Distributed
European
Infrastructure for
Supercomputing
Applications

DEISA:
The European HPC Infrastructure

www.deisa.eu

2nd EU-Korea Cooperation Forum on ICT Research
Brussels, Dec 1-2, 2008
Hermann Lederer, RZG + DEISA

e-infrastructure

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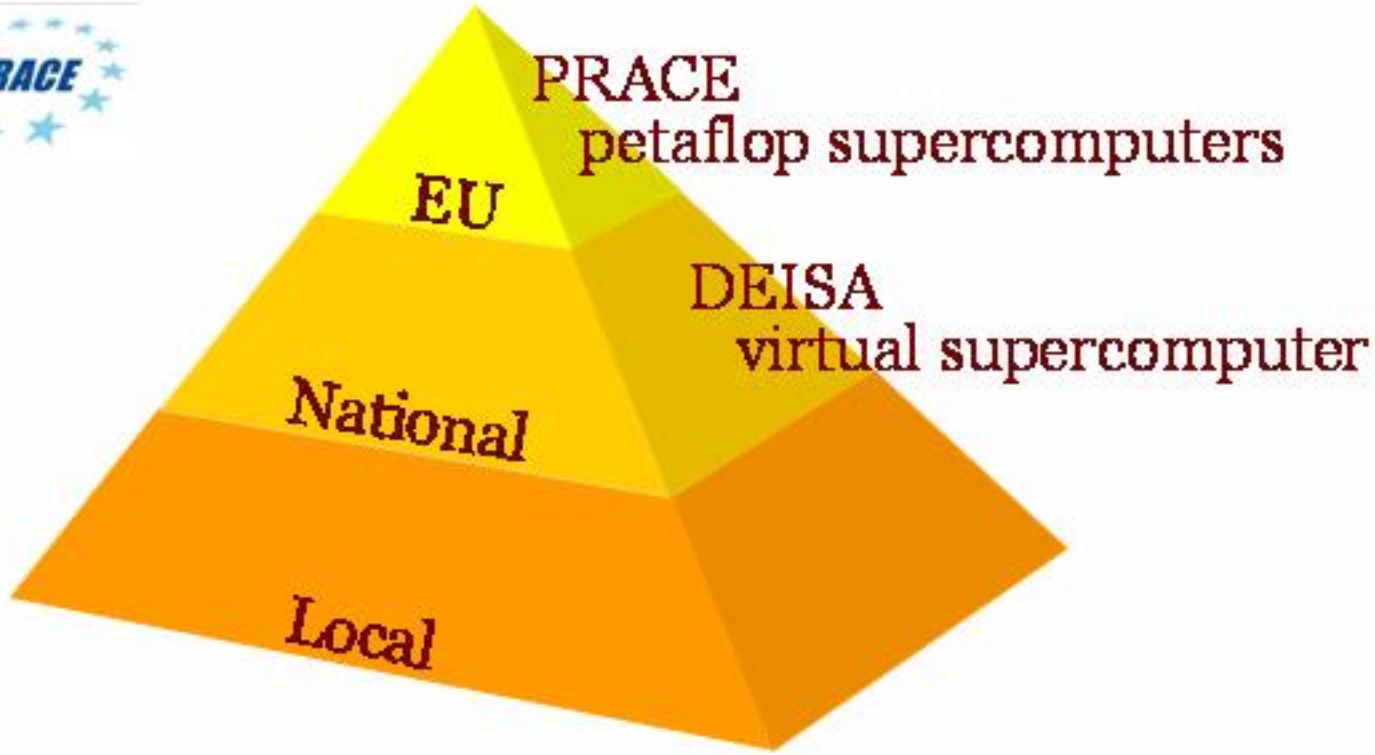
new "petaflop" supercomputers



Mario Campolargo
European Commission
OGF23, June 2008

Distributed European Infrastructure for Supercomputing Applications

PRACE

Partnership for Advanced Computing in Europe

Member state driven approach (political)

April 2007: MoU signed by 14 countries
Jan 2008: EU FP7 Design Study started
May 2008: Extended to 16 countries

DEISA

Distributed European Infrastructure for Supercomputing Applications

Supercomputing centre driven approach (technical / scientific)

May 2004: Start of FP6 DEISA project
June 2006: Start of FP6 eDEISA project
May 2008: Start of FP7 DEISA2 project

DEISA Partners

BSC	Barcelona Supercomputing Centre	Spain
CINECA	Consortio Interuniversitario per il Calcolo Automatico	Italy
CSC	Finnish Information Technology Centre for Science	Finland
EPCC	University of Edinburgh and CCLRC	UK
ECMWF	European Centre for Medium-Range Weather Forecast	UK (int)
FZJ	Research Centre Juelich	Germany
HLRS	High Performance Computing Centre Stuttgart	Germany
IDRIS	Institut du Développement et des Ressources en Informatique Scientifique - CNRS	France
LRZ	Leibniz Rechenzentrum Munich	Germany
RZG	Rechenzentrum Garching of the Max Planck Society	Germany
SARA	Dutch National High Performance Computing	Netherlands
CEA-CCRT	Centre de Calcul Recherche et Technologie, CEA	France
KTH	Kungliga Tekniska Högskolan	Sweden
CSCS	Swiss National Supercomputing Centre	Switzerland
JSCC	Joint Supercomputer Center of the Russian Academy of Sciences	Russia

DEISA Partners

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DEISA: May 1st, 2004 – April 30th, 2008

DEISA2: May 1st, 2008 – April 30th, 2011

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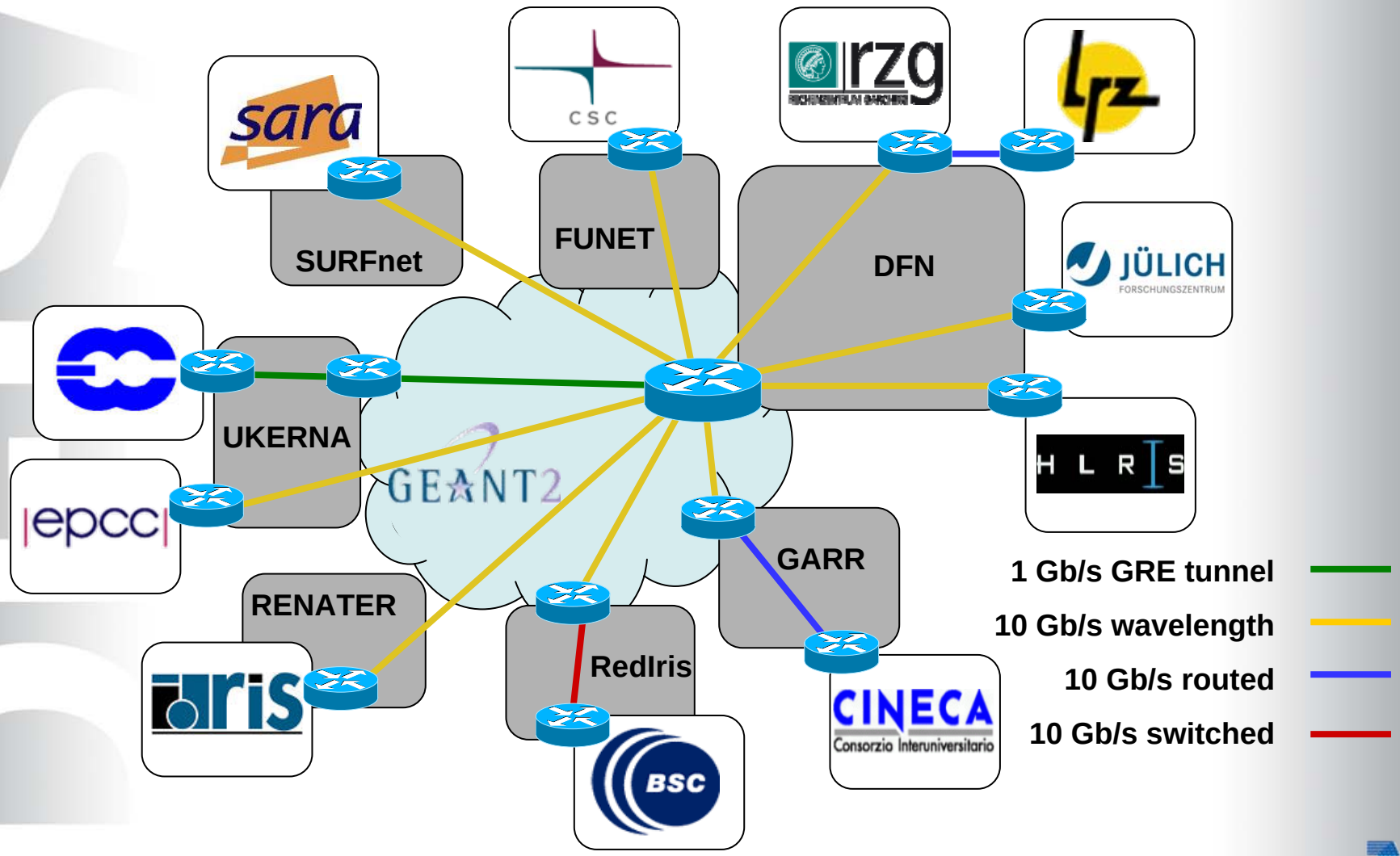
DEISA dedicated high speed network



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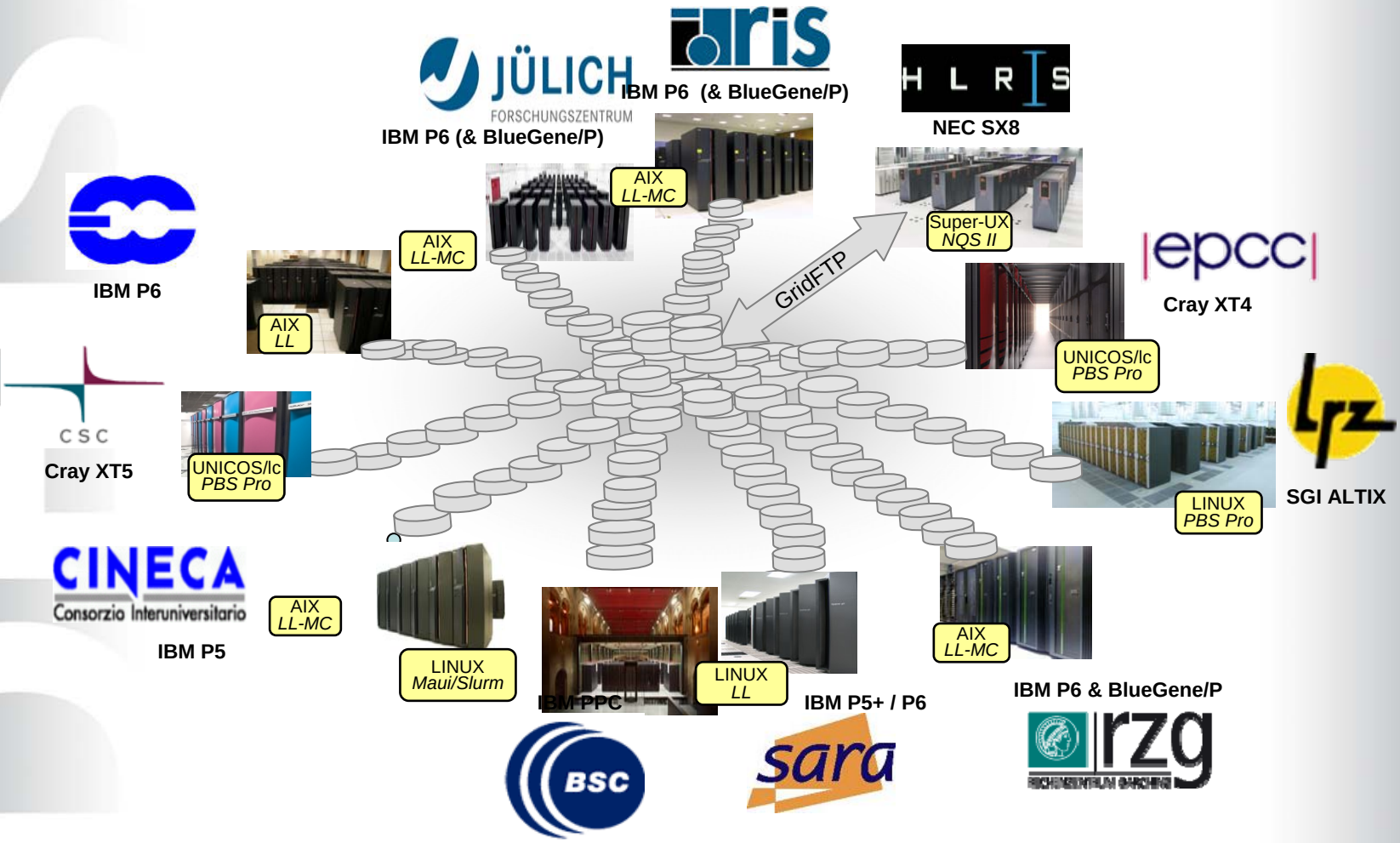
DEISA Global File System at Continental Scale
(based on MC-GPFS)



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DEISA Service Layers

Distributed European Infrastructure for Supercomputing Applications

Multiple ways to access	Workflow managem.	Common production environm.	*Presen-tation layer*
Single monitor system	Job rerouting	Co-reservation and co-allocation	*Job manag. layer and monitor.*
Data staging tools	Data transfer tools	WAN shared filesystem	*Data manag. layer*
Unified AAA	DEISA Sites	Network connectivity	*Network and AAA layers*

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DEISA Extreme Computing Initiative (DECI)

Distributed European Infrastructure for Supercomputing Applications

- DECI launched in early 2005 for complex, demanding, innovative simulations requiring the exceptional capabilities of DEISA
- Multi-national proposals especially encouraged
- Proposals reviewed by national evaluation committees
- Projects chosen on the basis of innovation potential, scientific excellence, relevance criteria, and national priorities
- Most powerful HPC architectures in Europe for the most challenging projects
- Most appropriate supercomputer architecture selected for each project
- Mitigation of the rapid performance decay of a single national supercomputer within its short lifetime cycle of typically about 5 years, as implied by Moore's law

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DEISA Supercomputers 2008

State-of-the art supercomputers > 1 PF aggregated peak performance

- Cray XT4/5, Linux
- IBM Power5, Power6, AIX / Linux
- IBM BlueGene/P, Linux (frontend)
- IBM PowerPC, Linux (MareNostrum)
- SGI ALTIX 4700 (Itanium2 Montecito), Linux
- NEC SX8 vector system, Super UX

- Fixed fractions of resources dedicated to DEISA usage
- Systems interconnected with dedicated 10Gb/s network

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DEISA Extreme Computing Initiative

Distributed European Infrastructure for Supercomputing Applications

Projects from DECI calls 2005, 2006, 2007:

Involvement of ~ 160 research institutes and universities from 15 European countries

Austria	Finland	France	Germany	Hungary
Italy	Netherlands	Poland	Portugal	Romania
Russia	Spain	Sweden	Switzerland	UK

with collaborators from

four other continents

North America, South America, Asia, Australia

Polymer Research

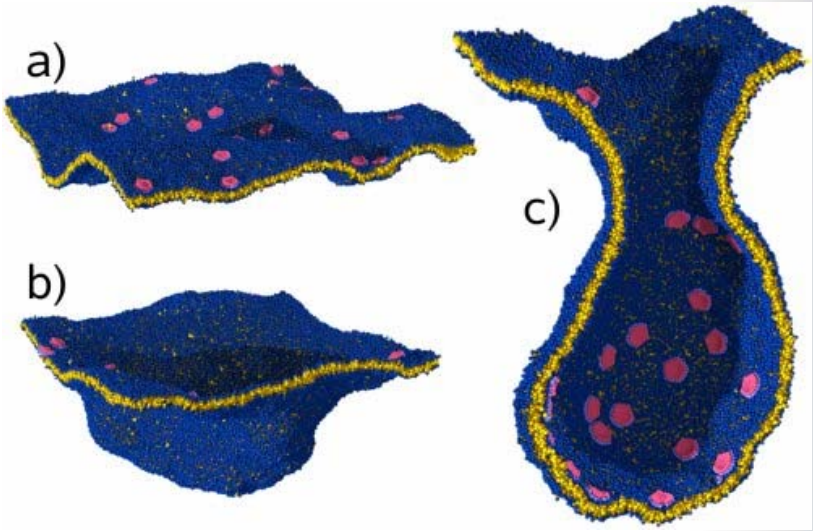
Distributed European Infrastructure for Supercomputing Applications

Cover story of Nature - May 24, 2007

Curvy membranes make proteins attractive

For almost two decades, physicists have been on the track of membrane mediated interactions. Simulations in DEISA have now revealed that curvy membranes make proteins attractive

Nature 447 (2007), 461-464



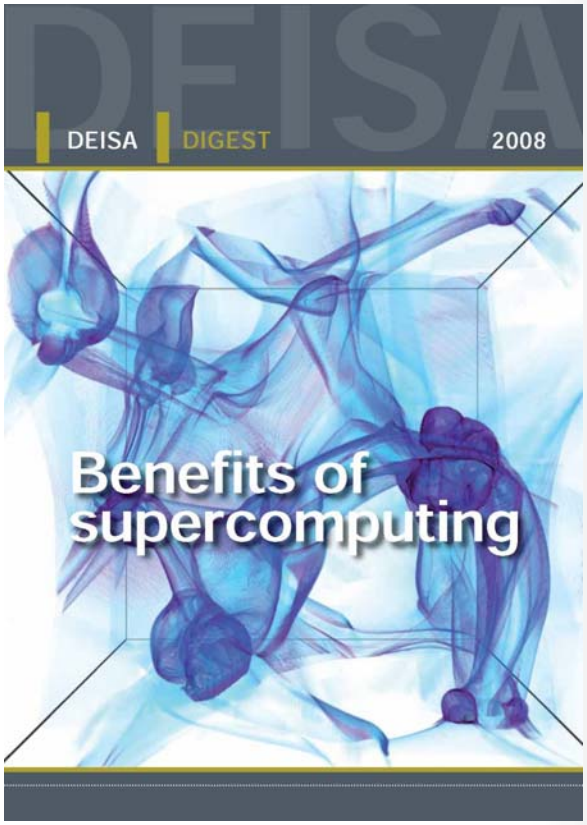
a) proteins (red) adhere on a membrane (blue/yellow) and locally bend it;

b) this triggers a growing invagination.

c) cross-section through an almost complete vesicle

B. J. Reynwar et al.: ***Aggregation and vesiculation of membrane proteins by curvature mediated interactions***, NATURE Vol 447|24 May 2007| doi:10.1038/nature05840

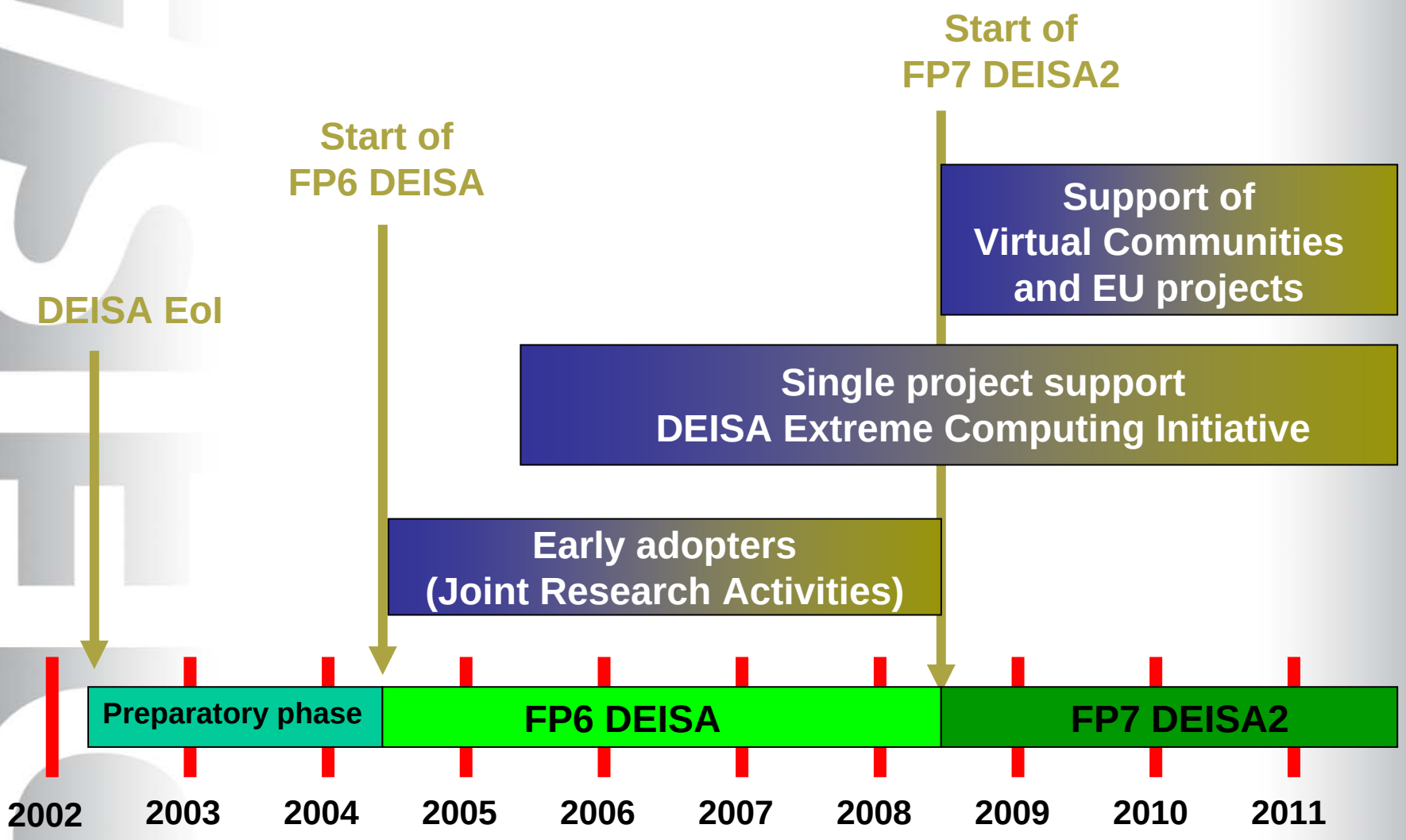
DEISA Achievements and Scientific Impact



DEISA brochures 2008

Brochures can be collected from DEISA partners‘ booths at SC08 or downloaded from http://www.deisa.eu/publications/results

Evolution of User Categories in DEISA



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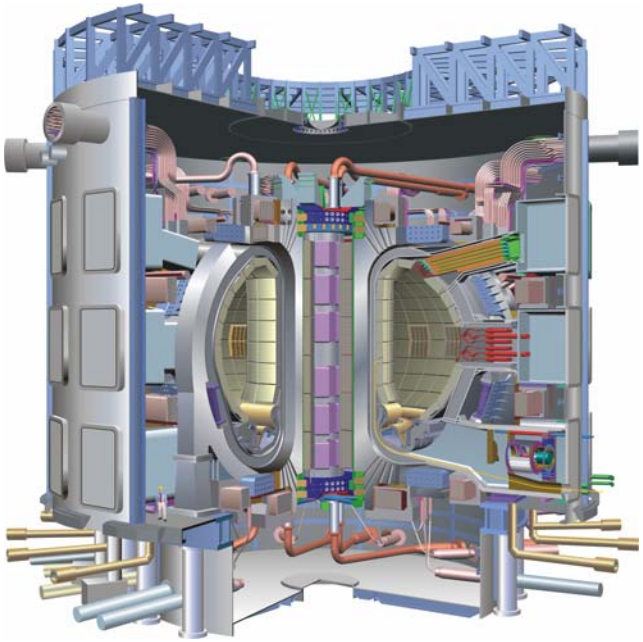
Theory Support of ITER



DEISA2 Essentials & Goals

Distributed European Infrastructure for Supercomputing Applications

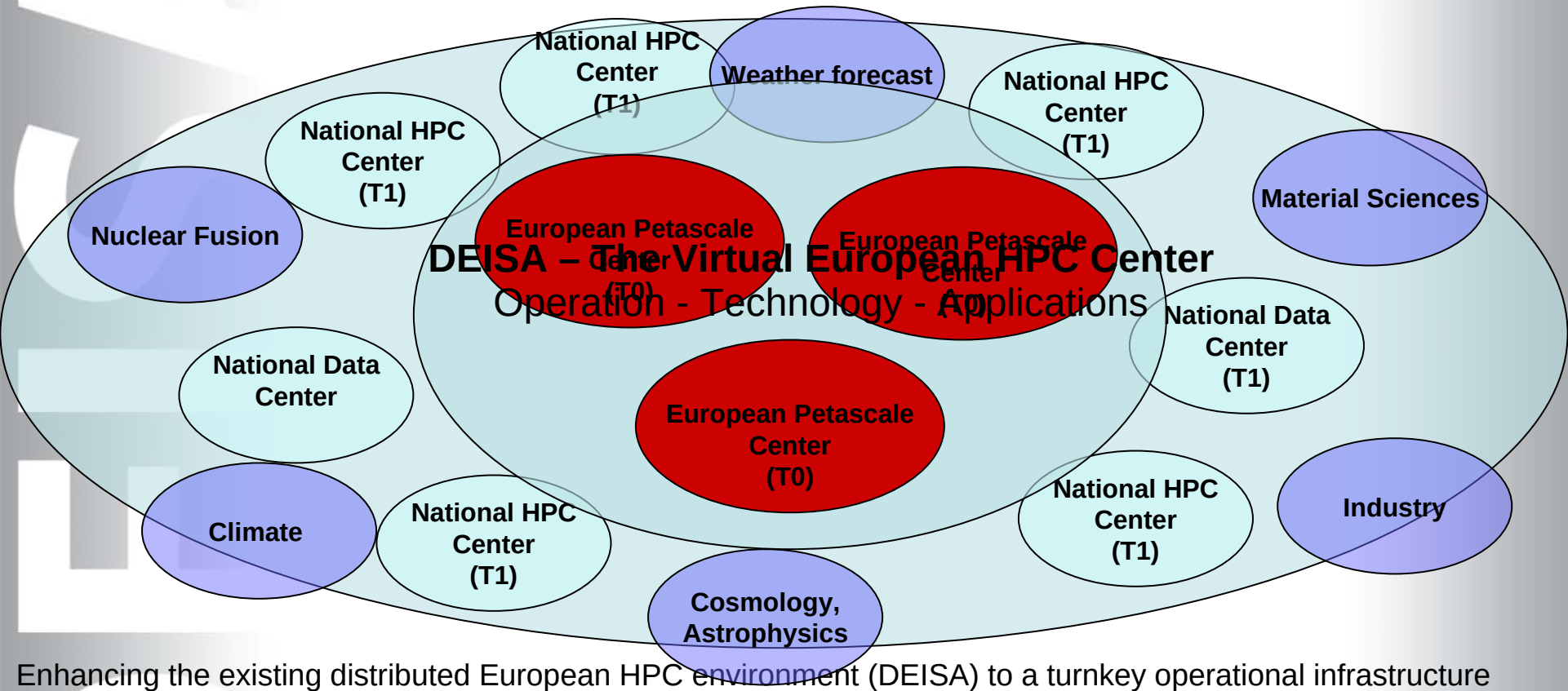
- To consolidate the existing DEISA infrastructure and to continue those activities and services that currently contribute to the effective support of world-class computational science in Europe

  A focus is on the provisioning and operation of the specific infrastructure services which allow its users to efficiently work within a distributed high performance computing environment.

- To evolve the DEISA infrastructure towards a robust and persistent European HPC ecosystem, by
  - enhancing the existing services
  - including support for European Virtual Communities
  - collaborating with new European initiatives, especially PRACE that will enable shared European PetaFlop/s supercomputer systems.

- To advance the existing distributed European HPC environment to a turnkey operational solution for a persistent European HPC infrastructure

Vision and Strategy



Enhancing the existing distributed European HPC environment (DEISA) to a turnkey operational infrastructure

Advancing the computational sciences in Europe by supporting user communities and extreme computing projects

Enhancing the service provision by offering a complete variety of options of interaction with computational resources

Integration of T-1 and T-0 centres

The Petascale Systems need a transparent access from and into the national data repositories

Bridging worldwide HPC and Grid projects

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Options for EU-Korean Collaborations in the area of HPC

Distributed European Infrastructure for Supercomputing Applications

- Korea is invited to participate in the DEISA Extreme Computing Initiative, ideally with European collaborators

- General collaborations could be established via existing research communities that are distributed world-wide with parties both in Korea and Europe, as it is the case for the fusion community providing theory support for the ITER project

- Recently direct contacts have been established between KISTI and DEISA members RZG and LRZ so that an HPC related information exchange is facilitated also on technical issues.

- The DEISA Symposium 2009 will take place as a joint DEISA/PRACE science workshop on May 11-13, 2009 in Amsterdam. Korean colleagues are cordially invited to participate. Details will be published on the DEISA website www.deisa.eu

Dr. Hermann Lederer is head of application support at Garching Computing Centre of the Max Planck Society (RZG). He received a diploma in physics from the University of Munich (LMU) and a PhD in Natural Sciences from the Technical University of Munich (TUM). After a post-doc position at Max Planck Institute of Biochemistry in Martinsried with research stays at Institut Laue-Langevin (ILL) in Grenoble, Risoe National Laboratory in Roskilde, and DESY in Hamburg, he took a position at RZG. After a group leader position for workstations and applications, he became head of the high performance applications group and project manager at RZG for supercomputing projects of the Max Planck Society in 1995. After leading the European Applications Task Force and Joint Research Activities in Plasma Physics and Materials Science in the FP6 DEISA project, he became work package leader for external relations and dissemination in the FP7 DEISA2 project.