Role of the User Forum

• A communication channel between the user community and the resource provider
• A forum in which users can share experiences
• Programme committee
  ➢ organizes user fora
  ➢ reports back to PRACE
    ✓ identification of user problems
    ✓ recommendations to meet user needs
User Forum Membership

- All researchers who have used PRACE resources within the past 5 years are considered to be members of the User Forum.

- The Program Committee of the User Forum is drawn from the User Forum membership and creates consensus within the User Forum regarding proposals to be brought forward to PRACE on behalf of the user’s community.
User Forum Committee

• Current members
  • Troels Haugbølle (Chair, Astrophysics, Denmark)
  • Derek Groen (Vice-chair Life Sciences, UK)
  • Carmen Domene (Chemistry and biophysics, UK)
  • Gabriel Staffelbach (Engineering & Energy, France)
  • Gustavo Yepes (Astrophysics, Spain)
  • Jorge Vieira (Plasma physics, Portugal)
  • Koen Hillewaert (Engineering & Energy, Belgium)
  • Marc Baaden (HPC, France)
  • Teresa Parra-Santos (Engineering, Spain)
  • Turlough Downes (Astrophysics, Ireland)
  • William Sellers (Biomechanics, UK)
Surveying PRACE users in 2019

- Survey carried out in spring 2019 among the PIs of PRACE Tier-0 awards

- **Case:** understand HPC user requirements and their view of PRACE and HPC in Europe in general

- **Demographics:** gathered 50 responses from former and current Tier-0 PIs leading groups from a broad range of fields → representative
What is a typical Tier-0 HPC user?
What is a typical Tier-0 HPC user?

90% Academic

Research Organization

Universe Sciences 30%

Physics 10%

Engineering 18%

Earth System Sciences 6%

Chemistry and Materials 18%

Bio & Life Sciences 10%

Plasma Physics
What is a typical Tier-0 HPC user?

Core hours used per year
- < 100,000: 58%
- 100,000 - 1,000,000: 12%
- 1,000,000 - 10,000,000: 6%
- 10,000,000 - 100,000,000: 24%
- > 100,000,000: 6%

- 10 – 100M CPUh / yr typical usage
- 12% use +100M / yr
- In house codes, or “standard” field specific codes

Type of code running on PRACE
- In house developed codes: 19 (38%)
- In house developed codes that are heavy: 29 (58%)
- Standard packages: 3 (6%)
- Standard packages for your field: 7 (14%)
- Standard packages for your field that are modified: 19 (38%)
- Modified versions of materials codes: 1 (2%)
What is a typical Tier-0 HPC user?

Architecture used for the codes

- Multi-core processors: 43 (86%)
- Many-core (GPU and/or KNL): 18 (36%)
- Hybrid multi-core / many-core: 18 (36%)
- FPGA: 1 (2%)
- GPU: 1 (2%)

PRACE Machines Used

- Curie: 15 (30.6%)
- Fermi: 14 (28.8%)
- Hazel Hen: 5 (10.2%)
- Hornet: 5 (10.2%)
- Joliot: 7 (14.3%)
- Juqueen: 3 (6.1%)
- Juwels: 8 (16.3%)
- Marconi: 20 (40.8%)
- Mare Nostrum: 23 (46.9%)
- Piz Daint: 16 (32.7%)
- SuperMUC: 4 (8.2%)
- SuperMUC-NG: 16 (32.7%)

- Multi-core still most popular, but many-core getting uptake
- Even FPGAs!
- Users of all PRACE machines represented
What is a typical Tier-0 HPC user?

- Academic
- 10 – 100M CPUh / yr
- In house code
- Mostly multi-core optimised code, but increasingly also able to run on many-cores
PRACE Application Process
PRACE Application Process

Compared to other grants, how is the process of applying to PRACE?

- Workload of PRACE Application process well balanced compared to other grants
- Important, because otherwise not enough applications

![Pie chart showing distribution of workload perceptions](chart.png)

- Much less work: 62%
- Somewhat less work: 18%
- About the same: 8%
- More work: 10%
- Much more work: 2%
Applications: how easy to ...

Write Technical Justification

- Easier to write technical part than gathering the data

Gather data for Technical Justification

"More specific guidelines to answer the technical requirements"

"Different systems may require different scalability tests, not necessarily easy to perform during the application stage"
Applications: how easy to ...

Write Scientific Justification

- 66% Very straightforward
- 22% Moderately straightforward
- 12% As expected
- 8% More work
- 14% Much more work

- Scientists know how to write their science!
- Referee system is working and not too much of a burden

Respond to referee comments

- 50% Very straightforward
- 26% Moderately straightforward
- 14% As expected
- 8% More work
- 2% Much more work
PRACE Calls: frequency and size

Application Frequency and size

- 2 calls per year for 1 year allocations with smaller core hour minima
- 2 calls per year for 1 year large allocations (minimum 15 million core hours)
- 1 call per year for 1 year allocations with even larger minimum number of core hours (e.g. like INCITE)
- 2 year allocations
- 3 year allocations

Relevance of multiple systems

- Relevant to maximize the chances to be awarded and easy to include in our application
- Relevant to maximize the chances to be awarded but difficult to handle in our application
- Relevant because our project has different requirements matching diff…
- Not relevant or the added application burden is not worth the trouble

"Difficult timescale. Only large groups can live with this. For smaller groups turnaround too long compared to PhD / Postdoc contracts"

- current design with larger Tier-0 allocations twice a year works.
- Users ok with relocation of grants to similar systems
PRACE Infrastructure and Experience
PRACE Infrastructure & Experience

How well is the workflow supported

- Current machines accessible through PRACE supports the workflow of users very well
- Strongly geared towards large-scale capability modelling

Relevance of workflows

- Large-scale parallel simulations (45 users, 90%)
- Large-scale embarrassingly parallel simulations (10 users, 20%)
- In-situ data analysis and simulation (10 users, 20%)
- Large-scale post processing and coupled Tier-1 access (12 users, 24%)
- Long term storage (17 users, 34%)
- Support for data portals and publications (5 users, 10%)
- Large memory (1 user, 2%)
- They are all relevant (1 user, 2%)
PRACE Infrastructure & Experience

How easy is it to start using the infrastructure?

- Varying degrees of success with setting up access to HPC centres
- Reporting requirements (checks and balances!) reasonable

How does the reporting requirements compare to similar sized grants?

- Much less work: 76%
- Somewhat less work: 12%
- About the same: 10%
- More work: 0%
- Much more work: 0%
Would you apply to PRACE again?

- 70% Yes, definitely
- 18% Yes, probably
- 10% Maybe
- 18% No, probably not
- 10% No, definitely not
Quotes from PRACE researchers

PRAISE
- “I think in Europe there is no other alternative than PRACE if one needs allocation of size of order 100M core-hr”
- “Great opportunity to make progress in my research”
- “I really appreciate the 3 years project.”
- “The resources granted by PRACE are necessary for the completion of our work”

CAUTIONARY REMARKS
- “The obligation of using a minimum number of cores (1024) per task is not ideal”
- “The technical details in the new application form seems unreasonably detailed.”
Is PRACE Superseded by other HPC facilities?

PRACE is the only option!
• No; PRACE is the only avenue via which we can apply for so many core hours.
• No. PRACE is the only option in Europe.
• No. We will need access to very large systems in the future that will not be available through other channels.
• No, no, no, no, no, ….

PRACE alternatives
• National Tier-1 covers most. The application is easier (no need for technical details) but limited by shorter duration.
• I feel that I am a valued customer of Juels and SuperMuc. Get always feedback within very short time.
• NERSC. The machine is made for large scale computing.
• CSCS production

PRACE is an indispensable infrastructure to perform modelling inaccessible on national resources
Sensible final comments by users

PRACE can impact the long-term HPC & science landscape

• “Suggestion for HLSTs: look for collaborations with HLST experts that result in new algorithms or implementations advancing the field.” [And maintain European excellence in applications!]

• “PRACE 3 year access is crucial for sustained long-term, ambitious projects from large groups.”
What have we learned?

- PRACE is a *resounding success* with the current users.
- System of application, review, reporting is fair and has a reasonable workload.
- *Typical Tier-0 user*: 10 – 100 M Cpuh / yr using in house developed code → medium sized research groups with a large variety of codes are the typical Tier-0 users
- *Application diversity* is an important characteristic of European HPC landscape

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Future European HPC Landscape

- **Application diversity** is an important characteristic of European HPC landscape.
- Preparing enough users to run on pre-Exascale systems requires diversity.
- Many (most?) of the current “community codes” grew organically starting out as a code developed by a small team of researchers.

→ use the established mechanism of HLSTs to support development of (in-house) codes used currently on Tier-0 systems.

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