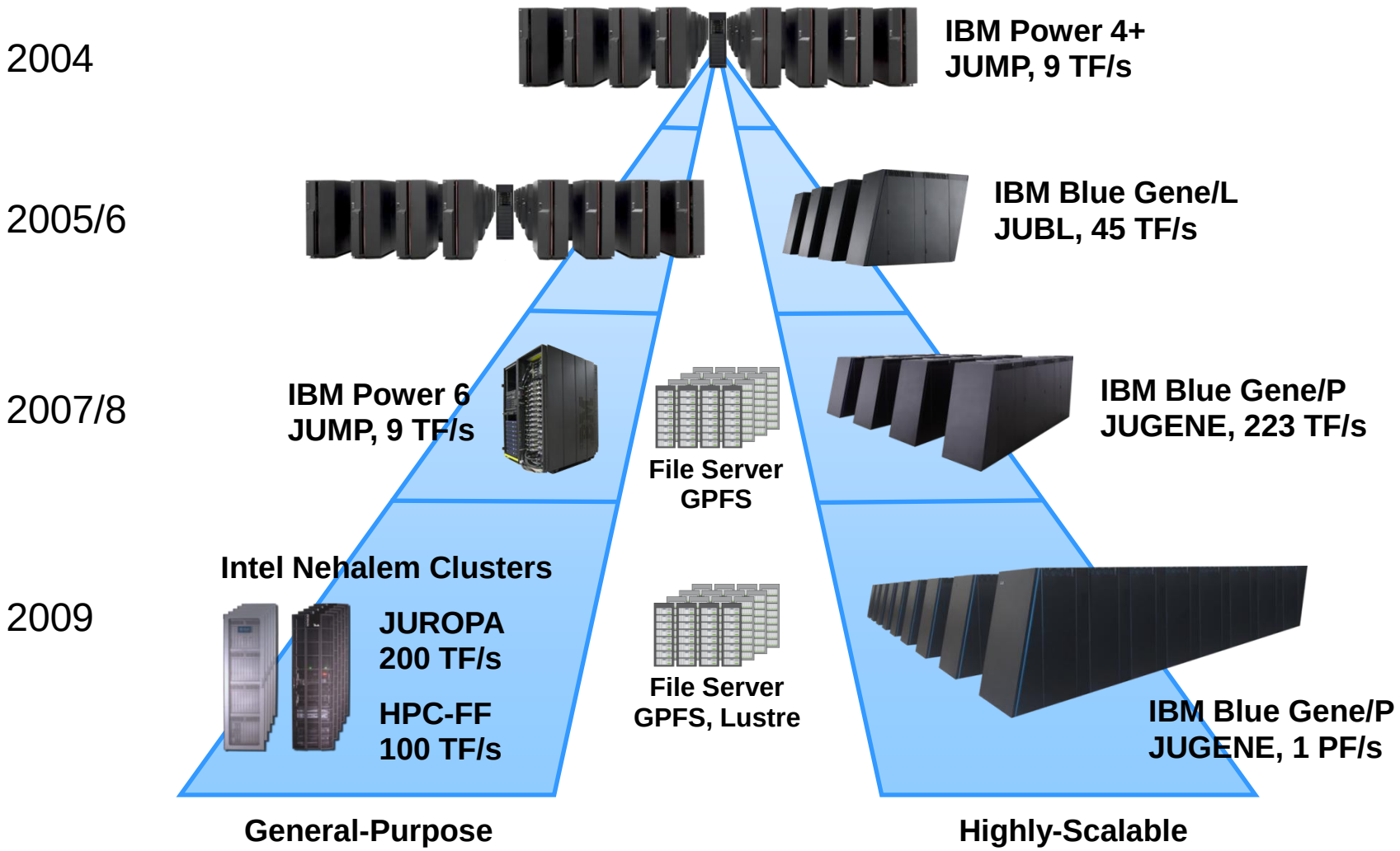
JÜLICH
FORSCHUNGSZENTRUM

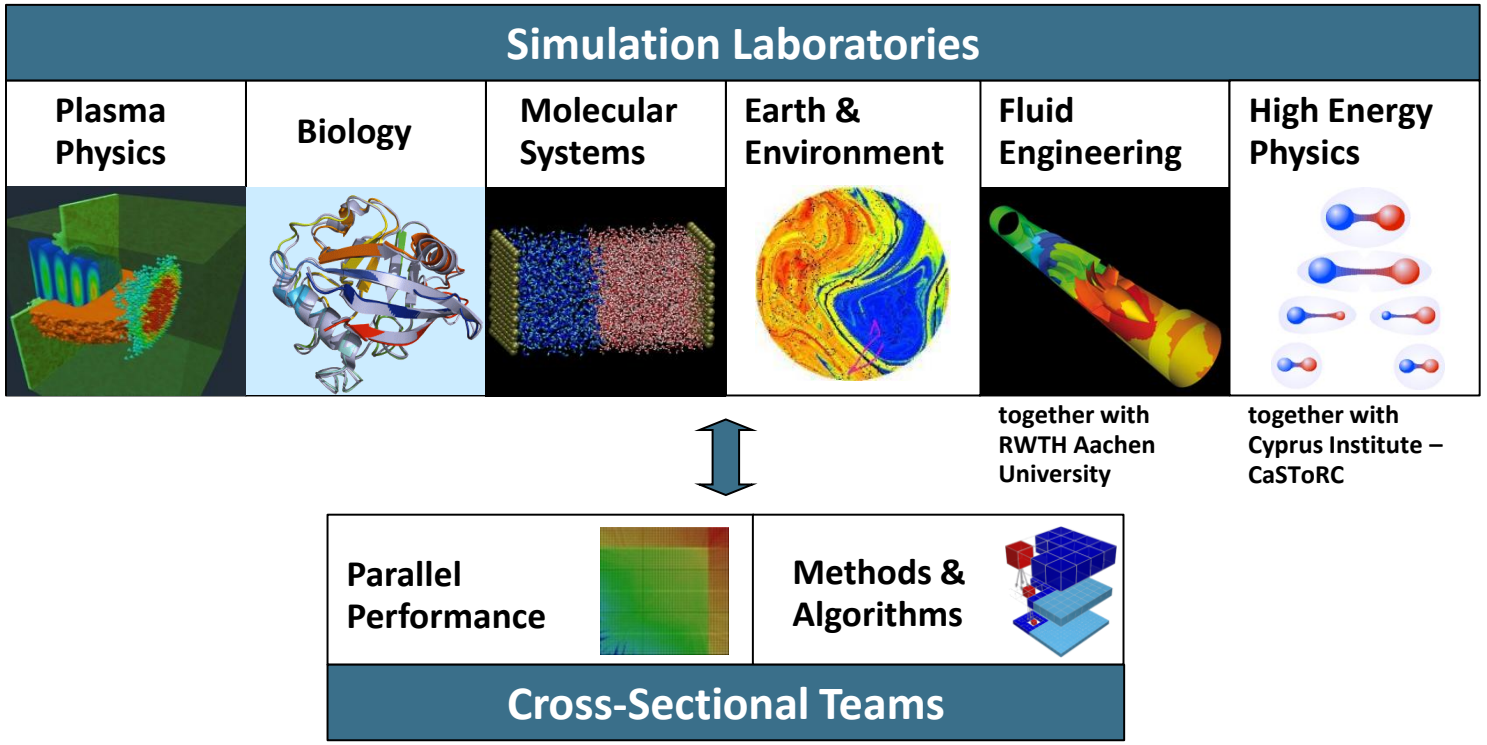
HPC challenges, expectations, and solutions

20th September 2011 | Thomas Fieseler

Jülich Supercomputing Centre
The Dualistic Approach

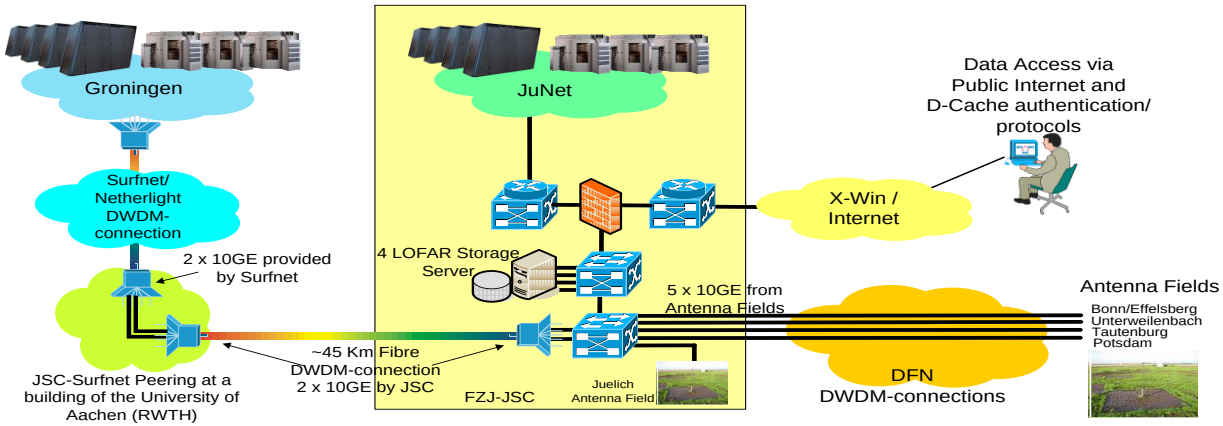


Jülich's Concept for User Support: Domain-specific Research and Support



Support for LOFAR / GLOW

Network & security



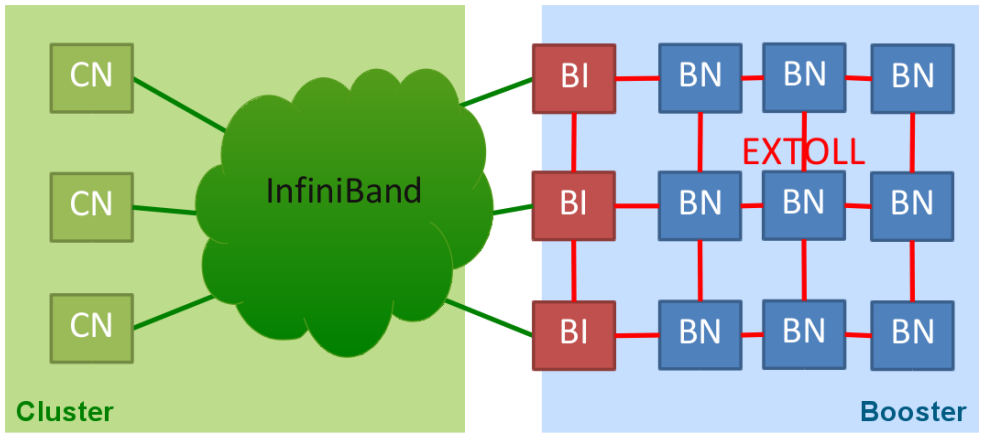
LOFAR station

Long term archive

Supercomputer resources

Technology R&D Contributions

- Computer architecture of systems with accelerators: FPGA, Cell, GPU
- Example QPACE: a project funded by a “special research field” of the DFG Partners: Uni Regensburg, Uni Wuppertal, FZ Jülich, IBM
- Dynamical Exascale Entry Platform (DEEP)
  - Multi-core cluster system with InfiniBand interconnect
  - Many-core MIC processors connected through a Terabit EXTOLL network



Complex access patterns

Regular access patterns

Energy efficiency

No. 1 on

THE GREEN 500

Nov. 2009,
June 2010

QPACE

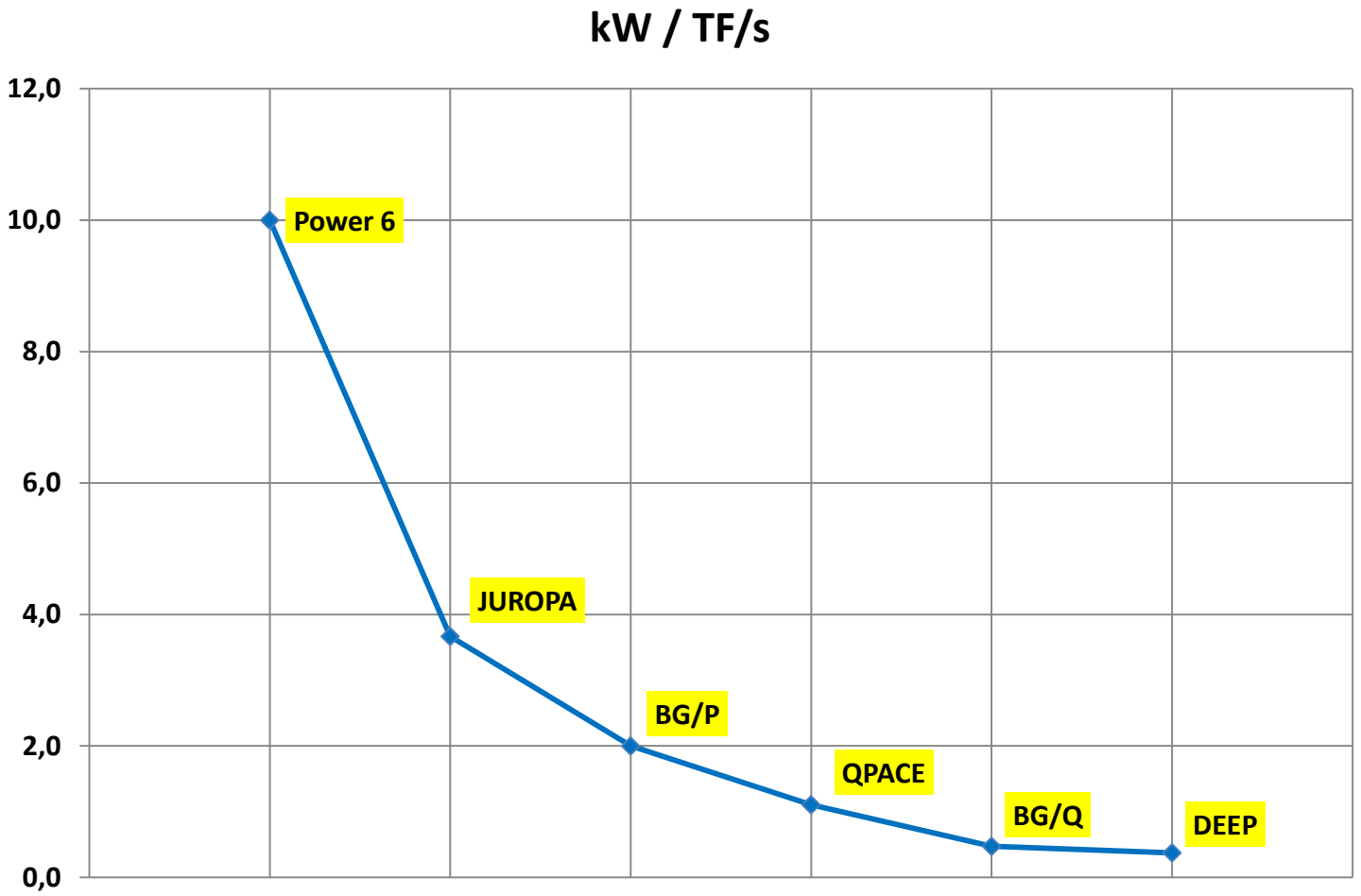
- installed: 2009
- Peak performance: 104 TF/s
- Power consumption: 115 kW
- Energy efficiency: 1.1 kW / TF/s

Nov. 2010,
June 2011

BlueGene/Q 8 racks @ Jülich

- Installation planned: March 2012
- Peak performance: 1,6 PF/s
- Power consumption: 800 kW
- Energy efficiency: 0.5 kW / TF/s

Energy efficiency



Summary

- Operation of supercomputing, storage, and network resources
  - Production runs for various communities
  - Infrastructure for the operation of supercomputers
- Research on architectures
  - Specialized architectures like GPU, ARM, MIC
  - Cluster / booster concept
  - Interconnect
  - I/O system
- Research on energy efficiency
  - Alternative cooling concepts
- Parallel applications, highly scaling
  - Performance analysis, optimizing algorithms and codes