



PARTNERSHIP FOR
ADVANCED COMPUTING IN EUROPE

PRACE: the European HPC Infrastructure and the Services for Industry

Stéphane Requena, member of the PRACE Board of Directors

ISC16, 21/06/2016



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435 scientific projects **enabled**



11.4 thousand million core hours awarded since 2010 with peer review, main criterion is **scientific excellence**. **Open R&D** access for **industrial users** with **>50 companies** supported



>7 350 people trained by **6 PRACE Advanced Training Centers** and others events



21 Pflop/s of peak performance on **6 world-class systems**



530 M€ of funding for **2010-2015**, access **free at the point of usage**



25 members, including **4 Hosting Members**
(France, Germany, Italy, Spain)

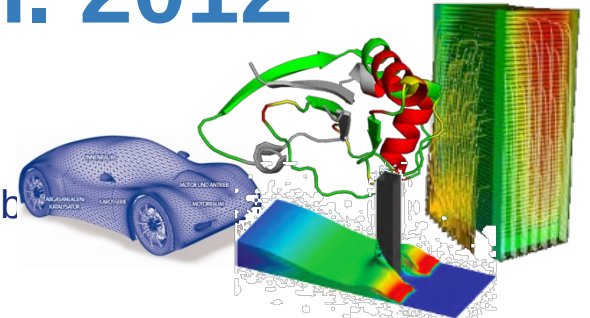


Open R&D model since Jan. 2012

Access to leading-edge resources

❑ Regular Calls open to industry twice a year

- Access is **free of charge**, based on scientific excellence only, b commitment to **publish results** in publicly available media
- Already various companies benefited from PRACE allocations for > than 250M cpu hours !
 - **SMES** : HydrOcean on HERMIT, ARIA Tech on CURIE, SCC : JUQUEEN, ...
 - **Large Companies** : Renault on CURIE, EDF R&D UK on HERMIT, MunichRé on Fermi, ...
 - **Private-Public Research centers** : Cenaero on JUQUEEN, CERFACS on Marenstrum, ...



 **Next call will open on September 2016**

❑ Permanent Preparatory Access call

- Assess the scalability and port the codes → preparation for future regular calls
- Big companies : PSA, Renault, CS, Tetrapak, ...
- SMEs : ARIA, Thermofluids, Vratiss, Dompé, ...

Since 2012 more than 50 companies, > 250M cpu hours
More than half of them : SMEs



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Open R&D model since Jan. 2012

Access to high-value services

❑ Access to new knowledge enabled through PRACE

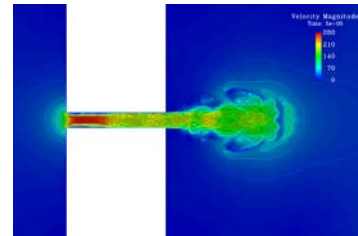
- Big science may be usable by industry in advance on leading edge HPC systems
- PRACE as a **catalyzer of technological transfer**

❑ Evangelization and Training

- Specific programme for SMEs HPC evangelisation (**SHAPE**)
- Specific courses targeting industrial users are programmed in the 6 **PRACE Training Centers**
- The online training portal is accessible by everyone

❑ Code enabling

- The implementation projects work at developing **Open Source codes for industry**
 - Computational Fluid Dynamics : OpenFoam - Uncertainties analysis : URANIE, ...
- Real industrial test cases are used in the process
- All the reports and white papers from PRACE are public !



❑ Information, Promotion and Networking

- **PRACE Days Conferences**
 - Last edition in Prague (May'16) with more than 250 attendees
 - Good mix of large companies and SMEs, from various industrial domains
- **PRACE Industrial Award** : in 2016 **Niels Aage** from the **Technical University of Denmark** awarded for "Ultra large scale structural optimisation-topology optimized wing structure »





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Some PRACE breakthroughs for the EU industry

IMPROVING CAR SAFETY

A world premiere in the automotive industry

→ Performing more accurate crash optimization

- **42 million hours** on Curie (France)
- Assess new large scale optimization methods: 200 parameters, 20 million finite elements
- Anticipate new security rules (EuroNCAP6)
- Impossible with internal Renault R&D HPC resources



DEVELOPPING NEW DRUGS

Molecular Dynamics Simulations for
Computing Kinetic Constants for Drug Discovery

- Improve the process of drug discovery by taking into account for the first time kinetic properties of a drug and a candidate protein
- International collaboration K4DD (Kinetics for Drug Discovery) with NAMD and Gromacs
- **11 million core hours** on Fermi (CINECA)

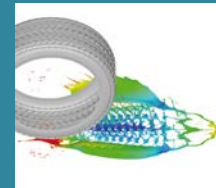


SANOFI

IMPROVING SHIP SURVIVABILITY UNDER WAVE IMPACT AND AQUAPLANING FOR AUTOMOTIVE

→ Major step: 32k cores simulations – Increased EU visibility and competitiveness for a SME

5 million core hours on Hermit (Germany)
8.2 million hours on CURIE (France)





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HPC for SME, a not so simple plan !



- **Most of the SMEs are not aware of « what is HPC and what for » or think "It's not for me !"**
 - Lack of trained resources/skills in HPC and simulation
 - Lack of knowledge of the ecosystem and tech transfer from academia
 - Who can help me and what tools/methodologies ...
 - SME are not talking the HPC and the Cloud jargon
 - Access to rough cycles is NOT the solution
- **HPC : a strategic decision for a SME**
 - Need of training, new HR, new investments, ...
 - ✓ SME need to have a clear view and a ROI demonstration



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A pan-European, PRACE-based, programme supporting HPC adoption by SME

- **Raise awareness** of SMEs of using HPC → **increased competitiveness**
 - Relying when existing on national HPC evangelisation prg. (UK, FR, DE, IT,...)
- Support SMEs up to a **proof-of-concept** with an integrated set of services
 - Training on PRACE PATC centers
 - Co-development of concrete industrial project with HPC and domain-specific experts
 - Demonstration using PRACE HPC resources (Open R&D model)
- After the SHAPE demonstration, companies **will have a clear view**
 - potential of HPC on their processes/business
 - investments to perform and skills to hire
 - software or methodologies to develop
 - next HPC Services to use : PRACE services for Open R&D, buying their own HPC facilities , remote access to HPC services on commercial Cloud platforms.



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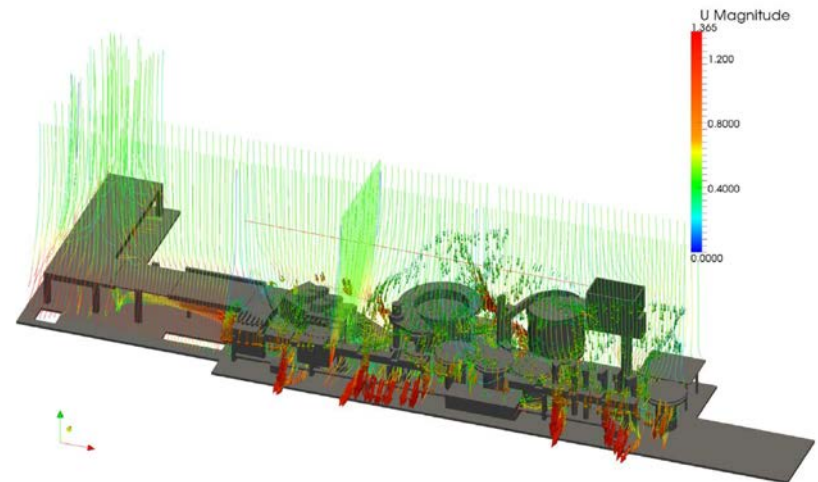
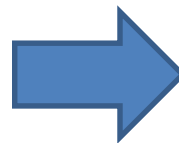
SHAPE : example of a recent result **OPTIMA**

A big German SME (450p) dedicated in the development and manufacture of filling and packaging machinery used in pharmaceuticals

Enhanced airflow simulations around filling machines in clean rooms

- Assessment of various refinement levels of the mesh using snappyHexMesh
- Use and optimisation of the OpenFOAM software
- Scaling tests on turbulence model solvers (RANS, DDES, IDDES, ...)
- Efficient post processing of the results

Use of the CRAY Hermit system at HLRS (Germany)

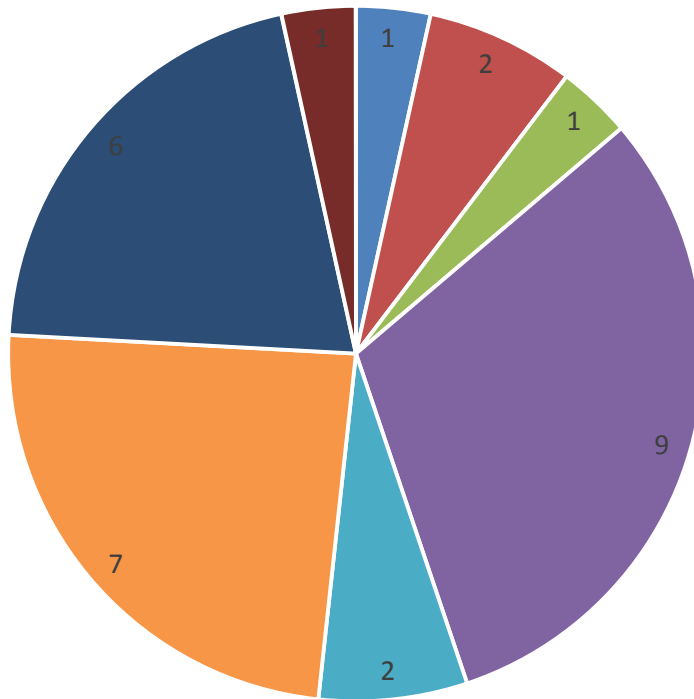




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SHAPE: 29 SME supported in 2 years

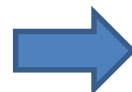
- One call for proposals per year



■ Finland ■ Sweden ■ UK ■ France ■ Germany ■ Italy ■ Spain ■ Switzerland

Industrial domains :

- Naval engineering
- Renewable energies
- Genomics & health
- Micro electronics
- Cloud / HPC
- Automotive / crash
- Digital media
- Electromagnetism
- Agriculture, ...



www.prace-ri.eu/shape



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Thank you very much for your attention!
SAVE the date

PRACEdays17
HPC for Innovation:
when **Science** meets **Industry**

May 2017 Barcelona



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