

The European Spallation Source

Overview presentation

www.europeanspallationsource.se

9 December, 2019

Vision



Build and operate the world's most powerful neutron source,

enabling scientific breakthroughs

in research related to materials, energy, health and the environment,

**addressing some of the most important
societal challenges of our time.**

Organisation and People

503

Employees



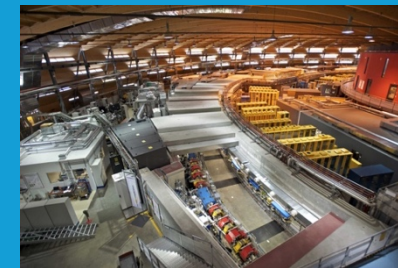
56

Nationalities



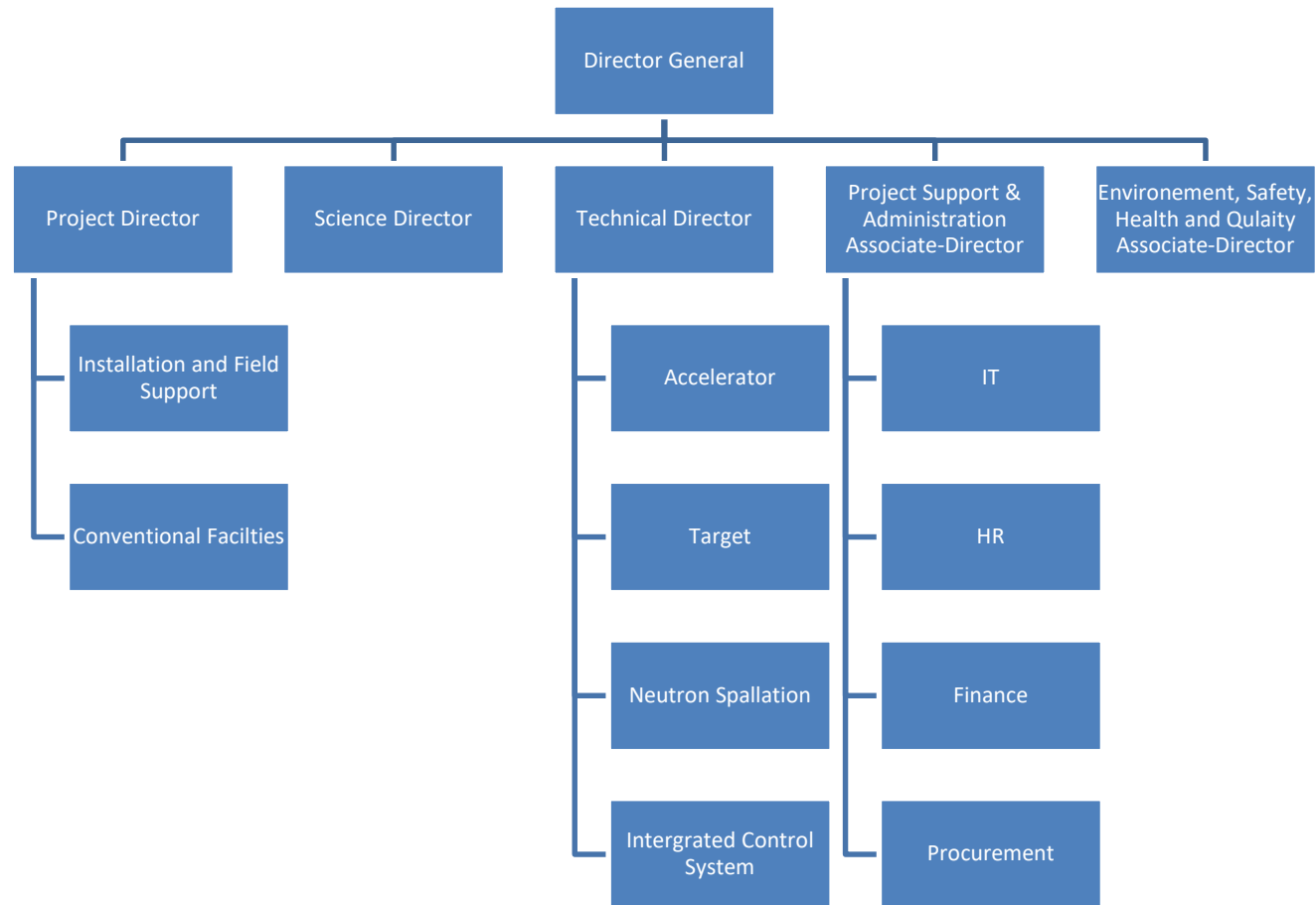
> 100

Collaborating Institutions



Organisation chart

Updated 17 Sep 2019



Provide world leading scientific software and scientific computing support for neutron scattering at ESS

Scientific Software

ESS experiment control system, Data acquisition, Data correction software, visualization, and software to model and analyze experimental data sets.

Data center operations

Store and catalogue ESS datasets, provide ESS users remote access to their data, computing for live data correction, and analysis software during and after experiments.

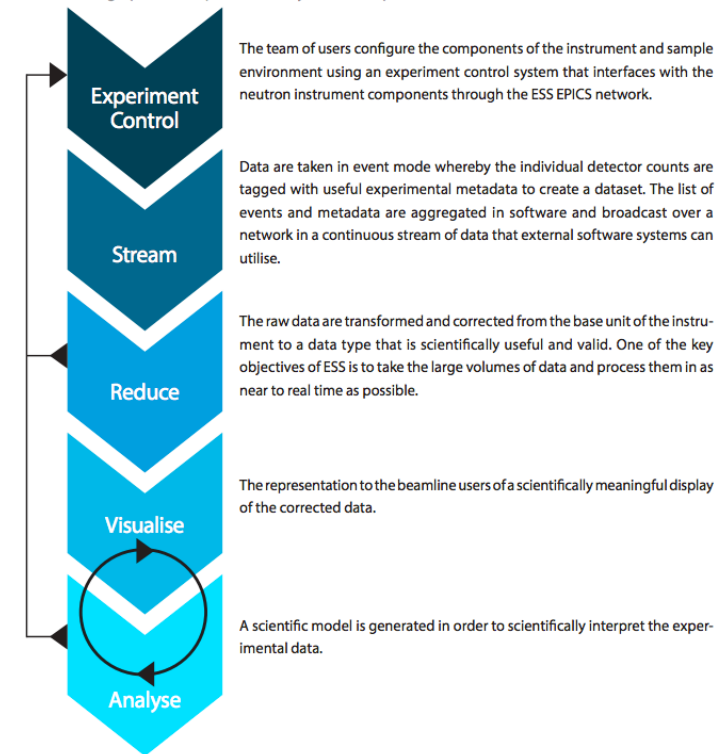
User support

Support ESS users with data treatment and analysis.



From Lund to Copenhagen, and Back Again

The figure illustrates a typical data flow for a neutron scattering experiment. Each arrow in the graphic corresponds to a key area of scope within the DMSC.



Data Flow / Experiment Control

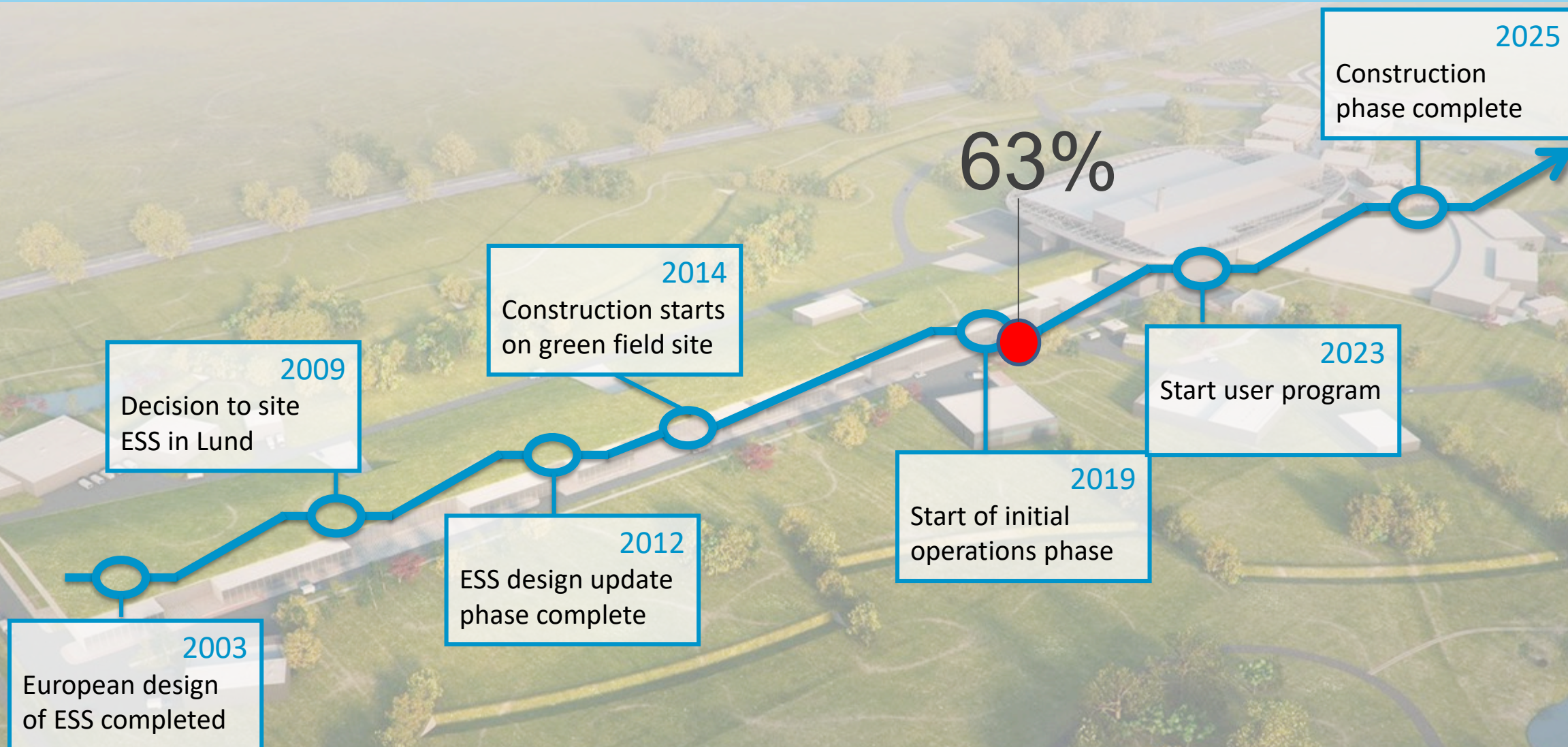
A key objective is to build in from the start the capability for the interconnected software systems to control the experiment. The lines connecting parts of the data flow to the experiment control represent this functionality.

Iterative Workflow

The circle in the graphic represents the iterative workflow of scientific modelling and visualisation of model and experimental data that is often used.

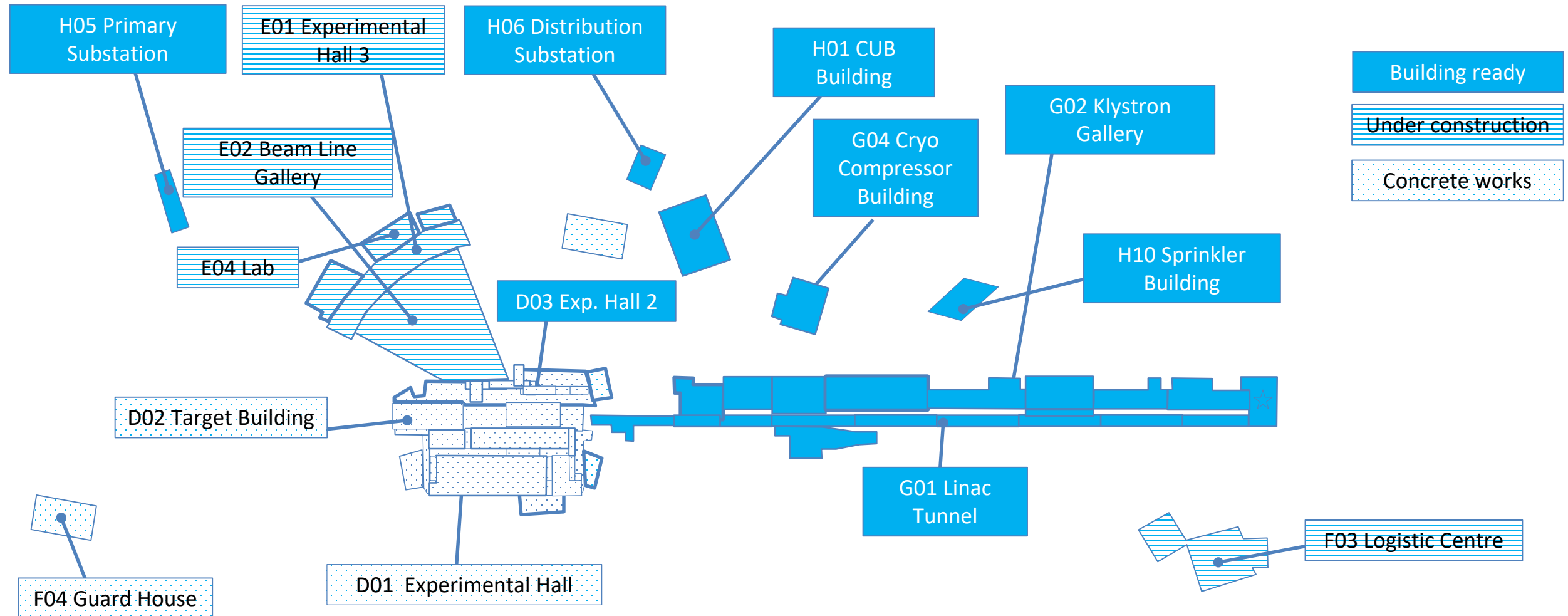
The ESS journey

Delivering the world's leading facility for research using neutrons



Facility outline

Proceeding according to plan



Financing includes cash and deliverables

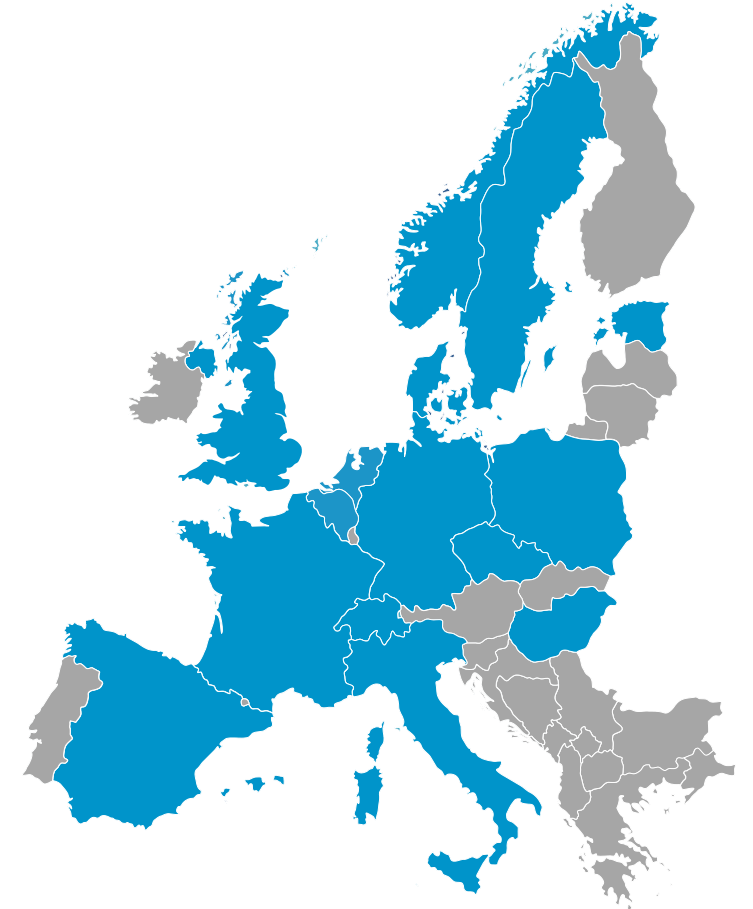
Host Countries Sweden and Denmark

Construction 47.5% Cash Investment ~ 97%
Operations 15%

Non Host Member Countries

Construction 52.5% In-kind Deliverables ~ 70%
Operations 85%

13 European Member Countries

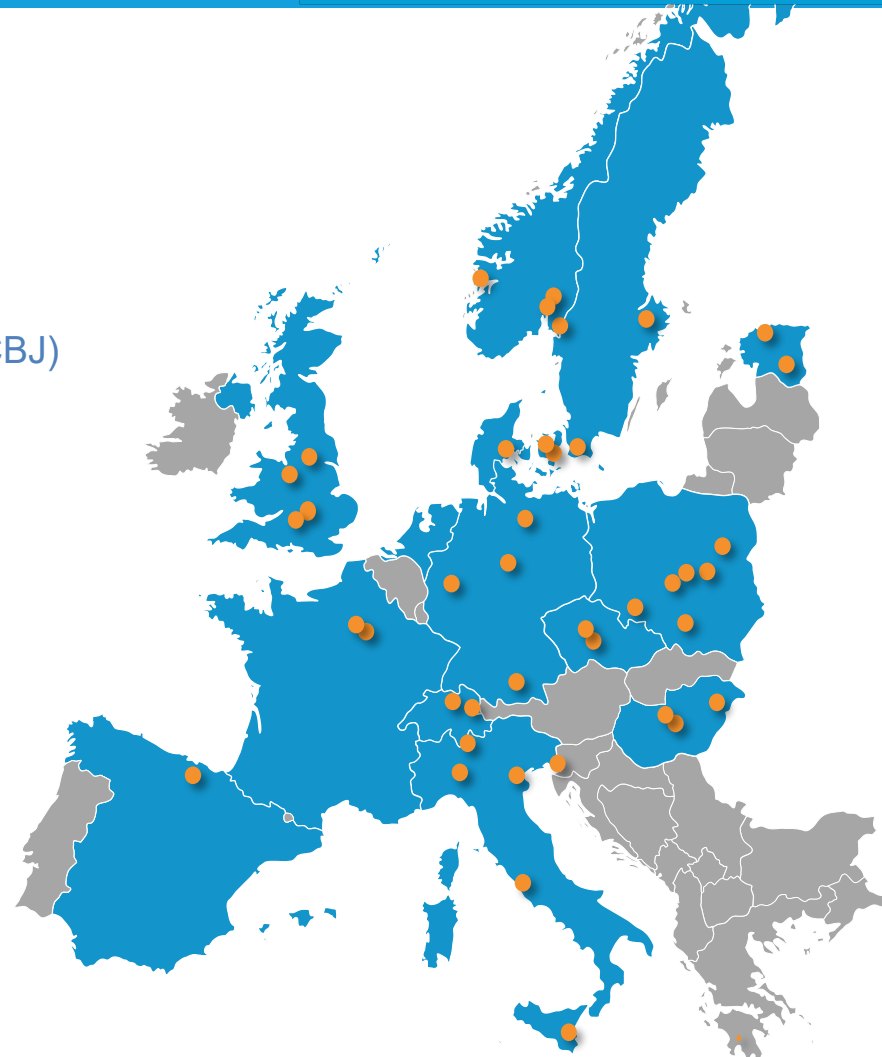


Unique international project

With unique cooperation among nations and leading research institutes



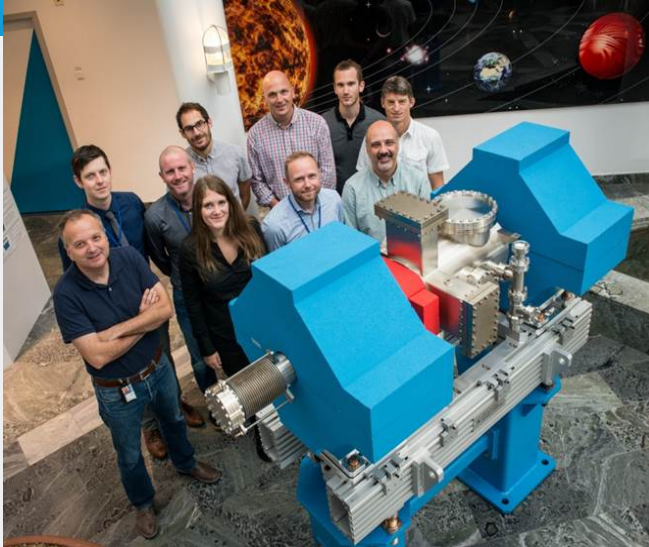
Aarhus University
Atomki - Institute for Nuclear Research
Bergen University
CEA Saclay, Paris
Centre for Energy Research, Budapest
Centre for Nuclear Research, Poland, (NCBJ)
CNR, Rome
CNRS Orsay, Paris
Cockcroft Institute, Daresbury
Elettra – Sincrotrone Trieste
ESS Bilbao
Forschungszentrum Jülich
Helmholtz-Zentrum Geesthacht
Huddersfield University
IFJ PAN, Krakow
INFN, Catania
INFN, Legnaro
INFN, Milan
Institute for Energy Research (IFE)
Rutherford-Appleton



Laboratory, Oxford(ISIS)
Kopenhagen University
Laboratoire Léon Brillouin (CEA/CNRS/LLB)
Lund University
Nuclear Physics Institute of the ASCR
Oslo University
Paul Scherrer Institute (PSI)
Polish Electronic Group (PEG)
Roskilde University
Tallinn Technical University
Technical University of Denmark
Technical University Munich
Science and Technology Facilities Council
UKAEA Culham
University of Tartu
Uppsala University
WIGNER Research Centre for Physics
Wroclaw University of Technology
Warsaw University of Technology
Zurich University of Applied Sciences (ZHAW)



Collaboration project



Forschungszentrum Jülich
Helmholtz-Zentrum Geesthacht
Huddersfield University
IFJ PAN, Krakow
INFN, Catania
INFN, Legnaro
INFN, Milan
Institute for Energy
Research (IFE)



ISIS - Rutherford-Appleton Laboratory, Oxford
Laboratoire Léon Brillouin (LLB)
Lund University
Nuclear Physics Institute of the ASCR
Oslo University
Paul Scherrer Institute (PSI)
Polish Electronic Group (PEG)
Roskilde University
Tallinn Technical University
Technical University of Denmark (DTU)
Technical University Munich (TUM)

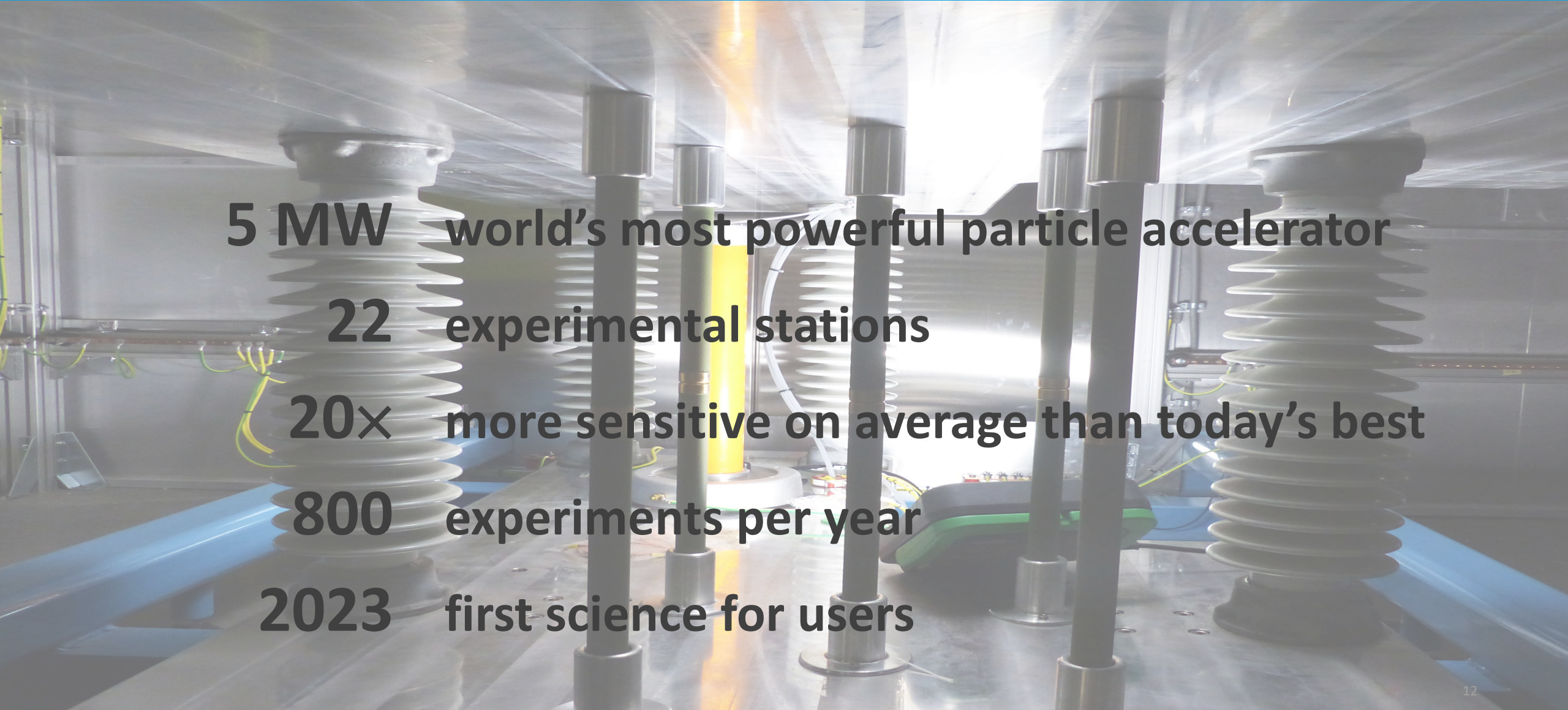


A global science hub

ESS, MAX IV, Science Village Scandinavia



Capabilities

- 
- 5 MW** world's most powerful particle accelerator
 - 22** experimental stations
 - 20x** more sensitive on average than today's best
 - 800** experiments per year
 - 2023** first science for users

Neutron science



Energy Environment and climate Medicine and health Electronics and IT Manufacturing and industry Natural world Heritage science



Hydrogen-fuelled society

Sub-zero survival

Disease resistant crops

Tackling chemical waste in the pharmaceutical industry

Tracking cholesterol

Super superconductors

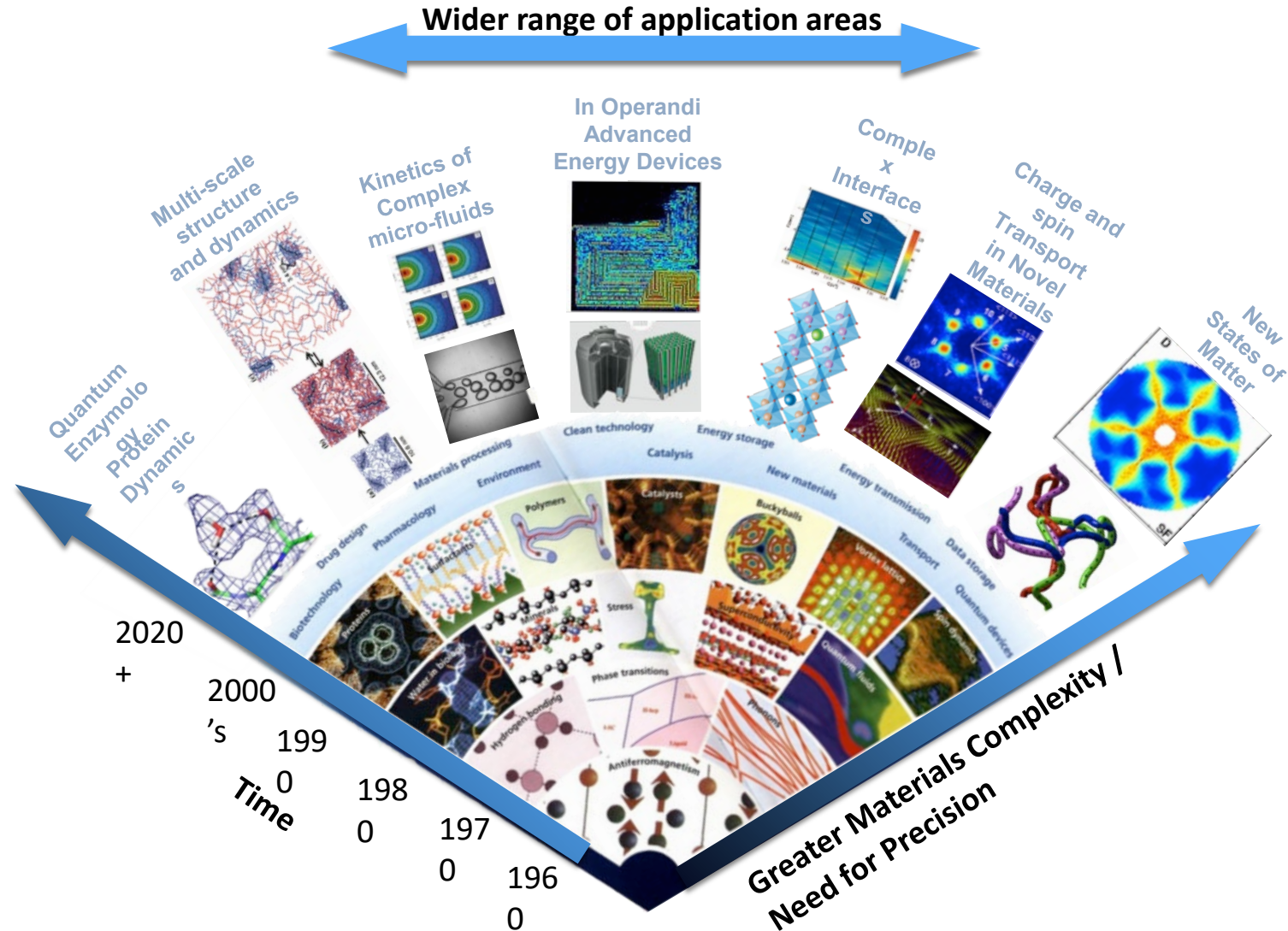
Enhanced oil recovery

Infection sensors

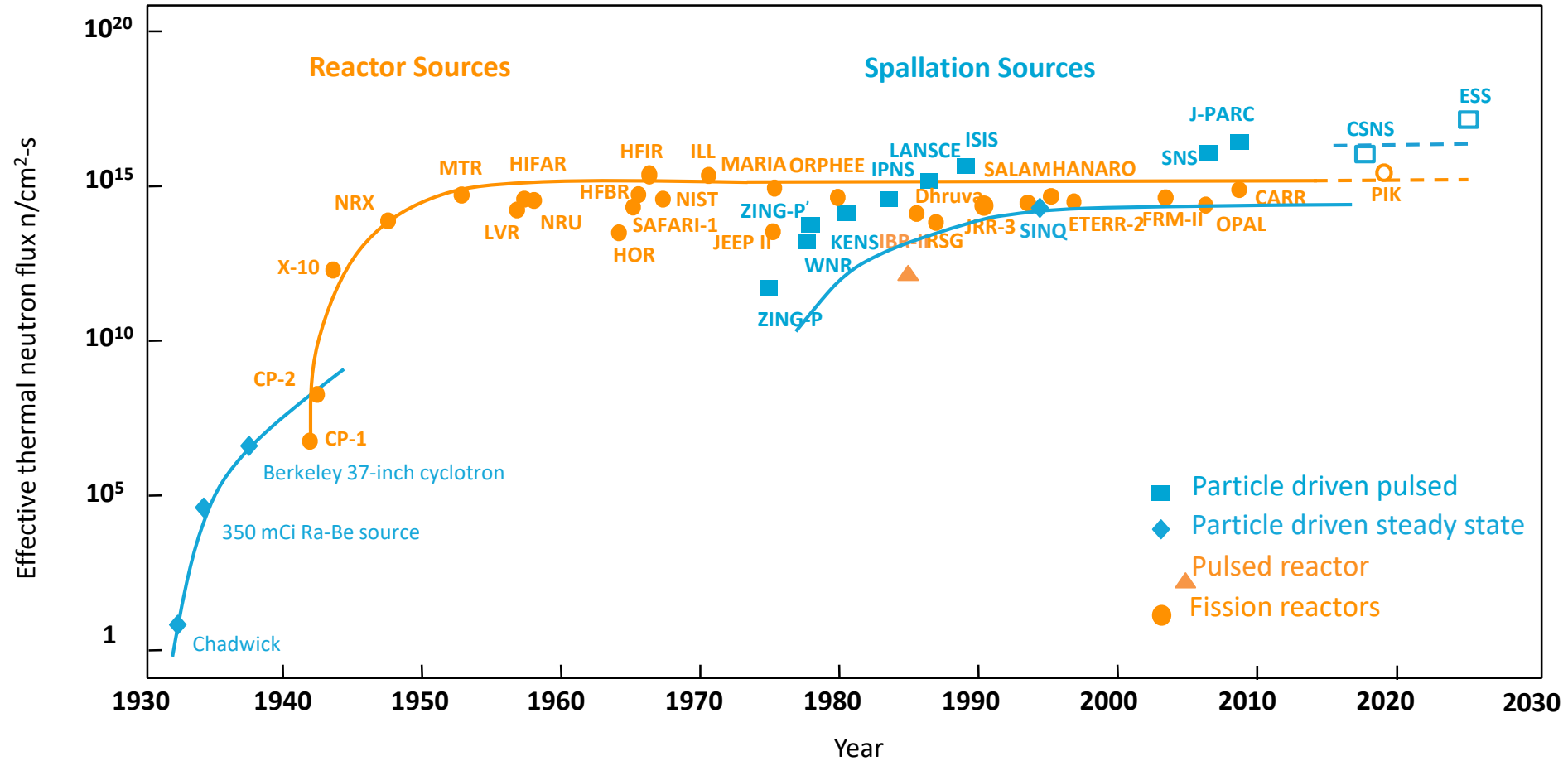
Stress relief in the air

Flexible plastic solar cells

Neutron science needs to push the boundaries



Neutron facilities – reactors and particle driven

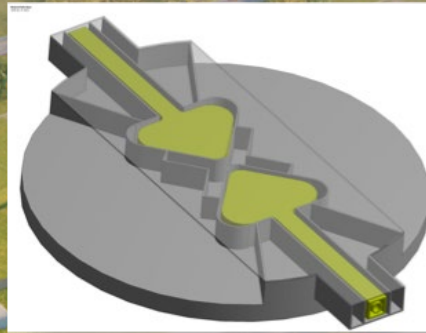


(Updated from *Neutron Scattering*, K. Skold and D. L. Price, eds., Academic Press, 1986)

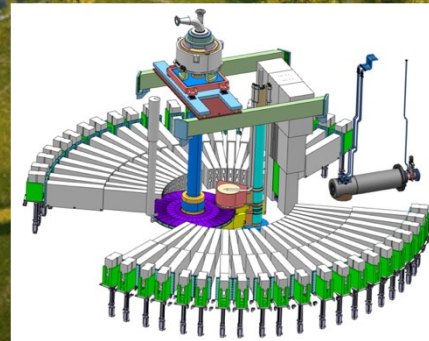
ESS High level design

High Power
Accelerator means
more neutrons

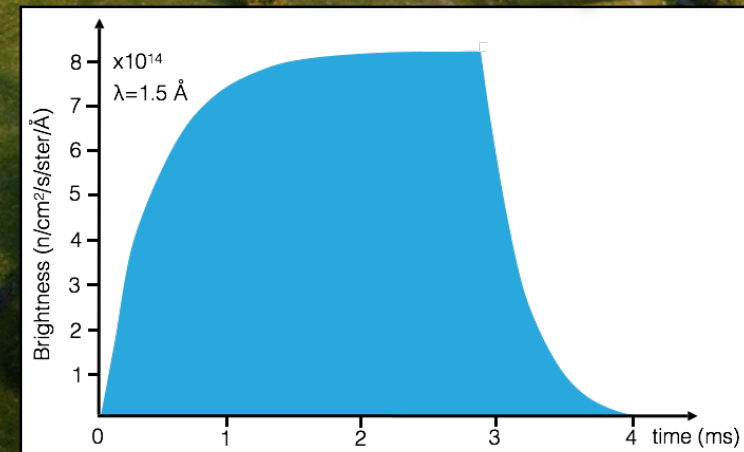
Flat moderator delivering smaller and
brighter neutron beams



High brightness and tuneable resolution
makes new measurements possible

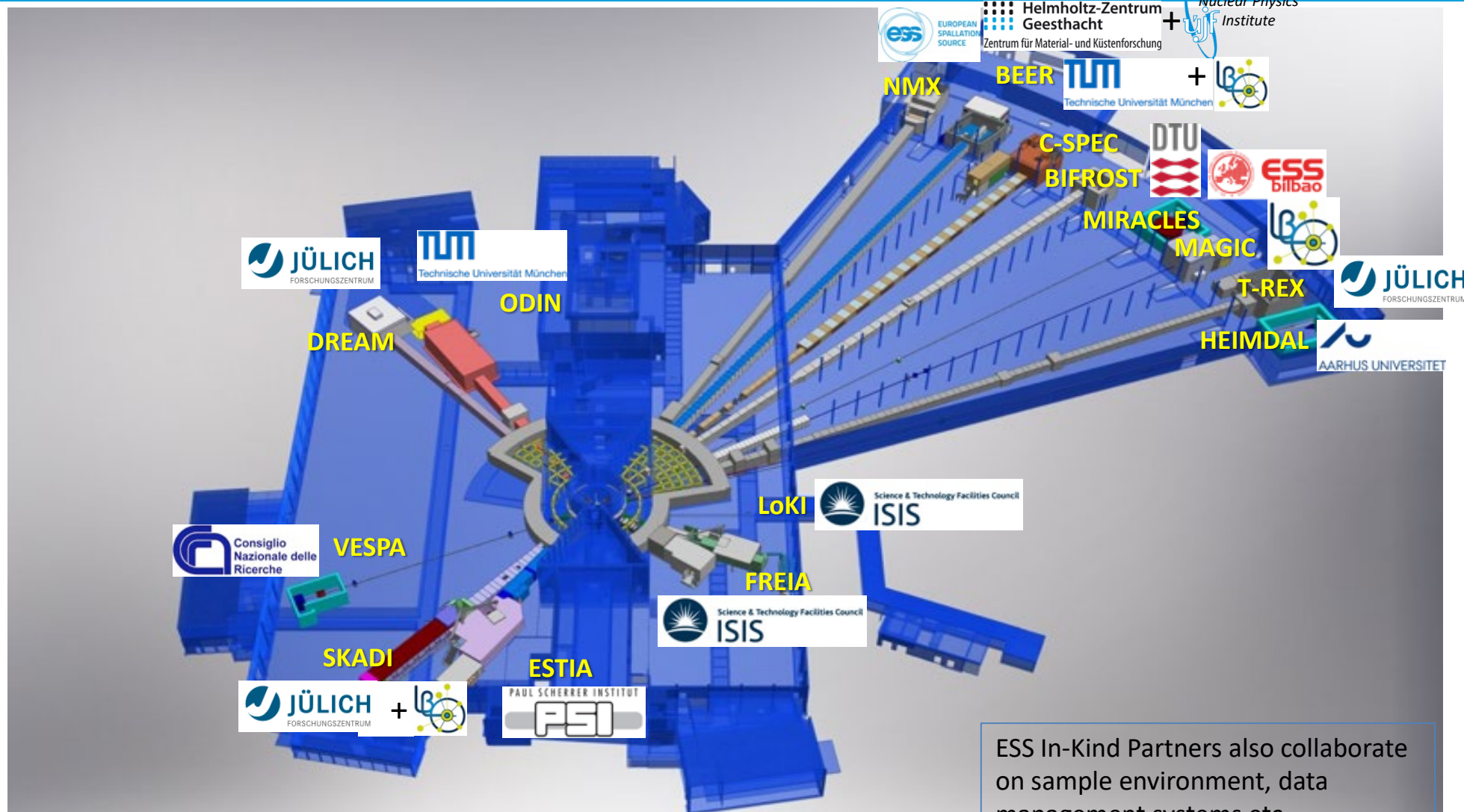


An Innovative Target Station that
can host >30 instruments



NSS Neutron Instrument positions

ESS Lead Partners for instrument construction



ESS In-Kind Partners also collaborate on sample environment, data management systems etc.

ESS Instrument Layout (December 2016)