



**SEVENTH FRAMEWORK PROGRAMME
Research Infrastructures**

**INFRA-2012-2.3.1 – Third Implementation Phase of the European
High Performance Computing (HPC) service PRACE**



PRACE-3IP

PRACE Third Phase Implementation Project

Grant Agreement Number: RI-312763

D5.2

PRACE Integrated HPC Access Programme for SMEs

Final

Version: 1.0
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Date: 22.02.2013

Project and Deliverable Information Sheet

PRACE Project	Project Ref. №: RI-312763	
	Project Title: PRACE Third Phase Implementation Project	
	Project Web Site: http://www.prace-project.eu	
	Deliverable ID: < D5.2 >	
	Deliverable Nature: < Report >	
	Deliverable Level: PU*	Contractual Date of Delivery: 28 / February / 2013
		Actual Date of Delivery: 28 / February / 2013
EC Project Officer: Leonardo Flores Añover		

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

Document Control Sheet

Document	Title: PRACE Integrated HPC Access Programme for SMEs	
	ID: D5.2	
	Version: <1.0 >	Status: <i>Final</i>
	Available at: http://www.prace-project.eu	
	Software Tool: Microsoft Word 2007	
	File(s): D5.2.docx	
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	Approved by:	MB/TB

Document Status Sheet

Version	Date	Status	Comments
0.1	17/December/2012	Draft	Skeleton and first elements of the document
0.3	21/December/2012	Draft	Contribution from some partners received
0.4	31/December/2012	Draft	More chapters written
0.5	03/January/2013	Draft	Chapter on services by SR
0.6	07/January/2013	Draft	Approval/rejection process, restructuring of the document by MO
0.8	08/January/2013	Draft	Further refinement
0.9	11/January/2013	Draft	Few changes, tables and objective/methodology added
0.91	15/January/2013	Draft	PRACE template + comments
0.915	22/January/2013	Draft	Corrections and elaboration on selected parts. Start on Executive Summary.
0.92	28/January/2013	Draft	Correction following Face to Face Meeting/Bologna/25 Jan and assignment of work
0.93	29/January/2013	Draft	Implementing comments from the Bologna Face to Face meeting
0.94	01/February/2013	Draft	Merging all input
0.95	05/February/2013	Draft	Stephane and Claudio's improvement of the documents. Accept all the changes except few pending from Carlos.
0.96	07/February/2013	Draft	Conclusion by GENCI and addressing Carlos' comments
0.97	08/February/2013	Final Draft	Introduction by CINECA and final polishing and editing
0.98	20/February/2013	Final Draft	Applying suggestions by Reviewers
1.00	22/February/2013	Final Version	Ready for submission

Document Keywords

Keywords:	PRACE, HPC, Research Infrastructure, Industrial Access, SME
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References and Applicable Documents

- [1] PRACE 3IP, D5.1 “*Analysis of Models and Practices for Industrial Access*”, December 2012.
- [2] INNO Partnering Forum - DRAFT SYNTHESIS REPORT, http://www.vinnova.se/PageFiles/604825187/synthesis_report.pdf
- [3] INNO-Partnering Forum Workshop Material, : "Better innovation support for SMEs in Europe", 7 November in Brussels, <http://www.vinnova.se/en/EU-and-international-co-operation/European-programmes-and-co-operation/INNO-net/INNO-Partnering-Forum/>
- [4] *High-Performance Computing: Europe's place in a Global Race, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions*, Brussels, 15.2.2012 COM(2012) 45 final.
- [5] <http://www.supercomputingscotland.org>
- [6] <http://www.sicos-bw.de>
- [7] <http://www.cineca.it/en>
- [8] <http://www.initiative-hpc-pme.org>
- [9] <https://www.surfsara.nl>
- [10] <http://www.ncms.org>
- [11] <http://www.eesi-project.eu/pages/menu/homepage.php>
- [12] <http://www.planethpc.eu>
- [13] <http://www.hpcuserforum.com/EU/>
- [14] PRACE-1IP Deliverable 2.4.1, Project, Monitoring and Reporting Procedures
- [15] PRACE 1IP Deliverable 2.4.2, Project, Initial Impact Assessment of the Research Infrastructure
- [16] PRACE 1IP Deliverable 2.4.3, Project, Second Impact Assessment of the Research Infrastructure
- [17] <http://www.prace-ri.eu>
- [18] IDC Special Study report : “Financing a Software Infrastructure for Highly Parallelised Codes” : <http://www.hpcuserforum.com/EU/downloads/ParallelSoftwareFINALStudyWP27.17.2011.pdf>
- [19] PRACE-1IP Deliverable D5.2.2 “*PRACE Industrial Offer Assessment*”, May 2012.
- [20] PRACE-2IP Deliverable D9.1.1 “*Support for Industrial Applications -Year I*”, August 2012.

List of Acronyms and Abbreviations

AISBL	Association Internationale Sans But Lucratif (legal form of the PRACE RI)
BSC	Barcelona Supercomputing Center (Spain)
BPI	Banque Publique d'Investissement
CaSToRC	Computation-based Science and Technology Research Centre (Cyprus)
CEA	Commissariat à l'énergie atomique et aux énergies alternatives (France)
CINECA	Consorzio Interuniversitario, the largest Italian computing centre (Italy)
CRM	Customer Relationship Management
CSC	Finnish IT Centre for Science (Finland)
CSCS	The Swiss National Supercomputing Centre (represented in PRACE by ETHZ, Switzerland)
DARPA	Defense Advanced Research Projects Agency
DEISA	Distributed European Infrastructure for Supercomputing Applications. EU project by leading national HPC centres.
EC	European Community
EESI	European Exascale Software Initiative
EPCC	Edinburg Parallel Computing Centre (represented in PRACE by EPSRC, United Kingdom)
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)
GRNET	Greek Research and Technology Network S.A. (Greece)
HPC	High Performance Computing; Computing at a high performance level at any given time; often used synonym with Supercomputing
HLRS	High Performance Computing Center Stuttgart (Germany)
IAP	Integrated Access Programme
ICHEC	Irish Centre for High-End Computing (Ireland)
IPB	Institute of Physics Belgrade (Serbia)
IPR	Intellectual Property Rights
IT	Information Technology
ISV	Independent Software Vendors
JSC	Jülich Supercomputing Centre (FZJ, Germany)
KI	knowledge and innovation
KPI	Key Performance Indicators
MoU	Memorandum of Understanding.
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.
NIIF	Nemzeti Információs Infrastruktúra Fejlesztési Intézet (Hungary)
PM	Person Month
PATC	PRACE Advanced Training Center
PRACE	Partnership for Advanced Computing in Europe; Project Acronym
PRACE-1IP	PRACE First Implementation Phase Project
PRACE-2IP	PRACE Second Implementation Phase Project

PRACE-3IP	PRACE Third Implementation Phase Project
PSNC	Poznan Supercomputing and Networking Centre (Poland)
ROI	Return on Investment
R&D	Research and Development
SARA	Stichting Academisch Rekencentrum Amsterdam (Netherlands)
SHAPE	SMEs HPC Adoption Programme for Europe
SME	Small Medium Enterprises
SMM	Small and Medium sized Manufacturers
SNIC	Swedish National Infrastructure for Computing (Sweden)
SSC	Scientific Steering Committee
Tier-0	Denotes the apex of a conceptual pyramid of HPC systems. In this context the Supercomputing Research Infrastructure would host the Tier-0 systems; national or topical HPC centres would constitute Tier-1
UC-LCA	University of Coimbra - Laboratório de Computação Avançada (Portugal)
WP	Work Package

Executive Summary

This document proposes a process for implementing the SME HPC Access Programme in Europe (SHAPE), a pan-European, PRACE-based programme supporting HPC adoption by SMEs. The Programme aims to equip European SMEs with the awareness and expertise necessary to take advantage of the innovation possibilities opened by HPC, increasing their competitiveness. The **mission** of this Programme is to help European SMEs to demonstrate a tangible Return on Investment (ROI) by assessing and adopting solutions supported by HPC, thus facilitating innovation and/or increased operational efficiency in their businesses.

SHAPE will address the following barriers to HPC adoption:

- Lack of expertise and/or knowledge on the possibilities of HPC and advanced numerical simulation;
- Lack of resources to facilitate the HPC adoption process;
- The entry costs of implementing new technologies.

Developing such a global programme through PRACE is the most effective option. For example, a pan-European programme will be able to provide resources and expertise that the existing local programmes will be unable to provide. Also, a pan-European initiative will open new possibilities for companies based in countries where there is no local programme. Thus, the Programme is seen as complementary to the local initiatives. As locality plays an important role in the evangelisation process, all projects will be served locally first, if that is the better option and if a local initiative exists in the given country. SHAPE will be employed in the case of projects that cannot be supported locally or for amplifying the outcome of national initiatives at the PRACE level (providing access to more HPC resources or allowing SMEs to be visible in a global market of 25 countries).

In order to support European SMEs, SHAPE will develop an integrated service offer:

- Information and networking;
- Access to expertise (science-domain expertise as well as applied mathematics, HPC and computer science expertise);
- Access to HPC systems (including pre- and post-processing and computing services);
- Access to funding sources.

The main area of the Programme's operations will be work on a one-to-one basis with SMEs willing to adopt a new, HPC-supported solution. The Programme will be able to take such customers as far as trying out the solution on the Programme's (i.e. PRACE's) infrastructure. The existing solutions such as the PRACE Open R&D Access Programme, the PRACE Advance Training Centres and the PRACE Project's Open Source code enabling activity will be employed in order to provide some of the Programme's services.

In order to evaluate various solutions in the process of the practical project implementation, the WP5 team is proposing to run a **Pilot Project** commencing in June 2013 and ending in April 2014.

1 Introduction

PRACE 3IP WP5 “*Services for industrial users and SMEs*” has the objective to design and pilot an Integrated Access Programme (IAP), a comprehensive set of services meeting the needs of SMEs.

Task 5.1 in WP5 analysed the support models currently operating in different research infrastructures in Europe and world-wide, including those unrelated to HPC. The results of this analysis, as well as the requirements of industrial users in relation to PRACE, have been reported in [1].

Based on these results, Task 5.2 aims to design an **SME HPC Access Programme in Europe (SHAPE)**, a pan-European, PRACE-based programme supporting HPC adoption by European SMEs. The design of the Programme is based on the conclusions of a recognised EU-funded project with an objective to establish best practices in SME innovation support [2, 3].

SHAPE will develop an integrated service offer including information and networking, coaching, access to expertise in different HPC and computational sciences domains as well as access to HPC resources within an Open R&D model. The Programme, once implemented, will focus on working on a one-to-one basis with SMEs willing to adopt a new HPC-supported solution.

The SHAPE Pilot Project will be implemented in order to assess and refine the assumptions made in this document. It will be launched through a dedicated call. The Pilot will be managed by PRACE 3IP-Task 5.3, working towards the following deadlines:

Feb 2013	June 2013	June 2013	April 2014	June 2014
Programme and Pilot Project Proposal Completed	PRACE Council Approval	Pilot Project Launch	Pilot Project Completed	Results Assessed

This Deliverable is structured as follows:

- Section 2 presents a brief overview of SMEs in Europe, their needs in relation to enhancing innovation through HPC, the challenges they face, and it introduces the value of a PRACE-based programme in the area;
- Section 3 defines the strategy of the Programme, analysing the legal aspects, the mission and the desired impact. Furthermore, some metrics are proposed to measure the Programme’s success;
- Section 4 first presents key operational principles and expertise governing the Programme, then draws a global structure, describing both the services and the tools needed to manage the Programme. A scenario example is also shown to illustrate the entire process;
- Section 5 analyses the resources needed to implement the Programme, providing only a qualitative analysis (more detail will be provided after the Pilot phase);
- Section 6 introduces the Pilot Project.

The Deliverable is intended to support the PRACE AISBL in the implementation of IAP. The intended audience is primarily the PRACE RI, and also industrial users and stakeholders who consider access to HPC expertise and resources an important instrument in enhancing their competitiveness. Furthermore, the Deliverable is intended for the PRACE-3IP Project, in particular the Work Packages directly involved in the launch of IAP: WP2, WP3, WP4, WP5, WP6 and WP7.

2 SMEs and HPC

2.1 SMEs and Innovation

In the European Union, SMEs provide two out of three of private sector jobs and contribute to more than half of the total value-added created by businesses¹. Dynamic SMEs are also important for innovation in manufacturing and services. With nine out of ten SMEs in Europe with less than ten employees, SMEs often face greater obstacles than bigger firms in terms of skills, costs of resources, funding or access to markets.

One of the main challenges for the sustainability of the EU economy and the generation of new jobs and revenues is to support SMEs' competitiveness by helping them produce better products, reduce the time and the cost of design and production and thus develop high-value products and high-tech skills. This will lead to development of existing industries as well as the emergence of high-tech and innovative companies. Technology transfer between academia and industry also has to be encouraged, as a key aspect of the innovative products and services design.

2.2 HPC Engagement of SMEs – Best Practice

As a key resource for innovation and scientific research and development in Europe, as recently stated by the European Commission in its communication “High-Performance Computing: Europe’s place in a Global Race” [4], HPC can significantly help SMEs innovate in products, processes and services and thus become more competitive. The adoption of HPC by European SMEs is hindered by the following obstacles:

- Lack of expertise and/or knowledge on the possibilities of HPC and advanced numerical simulation;
- Lack of resources to facilitate the HPC adoption process;
- The entry cost of implementing new technologies.

In order to answer to these challenges, a **HPC support program for European SMEs should be launched**.

Previous initiatives by HPC providers or research organisations aiming at engaging SMEs in the area of HPC have failed because they were only providing ‘random’ or rough access to HPC cycles with a poor user environment and associated services as well as a lack of surrounding human resources.

Following the feedback provided by new initiatives in Europe (e.g. Supercomputing Scotland [5], HLRS and Sicos in Germany [6], CINECA in Italy [7], HPC-PME in France [8] and SARA in Netherlands [9]), in the US like the “Missing Middle Initiatives” from the National Center for Manufacturing Sciences [10], or the findings of other EU FP7 projects (EESI [11] and PlanetHPC [12]) and IDC reports [13], the most optimal option is to provide European SMEs with a full set of integrated HPC services, i.e.:

- Information and networking;
- Access to expertise (science-domain expertise as well as applied mathematics, HPC and computer science expertise);
- Access to HPC systems (including pre- and post-processing and computing services);
- Access to sources of funding.

¹ According to Observatory of European SMEs and the 2012 Annual Report on European SMEs

2.3 Why PRACE?

There are existing initiatives on a national or regional level addressing the needs of HPC adoption by SMEs to a various extent [1]. A PRACE-supported pan-European programme should be **complementary** to these initiatives.

PRACE is in a unique position to offer such a programme, utilising its infrastructural and knowledge resources, and its links with academia and industry (both HPC users and vendors).

We argue that a pan-European initiative supported by PRACE can add the following value:

- The Programme should rely on national similar initiatives where they exist and amplify them at the European scale by providing the services that the local programme is unable to cater for.
- It would greatly motivate the countries where such a programme is unavailable at the moment (e.g. they could subsequently set-up a complementary local programme). It would also complement the existing programmes by providing all European SMEs with an opportunity to ‘take the first step’ in the world of HPC.
- Due to the diverse (and evolving) architecture and knowledge resources of PRACE, such a programme would be able to offer both the quality, quantity and diversity of resources and expertise not available within any other programme
- Within a programme targeting the entire European SME arena, it will be possible to enable synergies by providing e.g. thematic support programmes spanning a number of countries or regions
- The operation of a pan-European programme will also facilitate sharing resources and best practices within the programme
- Participation in a European-wide programme (e.g. demonstrating a proof of concept on various PRACE systems) will help companies gain European visibility and widen their market possibilities outside of their own countries.
- As 25 countries now compose the PRACE Research Infrastructure, PRACE RI has access to one of the biggest scientific communities available. Experts can be made available to European industries and especially SMEs for increasing innovation through technological transfer. This is one of the major assets of PRACE: to be a catalyst for such technological transfer in Europe.
- Finally, setting up such a Programme will increase the number of PRACE regular users by addressing the long-term R&D needs of the Programme’s customers. At the end of the SHAPE program, “evangelised” companies will have the possibility to continue to use HPC for their daily business and commercial activities by buying their own HPC facilities or remote HPC cycles and/or services through e.g. a commercial HPC Cloud provider. They will also have the possibility to participate in Open R&D through existing PRACE regular calls.

3 Programme Strategy

3.1 Legal aspects

The legal implications of implementing SHAPE have been analysed by the law firm Bird&Bird² in a confidential report (with the support of 3IP-WP2 Task 2.2: *Legal Aspects of PRACE Collaborations*).

The provision of services to commercial entities raises two main issues: 1/ **compatibility with state aid rules** (as a general rule, SHAPE and PRACE must avoid providing services that would qualify as state aid³) and 2/ **a potential abuse of a dominant position** (SHAPE must not offer any services that may be considered of commercial value and might thus disrupt the market).

The recommendations provided by Bird&Bird can be summed up this way:

- PRACE 3IP must organise a formal open call for proposals to select SHAPE beneficiaries.
- Publicising SHAPE opportunities on websites and forums, selecting project applications based on technical and business criteria, and using Open R&D calls for accessing computing resources satisfy all the legal requirements.
- PRACE 3IP is allowed to expressly state its support for a company applying for public funds (e.g. through national funding agencies)
- The selection process must not discriminate EU companies on the basis of their nationality.

The Programme proposed in this document meets all the criteria above.

3.2 Mission

The **Mission** of this programme is to help European SMEs to demonstrate a tangible Return on Investment (ROI) by assessing and adopting solutions supported by HPC, thus facilitating innovation and/or increased operational efficiency in their businesses.

The **Customers** of the Programme are the European SMEs whose objective is the achievement of a Return on Investment by implementing HPC-based solutions.

3.3 Desired Impact

The Programme will contribute to the growth of the European SMEs by allowing them to reap the benefits of HPC-enabled technologies. The tangible Return on Investment achieved in each project and associated activities will be the main criterion used in assessing both project and Programme performance.

This Programme will benefit the entire HPC industry since evangelised SMEs are likely to use it for commercial activities by buying their own HPC facilities or accessing remote cycles and services. This will impact the HPC hardware and software providers as well as the Cloud

² Bird&Bird, <http://www.twobirds.com>

³ A measure constitutes State aid if satisfies the following four criteria: 1) the measure is granted by the State and through State resources; 2) there must be aid in the sense of a benefit or advantage; 3) the measure is selective (favours certain undertakings); 4) it is liable to distort competition and affect trade between Member States.

providers by enriching their current market with a larger customer base consisting of innovative SMEs.

The Programme will also help PRACE to achieve its mission as a catalyst of the European HPC Ecosystem. The Programme will lead to an increase in the number of PRACE regular users since, after finishing the SHAPE programme, SMEs will also have the possibility to continue to use PRACE resources for Open R&D purposes. Secondly, the Programme will foster technological transfer between academia and industry by offering the opportunity to set up collaborations between SMEs and experts from public research in the industrial domain of the given SME (CFD, structure mechanics, acoustics, etc.), in the HPC domain or more generally in numerical and computer science.

3.4 Metrics

It will be possible to measure the Programme's success in the long-term (not before the end of PRACE 3IP) using the following KPIs:

- Number of SMEs that have successfully used a HPC-based solution. This can be complemented by surveys to assess how the expectations were met;
- Return on Investment achieved through the above;
- Business impact – reporting on business impact using some of the following variables, if possible: Direct jobs created, Market share increase, Number of patents, Participation in new collaborative projects;
- Number of publications and increase of the visibility of the SME more globally;
- Enlargement of the PRACE base of users: how many SMEs continue to use PRACE resources for Open R&D purposes after the end of their Programme?
- Increase of users of Commercial HPC offers coming from the SHAPE programme.

The process of measuring the Programme's success will be integrated in the broader impact assessment plan of PRACE on which PRACE-3IP Task 2.4: Impact Assessment for the Research Infrastructure is currently working, based on IIP deliverables [14], [15] and [16]. The actual measurement will take place when enough relevant information from a fully operational program is available, which will happen after the pilot phase run by the PRACE 3IP project.

4 Programme Operation and Structure

4.1 Programme Operation

4.1.1 The Concept

This Programme is seen as an extension of the current industrial relationships of PRACE. The Programme could be built on all or selected PRACE resources. It is envisaged that SMEs completing this Programme will be able to continue developing their expertise taking advantage of a, local or otherwise, commercial provider for their daily business activity while they could continue to use public funded resources for Open Research.

4.1.2 Key Operational Principles

- The programme is open to all Europe-based SMEs regardless of their location or the scale of their project.
- After a Pilot phase, the participation in the Programme could be performed through a permanent Call for Proposals announced by PRACE AISBL.

- Entry into the Programme will be based on a transparent peer review process involving two stages: a scientific and technical review, and a business review. The scientific and technical review will assess the feasibility of the idea or the industrial project proposed by the SME. The business review will assess the commitment of the Management of the SME to co-invest into the demonstration of such a project and the creation in a mid-term period of added value (investments, hiring, increase of market shares, etc.) and more globally in terms of expected ROI.
- On application approval, each participating SME is required to commit at least the same amount of resources (either financially, or in-kind) as the Programme.
- Each industrial project proposed will need to be divided into tangible milestones and project resources (i.e. moving onto the next step in a given project) will be released on milestone completion.
- The Programme will also work with SMEs prior to project submission (in order to prepare a proposal) and after project completion or rejection (in order to follow-up on some ideas).

4.1.3 Programme Expertise Resources

The Programme's expertise should match the requirements of SMEs in the area of HPC adoption, namely:

- Information and networking; Access to science-domain expertise as well as applied mathematics, HPC and computer science expertise;
- Access to sources of funding;
- Access to HPC systems including pre- and post-processing and computing services.

4.1.3.1 Information and networking services

The feedback gathered through the PRACE industrial seminars and similar new national initiatives shows that most SMEs do not have the internal skills and resources needed to take advantage of the potential of the HPC ecosystem or technology in their daily business. **SMEs need to be informed** about the organisations that provide numerical simulation and HPC services, the tools and methodologies available, and the companies in their domain which are already using such techniques.

SMEs will be invited to attend to PRACE industrial seminars or domain-specific meetings and a dedicated industrial webpage on the PRACE RI website could give them all the information about the HPC ecosystem and all the service providers in terms of training, expertise and HPC resources.

4.1.3.2 Access to expertise

SMEs will be allowed to **access high-value expertise**, in order to analyse the participating company's needs and to co-design an industrial project with an aim to demonstrate a proof-of-concept model by using the PRACE HPC facilities. Such collaboration is essential since the main concern of most SMEs, who usually do not speak the HPC jargon, is to reduce the overheads and/or to increase robustness of a given product, reduce the time to solution and increase their efficiency in order to be more competitive.

PRACE Research Infrastructure now covers 25 countries and it has access to one of the widest worldwide scientific community. As a catalyser of technological transfer, one of the main goals of SHAPE will be to connect experts from academia with SMEs in order to co-construct concrete industrial projects that could be demonstrated using the PRACE HPC resources.

One of the key mid-term issues for SHAPE will be the creation of a **database of experts** that could be made available for both evaluation of proposals at an early stage, or during the industrial project as consultancy for the selected SME (see 4.2.3.1)

As an example, an expert involved in the evaluation process could then continue working with the SME by co-supervising (together with the SME) a PhD or a Postdoc student during the implementation of their industrial project. Such a Postdoc could be hired by the SME after the end of the Programme.

PRACE members have also accumulated experience in HPC, applied mathematics and in some cases in domain-specific expertise that could also be made available to SMEs. The question of whether to charge or not for such an activity will depend on the level of involvement of the scientist. However, SHAPE should not charge the SME directly: rather it should foster the creation of bilateral collaborations between the research laboratory of the expert and the SMEs. All the relevant legal (IPR) and financial issues will be addressed.

4.1.3.3 Access to HPC resources

SMEs require **on-demand access to HPC resources**, supported by relevant expertise, in order to assess the validity of their assumptions (without committing to long-term investments). **The demonstration of an industrial project as a one-off experiment is the major element of the SHAPE Programme.**

HPC resources could be brought in by all or selected Tier-0 and Tier-1 PRACE partners depending on their availability (in legal terms) to deliver services to industrial users. The existing PRACE Preparatory Access call for proposal for Tier-0 services (which has been extended to support industrial users through Open R&D [17]) should be used. Companies will compete against proposals from academia by a specific technical evaluation and they need to commit to publishing the project results after the end of their grant period (from 2 to 6 months). The call's purpose is code development, code optimisation and scalability within the scope of an industrial project demonstration. In the case of Tier-1 centres, further discussions will be required in order to assess the possibility of using a similar Open R&D call.

If the SME is not willing to publish any results or information about its industrial project, a specific access through a call for proposals based on Pre Competitive R&D will be required. These business models are still under evaluation by PRACE AISBL and could perhaps be applicable on selected Tier-1 partners. As this might require financial compensation, SHAPE could facilitate a legal and financial agreement between the centre and the SMEs.

4.1.3.4 Access to funding

SMEs also require **information on funding possibilities** in order to implement their business projects. SMEs will need services, long-term expertise, access to specific HPC resources, local investment in workstations, software licenses, network capacity or hiring of new skills, with a potential associated cost (even if the goal of SHAPE is to try to lower such entry barriers to technologies).

In order to sustain such investments, SHAPE could provide information on funding sources available to SMEs, either at the regional, national or European level (such as FEDER funds). Some SMEs could also participate in funded research projects.

Such information on funding sources will be available through a database of funding sources that needs to be created by SHAPE at the earliest stage (see 4.2.3.1).

4.2 Programme Structure

SHAPE will operate through the application of its Expertise, by the provision of Services to its Customers, supported by its internal Processes. The objective of SHAPE is to lower the barriers that European SMEs face when entering the domain of innovation through HPC. This environment is schematically shown in Figure 1 below.

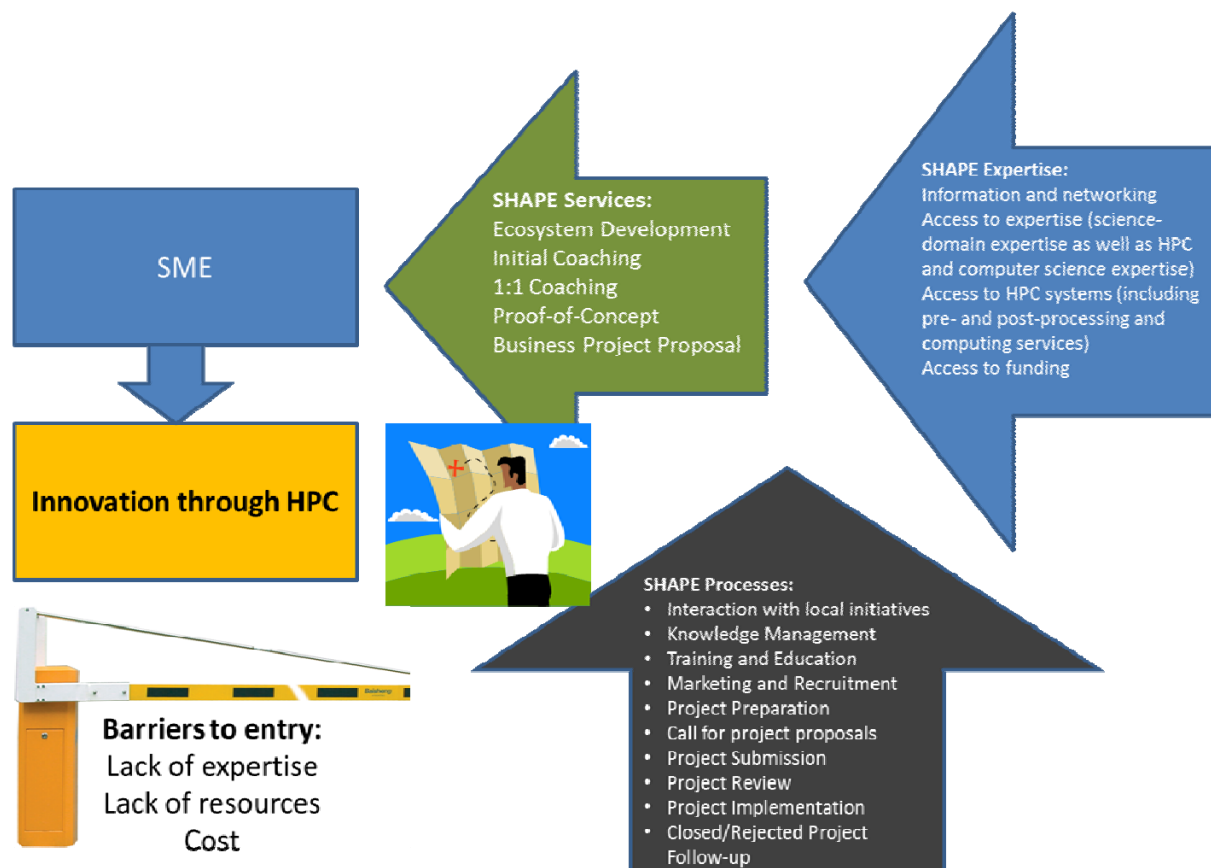


Figure 1 - Expertise, Services and Processes of SHAPE

4.2.1 Services

The Programme's customers (i.e. European SMEs) will perceive the Programme through the following services:

- **Ecosystem Development** – This will be a set of general services (combined with the activities in the Marketing and Recruitment Process – see below) such as: Training Courses, Seminars, Workshops and Networking Services with an objective to help SMEs obtain information and expertise related to HPC and the European HPC ecosystem. The Programme will announce the roll-out of the Ecosystem Development programme each year. This programme should be based on the expertise of PRACE and use the existing training infrastructure (e.g. PATC). The programme will target :
 - SMEs at the 'desktop-level' looking to begin using HPC and also
 - SMEs at a more advanced level, looking to broaden their knowledge using PRACE accumulated expertise.

The following services will target individual Customers, rather than the general SME audience.

- **Initial Coaching** – identifying project value and validating project steps

Following this, each qualifying SME will be able to participate in a tailored programme, involving all or some of the steps below:

- **1:1 Coaching** – working with an SME using a dedicated team in order to facilitate HPC adoption and define a business project proposal. This is the largest part of each project and it should be divided into tangible and measurable milestones. This elaboration of an industrial project could be done with the help of experts in HPC, numerical simulation, and computer science, as well as domain-experts.
- **Proof-of-Concept** – allowing the participating SME to try out a developed solution on a selected PRACE machine. This step is the key of the SHAPE program since it will allow the SMEs to really demonstrate the results obtained by using HPC resources on a concrete industrial project in terms of time to solution and performance gains.
- **Business Project Proposal** – the definition of a technological business project plan (i.e. ‘The Way Forward’) to be used by the participating SME to implement the solution developed. During the SHAPE program it is expected to help the SME in thinking about what could be the next step after SHAPE. Once the SME will have demonstrated its industrial project on the PRACE resources and wants to use HPC in a daily business mode, it will be possible for the SME to invest in its own computing resources or use remote cloud services. Helping the SMEs on sizing its future needs and choosing between such two solutions could be also a service provided by SHAPE.

4.2.2 Service Delivery System

The programme will work through the following processes:

- Interaction with local initiatives
- Knowledge Management
- Training and Education
- Marketing and Recruitment
- Project Preparation
- Call for Project Proposals
- Project Submission
- Project Review
- Project Implementation
- Closed/Rejected Project Follow-up

4.2.2.1 Interaction with local initiatives

SHAPE will work closely when available with existing national initiatives (e.g. in France, Germany, Italy or Netherlands) by leveraging the initial evangelisation process and amplifying it, allowing the SMEs to use larger configurations based on different architectures in different countries (in order to give a wider visibility to the SMEs on the European market).

SHAPE will lean on two crucial principles: subsidiarity (working where it is most appropriate and most efficient) and complementarity (not doing the work that has been done somewhere else).

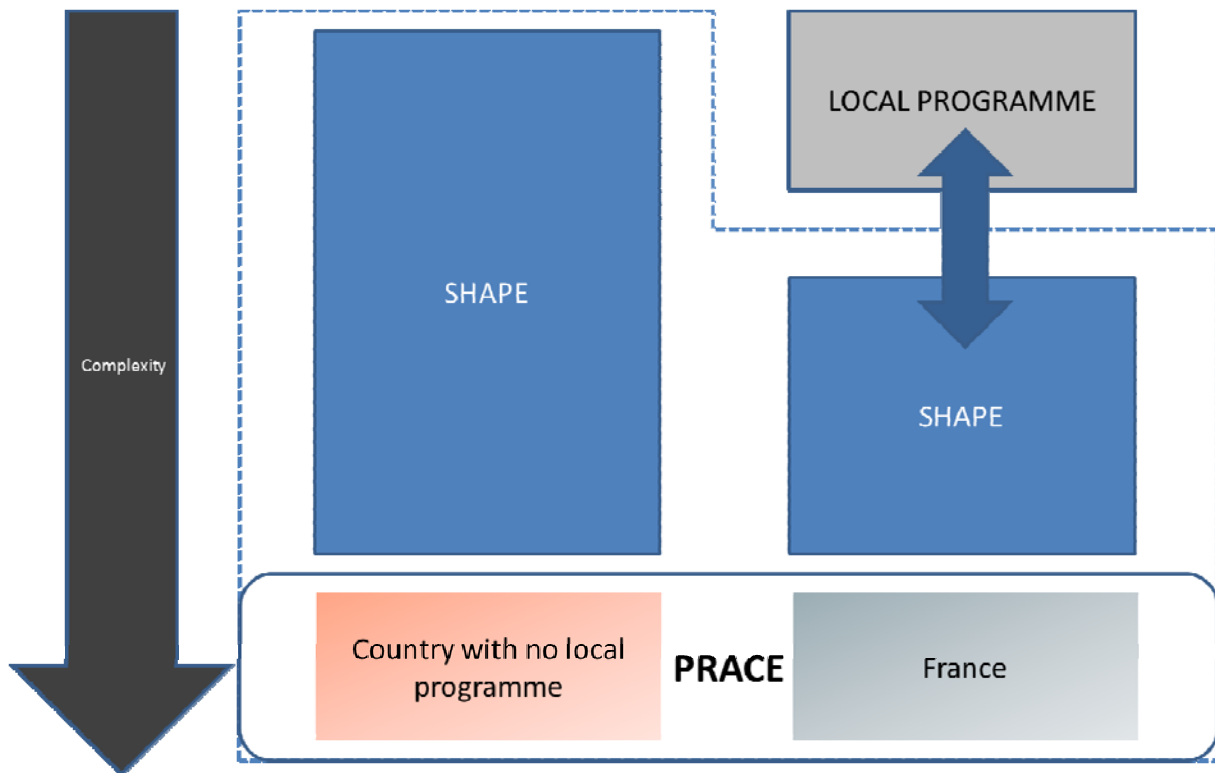


Figure 2 - Complementarity and Subsidiarity - Example of France with a local programme, and a country with no local programme

In the countries with no significant national initiatives existing yet, SHAPE will be able to provide the full scale of services. However, in the countries where such national initiatives already exist, the role and benefit of SHAPE will be twofold:

- Leverage the national evangelisation process by ensuring that the SME can get access to European resources if needed (e.g. by providing expertise in an application domain or particular HPC implementation that is not available locally).
- Amplify the work with SMEs whose project is mature enough to have a proof-of-concept at a larger scale (or on a specific architecture) than it is possible nationally.

The different roles of SHAPE, depending on national ecosystems, are shown in Figure 2.

The following rules will apply when interacting with local programmes:

- Projects should be first fulfilled through the local initiative (and use PRACE in the case of higher resources requirements or specific services that cannot be met locally).
- There will be process documents, such as Memorandum of Understandings, setting the boundaries and rules of interaction (entry point, transfer conditions, review process mutualisation) between SHAPE and the local programme.

An example:

1. SHAPE receives an application from a French SME whose needs can be addressed first by the national initiative (HPC-PME). SHAPE transfers the application to HPC-PME in order to process that project locally.
2. An SME participating in the HPC-PME programme (whether initially coming from SHAPE or not) needs to go to the European level (for computing resources, to have an international research collaboration or to gain a wider visibility on the market). HPC-PME will transfer the SME contact to SHAPE.

Generic agreements between national initiatives and SHAPE should be in place.

4.2.2.2 Knowledge Management

SHAPE will develop its own Knowledge Database (K-Base) which will integrate the four internal databases described in 4.2.3.1. Some of the content of this K-Base should be made available to the public through the Programme website.

4.2.2.3 Training and Education

One of the most recognized assets of PRACE is the hundreds of years of combined experience of the partners in training and code enabling. The recent launch in 2011 of the PATC (PRACE Advanced Training Centres) and their extension in 2013 with more industrial content will allow PRACE to deliver to SMEs a set of high value services across a pan-European HPC training program.

Following the tradition of the PRACE industrial seminars, thematic workshops should be focused on the use of HPC in a given industrial domain and present the outcome of national or regional initiatives. This will help establish (or leverage with existing actions carried out by projects such as EESI) a European cartography of service providers and it will inform about success stories and associated ROI. The current PRACE RI website should be enhanced in order to support this activity.

The training infrastructure of PRACE can also target more advanced organisations together with their traditional audience (i.e. the research community). As some SMEs are developing their own simulation codes or using off-the-shelf ISV or Open Source codes, such training services will cover a wide range of domains from programming languages, parallelisation techniques, use of numerical libraries, to best practices for using Open Source (or even ISV) codes.

4.2.2.4 Marketing and Business Development

The Programme will develop its logo and branding (e.g. ‘Get into SHAPE for HPC!’) as a part of the Programme’s broader market identity (including colours, visual presence, etc.).

The Programme will use the following marketing tools in order to recruit SMEs:

- The Programme’s own website;
- A CRM database of potential and existing clients (based on industrial research);
- An Information Pack distributed to potential clients;
- The existing channels used by PRACE, e.g. the PRACE website, events, press releases, etc.;
- Participation in related events (also with the support of PRACE);
- Engaging national- or regional-level industry support agencies or similar initiatives in order to recruit companies (e.g. BPI in France, Scottish Enterprise in Scotland).

Each year the Programme will issue a Marketing and Business Development Plan including:

- Goals (improving the program visibility, sharing best practices, etc.);
- Quantitative objectives (number of SMEs expected in the program in the coming year, industrial domains targeted, etc.);
- Target groups – the companies that the Programme should target;
- Strategies – how the objectives will be achieved - (marketing tools, communications channels, marketing effectiveness, etc.);
- Marketing and presales events/actions annual schedule.

This document will guide SHAPE Marketing and Business Development annual campaign. A process benchmarking will also be carried out (once a year or every six months) and will help compare best practices, coordinate marketing activities between SHAPE teams, analyse the Return on investment and thus lead to improved efficiency.

4.2.2.5 Project Preparation

SMEs will be advised to contact the Programme in order to obtain help with the preparation of their proposals prior to submission. The Programme will provide template and example documents of proposals, to give the SMEs a reference point from which they can start their proposal. Also, where possible the proposal should be drawn up with the assistance or guidance of one of the PRACE partners. In this way the quality and relevance of the proposal will be enhanced before entering the submission process. Only a limited amount of resources will be dedicated to this task and the return on investment in this activity will be an increased project acceptance ratio.

4.2.2.6 Call for Project Proposals

A continuous Call for Project Proposals accessible through the Programme's website should be executed.

4.2.2.7 Project Submission

Project submission will take place through the Programme's website. The following information will be requested (among others):

- Company details
- Technical Project Description
- Business Project Description (including a Return on Investment justification)

4.2.2.8 Project Review

Project Acceptance/Rejection will be executed by a Project Selection Committee during a regular meeting. The Committee's members will be approved by the PRACE Council. Some members of the Scientific Steering Committee (SSC) might be part of it to ensure that at least baseline scientific aspects are met in each approved proposal.

Project Acceptance/Rejection will take place in the following steps:

1. Entry Eligibility – Is the applying company eligible from a legal perspective (e.g. is it an EU-based company, is it an SME?)? Are they willing to contribute internal resources (e.g. manpower)?
2. Technical/Scientific Review:
 - a. Technical viability – is the solution possible to implement?
 - b. Innovative character – is this something new in the company's environment?
 - c. Sufficient Technical Complexity – is the use of HPC and the solution's technical complexity sufficient to engage the Programme's resources (although the Programme will consider all applications regardless of the scale of the solution)? This condition is included to avoid dealing with relatively trivial problems.
3. Business Review – will the project deliver a Return on Investment for the company? What is the mid-term commitment of the SMEs in investing, creating value, increasing market shares, etc.?

The Committee will issue a justification for each decision. Companies will be able to re-apply with modified proposals if their proposals are rejected.

4.2.2.9 Project Implementation

This process will involve:

- A preparation of a Project Plan including milestones and the definition and assignment of a team of dedicated resources (including 1:1 Coaching, Proof-of-Concept and Business Project Proposal as above);
- Regular reviews on the completion of each Milestone;
- Preparation for further work.

Each industrial project needs to be defined using a clear vision of the duration, objectives, milestones, resources required (expertise, hardware and software resources, etc.), training, and a clear view of the associated costs of such a project in order to request funding from national or European agencies. The project should also define how the SME will benefit from using HPC on project completion.

Each project specification will also need to include a clear commitment from the management of the company to use HPC in the long-term and the creation of value and assets as well as the enlargement of the business of the company.

Some of the services provided by the SHAPE programme may bear direct costs (i.e. establishing a one year R&D collaboration with a given national centre for providing expertise or hiring a post-doc for parallelising an internal code) or indirect costs (e.g. acquiring some hardware internally, renting some ISV licences or upgrading the network capacity of the company to reach PRACE systems). A clear cost estimate should be included in each project proposal. It will allow the SME to obtain a clear view of the application of HPC resources in a real scenario, together with the associated costs and the benefits of scaling out or implementing new processes using HPC for its daily business (i.e. Return on Investment).

Each project will pull resources from the following sources:

4.2.2.9.1 Expertise Provision

The **expertise** provided by PRACE or by third parties may be domain-expertise in CFD, acoustics, structural mechanics, optimisation, electromagnetism, etc. as well as numerical simulation (solvers, uncertainties tools, etc.), HPC (code enabling, profiling, optimisation, parallelisation, HPC platforms, pre/post processing, etc.) or computer science (development tools, software licensing, etc.). With the help of experts, the participating SME will be able to translate a domain-oriented idea into a concrete test-bed using new methodologies and tools requiring HPC facilities for scaling out the industrial processes used by the company.

As one of the goals of SHAPE is to foster technological transfer between academia (and PRACE) and industry, such expertise may be provided by public research organisations (however, collaboration with private companies for specific expertise could also be possible), PRACE partners or national or European research centres. This expertise-exchange could be implemented through initial discussions involving the company and the expert(s) in order to obtain a better understanding of the business and the stakes of the company and then through research collaboration in co-designing an industrial project using HPC.

PRACE may provide human resources through contribution from PRACE partners. It may also facilitate the establishment of bilateral R&D collaborations between SMEs and third-party European research organisations. For such organisations, the SHAPE programme represents an interesting opportunity to work closely with European industry, to disseminate their research and to allow their PhD or Postdoc students to be hired with the SMEs taking

part in the programme (a lack of human resources has been pointed as a major factor hindering the use of numerical simulation and HPC).

The Programme will need to establish a European network of experts and resources supporting its projects. In this process, the Programme should take advantage of the existing databases made available by PRACE partners. The network will include ISVs and commercial computing cycle providers, willing to act as a partner or to be recommended to SMEs if necessary.

4.2.2.9.2 Computing Resources

The resources required will be provided by Tier-1 centres, or Tier-0 centres in the case of larger requirements. Tier-1 centres, due to their national scope, will have also an invaluable role in addressing local SMEs within the SHAPE Programme. Access to PRACE resources could be provided through the existing PRACE Preparatory Access call or through a specific call approved by PRACE AISBL.

The PRACE Preparatory Access call is a permanent call with quarterly cut-offs, which already allows academic and industrial users to scale out their applications, eventually benefiting from expertise from PRACE experts for preparation towards an upcoming Regular call (more focused on producing scientific results with a higher level of resources allocated for one year). Preparatory Access awardees can use PRACE resources from a period of 2 to 6 months and for 50 000 to 200 000 CPU hours. Preparatory access calls are based on the Open R&D access programme - awardees need to publish the results (mainly performance and scalability curves) at the end of their grant period. If such an access mode is not compliant with the SHAPE program, a new access method needs to be decided by PRACE AISBL.

4.2.2.9.3 PRACE Advanced Training Centres

In early 2012 as part of the PRACE-2IP project the PRACE Advanced Training Centres (PATCs) have been established and became operational: BSC (Spain), CINECA (Italy), CSC (Finland), EPCC (UK), GCS (Germany) and Maison de la Simulation (France). The mission of the PATCs is to serve as European hubs of advanced, high-quality training for researchers working in the computational sciences.

The open courses provided by PATCs will also be able to fulfil the needs of the SHAPE participants. Whereas the main focus of the existing PATCs is fulfilling requirements of academic users, in the near future an extension is expected in order to integrate industrial users. This new training access will enable a number of PATCs open courses more suitable for the participants of SHAPE.

4.2.2.10 Closed/Rejected Project Follow-up

The Programme will dedicate resources to follow-up on closed or rejected projects in order to re-assess their preparedness.

4.2.3 Tools

4.2.3.1 Knowledge Resources

One of the main reasons identified for SMEs not using HPC, even though it could enhance their business, is a lack of information: they do not realise what can be done, who to approach for expertise, or where to gain assistance in funding. In this section we propose some data resources which will help bridge these gaps.

- **SHAPE Customer Relationship Management (CRM) Database** - Who is yet involved in SHAPE and who is not? A database will be provided and filled for each

new entry in the programme. It will help deliver a topology of SHAPE customers based on determined criteria (industrial domain, location and size of the SME, SHAPE project duration, etc.) and better design the marketing and presales phases.

- **Success Stories Database** - What can be done with HPC? - As proposed in section 4.2.2.2 “Knowledge Management”, to tackle the first issue of helping an SME realise what HPC has to offer them, we suggest making available a database of success stories. Via this, SMEs can see how other companies, both within their area of interest and further afield, have taken advantage of HPC facilities and expertise to improve their business. Several of the partners already have local success stories to contribute to such a database.
- **External Expertise Database** - Who to approach for advice? – A database will be established identifying domain experts who have experience of working with SMEs, and also of regional contacts who facilitate putting SMEs in touch with an appropriate expert. The database could be integrated with information on identified ISVs (with particular attention to European ISVs) willing to provide training and expertise services (other than only licenses) to SMEs and commercial computing cycle providers.
- **Funding Resources Database** – As the goal of the SHAPE program is to try to lower the entry barrier of HPC technologies for engaging SMEs, the Programme should analyse the different sources of funding available at the national and the European level and inform the SMEs about such possibilities. Funding could be provided by “traditional” funding agencies and mechanisms as well as through engaging SMEs in collaborative R&D projects with academia funded by the EC or by national research agencies.

It is envisaged that all databases will also be accessible through the Programme’s website.

4.2.4 Programme Management Structure

It is suggested that the structure of the Programme should be defined by PRACE on the completion of a Pilot Phase.

4.3 Scenario example: Taking a company through SHAPE – A country with no local programme

Let’s assume that an SME from a country with no local programme is interested in using HPC for film rendering and post-production and approaches SHAPE.

The following steps will take place:

1. SHAPE experts examine the technical aspects of SME’s request (*is that HPC i.e. is the technological solution suggested related to HPC?*), and explain the project management process to the company;
2. Help with application process; preliminary work plan prepared;
3. The company applies through a Continuous Call for Proposals (utilising the Programme’s website) including an explanation of the business value of the project and the commitment of their resources;
4. Review through a regular review process: technical and business review (based on a business case written by the SME). The review team are both technical/scientific and business people;
5. If unsuccessful, feedback is provided and SHAPE is happy to work with them to re-apply;

6. Contracts signed by the SME and the others bodies (laboratory for external experts, PRACE centres, etc.). At this stage the industrial project is clear on which services are required, what are the milestones, deliverables, what are the potential costs, IPR issues, etc.;
7. Training phase – exploring the options that provides the PATC curriculum, the centres' expertise, external experts (in this case a contract exists between the experts and the SME);
8. Open R&D Access Programme/Preparatory Access used for developing, optimising, scaling out the codes in order to demonstrate the industrial project of the SME;
9. Information provided on commercial service providers, centres with commercial services, and funding options;
10. Final report written.

5 Resources

5.1 Human Resources

The programme will be operated out of selected PRACE centres. A call for proposals will be announced in order to identify the resources which each centre is able to provide for the program. The selected centres will become programme members. Funding will be provided on a PM-basis to each centre participating. Such resources could allow the deployment of “Tiger Teams” consisting of two people skilled in HPC and domain-expertise with an aim to visit and assist the SMEs during the process or to provide HPC code enabling services and expertise. Establishing “Tiger Teams” is mentioned in the recommendations from the IDC Special Study report [18].

5.2 Resource Requirement and Funding

A detailed resource requirement according to the template below will be drawn after the completion of the Pilot Phase.

Process	PMs Required per SME
Interaction with local initiatives	
Knowledge Management	
Training and Education	
Marketing and Recruitment	
Project Preparation	
Call for Project Proposals	
Project Submission	
Project Review	
Project Implementation	
Closed/Rejected Project Follow-up	

In this way, we will gain an insight into the effort needed in the different processes. During the Pilot Phase we will also obtain an estimate of the number of SMEs potentially interested in the program and about the fraction of proposals which have to be rejected. Based on those numbers, we will be able to provide an estimate of the necessary resources for the implementation of the program.

5.3 Communication

Effectively organised information sharing and awareness via the internet are prerequisites for the success of the SHAPE programme. In that sense, the SHAPE website will be launched as a platform for information sharing and awareness as well as to facilitate the application process to the call for proposals. It will also allow better targeting at industrial groups which are potential or current users of PRACE services. The website will provide fundamental information about SHAPE (mission, resources, activities, open calls) linked with the main PRACE-RI website and PRACE Training Portal. Regular updates and structure extensions, based on the evolving needs and requirements of SHAPE participants and visitors, are planned during the Programme. The website will also include a visitor statistic monitoring system in order to support the improvement of the content and structure.

Having in mind that social networking services are increasingly transforming from a simple tool for expression and communication between individuals to professional groups by interest, SHAPE will consider some of the most popular social networks such as Facebook, Twitter, Google+ and LinkedIn in order to make a decision on which of them are most appropriate to be used for SHAPE purposes.

Dissemination of the results via HPC channels as well as industry channels is also crucial for raising the awareness of SMEs to HPC and numerical simulation. This is a major issue since one of the biggest difficulties is in reaching SMEs which typically are most of the time focused on short term issues and are not aware about the potential of HPC.

6 Pilot Project

To prove the viability and value of the SHAPE IAP a Pilot Project Call for SMEs will be proposed to be launched in June 2013, based on the Programme's approval by the PRACE AISBL Council. The purpose of the Pilot is to refine the details of the Programme in order to launch a comprehensive Programme after the Pilot completion.

The Pilot Project will look at implementing the following parts of this proposal:

- Marketing and Recruitment – running a pan-European campaign aimed at recruiting SMEs for the Programme;
- Setting up a Programme webpage with a Call for Project Proposals and Project Submission process;
- Announcing a Call for Proposals;
- Carrying out a Project Review;
- Implementing some projects using the Open R&D Access Programme;
- Analysing the results of the pilot and developing a set of recommendations to the AISBL Council for a permanent service.

Due to time limitations, not all of the IAP services will be operational or offered to the SMEs participating in the Programme. However, in order to obtain meaningful results, all the core aspects will have to be available:

- Ecosystem Development – due to the limited scale of the Pilot, general Marketing and Recruitment Processes will not be performed as the target SMEs will be those already having relations with the PRACE centres, or reached through the promotion at the Industrial Seminar or via the PRACE dissemination channels. At the same time, in order to reduce complexity and shorten the training phase, the pilot will target SMEs already having a basic knowledge and use of HPC services, but looking to broaden their knowledge.

- Initial coaching – restricting the access to the aforementioned topology of SMEs will likely shorten this phase because the SME will be already aware at least in some degree of the project value and of the project steps to be set up.
- 1:1 coaching – the PRACE centre contacted by the SME will create a dedicated team to define with SME a business project proposal. Since the process to identify suitable external experts is necessarily time consuming, for the pilot preference will be given to SMEs needing expertise available inside the PRACE centres.
- Proof-of-concept – the SME will try out the developed solution on a selected PRACE machine.
- Business Project Proposal – a business plan to be used by the participating SME will be implemented, and the feedback on the overall process will be collected.

A complete description of the final structure of the Pilot and the launch will be presented on Deliverable D5.3.1 *Programme Launch*, scheduled for June 2013.

The Pilot Project will be managed by the PRACE-3IP-WP5, based on the following main milestones:

- June 2013: Pilot Call Announcement;
- September 2013: Project Review Completed;
- September 2013 – May 2014: Project Implementation;
- April 2014 – June 2014: Pilot Project Results Review.

At the completion of the Pilot in June 2014, a Pilot Project Programme Review will take place, where the feedback of the SMEs and all acting partners will be collected and used to produce recommendations to PRACE AISBL for amending the model proposed in this deliverable.

7 Conclusions

Computational methods and simulation through HPC are well understood as being crucial instruments to support industrial competitiveness. In particular, HPC facilitates technological innovation, product enhancement and reduces time to market.

While some large companies experience a rapid Return on Investment (ROI) through aggressive HPC infrastructures and adoption of HPC methodologies in the production cycle, this process is not firmly established yet in the case of SMEs, where a huge potential exists.

Since its beginning, PRACE has been playing an important role in promoting HPC in the industrial sector, i.e.: the successful series of PRACE industrial seminars, the Open R&D industrial pilots launched in PRACE-1IP [19], the activities on Petascaling codes of industrial interest and support for emerging opportunities for industry in PRACE-2IP [20].

With the SHAPE Integrated Access Programme, presented in this Deliverable and based on a set of best practices analysed in [1], PRACE will be in a position to change the attitude of European SMEs towards HPC, foster technological transfer between academia and industry and actively support European competitiveness.

This document outlines the foundations of a pan-European programme supporting HPC adoption by SMEs. It points out the main entry barriers that the Programme should help SMEs to overcome, mainly the lack of knowledge, expertise and resources. SHAPE proposes to deliver a set of services based on PRACE expertise, knowledge and computing resources to match the requirements of SMEs in the area of HPC adoption. The programme should allow SMEs to access high-value expertise in order to identify their needs, to design an industrial project and to try out a proof-of-concept model by using the PRACE HPC facilities.

While the Programme's framework has been thoroughly designed in this document, the role of the Pilot Project will be to refine its main assumptions. This Pilot should deliver answers on the following issues:

- Best practices for Programme implementations (i.e. things that work and things that do not in the various processes proposed);
- The optimal management structure of the Programme;
- The scope and resource requirement of the Programme.

Depending on the conclusions of the Pilot, the Programme will have to be adapted to the needs of industry and PRACE capabilities. In the following phase, PRACE should determine a method for setting up and funding a permanent SME support programme.

At the completion of this Pilot project, in June 2014, the Work Package will issue another document with a set of recommendations to further implement the SHAPE programme and to complete the description of the final structure of this pan-European, PRACE-based programme supporting the adoption of HPC by European SMEs.

8 Appendix – SHAPE Process Map

