HP-SEE

High-Performance Computing Infrastructure for South East Europe's Research Communities

<Event Name, Location, Date>

www.hp-see.eu

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HP-SEE

High-Performance Computing Infrastructure for South East Europe's Research Communities

The HP-SEE initiative is co-funded by the European Commission under the FP7 Research Infrastructures contract no. 261499

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- **Contract n° :** RI-261499
- **Project type:** CP & CSA
- **Call**: INFRA-2010-1.2.3: VRCs
- **Start date:** 01/09/2010
- **Duration:** 24 months
- **Total budget:** 3 885 196 €
- **Funding from the EC:** 2 100 000 €
- **Total funded effort, PMs:** 539.5
- **Web site:** www.hp-see.eu

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HP-SEE Partnership

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Contractors (14)

GRNET	Coordinating Contractor	Greece
IICT-BAS	Contractor	Bulgaria
IFIN-HH	Contractor	Romania
TÜBİTAK-ULAKBIM	Contractor	Turkey
NIIFI	Contractor	Hungary
IPB	Contractor	Serbia
UPT	Contractor	Albania
UOBL ETF	Contractor	Bosnia-Herzegovina
UKIM	Contractor	FYROM
UOM	Contractor	Montenegro
RENAM	Contractor	Moldova (Republic of)
IIAP NAS RA	Contractor	Armenia
GRENA	Contractor	Georgia
AZRENA	Contractor	Azerbaijan

Third Party / JRU mechanism used

associate universities / research centres

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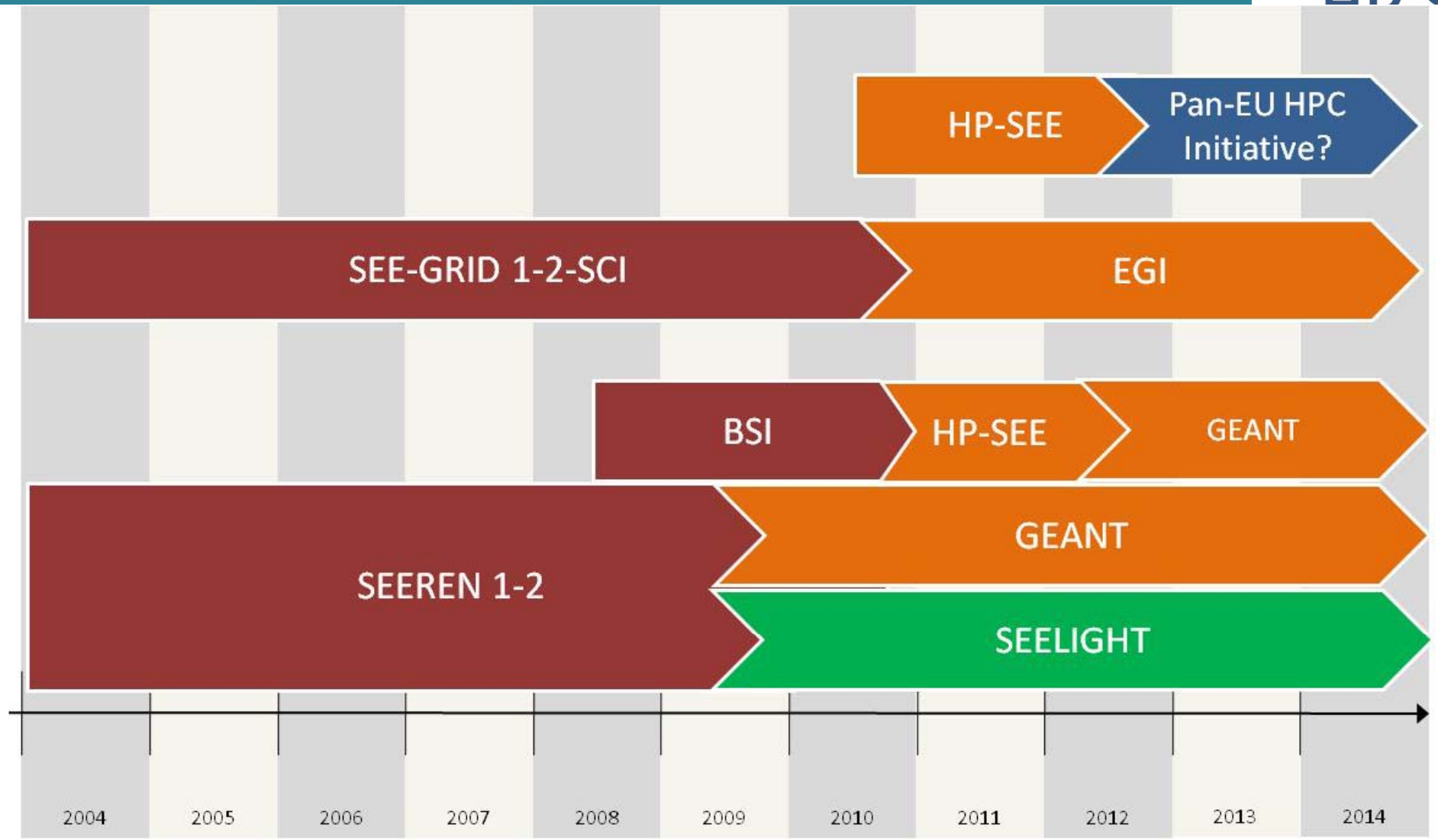
Context: the Timeline



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SEE eInfrastructure Activities – past 6 years

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- **SEEREN1/2:** regional inter-NREN connectivity and GEANT links [DGINFSO]
- **BSI:** Southern Caucasus links [DGINFSO]
- **SEELIGHT:** lambda facility in SEE [Greek HiperB]
- *Result: sustainable national & regional networks, most countries in GEANT*

- **SEEGRID1/2:** regional Grid infrastructure, building NGIs and user communities
- **SEE-GRID-SCI:** eInfrastructure for large-scale environmental science user communities: meteorology, seismology, environmental protection. Inclusion of Caucasus. [DGINFSO]
- *Result: sustainable national Grids, all countries within European Grid Initiative*

- **HP-SEE**: regional HPC interconnection and 2nd generation Caucasus link
- *Expected result: sustainable national HPC centers, long-term sustainable (hierarchical) model in collaboration with PRACE and DEISA*

- **SEERA-EI:** regional programme managers collaboration towards common eInfrastructure vision, strategy and regional funds [DGRTD]
- *Result: ensuring long-term national-level funds and regional funds to complement EC funds*

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Context: the Model; Converged Communication & Service Infrastructure for South-East Europe

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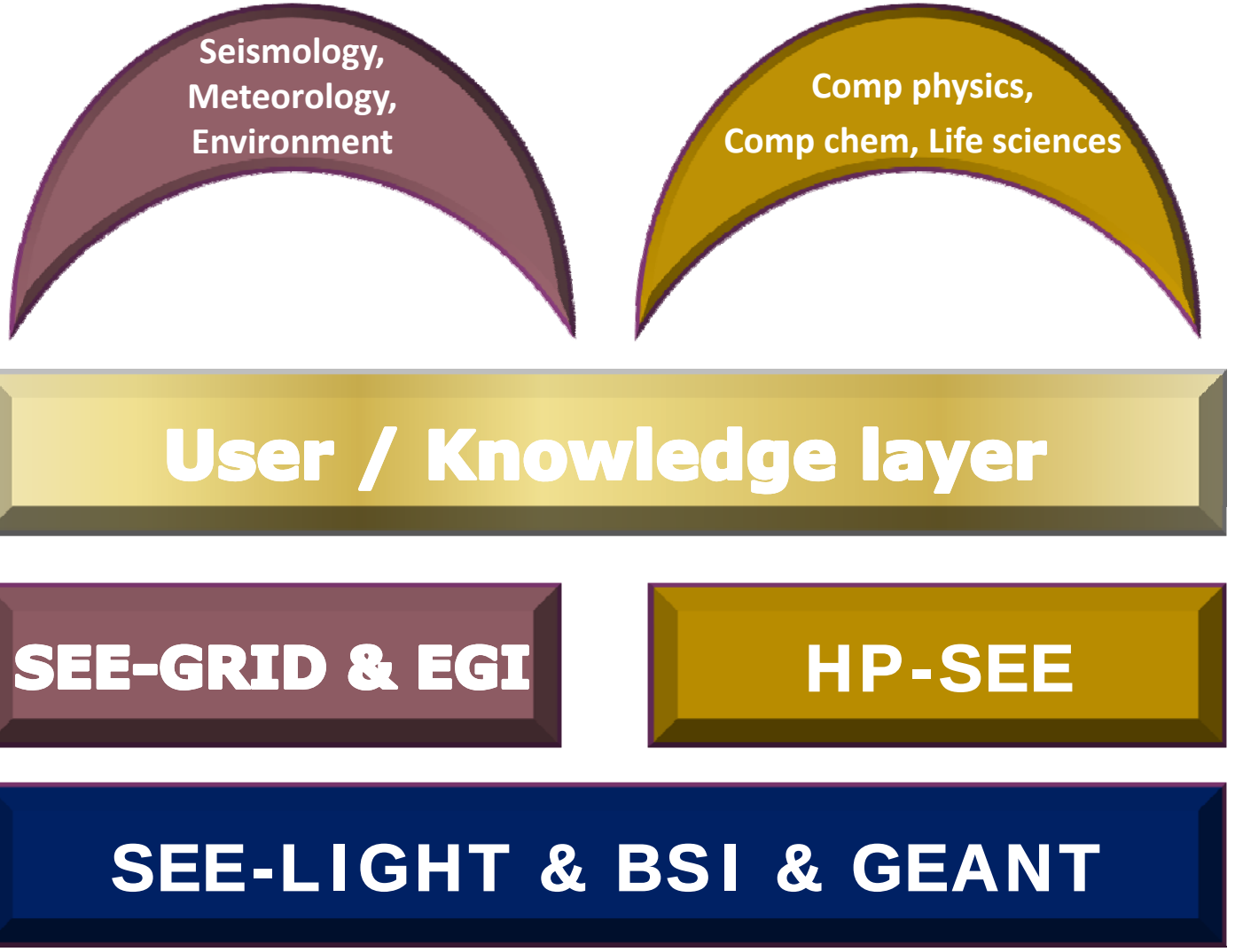

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HP-SEE Project Objectives

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- Objective 1 – Empowering multi-disciplinary virtual research communities
- Objective 2 – Deploying integrated infrastructure for virtual research communities
  - Including a GEANT link to Southern Caucasus
- Objective 3 – Policy development and stimulating regional inclusion in pan-European HPC trends
- Objective 4 – Strengthening the regional and national human network

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Work Organization

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Work Package	WP Title	Lead
WP1	Management	GRNET
WP2	National and Regional HPC initiatives and international liaison	GRNET
WP3	Dissemination and training	IPB
WP4	Virtual Research Communities support	IFIN-HH
WP5	Regional HPC infrastructure operations	IPP-BAS
WP6	Procurement and network design	GRNET
WP7	Network Operations	TUBITAK-ULAKBIM
WP8	Software stack and technologies updates	NIIFI

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Work Organization - PERT

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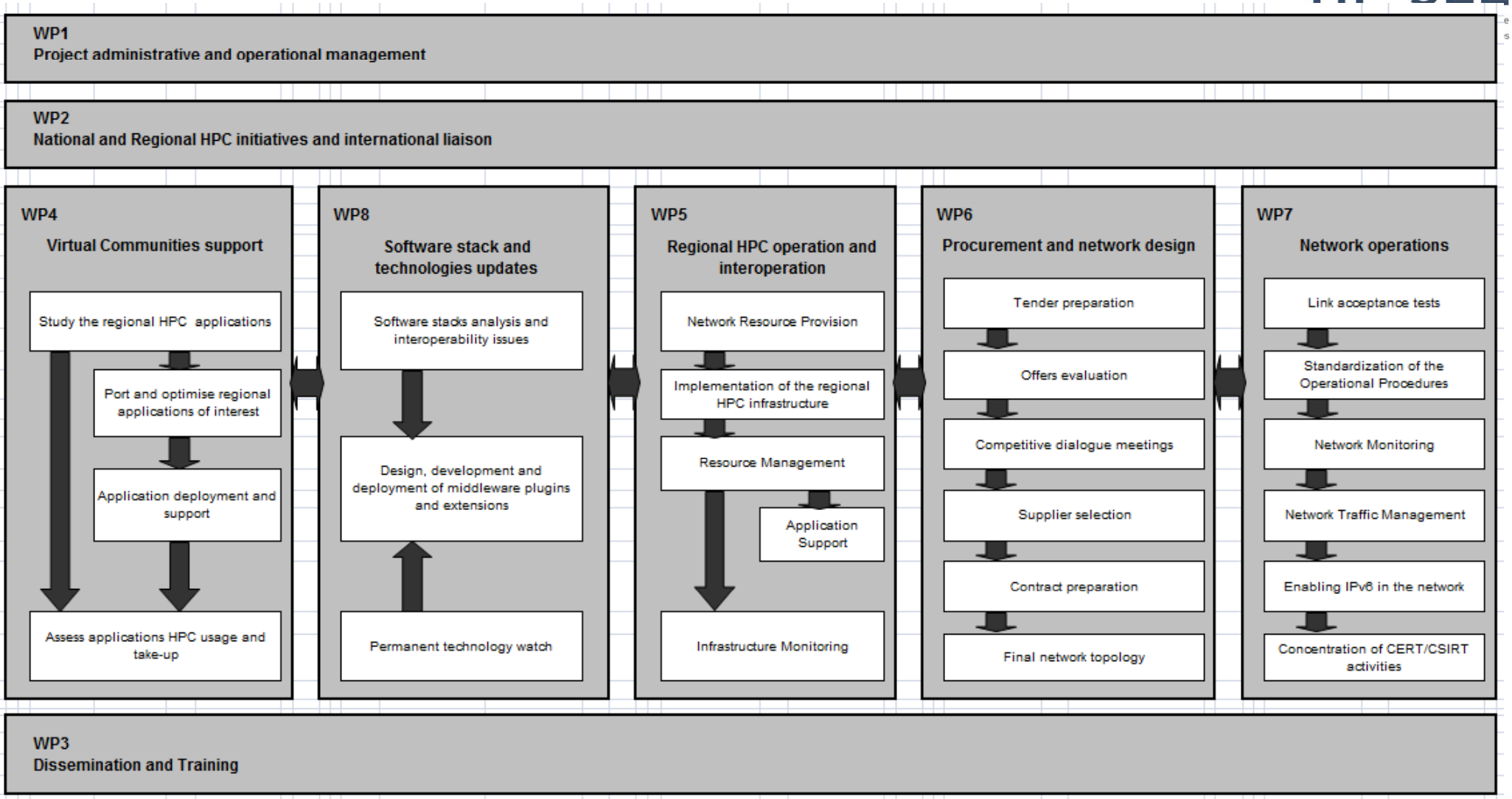

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HPC Infrastructure – Blue Gene/P

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- IBM Blue Gene/P – **two racks**, 2048 *PowerPC 450processors (32 bits, 850 MHz), a total of **8192 cores**;*
- Double-precision, dual pipe floating-point acceleration on each core;
- A total of **4 TB** random access memory;
- 16 I/O nodes currently connected via fibre optics to 10 Gb/s Ethernet switch;
- Theoretical peak performance: Rpeak= **27.85 Tflops;**
- **Energy efficiency: 371.67 MFlops/W: Green top 10**

- Smaller HPC machines in **Romania**, **Bulgaria**, **Hungary**
- Upcoming purchases in **Serbia** and **Greece**

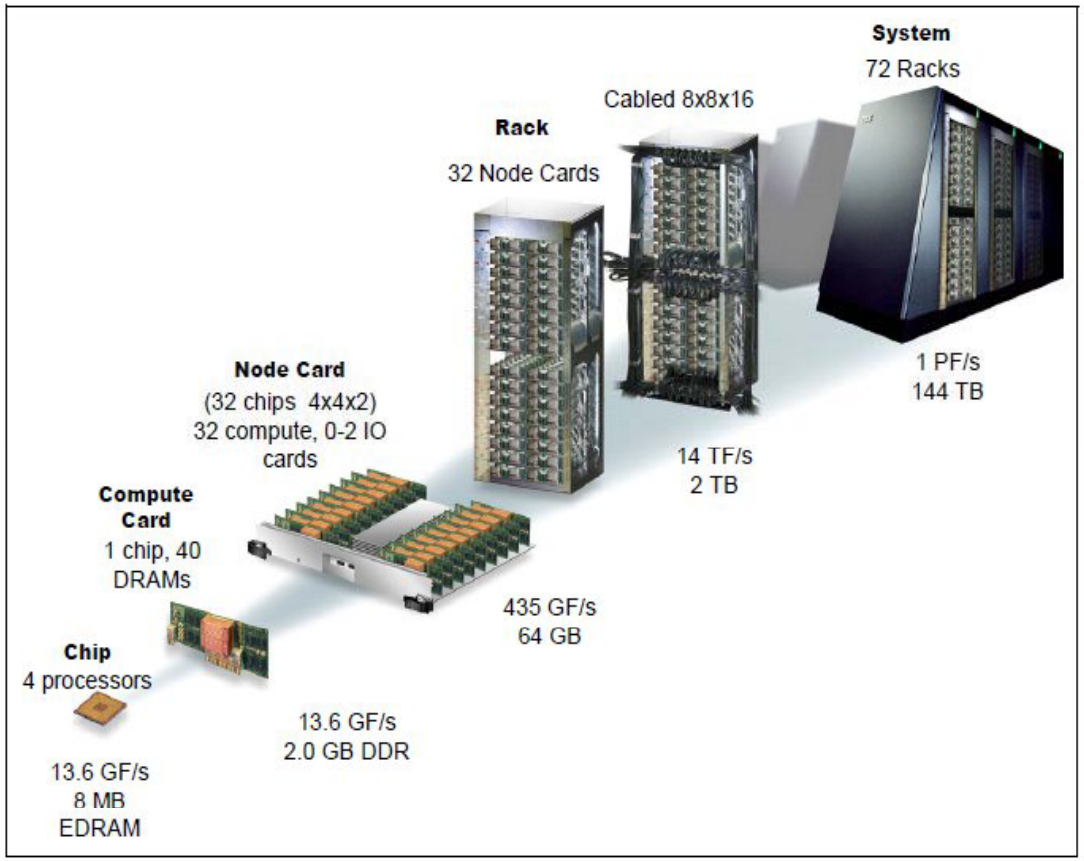

Figure 1-2 Blue Gene/P packaging

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Networking Infrastructure

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- Connecting South Caucasus region and a GÉANT PoP in the SEE
- Beneficiaries
  - Azerbaijan
  - Armenia
  - Georgia
- Continue the operations of the decentralised virtual NOC in the Caucasus area
  - Operational Procedures
  - Network Monitoring
  - Traffic Management
  - Security
  - Best Practices

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Introduction to VRCs

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- Comp. Physics
  6 countries,
  8 apps.
- Comp. Chemistry
  6 countries,
  7 apps.
- Life Sciences
  5 countries,
  7 apps.

Country	Physics	Chemistry	Life Sciences	TOTAL
Albania	1			1
Armenia			1	1
Bosnia-Herzegovina		1		1
Bulgaria	2	2		4
Georgia			1	1
Greece		1	2	3
Hungary			2	2
Moldova	1			1
Montenegro			1	1
FYR of Macedonia	1	1		2
Romania	2	1		3
Serbia	1	1		2
TOTAL	8	7	7	22

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Computational Physics VRC

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- Applications Areas
  - High Energy and Particle Physics
  - Plasma Physics
  - Physics of Condensed Matter
  - Atomic Physics
  - Computational Fluid Dynamics
- Indicative Applications range
  - Nano-electronics
  - Micro-devices optimization and modeling of robotic devices for biomedicine
  - Feature detection in satellite images
  - Modeling of electron transport
  - Complex gas dynamics and convection

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Computational Chemistry VRC

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- Applications Areas
  - Molecular dynamics and simulations
  - Material science
- Indicative Applications range
  - Study of physicochemical properties of compounds
  - Molecular design of platinum complexes
  - Material design for photonic applications
  - Molecular-orbital simulations
  - Design of chemical reactors, burners, boilers
  - Quantum mechanical simulation of Condensed Phases

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Life Sciences VRC

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- Applications Areas
  - Neuroscience
  - Proteomics
  - Genomics and DNA sequence analysis
- Indicative Applications range
  - Network models of short and long term memory
  - Identification of novel miRNA genes
  - Genomics / sequence analysis
  - Molecular Dynamics
  - Synthesis of nucleotide bases

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JRA: Software Stack and Technologies

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- Objectives
  - Study the Scalability of applications to ensure efficient usage of the infrastructure
  - Assess commonalities to facilitate usage of a heterogeneous infrastructure
  - Foster transparent access to the integrated infrastructure
  - Provide guidelines for the use of new hardware and software available in the HPC community

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Horizontal Actions: HPC Initiatives

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- Support setup of national HPC task forces or their incorporation in existing structures
- Support the definition of related organisational models on national and regional level
- Definition of models for international resource sharing across HPC resources and disciplines
- Guidelines for HPC centres procurement
- Liaison with PRACE, other pan-European activities, and world-wide initiatives

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Horizontal Activities: Training and Dissemination

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- Dissemination Event Agenda:
  - http://indico.hp-see.eu/categoryDisplay.py?categId=13
- Training Event Agenda
  - Training portal: http://indico.hp-see.eu/categoryDisplay.py?categId=6
- Trainings:
  - Train the trainers
  - Training material on line
  - 2 regional training events
  - National-level training events

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Long-term Vision...

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- Being on the technological par with the rest of Europe
- Enabling local scientists to use their potential
- Integrating the region to PRACE
- Role-model for regional developments
- Leading the way in wider contexts

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