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

D3.2
Outreach Plan

Final

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References and Applicable Documents

[1] 1IP Dissemination & Training Plan (http://www.prace-ri.eu/IMG/pdf/d3.1.1_1ip.pdf)
[2] 2IP Dissemination Plan (http://www.prace-ri.eu/IMG/pdf/d3.1.1_2ip.pdf)
[3] 1IP Final Report (http://www.prace-ri.eu/IMG/pdf/d3.1.8_1ip.pdf)
[4] 2IP First Annual Report (http://www.prace-ri.eu/IMG/pdf/D3-1-3_2ip.pdf)
[5] PRACE-3IP D3.1 (http://www.prace-ri.eu/IMG/pdf/d3.1.pdf)

List of Acronyms and Abbreviations

AISBL	Association Internationale Sans But Lucratif (legal form of the PRACE RI)
BSC	Barcelona Supercomputing Center (Spain)
CEA	Commissariat à l'énergie atomique et aux énergies alternatives (France)
CINECA	Consorzio Interuniversitario, the largest Italian computing centre (Italy)
CINES	Centre Informatique National de l'Enseignement Supérieur (represented in PRACE by GENCI, France)
CSC	Finnish IT Centre for Science (Finland)
CaSToRC	Computation-based Science and Technology Research Centre (Cyprus)
EC	European Commission
EPCC	Edinburg Parallel Computing Centre (represented in PRACE by EPSRC, United Kingdom)
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 for Supercomputing
ICHEC	Irish Centre for High-End Computing (Ireland)
IDRIS	Institut du Développement et des Ressources en Informatique Scientifique (represented in PRACE by GENCI, France)
IP	Implementation Phase
IPB	Institute of Physics Belgrade (Serbia)
ISC	International Supercomputing Conference; European equivalent to the US based SC1x conference. Held annually in Germany.
IUCC	Inter University Computation Center (Israel)
JKU	Johannes Kepler University Linz (Austria)
JSC	Jülich Supercomputing Centre (FZJ, Germany)
KTH	Kungliga Tekniska Högskolan (represented in PRACE by SNIC, Sweden)
LRZ	Leibniz Supercomputing Centre (Garching, Germany)
NCF	Netherlands Computing Facilities (Netherlands)

NCSA	National Centre for Supercomputing Applications (Bulgaria)
NIIFI	Nemzeti Információs Infrastruktúra Fejlesztési Intézet (Hungary)
PRACE	Partnership for Advanced Computing in Europe; Project Acronym
PATC	PRACE Advanced Training Centre
PSNC	Poznan Supercomputing and Networking Centre (Poland)
SNIC	Swedish National Infrastructure for Computing (Sweden)
SoHPC	PRACE Summer of HPC
STEM	Science, Technology, Engineering, and Mathematics
STFC	Science and Technology Facilities Council (represented in PRACE by EPSRC, United Kingdom)
STRATOS	PRACE advisory group for STRAtegic TechnOlogieS
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
UCPH	Københavns Universitet (Denmark)
UHeM	National Center for High Performance Computing of Turkey
ULFME	University of Ljubljana, Faculty of Mechanical Engineering (Slovenia)
VSB-TUO	Vysoka Skola Banska – Technicka Univerzita Ostrava (Czech Republic)
WP	Work Package
WP3	Work Package 3
PM	Person Month
XSEDE	Extreme Science and Engineering Discovery Environment

Executive Summary

This deliverable (Outreach Plan, D3.2) outlines the planned work of the outreach team during PRACE-3IP to describe the usage and empowering potential of High Performance Computing (HPC). This plan formalises the activities of WP3, defines the schedule of tasks and assigns responsible partners. The general objectives of the PRACE-3IP outreach effort are defined, along with the audiences that will be targeted and the various methods that will be used.

PRACE wishes to inspire and encourage the next generation of software engineers, system administrators, and general users of HPC systems in order to keep Europe at the forefront of supercomputing. To this end PRACE-3IP expands on previous outreach work (PRACE-1IP WP3 Plan [1]; PRACE-2IP WP3 Plan [2]; PRACE-1IP Final Report [3]; PRACE-2IP First Annual Report [4]) to include a summer internship programme called the PRACE Summer of HPC (SoHPC) and coordinated PRACE Campus Schools and HPC Classes across Europe.

The PRACE SoHPC will offer up to twenty undergraduates and junior postgraduate students of accredited universities the opportunity to spend two months at one of 10 HPC centres in PRACE partner countries. Students will undertake a visualisation project based on outcomes from PRACE technical work or other work using PRACE resources such as Tier-0/Tier-1 computers. The end product will be available for future outreach and dissemination activities to be carried out by the PRACE aisbl. The primary goals of the PRACE SoHPC is to ensure a positive experience for all students and through that experience to encourage them in their path to become the next generation of HPC users plus the successful completion of the student projects. This deliverable describes in detail the necessary steps to organise, monitor, and evaluate the PRACE SoHPC programme.

The PRACE Campus Schools and HPC Classes' activity will host numerous events during the course of the project across Europe. Students from secondary schools will learn about supercomputing through taught introductory classes, exhibition booths plus interactive and inspiring demonstrations. Using materials prepared in the PRACE-1IP project (D3.2.4) this subtask will encourage students to embark on a career in HPC, enlighten the general public of the utility of HPC and illustrate the advantages HPC can bring to industrial users.

The outreach results along with the dissemination outcomes from WP3 will be outlined in two annual reports, first in M12 (D3.3) and later when the project concludes in M24 (D3.4). It is anticipated that the PRACE SoHPC and PRACE Campus School programmes will provide valuable insights and lessons, which can be applied to subsequent programmes or transitioned to the PRACE AISBL.

1   Introduction

Work Package 3 (WP3) in the PRACE Third Implementation Phase Project (PRACE-3IP) sets out to complement and extend the work carried out in PRACE-PP, PRACE-1IP, and PRACE-2IP. PRACE-3IP WP3 plays a key role for the PRACE RI. WP3 will present PRACE-3IP results plus the scientific advances from using Tier-0 resources to academic and industrial users, enlighten the general public about the benefits of HPC, and encourage the next generation of users of HPC in Europe. WP3 divided into two tasks, Dissemination (T3.1) and Outreach (T3.2), fulfils the dissemination and outreach mission of PRACE during the 2012 to 2014 period. This document describes the planned outreach activities of PRACE-3IP while the dissemination plan was presented in D3.1 [5]. The purpose of this document is to outline the work to be carried out for the remainder of the project, to describe the similarities and differences to PRACE-2IP as there will be a temporal overlap, and to set out the key areas of extension: the PRACE Summer of HPC programme and the PRACE Campus Schools and HPC Classes.

Before the scope and objectives of the education outreach initiatives of PRACE-3IP are described, it is important to briefly describe the relationship and line of demarcation with the PRACE-1IP and PRACE-2IP projects. Under the PRACE-1IP project a conceptual framework for HPC Education Outreach (D3.2.4) was developed. The framework presented some common activities in organising and reporting PRACE educational outreach activities, which are mainly carried out within the PRACE-3IP project. In that sense, the PRACE-3IP is a natural extension of the results and efforts achieved during the PRACE-1IP project bringing a new degree of commitment and inclusion towards "computational science @ school". Furthermore, it is critical to define the line of demarcation with the PRACE-2IP project. Whereas the PRACE-2IP project concentrates its outreach activities around the preparation of a variety of educational materials (e.g. presentation kits) and streamlining the communications with potential users from different target groups, the main focus of the PRACE-3IP will be on the organization of a series of different Education Outreach events and schools[1].

The PRACE-3IP project will provide the required environment and will ensure that well-prepared speakers, along with adapted presentations encourage those in secondary and undergraduate education to embark on a career in HPC, enlighten the general public of the utility of HPC through events and illustrate the advantages HPC can bring to industrial users. To do this, the PRACE-3IP project will deploy several education outreach initiatives finding the right balance between appropriate content and engaging ways of presenting HPC to the audience.

This document is divided into five chapters. Chapter 2 describes the objectives of outreach, target audiences and the intended dissemination channels. Chapter 3 outlines the activities of the PRACE Summer of HPC programme while Chapter 4 details the work of the campus schools and HPC classes' team. Chapter 5 lists the important deliverables, milestones and planned outreach activities in 2013 and 2014.

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[1]As it is described in DoW in this subtask we need to "Organise HPC classes and campus schools/ and other activities to engage with different educational representatives (e.g. secondary, undergraduate) in addition to social and business groups that are directly influenced by HPC developments and outcomes."

2 General Objectives, Target Audiences and Dissemination Channels

The principal objective for outreach in PRACE-3IP is to encourage the younger members of our society to work in the area of supercomputing; to highlight that it is both a challenging and rewarding industry and to describe its widespread use in so many different fields as scientific research, Formula One racing, animation, Internet searching to social media.

The mission of outreach in WP3 will be completed within the following two subtasks:

- Subtask 3.2.1: PRACE Summer of HPC (SoHPC)
- Subtask 3.2.2: PRACE Campus Schools and HPC Classes

Site	T3.2.1	T3.2.2
EPCC	1	0.9
BSC	2	0
JKU	0	0.8
CINECA	1	0
PSNC	0	2
GRNET	1	0
ICHEC	5	2
UHEM	1	1
NCSA	0	2.9
VSB-TUO	2	2
IPB	1	0
NIIFI	1	2
UCPH	0.9	1
ULFME	2	2

Table 1: WP3 Task 3.2 distribution of PMs

The WP3 team (Dissemination and Outreach) includes 19 partners. Table 1: outlines the distribution of PMs for the 14 outreach partners (GENCI, CSC, Cyl-CaSToRC, IUCC, and PRACE asibl don't have outreach effort).

2.1   Target Groups

The primary audience of the outreach work in PRACE-3IP will be secondary school, college and post-graduate students. The PRACE Summer of HPC programme will focus on the older students (18-24 year old) in this group whereas the PRACE Campus Schools and HPC Classes will target scholars between the ages of 13 and 18.

2.2   Dissemination Channels

There will be a strong focus on social media to disseminate the outreach activities in PRACE-3IP. These include Facebook, Twitter, and LinkedIn. The target groups are readily accessible through these channels. The partners' dissemination channels will also be extensively used to maximise the exposure of the defined events. The following channels will be used to announce and report on events:

- PRACE website
- Social media
- AlphaGalileo (reaches over 7000 science editors worldwide)
- Newsletters
- Secondary school teachers

3 PRACE Summer of HPC

The SoHPC programme will offer undergraduate and junior postgraduate university students the opportunity to spend two months of the summer at a HPC centre in a PRACE partner country. Students will undertake a visualisation project, based on the outcomes from PRACE technical work or other work using PRACE resources (where possible), under supervision of a Project Mentor. This end product will be available to PRACE for use in further outreach and dissemination activities.

The primary goal of the SoHPC is to ensure a positive experience for all students and through that experience to encourage them in their path to become the next generation of HPC users. It is hoped that the programme will also create goodwill around PRACE and HPC both in the home institutions and amongst the peers of all applicants and participants. The secondary goal of the SoHPC is the successful completion of the student projects; with the visualisations produced being of benefit to future PRACE outreach and dissemination activities.

3.1 Description of the Programme

The SoHPC will assign up to 20 students on a competitive basis to PRACE-related projects across ten member countries. The SoHPC from inception through to completion has four main phases (see Figure 1), which encompass Project Selection, Student Selection, Projects, and Follow-on. The Irish Centre for High-End Computing (ICHEC) is acting as Programme Co-ordinator.
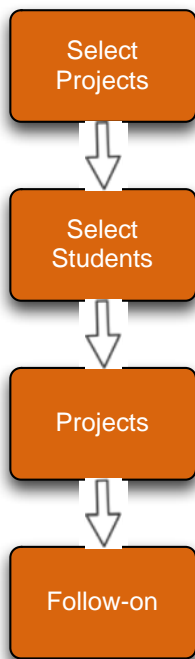
In designing the programme, lessons were taken from the experiences of *EU-US Summer School* and *HPC-Europa.* The EU-US Summer School is a summer school designed to foster international and multidisciplinary research collaborations with US and European graduate and postdoctoral scholars. It is run by PRACE in conjunction with XSEDE in the US. HPC-Europa is a EU-funded HPC Visitor Programme, which enables collaborative research visits to HPC centres across the EU. Risks and opportunities were also evaluated and incorporated into the plan.

Ten sites came forward to host students. Each site will host a minimum of 2 students. A Site Co-ordinator for each host site will be identified who in turn, will identify a Project Mentor for each project. Site Co-ordinators and Project Mentors will then develop project proposals and submit them to the Project Evaluation Team, led by the Project Selection Co-ordinator. The Project Evaluation Team will evaluate all the project proposals and make recommendations for improvements. Projects will be finalised and the call for applications will be made in all PRACE member countries.

Figure 1: Summer of HPC

Students will submit applications. Once the call is closed a Student Selection Panel will be convened under the leadership of the Student Selection Co-ordinator. The Student Selection Panel will define a pool of eligible applicants and assign students to projects. Host sites may then carry out optional interviews with students. Offers will be made to students, followed by student acceptance and registration.

The SoHPC will kick off at EPCC in Edinburgh with a weeklong training session. The course will be delivered from the EPCC PATC and will cover an introduction to HPC and

visualisation techniques. Students will then leave Edinburgh for their host sites. Orientation and integration events will be organised to help the students settle in. They will work closely with their mentor on their chosen project, submitting a Project Plan in the third week and a Final Report in the final week. Students will also be supported through an online Student Support Forum organised by Student Support Forum Co-ordinator (ULFME). In addition, they will blog about their experiences on a single dedicated wordpress-like site. Articles would include daily experiences in the HPC experience, tools and techniques used, preliminary results with images and videos, and their final presentation.

On returning to their home countries, students will be encouraged to continue their relationship with PRACE and to present their work in their home institutions. Students will also receive an information pack on education and training opportunities in HPC.

3.2   Risks

After carrying out an extensive risk analysis the following risks were identified:

- Risk 1: Poor student experience or poor project outcomes as a result of insufficient student skills (Student skills/Severe). For the project to be a success students must have adequate programming ability, in addition to communication skills and the ability to integrate into a new work environment.

- Risk 2: Poor student experience or poor project outcomes as a result of inadequate project design (Project Design/Severe). Projects must be of a level appropriate to the skills of the student and have the scope to scale to student skill levels. They must be achievable within the time frame.

- Risk 3: Poor student experience or poor project outcomes as a result of inadequate student-project match (Student-Project Match/Critical). Should the project not match student's interests or abilities, the student may disengage from the process resulting in a sub-optimal experience and outcome.

- Risk 4: Poor student experience as a result of lack of student integration (Integration/Critical). Poor student integration at the host sites may result in students being unhappy and disengaging from the process, leading to sub-optimal outcomes. Students will be in a new country and most likely working through a foreign language. They will require support to integrate and engage.

3.3   Roles

The following outlines the main responsibilities of the identified roles. Individuals may hold one or more roles.

Role	Duties
Programme Co-ordinator (ICHEC)	**Role:** *Responsible for overall planning and progress of programme* • Co-ordinate and oversee all phases • Liaise will all participants to ensure programme success
Site Co-ordinator	**Role:** *Responsible for success of hosting process in their organisation* • Identify Project Mentors • Liaise with Programme Co-ordinator on administrative issues

Role	Duties
	• Arrange accommodation and payment of stipend for students • Work with Project Mentors to develop and submit Project Proposals • Sit on the Project Evaluation Panel • Sit on the Student Selection Panel (optional) • Develop a Student Integration & Orientation Strategy • Submit a progress report every 2 weeks
Mentor Site	**Role**: *Act as a mentor, to a site who has not hosted a visitor programme before. Mentor sites are highly experienced at hosting students.* • Develop a relationship with Mentee site and consult on issues as they arise • Optionally, visit Mentee site during the programme
Project Mentors	**Role**: *Act as a mentor to the students during their project. Project Mentors should be working within PRACE technical or industrial work packages such as PRACE-3IP WP7, if possible* • Work with Site Co-ordinator to develop and submit project proposals • Sit on the Project Evaluation Panel • Sit on the Student Selection Panel (optional) • Meet with the students regularly to advise on their project • Work with the student to produce the Week Three Plan, Final Report and the visualisation end product • Participate in regular progress teleconference with Site Co-ordinator every two weeks • Monitor and answer queries on the Support Forum
Project Selection Co-ordinator (Leon Kos, ULFME, Slovenia)	**Role**: *To co-ordinate the evaluation and selection of projects* • Oversee and co-ordinate the running of the Project Evaluation Panel
Project Evaluation Panel /Team	**Role**: *Evaluate Project Proposals* • Assess and make recommendations on Project Proposals
Student Selection Co-ordinator (Ioannis Liabotis, GRNET, Greece)	**Role**: *Co-ordinate the Student Selection process* • Oversee and co-ordinate the running of the Student Selection Panel • Assign application(s) to reviewers • Nominate the chair for the student selection meetings • Notify sites of student allocations • Notify students of site allocation • Notify unsuccessful candidates

Role	Duties
Student Selection Panel	**Role:** *Review student applicants and match students to projects* • Evaluate student applications to create a pool of qualified applicants • Attend the Student Selection meetings • Allocate students from the qualified pool to projects
Training Week Team (EPCC)	**Role:** *Host, plan and co-ordinate the training week in Edinburgh* • Organise and host training and introductory session for students • Arrange accommodation for students in Edinburgh
Student Outreach Co-ordinator (Emma Hogan, ICHEC, Ireland)	**Role:** *Set-up, maintenance and co-ordination of Student Blog. Co-ordination of follow-on activities including social media* • Set-up & Monitor Blog • Develop Twitter, Facebook and LinkedIn accounts • Provide material for blog and social media briefing in Edinburgh • Create flyers for dissemination • Ensure dissemination of announcements and calls through national channels of all PRACE member countries • Co-chair weekly student teleconferences • Coordinate follow-on activities
Student Support Forum Co-ordinator (Leon Kos, ULFME, Slovenia)	**Role:** *Set-up, maintenance and co-ordination of Support Forum* • Set-up Support Forum • Liaise with Project Mentors to ensure the Support Forum is monitored • Co-chair weekly student teleconferences

Table 2: PRACE Summer of HPC Roles

3.4 The Plan of SoHPC

The following outlines the details of the Summer of HPC programme, under the headings of the four phases: Project Selection, Student Selection, Project and Follow-on.

3.4.1 *Project Selection*

The Project Selection phase comprises of six main stages, outlined in the Figure 2. Ten sites came forward to host students: VSB-TUO, UCHP, NIIFI, ICHEC, CINECA, IPB, ULFME, BSC, UHEM, and EPCC. To mitigate *Risk 4: Integration* each site will host at least 2 students ensuring that each student has a companion.
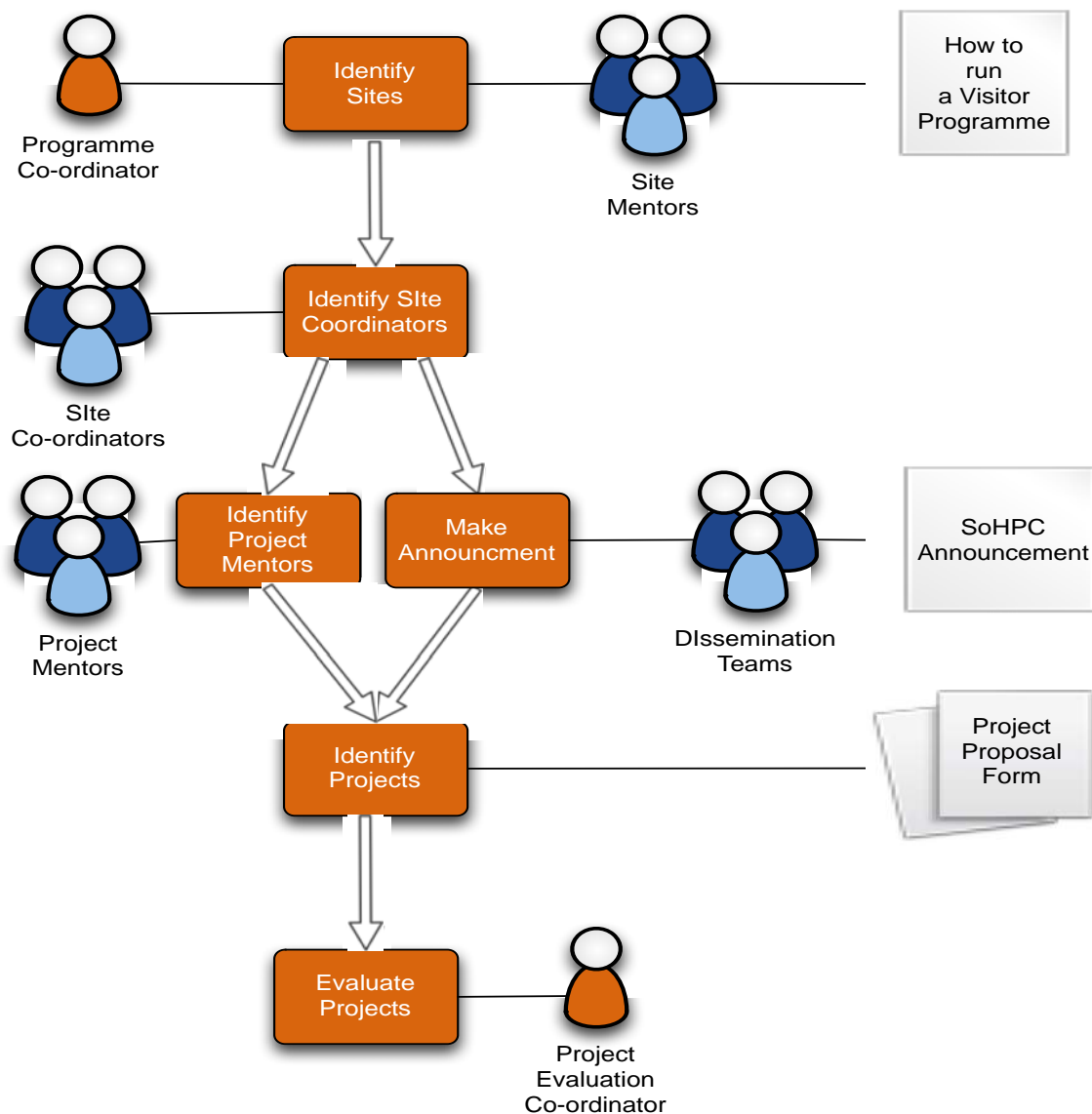
Figure 2: SoHPC Project Selection

Some sites have had little experience of hosting students, while others are very experienced. To mitigate *Risk 4: Integration,* Site Mentors will be assigned to those sites that may benefit from the experience of Site Mentors. Site Mentors will also be available via phone and email to give Mentee organisations the benefit of their experiences and to help out with any problems. The Site Mentors may arrange visits to the Mentee organisations at the start of the programme. The following Site Mentor:Mentees relationships were created: EPCC:VSB-

TUO; BSC:UHEM; and CINECA: ULFME. A "Guide to Running a Visitor Programme" document will be created by EPCC and ICHEC, and made available to all sites.

Identify Site Co-ordinators and Project Mentors

The Programme Co-ordinator will liaise with a representative in each country to identify a Site Co-ordinator for the programme. Site Co-ordinators will identify Project Mentors within their organisation. Selection of Mentors will be based on availability to work closely with students during the time frame of the programme and experience in the following PRACE Project Technical and Industrial work packages: PRACE-1IP-WP7 (Enabling Petascale Applications: Efficient Use of Tier-0 Systems), PRACE-2IP-WP5 (Best Practices for HPC Infrastructure Operations and Evolution), PRACE-2IP-WP7 (Scaling Applications for Tier-0 and Tier-1 Users), PRACE-2IP-WP8 (Community Code Scaling) PRACE-2IP-WP9 (Industrial Application Support), PRACE-2IP-WP12 (Novel Programming Techniques), PRACE-3IP-WP5 (Services for Industrial Users and SME) and PRACE-3IP-WP7 (Applications Enabling and Support).

Identify Project

Site Co-ordinators and Project Mentors will work together to identify potential projects in the visualisation area on PRACE project work. To mitigate *Risk 2: Project Design*, each project proposal will be associated with a Work Package (WP) to ensure that it is PRACE-related. They will create and submit a project proposal form for each project to the Project Evaluation Team. A project proposal template and sample proposals will be made available. To mitigate *Risk 2: Project Design,* project prerequisite skills and related training material will be identified. These will be fed into the application and interview process. For new PRACE partners there will be flexibility in the subject matter of the project. Some flexibility will be available regarding the final products for host sites with technical expertise, which does not lend itself easily to visualisation. To mitigate *Risk 3: Student-project match,* project proposals will include a description of how the project can be amended to make it easier or more difficult to meet the students ability. In addition, project proposals will include preparatory homework to be completed by the student before they arrive.

Evaluate Projects

To address *Risk 2: Project Design* a Project Evaluation process will be undertaken. The Project Evaluation Panel under the leadership of the Project Evaluation Co-ordinator will evaluate the project proposals. Projects will be assessed in relation to their appropriateness, feasibility and difficulty. Appropriateness refers to the level of visualisation content; the relationship to PRACE project work and the whether the skill level required is reasonable. Feasibility refers to whether the project can be reasonably completed in the time frame by the students. Difficulty refers to whether the project is sufficiently challenging for students without being overly so and whether there is scope to adjust the project should the need arise. The Project Evaluation Panel will make recommendations and consult with Project Mentors and Site Co-ordinators, if required.

Making the Announcement

The announcement introducing the SoHPC will be made in each PRACE member country co-ordinated via the Student Outreach Co-ordinator. Site Co-ordinators will also disseminate the announcement. The Student Outreach Co-ordinator will create a flyer for dissemination in addition to setting up Twitter (www.twitter.com/SummerOfHPC), Facebook (www.facebook.com/SummerOfHPC) and LinkedIn (www.linkedin.com/groups/Summer-HPC-4725549) accounts to publicise the announcement.

3.4.2 *Student Selection*

The Student Selection phase is comprised of six main stages outlined in Figure 3.
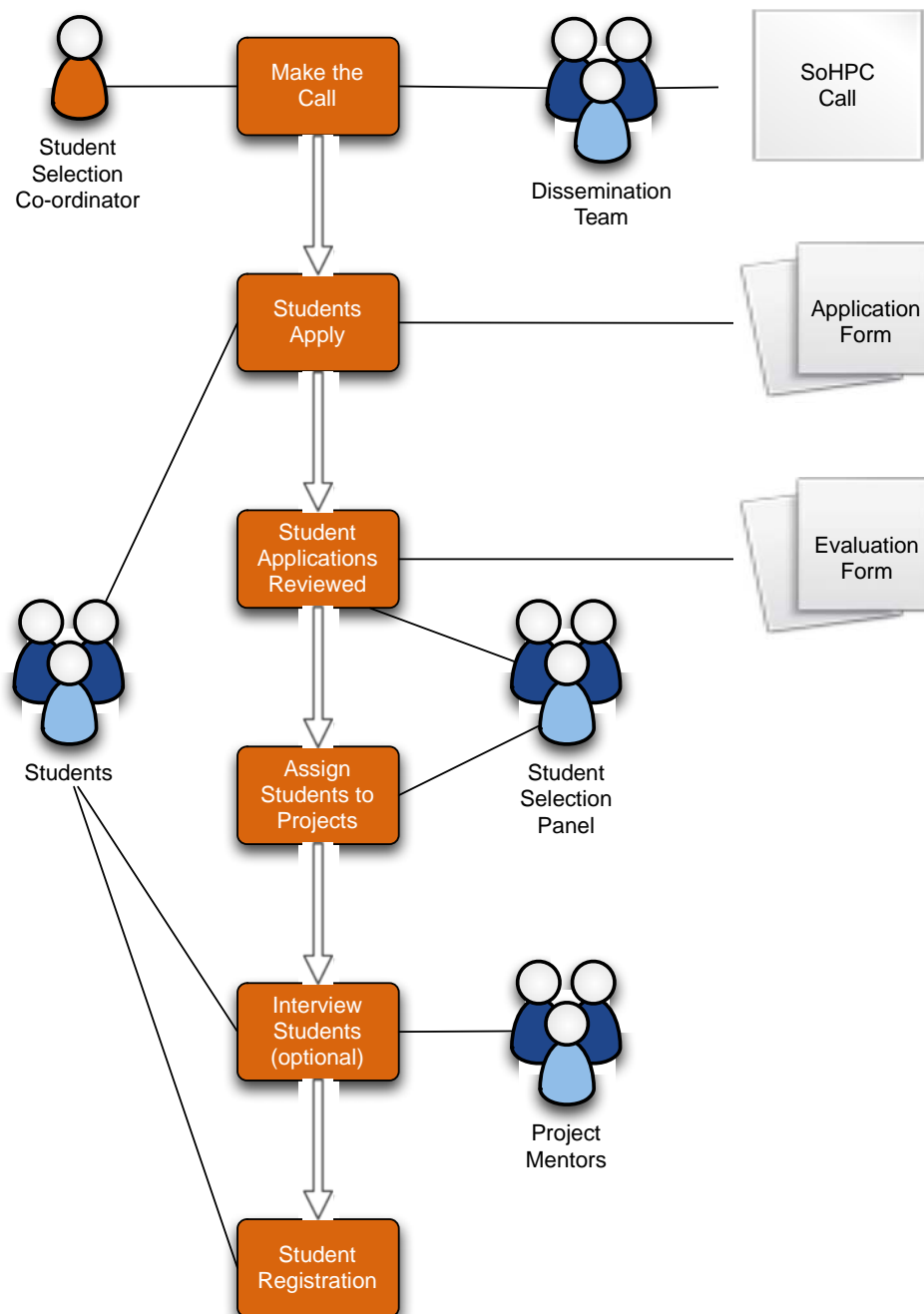
Figure 3: SoHPC Student Selection

The Call for Applications
The call for applications will be made on the 25th January 2013 in each PRACE member country, co-ordinated by the Student Outreach Co-ordinator. Site Co-ordinators will also disseminate the call. Twitter, Facebook and LinkedIn channels will be used.

Student Application Process
Once the call has been made, student applications will be received from 25th January 2013 to 17th February 2013, with an extension to 24th February 2013. The application will be made via an online form. To mitigate *Risk 1: Student Skills* the application will include a code test, a

statement of interest in the programme/HPC, a list of preferred projects including decision rationale, and contact details for a referee. Students will not be eligible to apply for placement in their own home country.

Student Application Review

Lessons from *HPC-Europa* contributed to the methods adopted for the Student Application Review. Rather than a simple ranking system, *HPC-Europa* assigns applicants grades ranging from *α, β+, β-, to γ*. Those assigned alpha status are automatically brought forward to the next stage. Those assigned gamma status are removed from contention. Those assigned beta status are referred for discussion. Beta classified students are then graded up or down to alpha or gamma status. This creates a pool of candidates from which to select. This is the method that the SoHPC will adopt.

The initial review of student applications will be conducted individually by members of the Student Selection Panel under the co-ordination of the Student Selection Co-ordinator. Two members of the Panel will review each application separately. Beta students will then be referred for discussion to the Selection Panel. The pool of eligible alpha candidates will continue to the assignment stage. This student selection process will be put before the management board (MB) for approval on the 18th of December 2012.

The Selection Panel will be comprised of volunteers from the Site Co-ordinators and Project Mentors. In addition, the Management Board will be approached to suggest appointments to the Panel, at their meeting on 18/12/12.

Assignment of Students to Projects

The Student Application Review and Assignment of Students to Projects Processes have been designed to mitigate *Risk 3: Student-Project Match.* The eligible pool of alpha students will be assessed and assigned to projects. The assignment will take place through a collaborative discussion-based process by the Student Selection Panel. The criteria used in the assignment will be to match the skills and interests of the students to projects while trying to get a broad spread of countries represented. Once all projects have been allocated, 'alternate' candidates will be identified as a provision against the unlikely event of students not taking up places allocated.

Student Interviews (optional)

Once students have been assigned to projects, the host sites will receive notification of the allocation. At this time host sites will have the option to interview candidates. This would likely take place by phone or video conferencing. The optional interview will open a dialogue between the student and the host site. It will provide the opportunity for the host site to engage the student on the specific project, HPC, and PRACE. Both the student and the host site will be able to gauge the student-project fit, thus mitigating *Risk 1: Student Skill* and *Risk 3: Student-Project Match.*

Student Registration

Once host sites have conducted the optional interviews, the student offers will be made via email. Students will then have a registration window from March 22nd 2013 to March 29th 2013 in which to respond. In the event that a place is not accepted, the Student Selection Co-ordinator will notify the host sites(s) and give them the details of the alternate student. Once all places are filled emails of regret will be sent to unsuccessful applicants.

3.4.3 Project

The Project phase of the programme consists of several components, outlined below:

EPCC Training Week

The Summer of HPC will begin on 1st of July 2013 with successful applicants attending a training week in Edinburgh at EPCC. Students will undertake training in visualisation and an introductory course on HPC. Students will also have briefings on PRACE, on the Week 3 Plan and Final Report. In addition they will be introduced to their blog and awards (described below). Students will fly from Edinburgh to their host countries and begin their placement.

Site Mentors

To mitigate *Risk 4: Integration,* Site Mentors may visit Mentee sites early in the programme to advise on student integration and any other issues.

Integration & Support

To mitigate *Risk 4: Integration,* Site Co-ordinators will develop and implement an Integration and Orientation Strategy. A Guide to Running a Visitor Programme will be created by EPCC and ICHEC and will be provided to other partners.

A weekly teleconference, co-chaired by the Student Outreach Co-ordinator and the Student Support Forum Co-ordinator with all students will be held to report progress and raise issues. Site Co-ordinators will hold a meeting with Project Mentors every two weeks and submit a short report to the Programme Co-ordinator.

Student Support Forum

Students will have a student support forum available to them. This forum will allow them to ask questions, voice their concerns and interact with the other participants. The forum will be co-ordinated by the Support Forum Co-ordinator and monitored by Project Mentors. Project Mentors from all host sites will interact on the forum to answer questions and address concerns for all students. In this manner the expertise of all the Project Mentors can be leveraged across all projects. The Student Support Forum will also increase the support available to students from both other mentors and their peers. This will have the net effect of mitigating *Risk 4: Integration.*

Project Plan (Week 3)

In week 3 of the placement students will work with their Project Mentor to create a work plan. This plan will outline their project, their proposed timeline and what they hope to achieve by the end of their placement. A Week 3 Plan template will be made created by ICHEC and made available to the students.

Final Report & Final Product

In the last week of the placement students will be required to submit a Final Report, outlining their project, their progress and the outcomes. A final report template will be made available. At the end of their projects, students should have a final product – a visualisation. These visualisations will be submitted to PRACE where they will be stored and disseminated as needed. The final products will be used in future outreach and dissemination activities by PRACE.

Final Presentation

In the last week, students will present their final product to their host organisation, video it and upload it. All students will watch videos simultaneously on a designated Presentation Day

in the final week. Students will participate in Q&A and discussion sessions around their presentations via voice conferencing.

Student Blog

The students will engage in an outreach activity of their own. They will co-ordinate with each other to produce regular content outlining their projects. Students will be asked to promote the blog through social media and their own social networks. The inclusion of a student blog is a result of a lesson learned from the success of *HPC Europa.* The blog will be located at www.summerofhpc.prace-ri.eu.

Project & Blogging Awards

Students will compete for two awards – HPC Ambassador and Best Visualisation. The HPC Ambassador award will be given to the student who exceled in promoting HPC, PRACE and the SoHPC programme within their outreach group and the Best Visualisation award will be given to the project that produces the best image, video, or other material that can be used later by PRACE for dissemination. The prize for both awards will be a trip to a Tier-0 site, where winners will be presented with a certificate or plaque. Awards will be leveraged for press coverage.

3.4.4 Follow-on

Presentation of Visualisations

On return to their home institution, students will arrange to present their project and final product at their home institution. This could take the form of an in-class presentation, a guest seminar or an evening event. Students will be encouraged to engage their local and university press in relation to their project and the SoHPC.

Maintaining a Relationship: Social Media networks

Facebook & LinkedIn alumni groups will be set up. Students will be encouraged to join and to maintain membership of the existing Facebook and LinkedIn groups. Students will be encouraged to remain subscribed to the SoHPC twitter feed (@SummerofHPC or #SoHPC).

PRACE Mentoring network

Students will be put in touch with their home PRACE organisation. The home PRACE organisation will be encouraged to speak with the student's Project Mentor and home institution referee to build a mentoring network for the student. A visit or meeting will be arranged, if possible.

Further Study: Information pack

An information pack outlining opportunities for further study and training in HPC will be made available to the students at the end of the programme. Students will be encouraged to discuss these opportunities with their mentoring network.

Continuing the blog

Student blog accounts will remain open and they will post about their return home and presentations. Award winners will create a video for the blog based around their trip.

Student Contact Details

Permission will be sought to retain student contact details for future outreach activities.

3.5   Financial aspects

The budget for the PRACE SoHPC programme is €92,000. This covers flights, accommodation, training and a stipend for all students. Individual sites will arrange payment for accommodation, flight and stipend expenses and will be reimbursed through contract amendment at the end of the programme. Estimated costs are outlined in Table 3. Flight costs will be capped at €900 per student. This will cover a flight to Edinburgh, a flight from Edinburgh to host site and a flight home from the host site. Where possible other cheaper forms of transportation will be used such as trains and buses.

Accommodation and stipend costs vary across country. Average cost for accommodation and stipend for the duration of the programme is estimated at €3,000 per student.

EPCC PATC will cover the cost of accommodation and lunch during the training week. Students will receive a fixed daily stipend while in Edinburgh to cover other expenses. Additional training expenses include travel for trainers, room rental and events.

	Average Per Student (€)	Total (€)
Stipend	1,800	36,000
Accommodation	1,200	24,000
Travel	900	18,000
Training	525	10,500
Awards		3,000
Promotional Material		500

Table 3: PRACE SoHPC Estimated Costs

3.6   Copyright

PRACE requires permissions to use the visualisations created by the projects. A non-exclusive agreement will be created and signed by all parties (students, mentors, partners, aisbl, etc.) to ensure the PRACE aisbl can use the content during and after the PRACE-3P project finishes. Copyright must be considered in the project proposal stage. Projects where copyright cannot be granted cannot be considered.

3.7   Success Criteria

The success of the programme will be measured against the successful achievement of the objectives of the programme, measured by the following criteria:

Successful Attraction of Applicants to the programme

- Number of applicants. (Target: 40 applications)

Positive student experiences

- Captured by a Student Evaluation Form at the end of the process
  - Percentage of students who would recommend the programme (Target 70%)
  - Percentage of students who say they had a positive experience (Target 70%)
  - Percentage of students who would consider a career using HPC (Target 30%)

Goodwill towards, and familiarity with, PRACE and HPC

- Social Media interaction
  - Facebook likes
  - Twitter Followers
  - LinkedIn connections

- o Blog entries
- o Blog visits
- Any media coverage

Successful Projects with final products useful for dissemination and outreach activities.

Useable final products are the secondary objective of the programme and their success is subject to significant risks as outlined. While the programme has been designed to mitigate such risks, the programme is a pilot and has an associated level of uncertainty. It is expected that the majority of students will submit final products, however not all may be suitable for use in outreach and dissemination activities. Consequently a pragmatic target has been selected:

- 25% of projects result in usable outreach & dissemination material.

3.8   Follow-on

The programme as outlined creates a robust framework for the successful implementation of the Summer of HPC. Risks to the success of the programme have been identified and addressed through the design. The roles identified and specified will create the administrative and organisational channels through which the project will be managed. The Project Selection and Student Selection procedures along with the Support and Integration strategy will form the bedrock of this process. The Site Mentoring programme will ensure that sites will benefit from the experience of others.

ICHEC will produce a Summer of HPC Handbook, which will support the logical transition of the project to the aisbl and the management of the programme in subsequent years, should that be approved.

In line with the objectives of 3IP WP3 the dissemination of information will take place through social as well as traditional media. The engagement of students in their own outreach activity via their blog is an extension of this policy.

It is anticipated that this pilot programme will provide valuable insights and lessons, which can be applied to subsequent programmes.

4 PRACE Campus Schools and HPC Classes

Nowadays education outreach is well-recognised as an integral part of every organisation and community's strategy for development in dynamic internal and external environments. It refers to activities that support formal, as well as informal education with user (customer) groups and/or partners by other self-organized communities. Outreach within PRACE links HPC with educational institutions in PRACE member countries. It is important that HPC awareness begins as early as possible in the educational process. For this reason, PRACE will reach out to secondary school classes by providing teachers (e.g. science, informatics etc.) with the hands-on expertise and theoretical know-how to bring concepts of scientific computing into the classroom as well as encouraging pupils to embark on future professional development in HPC.

Within the PRACE-3IP project, it is envisaged that the following PRACE educational outreach activities will reach youths with both theory and practise through:

- Popular Science events including presentation during scientific festivals – targeting educational representatives (e.g. secondary, undergraduate) by arranging meetings between them and people working in computational sciences. This will give them an

opportunity to familiarize themselves with HPC through a few popular science/supercomputing presentations.

- HPC Classes in schools by visiting scientists – targeting secondary education representatives. The events are organised around the preparation of ready-to-run presentation kits for lessons on computational science in science classes, combined with practical demonstrations by local HPC staff and scientific representatives.

- PRACE Campus Schools targeting educational representatives (e.g. secondary, undergraduate) with a strong focus on youths with recorded profiles (achievements) in Science, Technology, Engineering, and Mathematics (STEM), but also having a strong interest in natural sciences. Such events may be organized around or to complement several popular sciences/computing events including practicals on HPC systems and/or demonstrations of some eye-catching examples of the scientific or industrial domains.

This allows PRACE to target all the key educational groups in an efficient and effective manner through different face-to-face outreach events organized by the PRACE partner sites. In contrast to the formal training implemented by the PRACE training programmes, the educational representatives (e.g. secondary, undergraduate) require a slightly softer and inspiring approach. PRACE outreach endeavours to capture and fascinate participants' hearts and minds through the demonstration in an illustrative and sound way. Descriptions of events planned are outlined below in Sections 4.1 and 4.2.

One of the main outcomes of the education outreach initiatives is to record the level of interest and enthusiasm in the youth audience about HPC. On this basis we drew up some practical recommendations for PRACE bodies engaged in educational outreach activities.

4.1   PRACE Campus Schools

1st Campus School, ULFME, Slovenia

A three-day school is planned (November 2012) in Ljubjana, Solvenia to present opportunities offered by HPC to future students of technical sciences and PRACE as a leading HPC organisation in Europe. The event is aimed at 40 talented high school students to be selected from seven top Slovenian high schools based on excellent academic and extracurricular work. Topics including the following will be discussed:

- HPC and PRACE
- Supercomputing centre visit
- HPC applications in engineering
- Basic and Advanced linux introductions
- Introduction to Ansys multiphysics simulations
- Python programming
- Parallel programming

2nd Campus School, ICHEC, Ireland

A HPC Showcase at the BT Young Scientist Exhibition (BTYSE http://www.btyoungscientist.com) will present various aspects of supercomputing to second level students in January 2013. The BTYSE is an annual event held in Dublin, Ireland to showcase the scientific achievements of secondary level students and for companies and organisations to introduce scientific concepts and innovations. The students carry out research in the months before the exhibition and then present a poster (~ 120 posters presented) at the event to a panel of judges. The eventual winner then represents Ireland at the EU Young

Scientist competition (http://ec.europa.eu/research/youngscientists/index_en.cfm). The BTYSE will take place from the 9th to 12th January 2013 and expects to attract over 45,000 students. Here we plan to arrange a showcase of HPC at a booth in the World of Science & Technology (WST) Hall during the event. The WST Hall is setup to exhibit chemical, physical and mathematical sciences using live demonstrations and hands-on interaction. Booths also serve to promote career opportunities in technology, engineering and physical sciences and demonstrate the latest developments in technology. At the booth we will display a fully configured live mini "supercomputer" built from the relatively cheap Raspberry Pi (http://www.raspberrypi.org/) boards, 3D scientific visualisations of climate and weather data, present the latest in accelerators/coprocessors and run introductory sessions into HPC, networking, and parallel programming languages.

3rd Campus School, NCSA, Bulgaria

The third Campus School will be held in Bulgaria over approximately one week during autumn 2013. The school will target secondary schools students from different high schools in Bulgaria and teachers with a strong focus on youths with recorded profiles (achievements) in STEM, but also having strong interest in natural sciences.

A team led by the NCSA will work closely with those youths and their teachers demonstrating the strong role of supercomputing in STEM disciplines. In an out of classrooms environment the fundamental HPC concepts and parallel programming mixed with several visualizations from scientific and industrial domains will be introduced. High-performance computer systems and architectures will also be presented.

Quizzes and different games and competitions will be played and the best teams will be awarded. Supercomputer (Blue Gene/P) and/or other computing clusters access will be granted to the students. This will allow them to run different tasks as part of the programme. The final objective of the school is to provide all students and teachers with a general overview of some code development and optimization techniques so that they have a quite basic understanding of issues that may arise, can begin to analyse the simple codes being used in science or engineering disciplines, and can follow by their own for code development.

4th Campus Schools, VSB-TUO, Czech Republic

A three-day event is planned in Ostrava, Czech Republic to be held in January 2014. Students from secondary schools with interest in science, technology, engineering, and mathematics are expected to attend/participate. Topics including the following will be discussed:

- History of computing
- PRACE and HPC
- Mathematical modelling
- Differential equations
- Functional analysis
- FEW fundamentals
- Iterative and direct solvers
- Algorithm complexity
- Domain decomposition methods
- Errors in mathematical modelling
- Parallel implementations of scalable algorithms
- Flood simulations
- Graph walks

4.2   PRACE HPC Classes

HPC Classes, JKU/RISC, Austria

HPC Classes held by RISC will be divided into two categories: classes on-site at JKU and classes held at different schools. In coordination with on-site initiatives at JKU (like TEC – Tomorrow's Experts in Computing and FIT – Frauen in die Technik) also presentations and talks at schools in Austria will be organized by RISC. The classes will be complemented by the possibilities of tours to and through the computing facilities of JKU. Three classes will be held in February, June and December 2013 at schools from Austria in coordination with mathematics and computer science teachers (with a focus on schools already collaborating with JKU/RISC).

The aim of the activities of JKU/RISC will be based on giving the students the possibility to experience HPC by seeing HPC resources, hearing about and seeing what is possible with HPC resources and having first experiences with parallel and distributed computing with simple examples. The classes will also include videos from HPC users from research and industry in Austria (meteorology, astrophysics, medicine, airplane construction, etc.).

In addition to outreach activities to schools in Austria, RISC will provide input for HPC presentations and HPC classes for the next Long Night of Research in Austria, which is not yet fixed but is currently planned to take place during the spring of 2014.

European Union Contest for Young Scientists (EUCYS), NIIFI & ICHEC, Prague, Czech Republic

The EU Contest for Young Scientists, an initiative of the European Commission, is an annual event held in a city in Europe (http://ec.europa.eu/research/youngscientists/index_en.cfm) to showcase the scientific achievements of young European scientists. The 25th edition of the contest will be held in Prague, Czech Republic during September 2013. After agreeing to attend the EUCYS with the programme officer at the EC, NIIFI and ICHEC will represent PRACE at this event and showcase the very best of European HPC. Materials created in PRACE-1IP and PRACE-2IP such as videos will be used to enlighten the attendees. Demos and knowledge on how to interact with these students will be taken from ICHEC at the 2nd Campus school in Ireland and the experience of EPCC reaching out to similar audiences in the UK.

Science Festivals, UK

EPCC plans to attend two events in the UK during 2013: the Manchester Science Festival (October 2013) and the British Science Festival in Newcastle (November 2013). Both events will comprise a general interest lecture and a drop-in exhibit where people can learn about supercomputing through posters, interactive demos and talking to experts. All material is designed to be interesting and accessible to anyone of secondary school age or older. The lecture aims to explain what a supercomputer is and the crucial role that computer simulation plays in modern science. It includes numerous videos and visualisations to illustrate what modern computers can do. The exhibit contains posters and examples of supercomputing hardware for people to handle, a rolling power point presentation displaying the videos from the talk, and two interactive demos:

- Protein surrounded by water and inside the protein is a pheromone molecule. Molecular dynamics simulations are run remotely on the HECToR Supercomputer, and people can interact with it in real time and apply forces to the pheromone to help it to escape from the enclosing protein;
- Parallel algorithms illustration. Giving small groups of people a deck of playing cards and request them to sort into numerical order. By dividing the cards between people it

is demonstrated that the task is done faster. Once sorted, the cards can be turned over to reveal a picture of HECToR (assuming they were placed in the correct order!).

HPC Classes, NIIFI, Hungary

NIIFI will perform three HPC training classes during the project featuring the following syllabus:

- HPC fundamentals, the brief history of HPC (mainframes, cluster architectures, parallel processing, grand application challenges;
- NIIFI HPC resources introduction, operations challenges, and accessing the compute facilities;
- CPU/GPU architectures and efficient use of memory resources;
- Introduction to compilers, debugging tools, profiling utilities
- Parallel programming languages;
- Serial and parallel code optimisation;
- Data storage in HPC systems;
- European HPC Federations;
- System administration;
- Visualisation of computational data.

4.3   Financial aspects

The budget for the PRACE Campus Schools and HPC Classes subtask is €46,000 with the breakdown defined in Table 4. There will be four PRACE Campus schools with an average cost of €9,000. Costs include booth/room hire, presenter and student travel and accommodation as well as promotional materials. The HPC Classes (nine events in total) costs include the printing of flyers, posters, shipping, light snacks, hosting exhibit plus travel and accommodation for presenters. The costs of attending the EUCYS event is budgeted at €2,000.

	Average Per Event (€)	Total (€)
Campus Schools	9,000	36,000
HPC Classes	1,000	10,000

Table 4: PRACE Campus Schools Estimated Costs

4.4   Management

Subtask 3.2.2 of PRACE-3IP WP3 will be managed by NCSA, Bulgaria. Monthly video/telephone conference will be held in addition to the general face-to-face meetings of the WP3 Dissemination and Outreach team. Each education outreach activity carried out during the lifespan of the project will have an appointed local coordinator by the PRACE-3IP project partners.

The WP3 mailing list will be employed for day-to-day communication, but additionally a short mailing list of only involved partners will be used for higher convenience. All activities will be carried out in collaboration with the subtask 3.2.1 "Summer of HPC" programme and the dissemination task 3.1. As part of this education outreach, partners will be encouraged to distribute the printed PRACE materials to the secondary schools in their countries as well as being encourage to establish strong contacts with schools.

In order to ensure that there are not overlapping activities with WP3, Task3.2 of the PRACE-2IP project it will be conducted periodic discussions and exchange of progress information.

5 Initial Agenda for PRACE-3IP WP3 Outreach

Table 5 lists the planned outreach activities and the key dates for PRACE-3IP during the lifetime of the project. Updates to this plan will be reported in the periodic progress and managements reporting, and in the annual outreach reports (D3.3 and D3.4).

Month	Activity, Organiser, Location
3	British Science Festival, EPCC, UK
5	1st HPC Campus School, ULFME, Slovenia
6	Outreach Plan (D3.2)
6	SoHPC Announcement
6	SoHPC Project Proposal Submission Deadline
7	2nd HPC Campus School, ICHEC, Ireland
7	SoHPC Call for Applications
8	SoHPC Applications Close
9	Face2Face Meeting, Helsinki, Finland
10	HPC Classes, JKU/RISK, Austria
12	SoHPC Training Week
12	SoHPC Placement begins (MS33)
12	First Annual Dissemination and Outreach Report (D3.3)
14	SoHPC Final Products and Final Reports Submitted
16	European Union Contest for Young Scientists, NIIFI & ICHEC, Prague, Czech Republic
16	Manchester Science Festival, EPCC, UK
17	British Science Festival, EPCC, Newcastle, UK
17	3rd HPC Campus School, NCSA, Bulgaria
19	4th HPC Campus School, VSB-TUO, Czech Republic
21	HPC Classes, NIIFI, Hungary
24	Second Annual Dissemination and Outreach Report (D3.4)

Table 5: Planned deliverables, milestones and events for 2012-14