



Jülich Supercomputing Centre

Introduction

N. Attig

Jülich Supercomputing Centre (JSC), Forschungszentrum Jülich

Jülich Supercomputing Centre

Supercomputer operation for:

- Centre – FZJ
- Region – RWTH Aachen University
- Germany – Gauss Centre for Supercomputing
John von Neumann Institute for Computing
- Europe – PRACE, EU projects



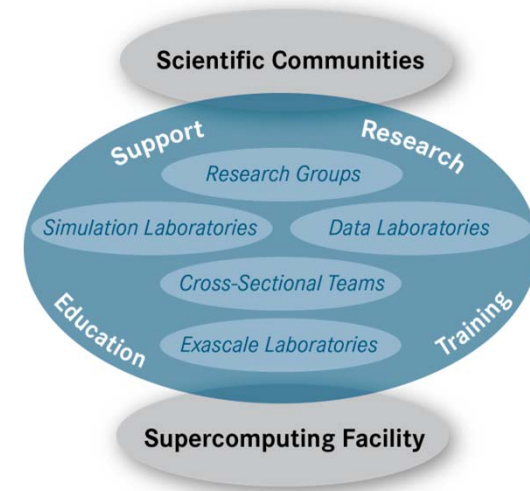
Application support

- Unique support & research environment at JSC
- Peer review support and coordination

R&D work

- Methods and algorithms, computational science, performance analysis and tools
- Scientific Big Data Analytics with HPC
- Computer architectures, Co-Design
Exascale Labs together with IBM, Intel, NVIDIA

Education and training



Access to Supercomputing Resources at Jülich

- Access to JURECA via
 - JARA-HPC Vergabegremium (VGG) and/or Kommission zur Vergabe von SC Ressourcen (VSR) (for FZJ and RWTH staff members only; JARA-HPC Partition)
 - John von Neumann Institute for Computing (NIC)
- Access to JUQUEEN via
 - JARA-HPC Vergabegremium (VGG) and/or Kommission zur Vergabe von SC Ressourcen (VSR) (for FZJ and RWTH staff members only; JARA-HPC Partition)
 - Gauss Centre for Supercomputing (GCS) (JUQUEEN CPU time proposals are evaluated by NIC)
 - European Research Infrastructure PRACE
 - Project Access: Biannual CfPs since June 2010
 - Call for preparatory access open, no closing dates

Gauss Centre for Supercomputing (GCS)

A German Success Story:

GCS is the leading Tier-0 HPC centre in Europe

- Alliance of the three German Tier-1 centres
- Jülich Supercomputing Centre (JSC),
- High Performance Computing Centre Stuttgart (HLRS),
- Leibniz Rechenzentrum (LRZ), Garching

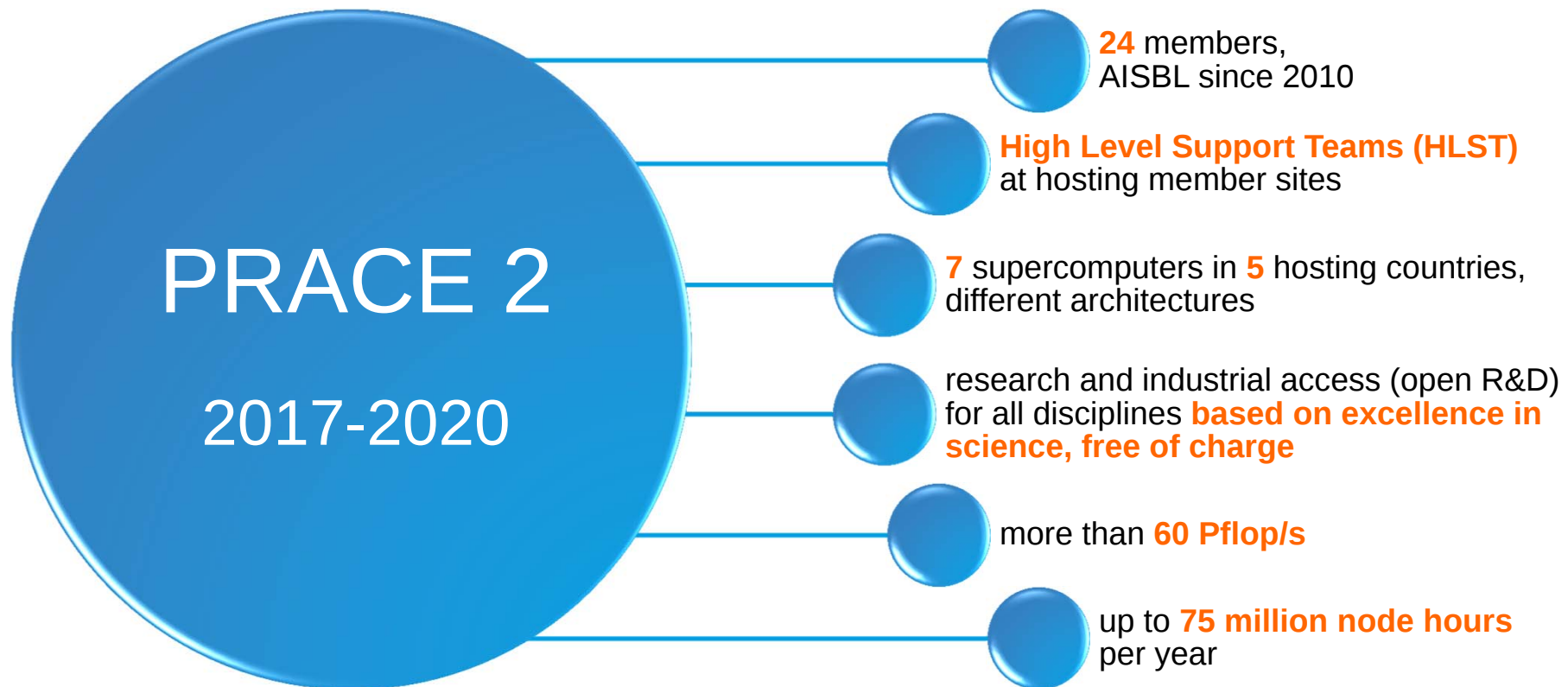
Key Facts

- Since its inception at least two systems in TOP 10
- To date in sum more than 20 Petaflops (continuously expanding)
- 400 people for Operation, HPC-research, Services, Training
- Extensive know-how in key scientific fields

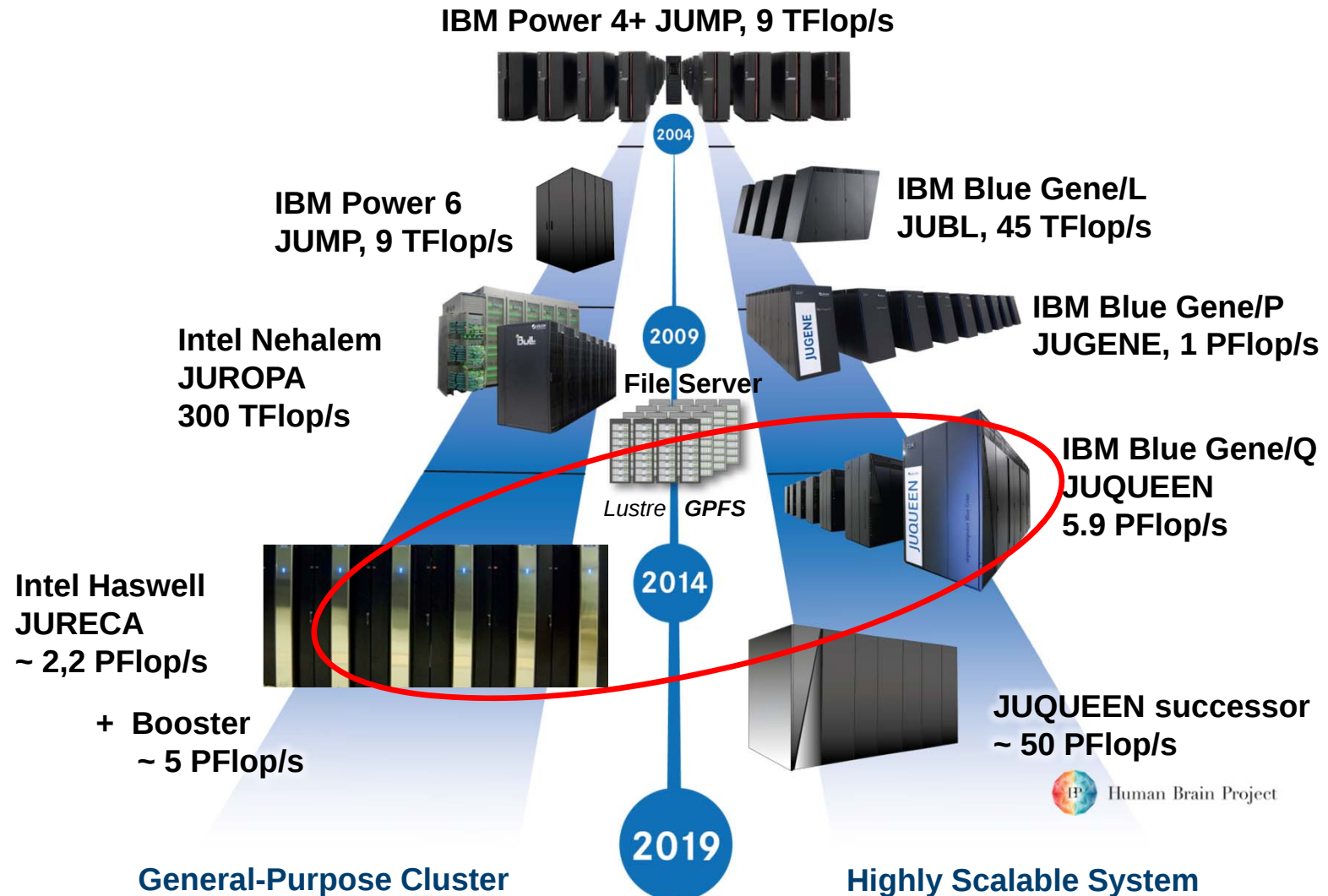


PRACE - Partnership for Advanced Computing in Europe

The European HPC e-infrastructure (ESFRI)



Supercomputer Systems: Dual Architecture Strategy



JUQUEEN: Jülich's Scalable Petaflop System

IBM Blue Gene/Q JUQUEEN

- IBM PowerPC® A2 1.6 GHz, 16 cores per node
- 28 racks, 458,752 cores
- 5,9 Petaflop/s peak
5,0 Petaflop/s Linpack
- 448 TByte main memory
- connected to a Global Parallel File System (GPFS) with
O(10) PByte online disk and O(50) PByte offline tape capacity
- 5D network
- Production start: Nov 5, 2012



Nov 2016:
#6 in Europe
#19 worldwide
#85 in Green500

JURECA: Jülich Research on Exascale Cluster Architectures

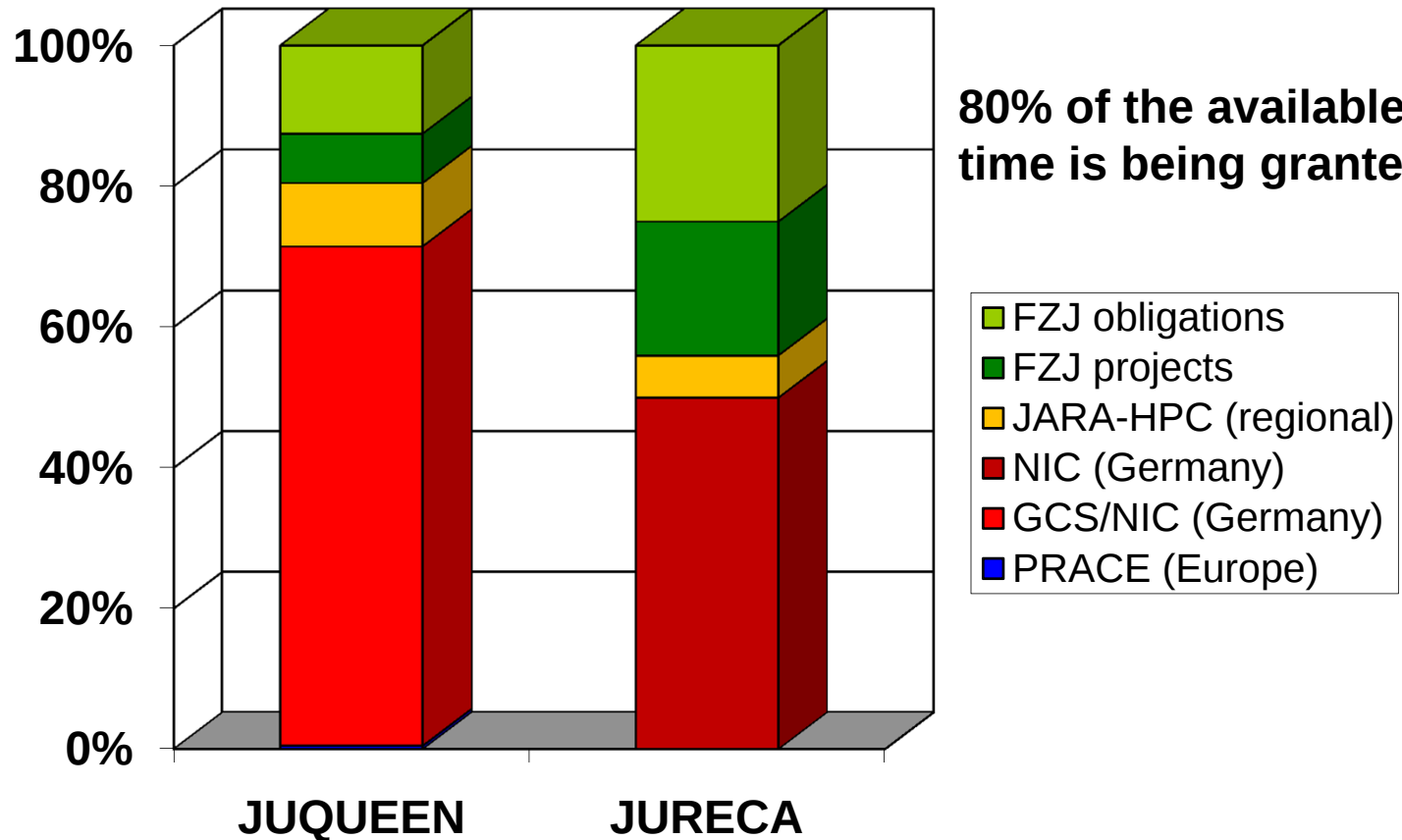
JURECA, an Intel-based cluster

- 2 Intel Haswell 12-core processors, 2.5 GHz, SMT, 128 GB main memory
- 1,884 compute nodes or 45,216 cores, thereof 75 nodes with 2 K80 NVIDIA graphics cards each and 12 nodes with 512 GB main memory and 2 K40 NVIDIA graphics cards each for visualisation
- 2.245 Petaflop/s peak (with K80 graphics cards)
1.425 Petaflop/s Linpack from CPUs (out of 1,693 Petaflop/s peak)
- 281 TByte memory
- Mellanox Infiniband EDR
- Connected to the GPFS file system on JUST



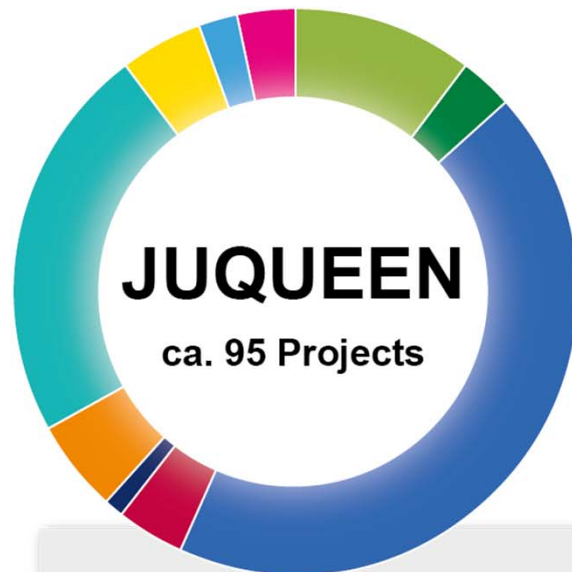
Nov 2016:
#69 worldwide

Use by Compute Time Shares

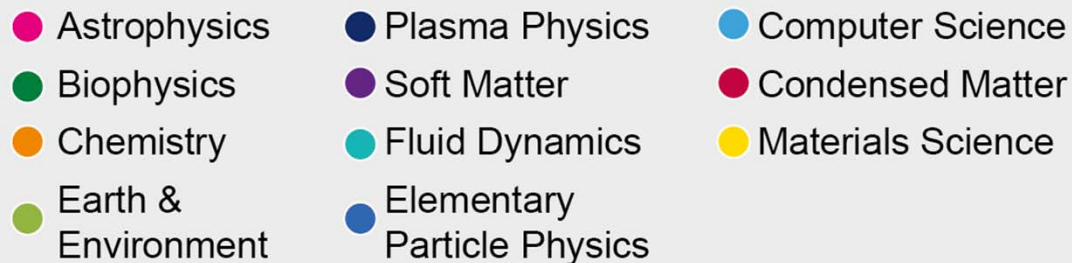
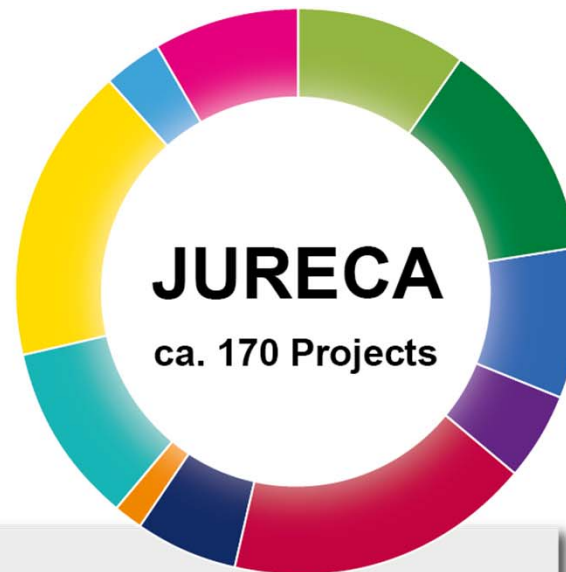


Research Fields of Current National Projects

**Leadership-Class
System**



**General-Purpose
Supercomputer**



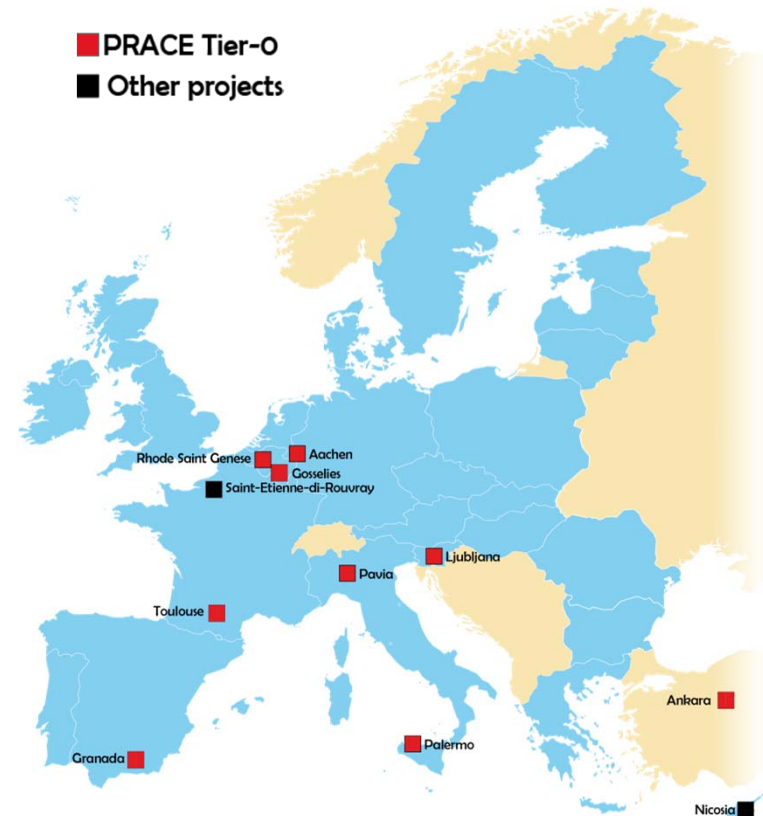
Granting periods
11/2016 – 10/2017
05/2017 – 04/2018

National and European User Groups

■ Astrophysics
 ■ Biophysics
 ■ Chemistry
 ■ Condensed Matter
 ■ Earth Environment
 ■ Fluid Dynamics
 ■ Informatics
 ■ Materials Science
 ■ Particle Physics
 ■ Plasma Physics
 ■ Soft Matter
 ■ Other

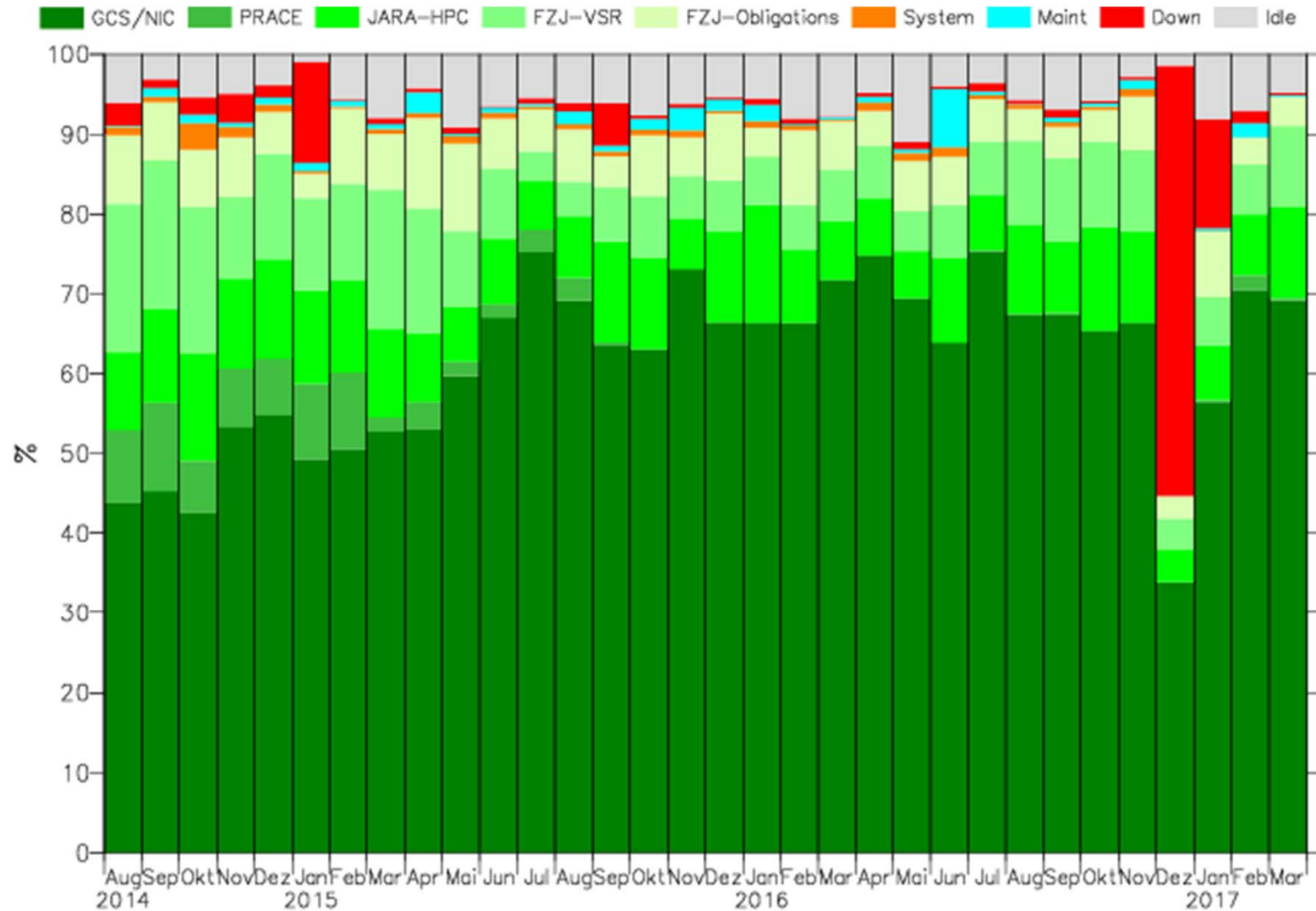


■ PRACE Tier-0
 ■ Other projects

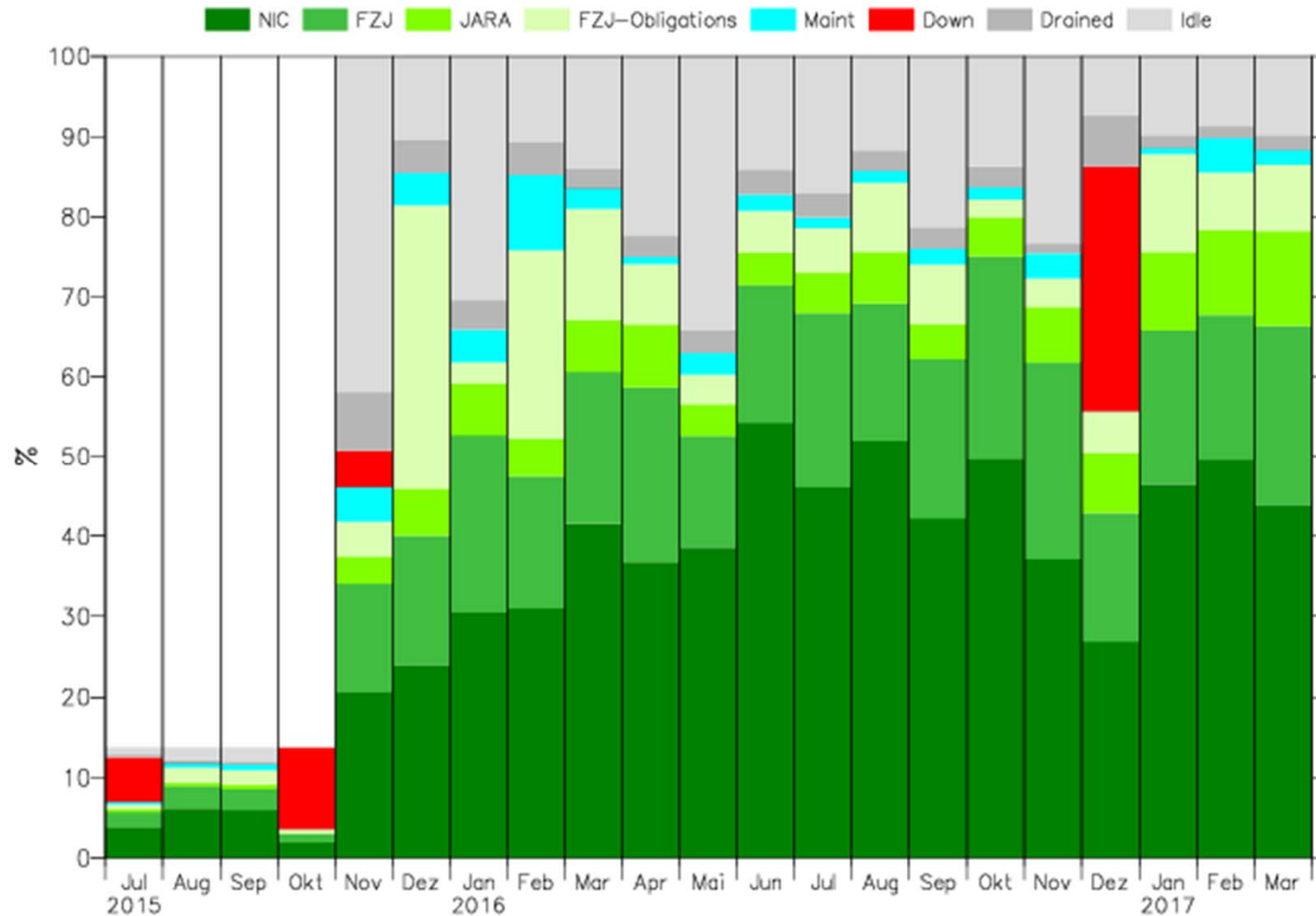


- Proposals for computer time accepted from Germany and Europe
- Peer review by international referees
- CPU time is granted by independent Scientific Councils

JUQUEEN Usage

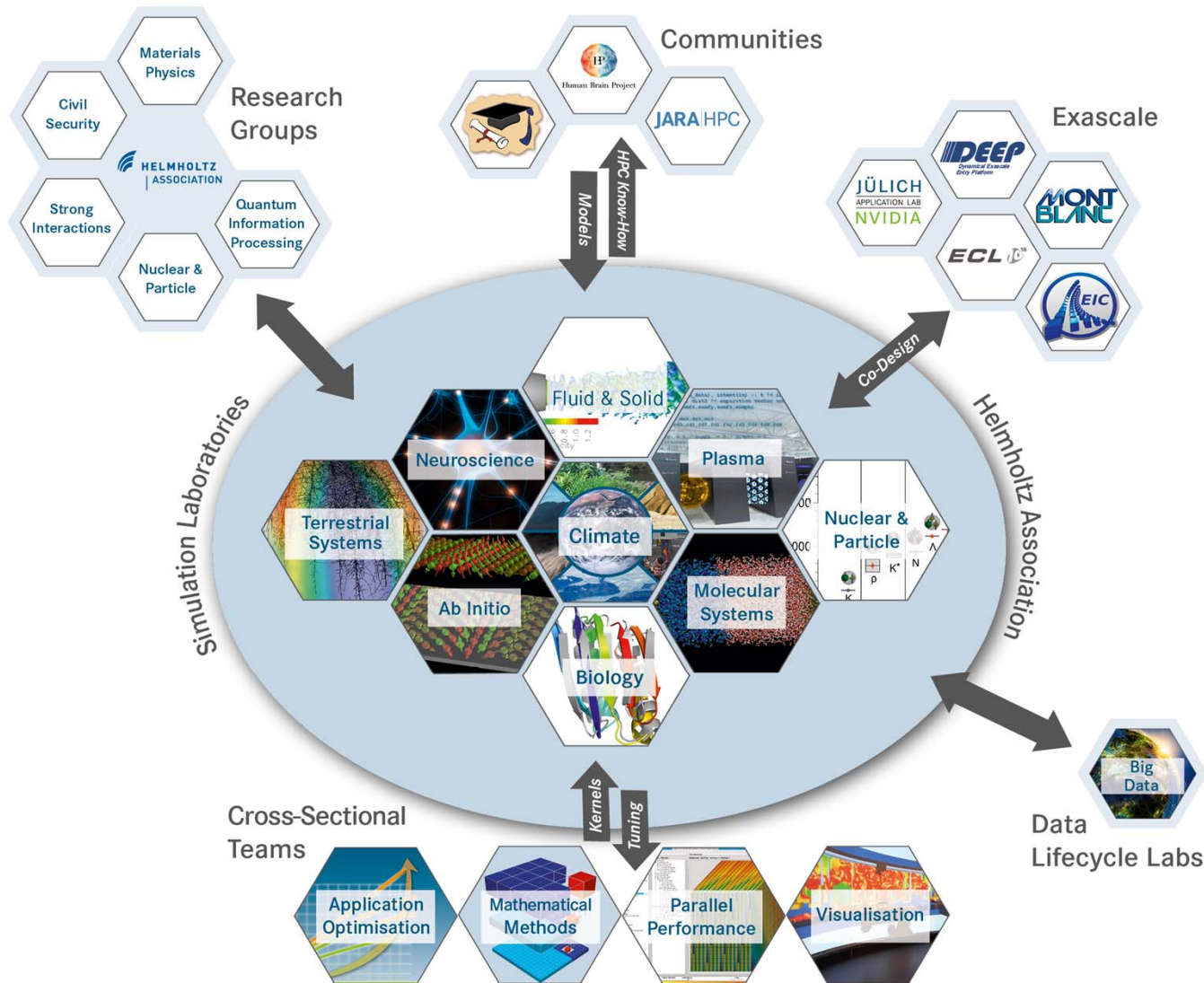


JURECA Usage



Launch of JURECA, phase 1: 260 nodes: Jul 13, 2015
 Launch of JURECA, phase 2: 1,884 nodes: Nov 2, 2015

Domain-specific User Support and Research



Summary

- The Jülich Supercomputing Centre provides
 - world-class HPC resources
 - high-end primary and domain-specific user support
 - ...

to German and European research groups working in the computational sciences and in engineering

- JSC expects to see
 - breakthrough science
 - parallel applications, using a substantial number of processors simultaneously

End of Presentation