approval which will be time and resource consuming initially.</p>

Table 7: Advantages and disadvantages of model C for PRACE

PRACE Members	
Advantages	Disadvantages
<p><i>Growth in expertise</i> Members would benefit by collaborating with each other and therefore gaining experience and skills for its staff. Each team could include an experienced individual but also those with less experience who would benefit from the participation in the collaborative activities and bring new knowledge back to the individual members and therefore to PRACE.</p>	<p><i>Lack of engagement</i> Given the need for the high level of control from PRACE, Members may feel that they cannot engage and lead to reduced offers of in-kind activity.</p>
<p><i>Wide spread of contributions across members</i> As the Director would have the flexibility to build the teams, activities could be spread amongst the members and avoid concentration in only a few centres.</p>	<p><i>Lack of transparency</i> As the Director will be responsible for choosing teams this could lead to reduced transparency in the process for members if the rationale for decisions is not made clear.</p>
<p><i>Improved communication across the Partnership</i> Members will be expected to publicise their skills and expertise, as well as the availability of pre-existing products and services to PRACE. This will lead to improved communications within PRACE and ensure a better selection of members by the Director.</p>	

Table 8: Advantages and disadvantages of model C for the PRACE members

Risk mitigation for model C

The PRACE-directed nature of this model means that PRACE is more responsible for risk-mitigation than in models A and B where much of the risk mitigation lies with the individual members. PRACE must ensure that the members who are given work to deliver in-kind have the right expertise and the time to perform the contributions. Much of this will be mitigated by the pre-work done by the Director to ascertain where members' strengths lie and the amount that they are willing to contribute. The offers from the members as to what and how much they can contribute will also mitigate the risks here.

In this model, PRACE must accept more responsibility for delivery but can give the members clear guidelines to work to and have regular monitoring to ensure that members are meeting key criteria and agreed delivery points.

Confirmation of model C against the principles for in-kind contributions

Due to PRACE determining the activities of each member without members offering to do particular contributions, the way this model meets the PRACE principles of in-kind contributions is somewhat different to models A and B.

Value for money. PRACE will determine what it believes is value for money for each part of the in-kind contribution and will distribute money accordingly. PRACE will decide the best combinations of members to deliver the activities.

Relevance to PRACE goals. PRACE will only give members resource through in-kind contributions once it has determined what in-kind contributions it needs to meet its goals.

Ability to audit. This will be agreed between PRACE and the members when PRACE awards members contributions. It should be included in the on-going monitoring of the contribution by the Director.

Transparent and equitable accounting. This will be part of the general rules that all members will have to comply with when they accept an in-kind contribution awarded by PRACE.

Efficient and effective costing. PRACE will ensure this is the case when it distributes in-kind contributions amongst members.

Environmental considerations. PRACE can decide to award contributions to members who are able to perform it using less wasteful or more environmentally-friendly approaches.

Model C also helps meet the other principle identified in section 2 as a secondary consideration. This is to involve a wide-range of PRACE members. This model allows PRACE to determine where members will provide effort and enforce partnerships between members for delivery of contributions.

Conclusions for model C

This model takes a different approach to the first two models described here. This model will ensure involvement from all willing PRACE members and will help share expertise and skills amongst members which will strengthen individual members and PRACE as a whole. It will clearly follow the PRACE goals and will stay within the required budget.

There is the possibility that elements of this approach could be included in the other models, for example a call for proposals could be released, as in model A, that specifies that an experienced member must collaborate with a less-experienced member. However, model C ensures that collaborations do not just come via existing routes. Model C gives PRACE the mechanism to potentially be highly original and creative with the in-kind contributions it

receives. However, with this model, the lack of involvement from the members in setting the PRACE agenda may alienate some members.

4.2.4 Comparison of models A, B and C

As discussed at the beginning of section 4.2, it is not envisaged that any of these models will be used in isolation to manage in-kind contributions to PRACE. A combination of models can be used depending on the type of contribution involved and the required outcome.

A summary of the three models is presented below in tabular form, which attempts to highlight the similarities and differences between the models.

	Model A Calls for Proposals	Model B Member Directed	Model C PRACE Directed
Biggest advantages to PRACE	PRACE gets what it wants and competition helps get value for money	PRACE gets a creative portfolio of contributions which will meet and hopefully exceed projected PRACE needs	PRACE has complete control over the contributions delivered and the mechanism of delivery
Biggest disadvantages to PRACE	High administrative burden: for organising the calls for in-kind contributions PRACE will need to understand and specify all needs upfront	PRACE has less control over the direction and implementation of the contributions	Potential lack of engagement and hence lack of resource from members
Biggest advantages to members	Members' expertise will be key in bidding via competition	Members are able to have a high level of influence on PRACE activities	Will give members the opportunity to partner with each other to share skills and knowledge
Biggest disadvantages to members	Could lead to a concentration of contributions from a small number of members	Potentially there could be a lack of clarity during the calls for offers	Very limited input into direction of PRACE and lack of choice in the contributions awarded
Advantages compared to other models	Clear process with clear outcomes	A creative approach that could lead to a forward-thinking partnership	Increases the overall skill set of the PRACE partnership
Primary risks	Members may not deliver what they promised	Members may not deliver what they promised	Members may not deliver what is asked of them

	Model A Calls for Proposals	Model B Member Directed	Model C PRACE Directed
Risk mitigation	Clear expectation on members from the start of the process with the threat of potential sanctions if not met	Clear expectation on members from the start of the process with the threat of potential sanctions if not met	Clear understanding by PRACE of what members can offer before PRACE assigns contributions
Quality assurance	Continual monitoring of progress	Continual monitoring of progress	Continual monitoring of progress
Fit to principles	Fits well to all principles – transparency must be maintained	Fits well to all principles – transparency must be maintained	Fits well to all principles and in addition meets secondary principle of sharing contributions between members

Table 9: Summary of key points and comparison of models A, B and C

4.3 Translation to voting rights

In-kind contributions from the members play a fundamental role in maintaining the sustainability of PRACE. The work on in-kind contributions carried out during the PRACE preparatory phase project lead to specific articles being included in the PRACE Statutes and side agreements concerning their valuation and translation to voting rights.

The PRACE Statutes specify in Article 9 what a member's contribution is:

“The contributions of the Members to the Association may be grouped into (i) monetary contributions; and (ii) contributions in goods or services other than monetary contributions, also called contributions in-kind, which include the Contributions in-kind of the Hosting Members”

The same article establishes a direct relation between the contribution and voting rights:

“For the purpose of exercising the right to vote set out in article 14 of these statutes, the Council shall, at the start of each calendar year, place a monetary value on the contributions in-kind provided by the Members during the previous year and on those contributions in-kind that the Hosting Members have committed themselves to make available to the Association, in any case based on the criteria set out in sub-paragraph b) of article 8 of these statutes. This is without prejudice to the initial contributions of members.”

For a specific Hosting Member, the matter has been further specified and detailed in Annex IV of the Agreement for the Initial Period, where the general rules of cycles valuation are articulated in Article 1. The article defines the valuation criteria based on the contributed fraction of the Total Cost Ownership (TCO) of the installed Tier-0 system. The monetary value of the annual contribution of each Hosting Member is calculated as follows:

Contribution = cash contribution + Hosting Member contribution

The above definition takes into account the contribution committed by each of the Hosting Members and does not apply to non-Hosting Members. Article 9, paragraph 7 of the Statutes

establishes that Hosting Members' in-kind contributions for the calculation of the voting rights may not exceed the minimum level of contribution. The matter of members' in-kind contributions and their valuation will be discussed by PRACE Council every fiscal year and is therefore subject to whatever decision the Council itself agrees to take.

The first Council meeting unanimously approved the criteria for the in-kind contribution valuations for Hosting Members and non-Hosting Members for the purpose of establishing the voting rights. According to the articles of the Statutes and the articles of the Agreement for the Initial Period, the contribution of the Hosting Member is set to a minimum of 20 Million Euros/year whilst the non-Hosting Member's minimum contribution consists of the association fee established annually by the Council.

Article 6 of the Agreement for the Initial Period states that PRACE members' contributions to the PRACE Implementation Phase projects (PRACE-1IP and PRACE-22IP) **are accepted as in-kind contributions to PRACE as well as contributions to other EC funded projects approved by the Council of the association.**

The major issue that arises from the in-kind contribution definition and the rules and corresponding valuation procedures is the impact on the taxation status of PRACE and its members.

Most notably there have been concerns about the impact for some members on the VAT status and the consequences on how the in-kind contribution of cycles or services to PRACE might be affected considering the relevant amount of money involved.

The legal status of the association itself provides boundary conditions with respect to tax and VAT status and therefore a major analysis is needed in order to provide a clear understanding on how the matter of in-kind contributions will have to be managed with regards to VAT. This analysis is currently being undertaken by the interim Board of Directors and will be reported on in the next deliverable on this topic (D2.3.2) if the outcome is available.

5 Issues for PRACE and future work

In order to perfect the framework for organising and valuing in-kind contributions to PRACE, some issues have been identified which need to be investigated further. PRACE governance bodies will have to address these issues before finalising the mechanisms and metrics for in-kind contributions and it is hard to predict how they will be dealt with without gaining some experience. Some more analysis of these issues will be presented in deliverable D2.3.2 along with any experience gained of them being managed within PRACE.

The on-going issues are listed below:

- Confidentiality issues arising in determining the value of an in-kind contribution
- Possible legal constraints concerning the qualification of the in-kind contributions
- Specific scheme deployed for the valuation of cycles offered by Hosting Members
- Valuation of the human resources costs
- Translation of in-kind contributions in voting rights
- Special case of an in-kind contribution provided by access to Tier-1 cycles
- Incentive for giving in-kind contributions

a) Confidentiality issues arising in determining the value of an in-kind contribution

The mechanisms for evaluating in-kind contributions require that members share with the PRACE Council and hence other PRACE members, accurate financial information to ensure the transparency and equitable accounting of the whole process. However, it may be that, for confidentiality reasons, some members are presented with difficulties in providing detailed financial data.

This may be the case:

- for members engaged in contractual relations with third parties, where there is a legal constraint of confidentiality concerning the financial scheme
- for Hosting Members engaged in a contractual relation with a vendor for the installation of a Tier-0 system. Under the Cycles model, for legal and strategic reasons, a Hosting Member can reserve the right not to communicate accurate data on the cost of acquisition of a Tier-0 machine, and such a right has to be taken into consideration and accepted by PRACE.

These confidentiality issues may be addressed by reinforcing the principle of ability to audit: each member offering an in-kind contribution (cycles or other type of contribution) should accept that there is a possibility they will be audited by an independent auditor, if PRACE decides to check the costs provided through the in-kind contribution.

b) Possible legal constraints concerning qualification of the in-kind contributions

The mechanisms for receiving in-kind contributions to PRACE should not lead to legal and fiscal issues, as it is an internal mechanism within the PRACE membership and supports PRACE operational activities. However, it is desirable to undertake a further legal analysis in order to validate that such contributions are not qualified as exchanges of services and are consequently not VAT-relevant or subject to public procurement schemes. The work currently being undertaken in PRACE has been discussed in section 4.3 above.

c) Specific scheme deployed for the valuation of cycles offered by Hosting Members

The Agreement for the Initial Period, signed between all PRACE members, sets out the operational rules of PRACE for the first five years and allowed services to start in 2010. This

agreement has made it possible to obtain funding commitments from Hosting Members enabling the creation of PRACE and the start of its operation using the Cycles model.

Annex IV of the Agreement for the Initial Period provides the qualitative and valuation criteria of the in-kind contributions provided by the Hosting Members. It establishes the basic principles for a common mechanism to evaluate the value of the cycles offered by the Hosting Members. This Annex has been approved as an internal regulation of PRACE by the Council.

Furthermore, the Contributors Agreement regulates the relation between PRACE and each Hosting Member. It specifies the rights and duties of the Hosting Member and PRACE. Very specific provisions of the Tier-0 contributions to PRACE, with detailed technical descriptions, are part of this agreement. A specific annex will be dedicated to the valuation of the cycles. Each Hosting Member has to sign the Contributors Agreement together with the PRACE AISBL statutes, and consequently provide a financial annex with detailed information on the valuation of cycles.

All the legal documents and basic principles are in place for the specific processing of the cycles contribution. However, further work is needed to go deeper into the process and to ensure a common approach from the Hosting Members. This point will have to be discussed and addressed by the PRACE Council, with a strong cooperation from the Hosting Members.

d) Valuation of the human resources costs

Most of the in-kind contributions will be delivered through participation of dedicated staff. Therefore, personnel costs will constitute many of the evaluated costs for in-kind contributions. So far, the PRACE members have used the EC rules, notably for building PRACE FP7 support projects (preparatory phase and implementation phase) by declaring funded and unfunded PMs, with an agreed co-financing ratio. These PMs comprise the direct costs of personnel, complemented by overheads costs. This scheme has the advantage of being transparent and commonly used by PRACE members. However, when receiving an in-kind contribution, the skill of the personnel may want to be considered as well as the direct cost of the PM. This is something that is very difficult to measure.

Further investigation needs to be done to elaborate the metrics for evaluating personnel costs in the framework of in-kind contributions. Notably, the question of overheads should be raised to determine which type of indirect costs could be, or should be, included in the valuation made by the members.

e) Translation of in-kind contributions in voting rights

The additional in-kind contributions to PRACE, upon acceptance by PRACE and proper execution, should be accrued in the voting rights of the relevant members. It is agreed that the provider of an in-kind contribution which is to be included in voting rights needs to keep appropriate records to be able to provide evidence of the costs incurred.

Furthermore, it may be desirable to establish a cap for voting rights for each member. This mechanism has already been put in place for the Hosting Members. Each Hosting Member could contribute more than 100 Million Euros over the first five years (the Initial Agreement), but this additional contribution will not give additional voting rights.

In order to maintain equilibrium between PRACE members, establishing a cap for voting power should be further investigated.

f) Special case of an in-kind contribution provided by access to Tier-1 cycles

In the context of the PRACE 2IP project, which is due to start in spring 2011, PRACE will have a reinforced integrative role in the European HPC ecosystem, including the integration of DEISA-type resources (Tier-1 cycles) and services in PRACE. The PRACE-2IP project

will develop the necessary processes that enable the sharing of resources between different parties in the European HPC ecosystem on a contractual basis. This goes beyond the voluntary exchange of resources between DEISA partners. It is anticipated that the Tier-1 exchange of resources will be handled through an optional programme in PRACE with its own governance and budget.

The link between Tier-0 and Tier-1 resources, and the possible valuation of Tier-1 cycles as in-kind contribution to PRACE, will need in-depth discussions at the level of the PRACE Council and could lead, in the near future, to specific internal regulations within PRACE. Currently, it is premature to design the basic principles for the valuation of Tier-1 cycles and it is the responsibility of the PRACE Council to determine strategic orientations in this domain.

g) Incentive for giving in-kind contributions

The contribution of non-Hosting Members to PRACE funding covers mainly the costs for running the organisation of PRACE. This level of funding is also reflected in the voting rights of the non-Hosting Members in the PRACE Council and may be seen from the point of view of non-Hosting Members as a limitation of their influence on the governance of PRACE. However, it is expected that the PRACE Council should be concerned with maintaining the cash balance and therefore the level of cash contribution to PRACE, allowing PRACE to fully exercise its mission and implement its strategy. Therefore members must still pay their membership contribution to PRACE on an annual basis regardless of the in-kind contributions they have made.

The in-kind contributions, after acceptance by PRACE, should be converted in to voting rights for the relevant member. However, under the Cycles operational model, the Hosting Member, by contributing with Tier-0 cycles, will naturally maintain their influence in the voting scheme of PRACE. Therefore, one could question the motivation to offer in-kind contributions, especially if it is decided to establish a cap for voting rights.

However, by actively participating in the core activities of PRACE, the non-Hosting Members will also have the following advantages:

- Participation in a world-class infrastructure and the opportunity to gain expertise and know-how.
- The possibility to establish or strengthen their credentials both internationally as a recognised and valued partner within PRACE, and nationally by demonstrating international dimension.
- The possibility for value to be given to their expertise and know-how.
- Access for their researchers to a world-class HPC infrastructure, if they are supported through the peer review process.

In any case, this possible lack of in-kind contribution offers may constitute a risk for the deployment of PRACE activities. In case of a deficit of offers, an analysis should be elaborated, trying to determine corrective actions and incentives which could be implemented to encourage members to participate in PRACE.

6 Conclusions

This document has presented an overview of in-kind contributions, their nature and the approaches taken by other organisations. Some options for measuring in-kind contributions and approaches to take to managing them have been outlined. Some potential issues have also been identified.

The PRACE Council needs to make decisions relating to voting rights and the types of in-kind contribution they are expecting. There is concurrent work taking place in the PRACE-IIP project on funding models, the definition of Tier-0 and voting rights which will help feed into deliverable D2.3.2 and will present a wider view of the PRACE funding model. Experience gained in managing on-going in-kind contributions such as peer review, will also help in expanding the ideas that have been proposed here.

In-kind contributions need to be managed immediately through PRACE and therefore the PRACE Council should be able to take much of the work from this document and apply it to current situations in PRACE. As PRACE gains more experience in working with in-kind contributions, the mechanisms and approaches can be refined and these additional findings will be reported as part of the wider funding model discussion in D2.3.2.

The processes for handling non-delivery of in-kind contributions and disputes has not been formulated but should be considered and the processes outlined for XFEL and ESRF give a good starting point for PRACE. These processes are again a discussion point and eventual decision for the PRACE Council.

After analysing the framework of in-kind contributions for PRACE, three potential models have been and their advantages and disadvantages discussed. The recommendation from the authors is that no one model is used but that different types of in-kind contributions are treated differently depending on what would best suit them.

The next steps for PRACE could include but are not limited to:

- a) Performing further analysis on the options presented in this task to refine the models and to enable better decision making between options.
- b) Performing test pilots, in order to refine the models or assess which model suits which type of in-kind contribution.

From this work it can be seen that there are a number of ways that PRACE could deal with in-kind contributions, both those in the short term that are not covered by the implementation projects and, in the longer term, when it cannot be assumed that EC funding will be available. Some of these approaches could lead to creative and innovative methods of managing a large number of members contributing to a project that is leading the way not only in computing but in how the resources are managed.

There are difficulties to implementing a procedure for accepting in-kind contributions but as long as PRACE abides by the principles of in-kind contributions and makes certain that members are engaged with the routes that are taken to process them, there is no reason why PRACE cannot use in-kind contributions to maximise the output of the organisation and to grow into a true European partnership.