European Exascale Software Initiative

March 2010

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EDF
LEADING THE ENERGY CHANGE

European Exascale Software Initiative (EESI)

Context in Europe

HPC Eur - European High Performance Computing Initiative, "*The Scientific Case for a European Super Computing Infrastructure*", Petascale Computing in Europe - input for the ESFRI Roadmap process, spring 2006

DEISA, Distributed European Infrastructure for Supercomputing Applications

PRACE, Partnership for Advanced Computing in Europe **(PRACE)**

European Exascale Software Initiative (EESI)

Context in Europe

PRACE History and first steps

EU-Grant: INFSO-RI-211528, 10 Mio. €

PRACE

Foreseen: PRACE Tier-0 centres providing HPC-capability service in a legal entity

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European Exascale Software Initiative (EESI)

Context in Europe

PRACE – A Partnership with a Vision

- Provide world-class HPC systems for word-class science
- Support Europe in attaining global leadership in public and private research and development

… and a Mission

- Create a world-leading persistent high-end HPC infrastructure managed as a single legal entity
  - Deploy 3 – 6 systems of the highest performance level (Tier-0)
  - IBM BlueGene/P in Jülich will be the first European Tier-0 system
  - Ensure a diversity of architectures to meet the needs of European user communities
  - Provide support and training

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European Exascale Software Initiative (EESI)

Context in US/ International Exascale Software Project

http://www.exascale.org/iesp/Main_Page

Purpose

- The IESP software roadmap is a planning instrument designed to enable the international HPC community to improve, coordinate and leverage their collective investments and development efforts.
- After we determine what needs to be accomplished, our task will be to construct the organizational structures suitable to accomplish the work

Four Goals for IESP

- **Strategy for determining requirements**
  clarity in scope is the issue
- **Comprehensive software roadmap**
  goals, challenges, barriers and options
- **Resource estimate and schedule**
  scale and risk relative to hardware and applications
- **A governance and project coordination model**
  Is the community ready for a project of this scale, complexity and importance?
  Can we be trusted to pull this off?

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Context in US/ International Exascale Software Project

DOE Workshop series,
http://www.exascale.org/mediawiki/images/a/a7/Messina-doeexa.pdf,

IESP identified US contribution: http://www.exascale.org/iesp/Main_Page

"The guiding purpose of the IESP is to empower ultrahigh resolution and data intensive science and engineering research through the year 2020 by developing a plan" that addresses the following objectives:

1. *Make a thorough assessment of needs, issues and strategies*
2. *Develop a coordinated software roadmap*
3. *Provide a framework for organizing the software research community*
4. *Engage and coordinate vendor community in crosscutting efforts*
5. *Encourage and facilitate collaboration in education and training*

European Exascale Software Initiative (EESI)

Motivations for launching EESI

Coordinate the European contribution to IESP

Enlarge the European community involved in the software roadmapping activity

Build and consolidate a **vision and roadmap** at the European Level, including applications, both from academia and industry

European Exascale Software Initiative (EESI)

EESI main Goals

Build a **European vision and roadmap** to address the **challenge of performing scientific computing** on the new generation of computers which will provide multi Petaflop performances in 2010 and Exaflop performances in 2020.

- Investigate how Europe is located, its strengths and weaknesses, in the overall international HPC landscape and competition
- Identify priority actions
- Identify the sources of competitiveness for Europe induced by the development of Peta/Exascale solutions and usages
- investigate and propose programs in education and training for the next generation of computational scientists
- Identify and stimulate opportunities of worldwide **collaborations**

European Exascale Software Initiative (EESI)

EESI main tasks

Coordination of the European participation in IESP

- *Make a thorough assessment of needs, issues and strategies*
- *Develop a coordinated software roadmap*
- *Provide a framework for organizing the software research community*
- *Engage and coordinate vendor community in crosscutting efforts*
- *Encourage and facilitate collaboration in education and training*

Cartography of existing HPC projects and initiatives in Europe, US and ASIA

Coordination of "*disciplinary working groups*" at the European level

- ***Four groups "****Enabling technologies for Petaflop/Exaflop computing"*
- ***Four groups "****Application Grand Challenges"*

Synthesis, dissemination and **recommendation** to the European Commission

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EESI expected outputs

A **set of recommendations** to the EC shared by the European HPC community, on software - tools, methods and applications - to be developed for this new generation of supercomputers.

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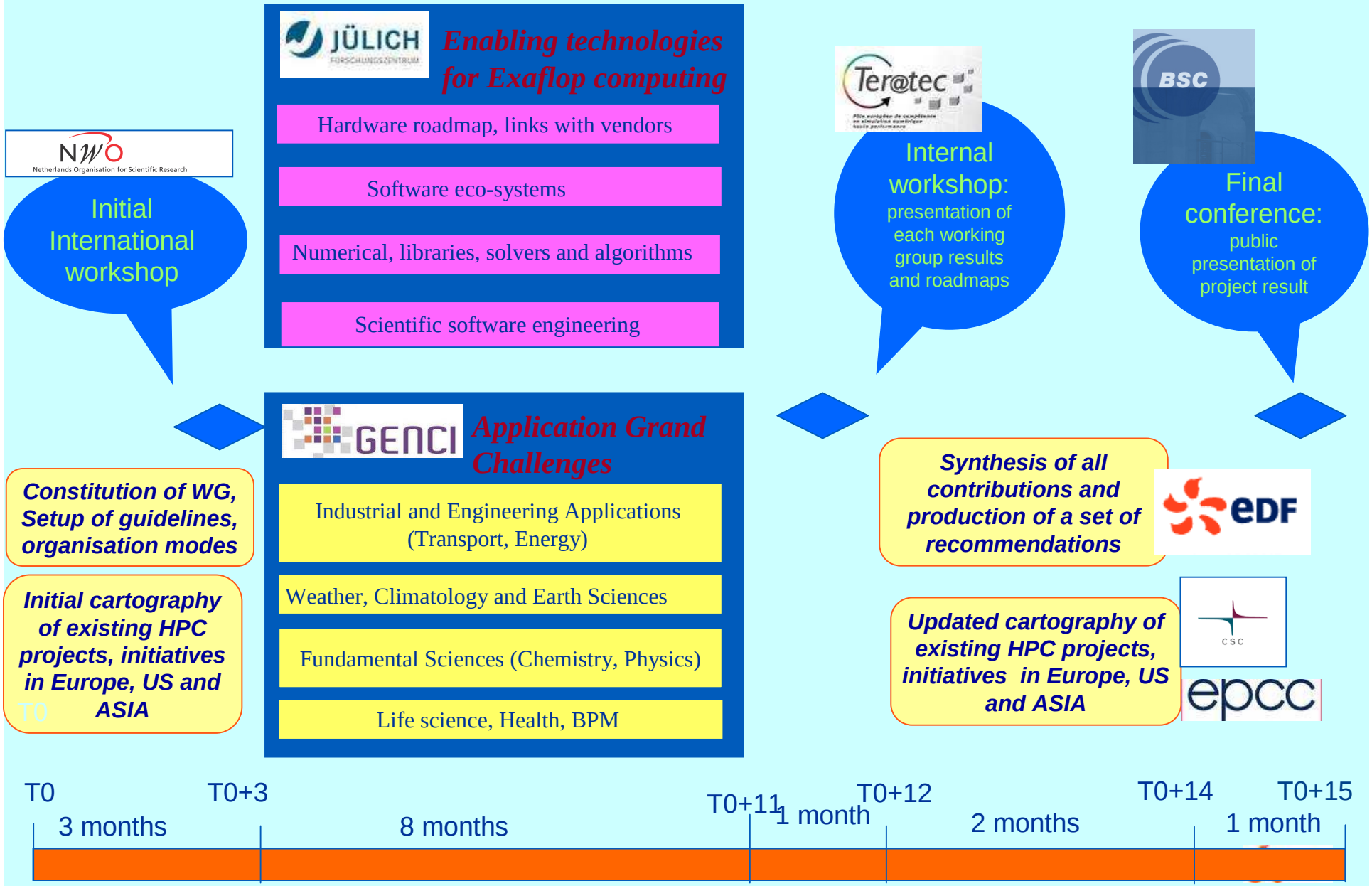

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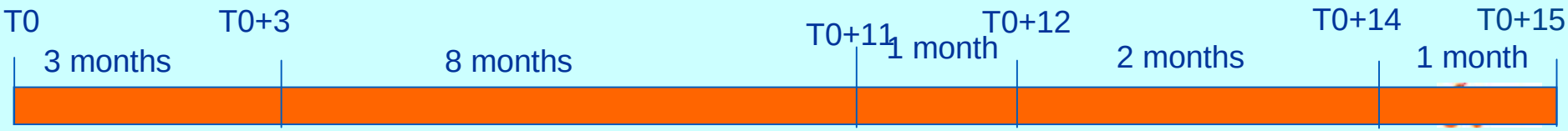
Hardware roadmap, links with Vendors

Chair: Herbert Huber/STRATOS-LRZ

Vice-Chair: Sanzio Bassini/CINECA



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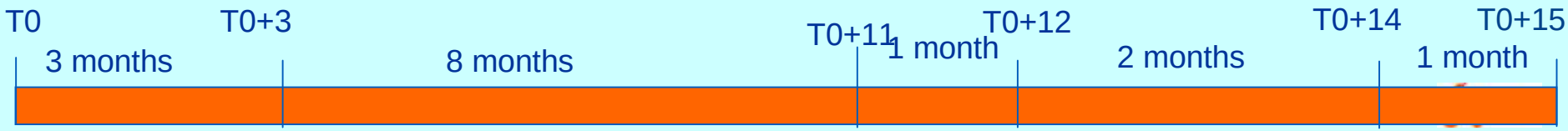
INRIA

JÜLICH



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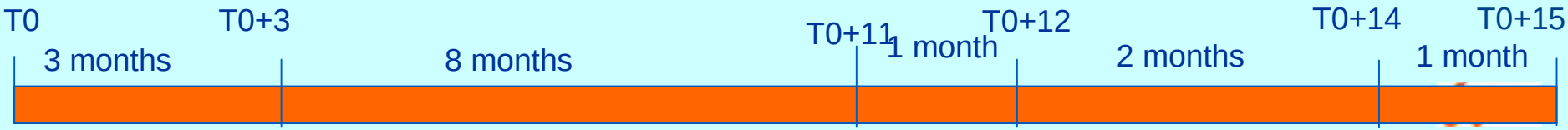
Numerical, libraries, solvers and algorithms
Chair: Iain Duff/ STFC-Rutherford Appleton Laboratory
Vice-Chair: Andreas Grothey/ Edinburgh University

Science & Technology Facilities Council
Rutherford Appleton Laboratory

THE UNIVERSITY OF EDINBURGH



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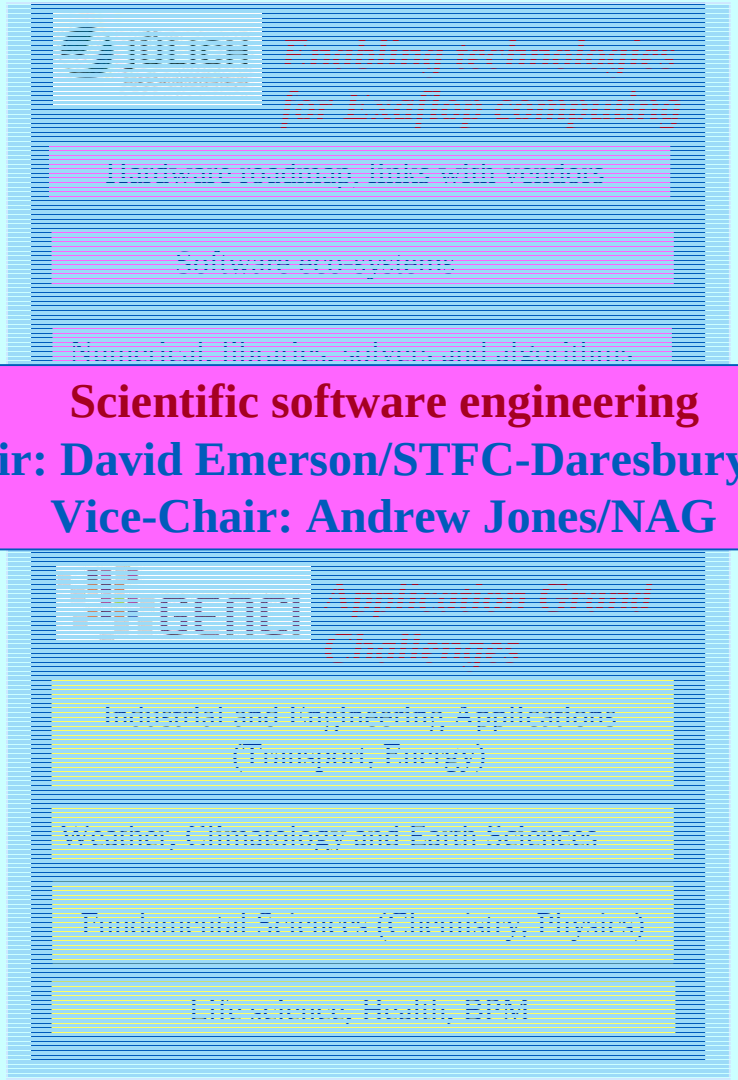
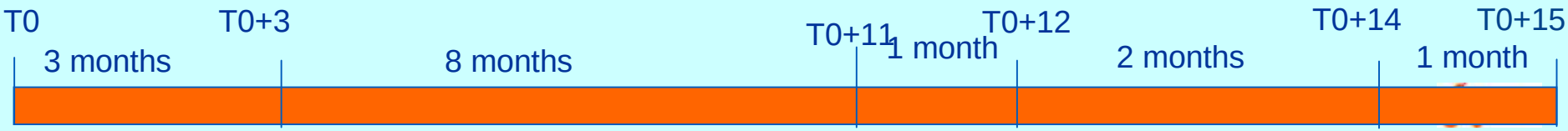


Scientific software engineering
Chair: David Emerson/STFC-Daresbury Lab.
Vice-Chair: Andrew Jones/NAG

Daresbury Laboratory

nag



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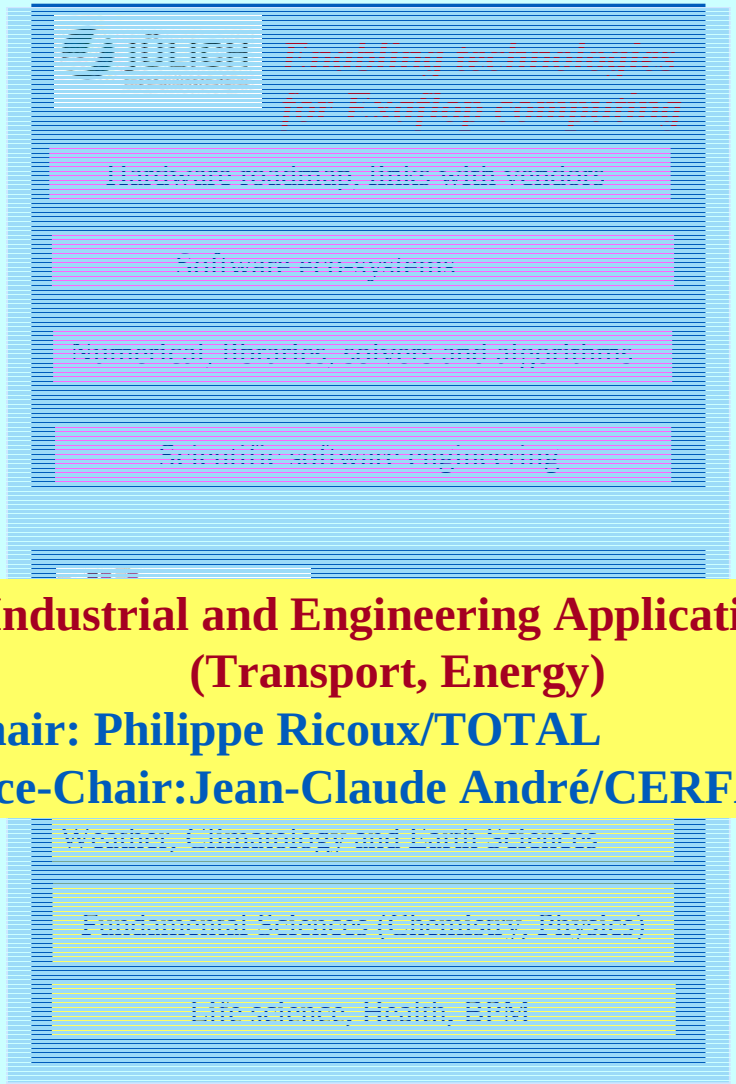
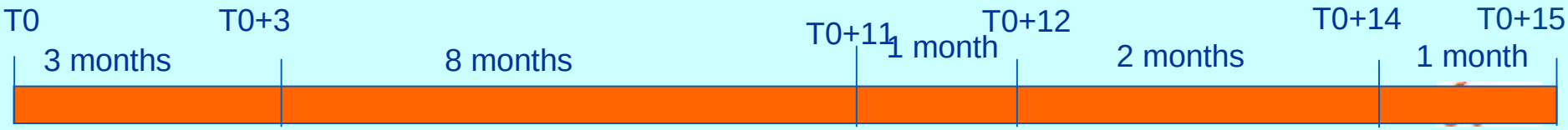


Industrial and Engineering Applications (Transport, Energy)

Chair: Philippe Ricoux/TOTAL

Vice-Chair:Jean-Claude André/CERFACS



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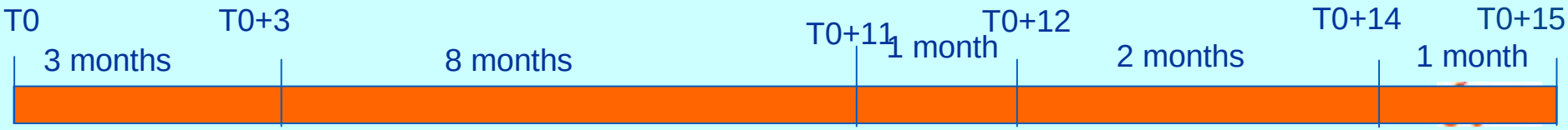
Weather, Climatology and Earth Sciences

Chair: Giovanni Aloisio / ENES-CMCC

Vice-Chair: Massimo Cocco/ INGV



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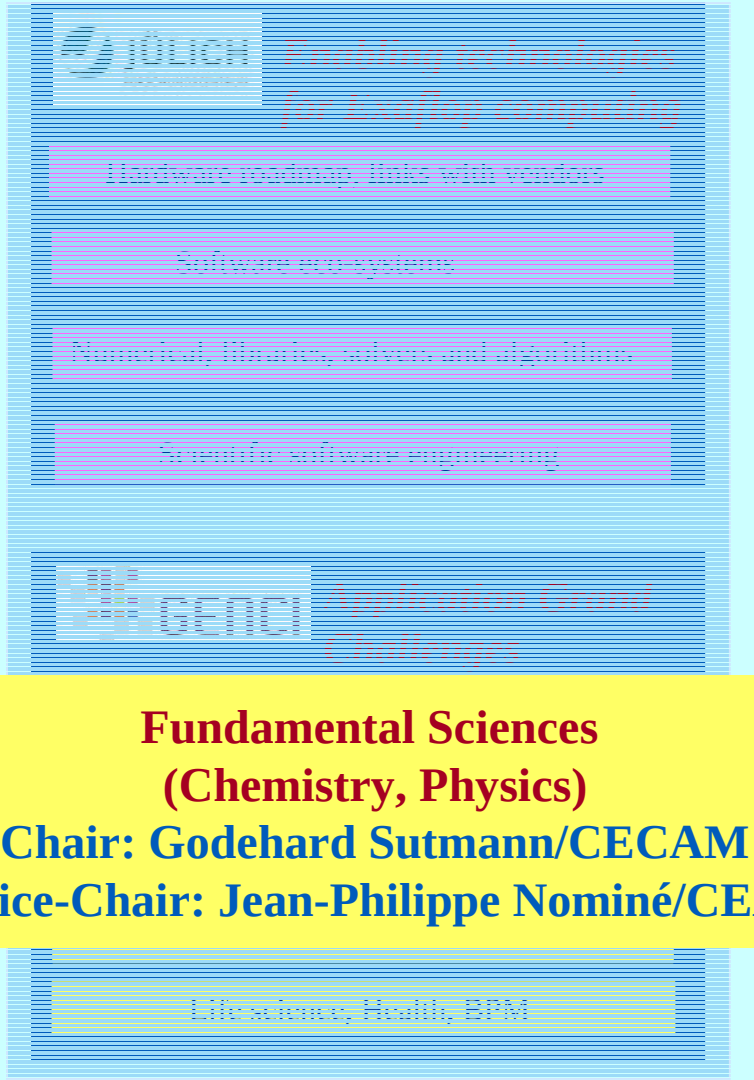
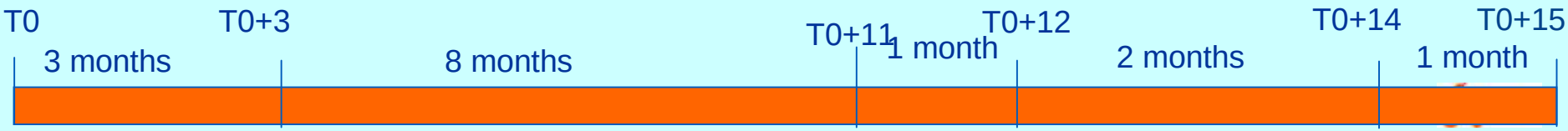


Fundamental Sciences
(Chemistry, Physics)
Chair: Godehard Sutmann/CECAM
Vice-Chair: Jean-Philippe Nominé/CEA



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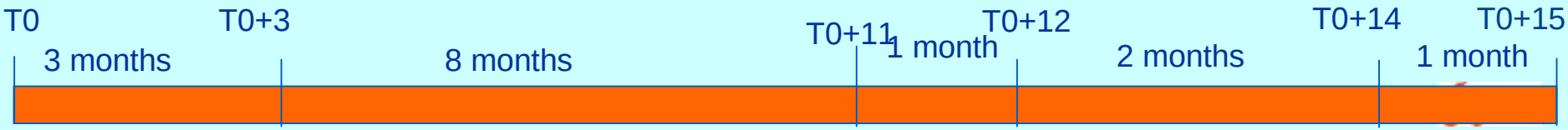
Life science, Health, BPM
Chair: Modesto Orozco/ BSC
Vice-Chair: Janet Thorton/EMBL-EBI



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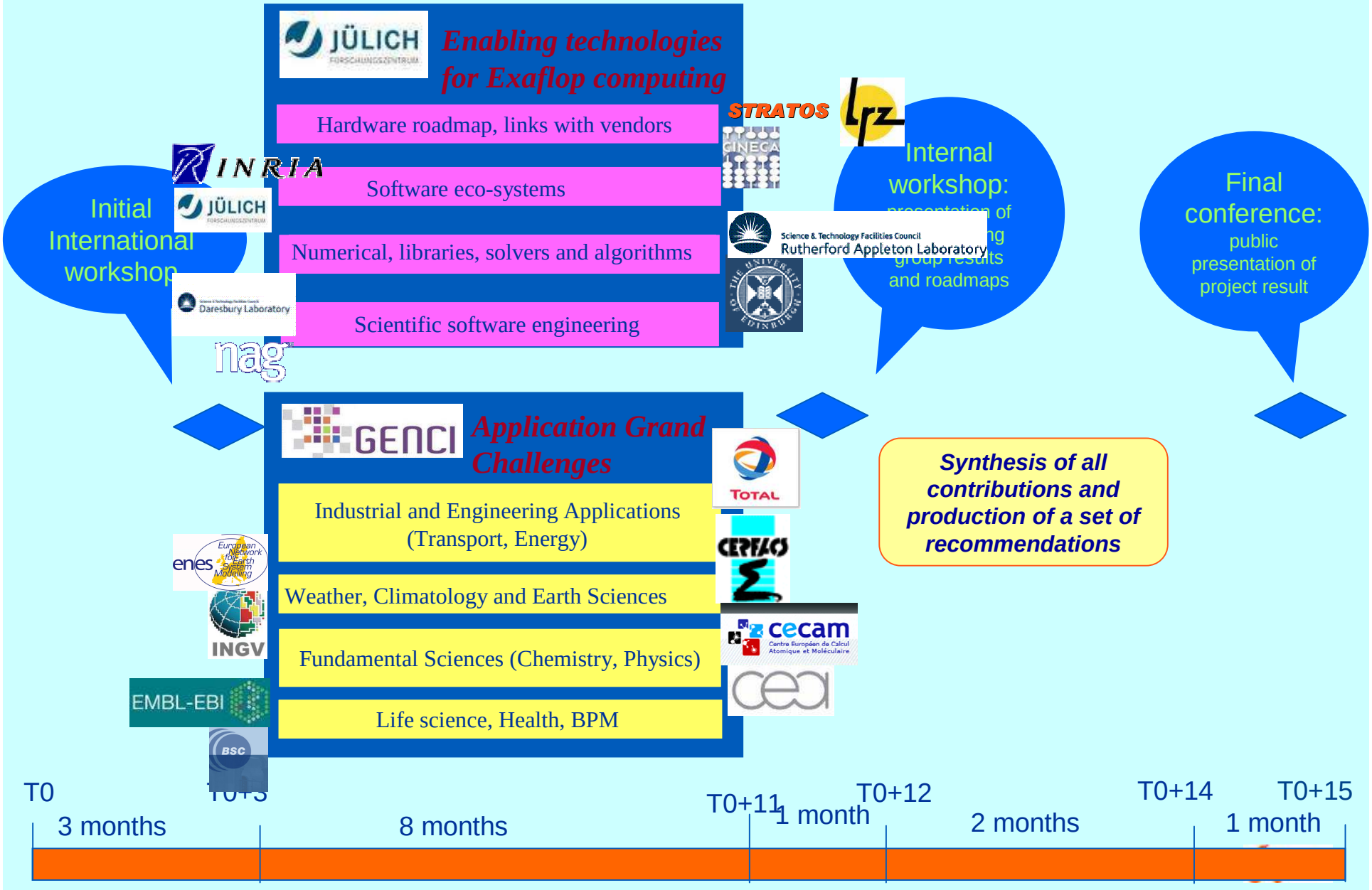

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NWO Netherlands Organisation for Scientific Research

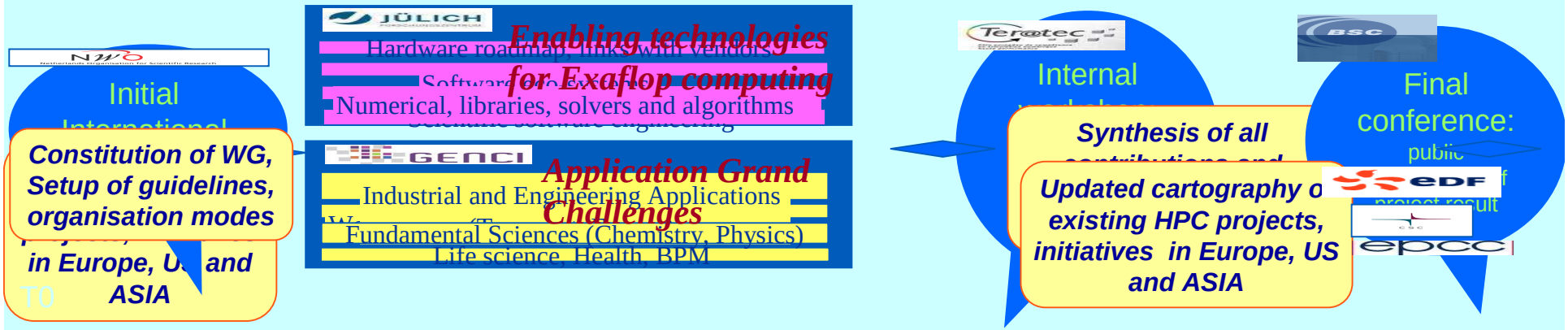
JÜLICH FORSCHUNGSZENTRUM

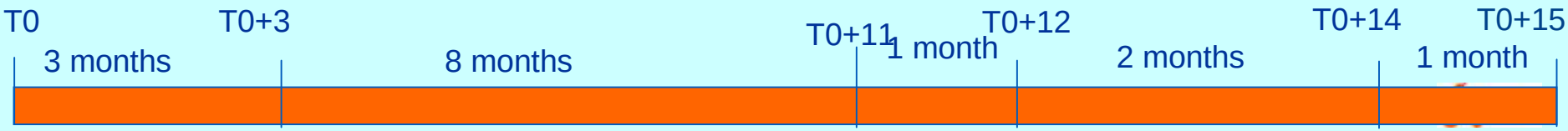
THE UNIVERSITY of TENNESSEE KNOXVILLE

Link with US and ASIA

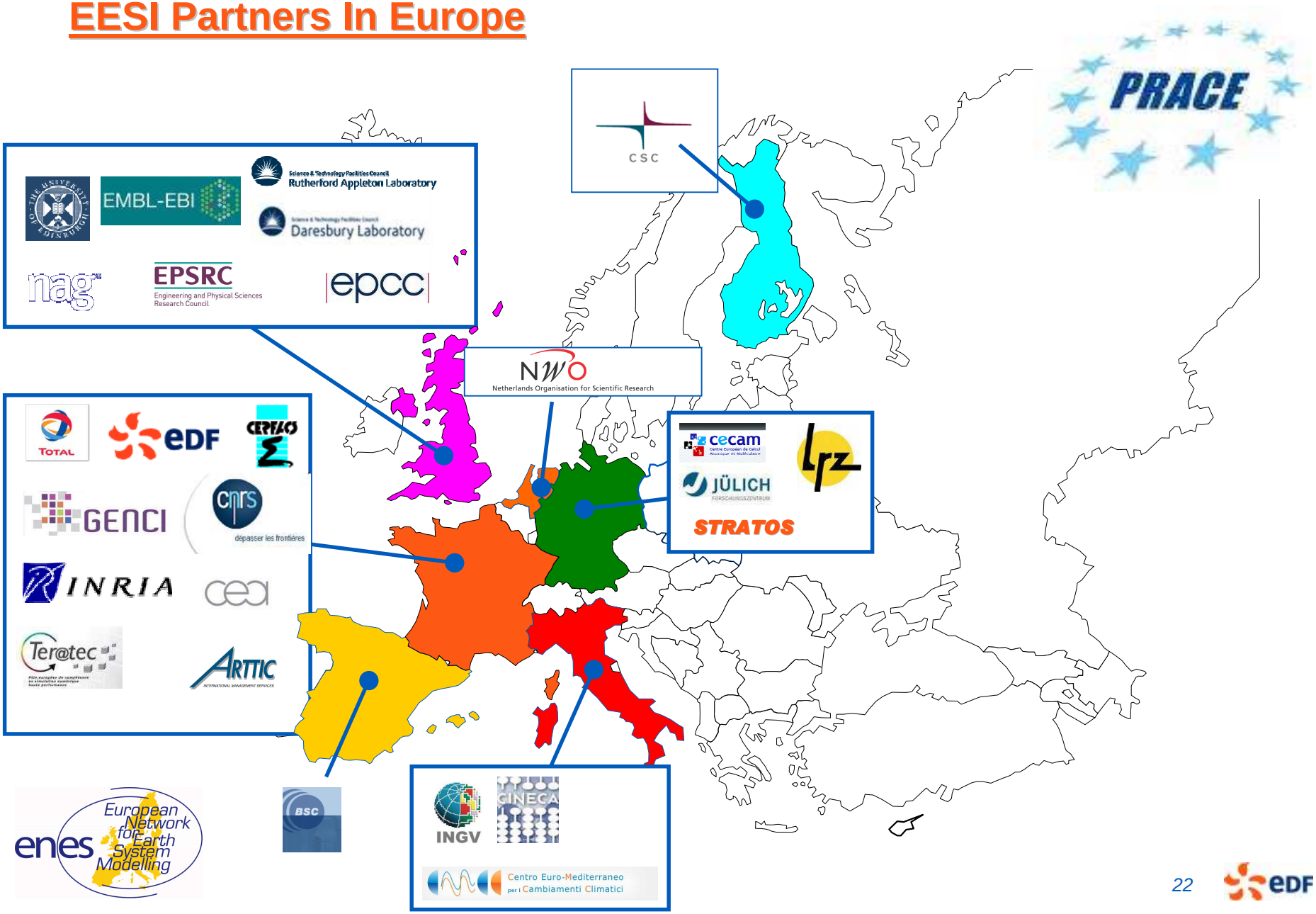
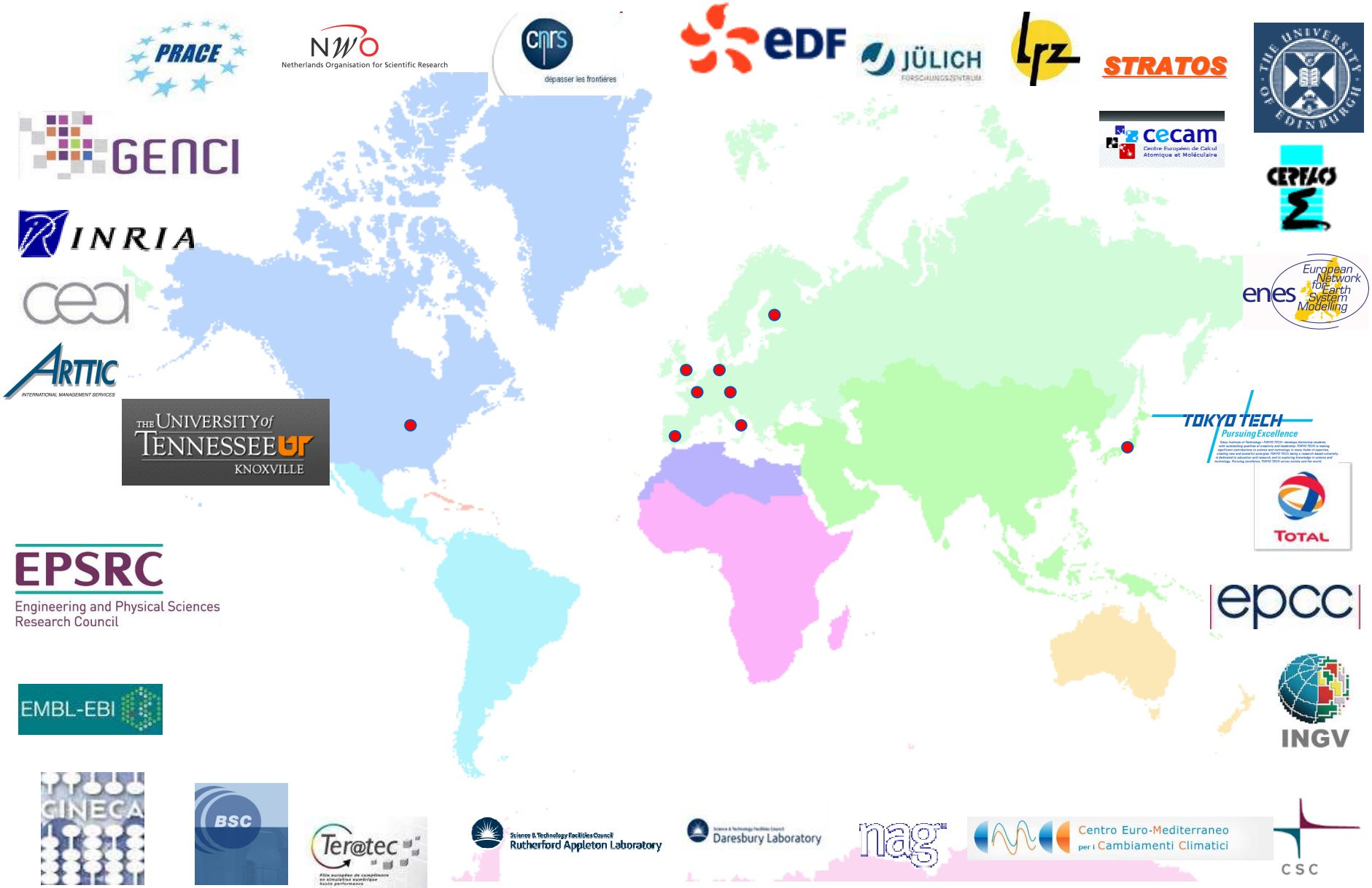
Preparation and participation to IESP boards/meetings, transfer to the EESI partners/contributors, identification of US, ASIA and European cross actions

TOKYO TECH Pursuing Excellence





EESI Partners In Europe



EESI Partners around the world