EUROEXA

FUNDED BY THE EUROPEAN UNION

EuroEXA: European co-design for exascale applications

The Horizon 2020 EuroEXA project proposes a ground-breaking design for mind blowing results: over four times more performance and four times more energy efficiency than today's High-Performance platforms.

What is EuroEXA?

Other Partners

ARM · Synopsys — Additional IP

Open Competitive Exercise Organised by the EU

ExaNoDe · ECOSCALE · ExaNeSt

EU Funding & Monitoring

Who has been selected?

Commercial Partners Include: ARM, MAXELER Technologies, Synelixis, ICEOTOPE

Accademic / Gov. partners Include: FORTH Foundation for Research & Technology - Hellas, Fraunhofer, BSC Barcelona Supercomputing Center Centro Nacional de Supercomputación, INFN Istituto Nazionale di Fisica Nucleare, ICCS, imec, MANCHESTER 1824, ECMWF, Hartree Centre Science & Technology Facilities Council

Our Path: Prototypes

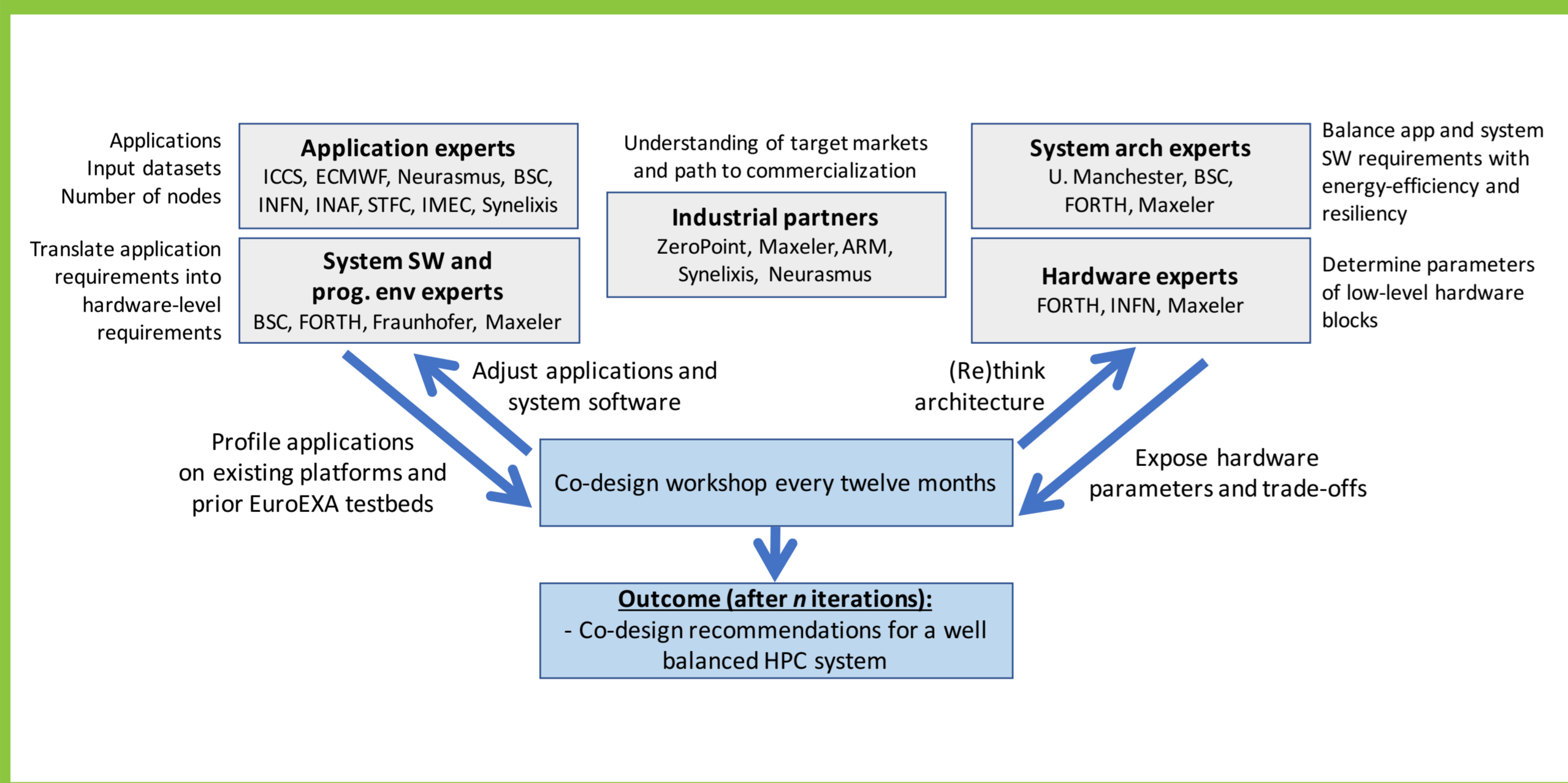**Demonstration and evaluation using exascale-class apps**

3 Testbeds will be deployed at STFC, Daresbury

- **Testbed 1** 50 nodes of new technology for **software development**
- **Testbed 2** 500 nodes and new infrastructure technologies to **test scaling**
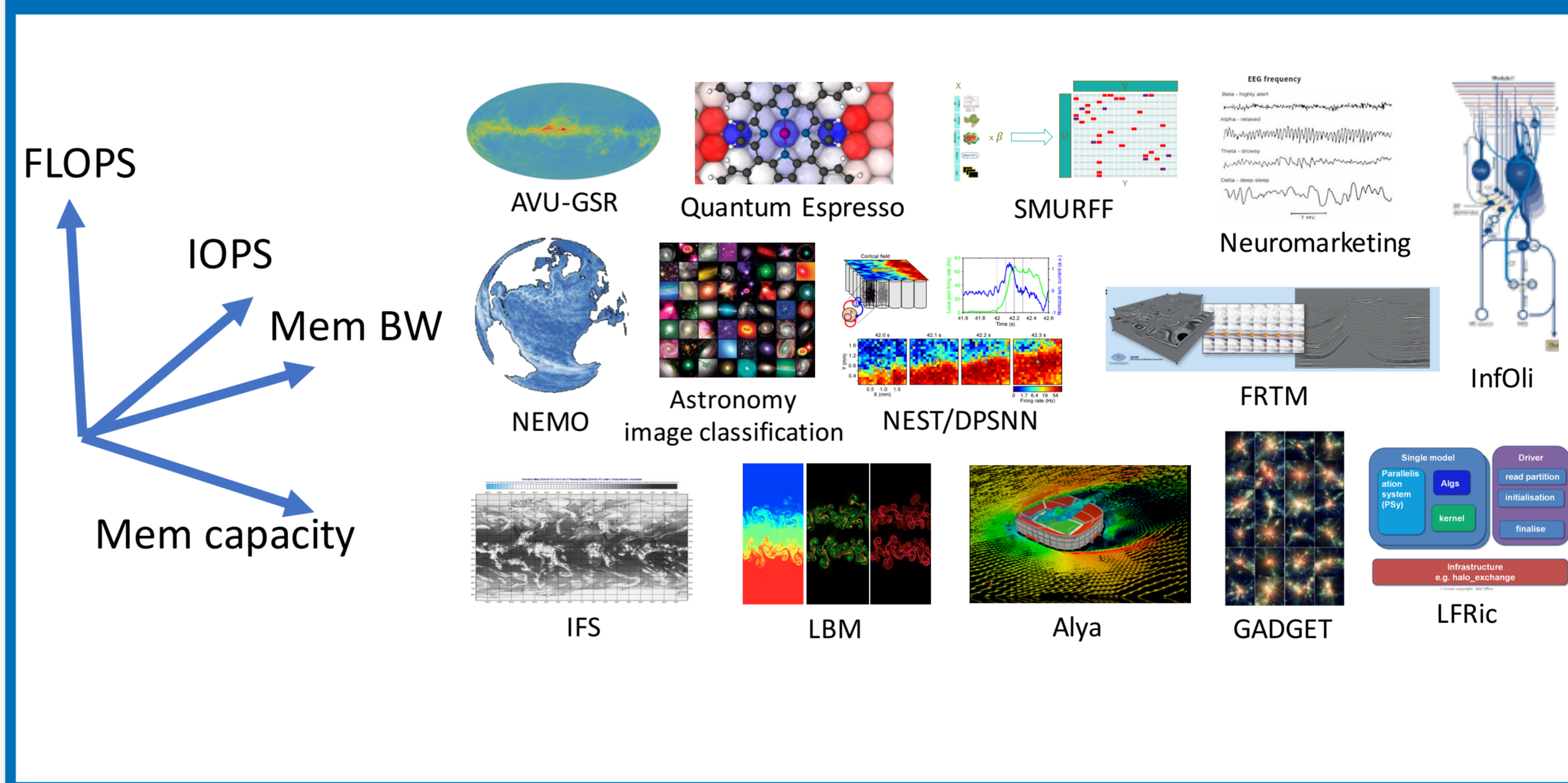- **Testbed 3** Test **new node and processor technologies** that will ultimately project to Exascale.

Our Vision

- First testbed architecture will be shown to be capable of scaling to world-class **peak performance in excess of 400 PFLOPS** with an estimated **system power of around 30 MW peak.**
- **A compute-centric 250 PFLOPS per 15 MW** by 2019.
- **Show That An Exascale** Machine could be built in 2020 within 30 shipping containers with an edge to edge distance of less than 40m.

Architecture

Applications Input datasets Number of nodes

Application experts ICCS, ECMWF, Neurasmus, BSC, INFN, INAF, STFC, IMEC, Synelixis

Translate application requirements into hardware-level requirements

Understanding of target markets and path to commercialization

System arch experts U. Manchester, BSC, FORTH, Maxeler

Balance app and system SW requirements with energy-efficiency and resiliency

Industrial partners ZeroPoint, Maxeler, ARM, Synelixis, Neurasmus

System SW and prog. env experts BSC, FORTH, Fraunhofer, Maxeler

Hardware experts FORTH, INFN, Maxeler

Determine parameters of low-level hardware blocks

Adjust applications and system software

(Re)think architecture

Profile applications on existing platforms and prior EuroEXA testbeds

Co-design workshop every twelve months

Expose hardware parameters and trade-offs

Outcome (after n iterations): - Co-design recommendations for a well balanced HPC system

Applications

FLOPS · IOPS · Mem BW · Mem capacity

AVU-GSR · Quantum Espresso · SMURFF · Neuromarketing · NEMO · Astronomy image classification · NEST/DPSNN · FRTM · InfOli · IFS · LBM · Alya · GADGET · LFRic

Technology - Nodes

Technology from FORTH:

- 12cm x 13cm
- 4 ARM Processors and 4 FPGA Accelerators
- M.2 SSD
- 4 x SODIMMS + Onboard RAM
- Daughterboard style
- 160Gb/s of I/O
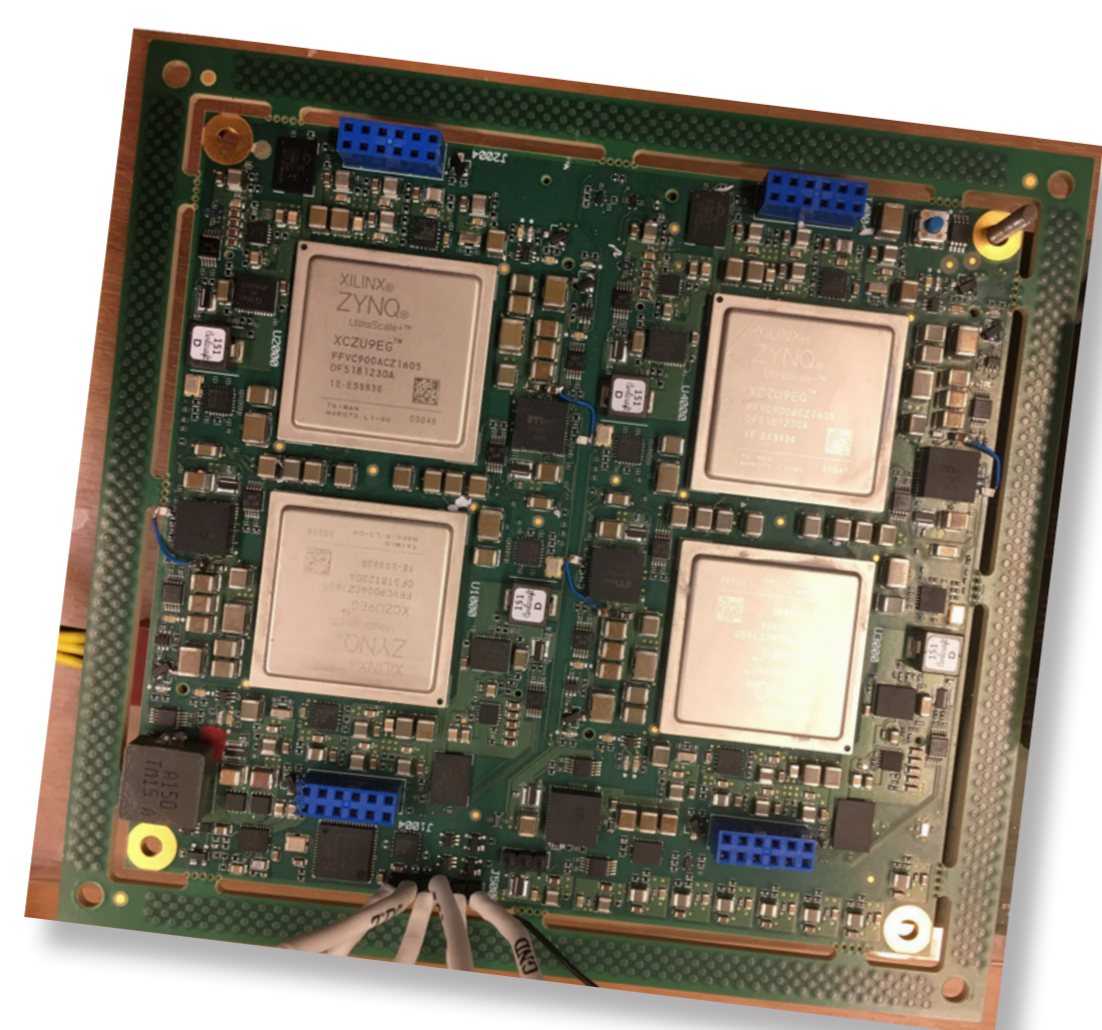
Technology

Technology from Iceotope:

- 16 Node half depth 1u chassis
- 2 x 3.2kW per U (back2back)
- Total Liquid Cooling technology
- 48v DC distribution
- Hot water out, chiller-less operation