

# Looking to the future of the Research Infrastructures

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# ► Pan-European Research Infrastructures

- Are **strategic investments in scientific excellence** that provide access to capabilities and datasets that go beyond what any single institution or country can deliver
- An **essential pillar of the European Science Area**
- Act as **knowledge and innovation hubs**
- Form part of a **coherent research ecosystem** capable of addressing the major, **interdisciplinary challenges** facing Europe
- Serve as major **promoters of Open Science and Open data** through the European Open Science Cloud

**Research Infrastructures are facilities that provide resources and services for research communities to conduct research and foster innovation.**



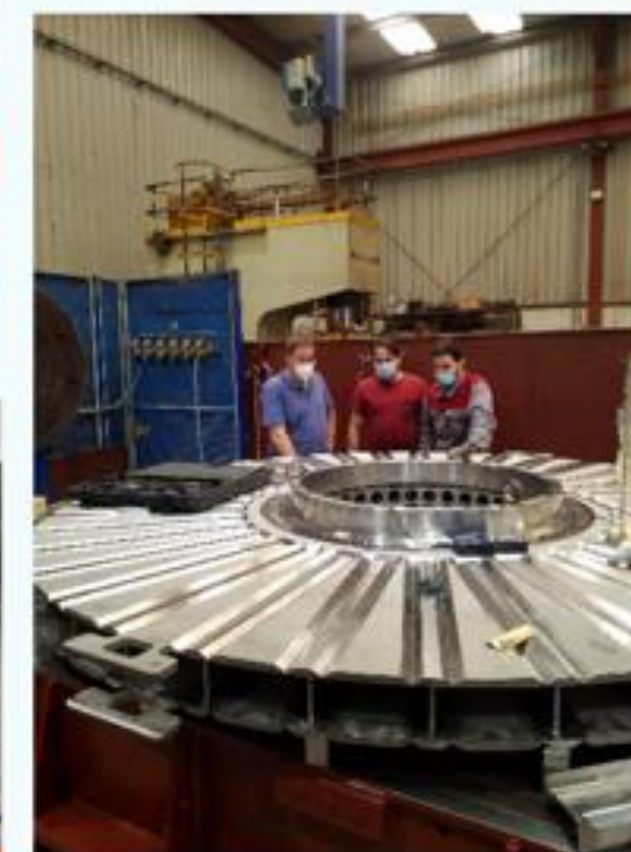




# European Spallation Source ERIC



Aerial view, September 2020



## SOME NUMBERS

**1843 M€**  
construction cost

**5 MW**  
world's most  
powerful particle  
accelerator

**15**  
experimental stations

**20 ×**  
more sensitive  
on average than  
today's best

**800**  
experiments per year

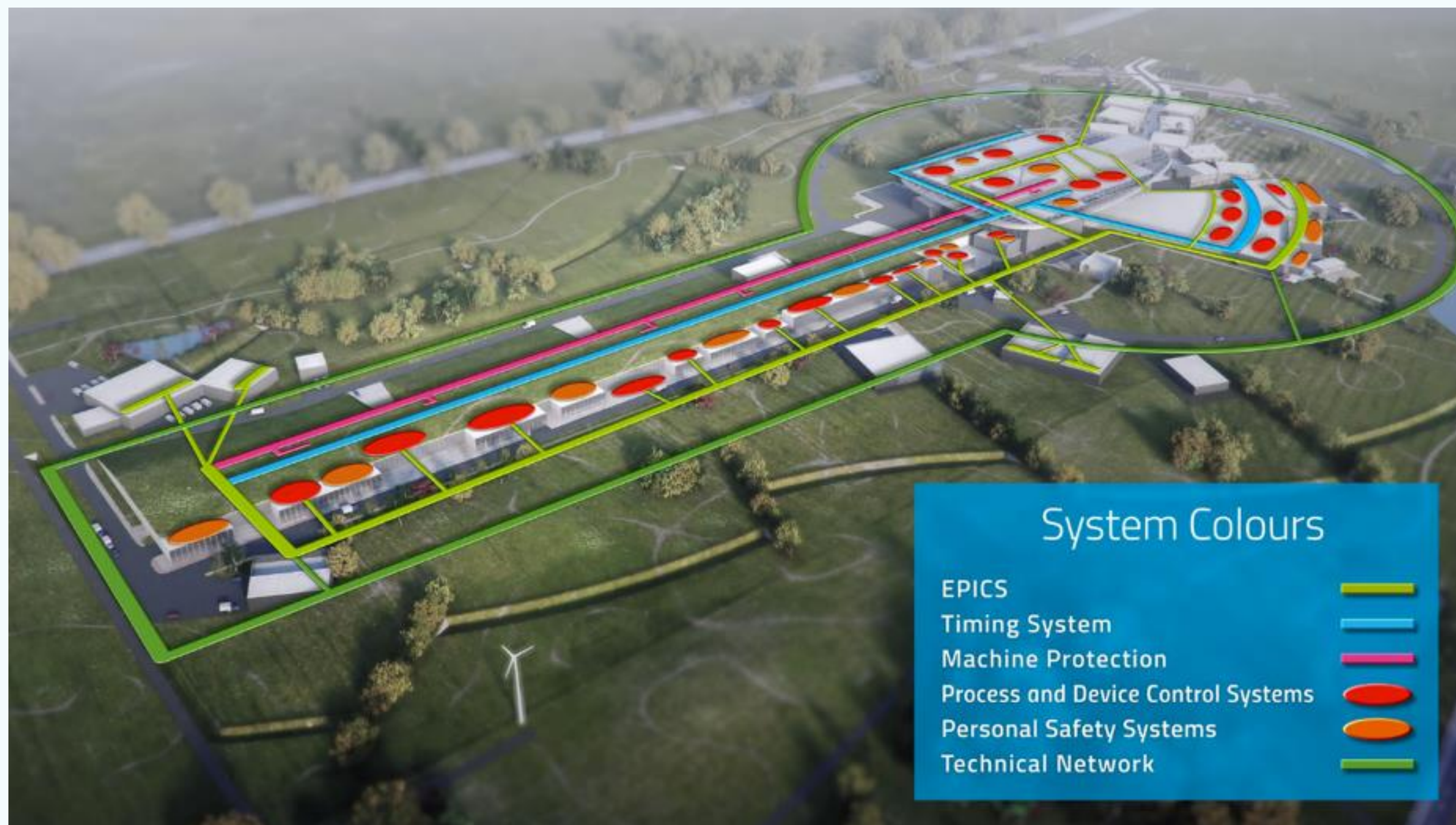
**2023**  
First Science for users

**13**  
ERIC member nations





## Research Infrastructures and Industry: Example of innovation benefits - Recab (Denmark)



The engineering company Recab from Denmark supplies part of **the turnkey solution of EPICS** to ESS

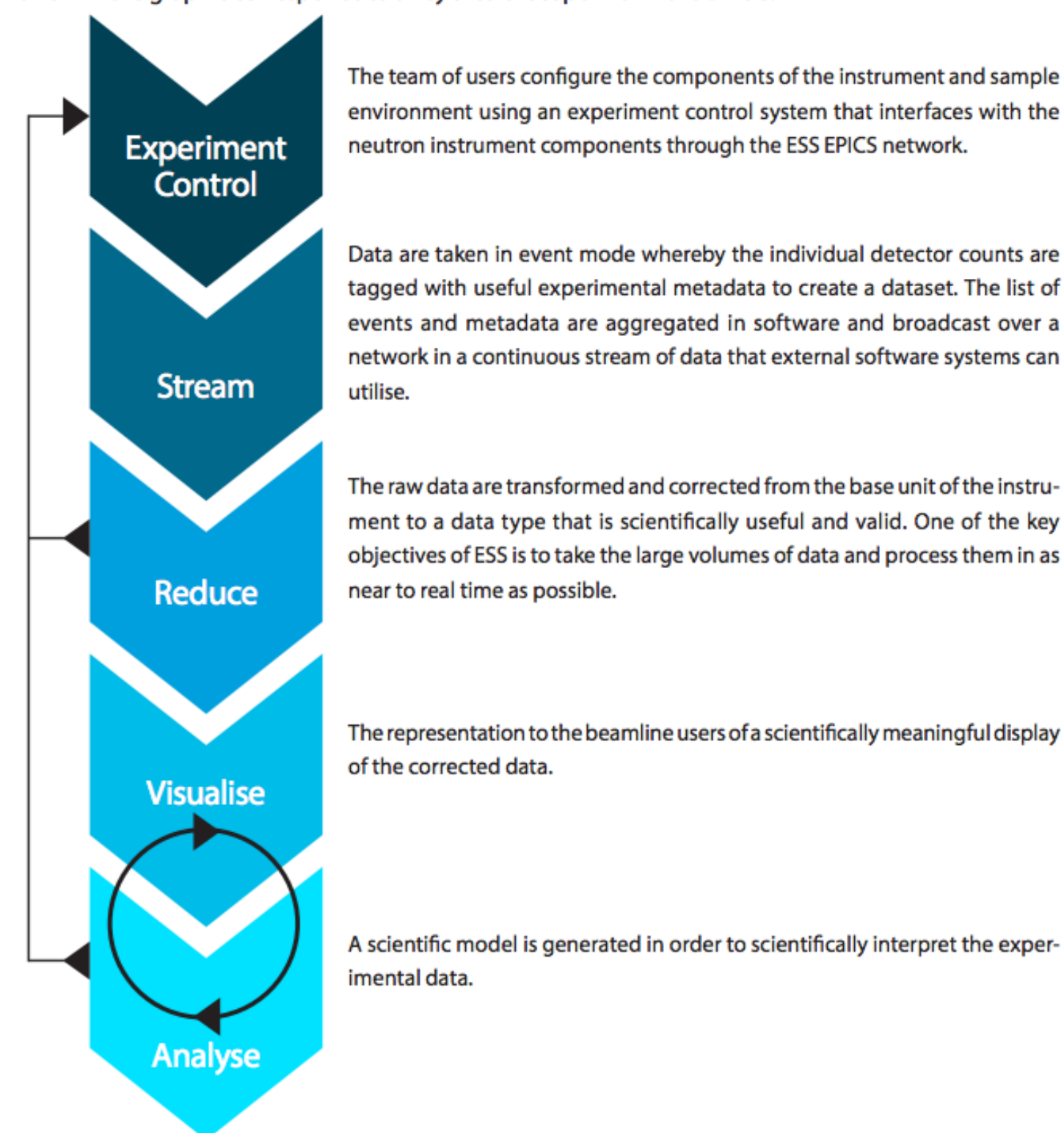
Resulting from supplying to ESS, the company **pushed its technical boundary** to develop technology in high-speed data acquisition, which now has made the company **one of the few companies in the world that hold the leading technology**



# ► ESS Data Management and Software Centre (DMSC)

## 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.

- Offices in **Copenhagen Bio Science Park (COBIS)** – Denmark inaugurated in 2016
- DMSC **designs, develops and supports the ESS scientific data pipeline**
- ESS requires that all user data be made **open and FAIR**
- Active partner in collaborative **open source software** development and **EOSC**







## Research Infrastructures form EUROPE-WIDE NETWORKS

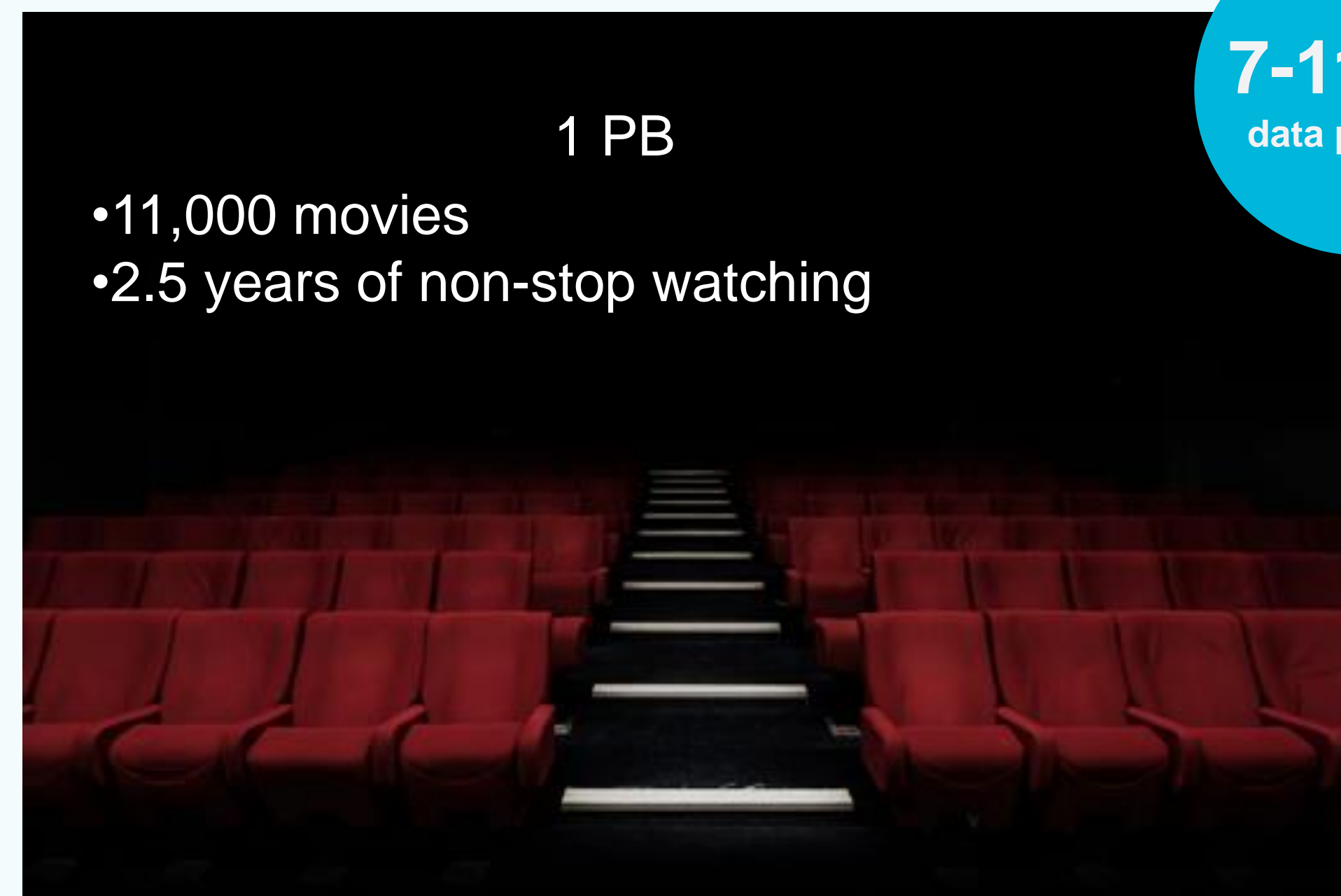


Map of Europe showing countries which  
host an **ERIC (dark blue)** and countries which  
are a **member of an ERIC (turquoise blue)**

## Research Infrastructures produce HUGE DATA SETS



Example: ESS Data Management and  
Software Centre (DMSC) in Copenhagen,  
Denmark will handle and store large amounts  
of experimental scientific data every year



- 11,000 movies
- 2.5 years of non-stop watching

1 PB

**7-11 PB**  
data per year



# ► Research Infrastructures and ERA

Research Infrastructures with in-kind investments or distributed nodes in **countries of southern and eastern Europe**

- Serve as visible **pillars of European excellence** in those regions
- Help to **counteract movement of talent to north and west**



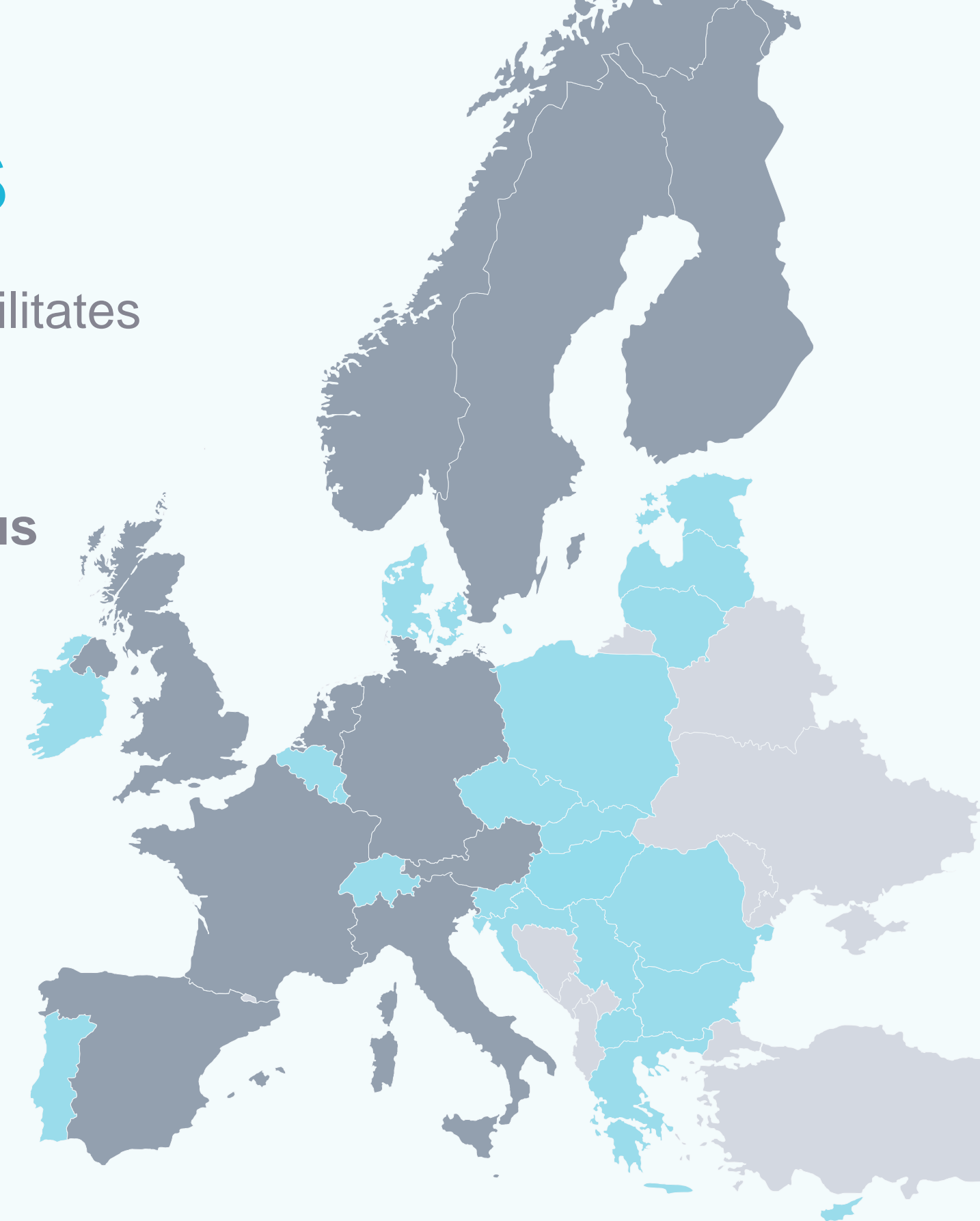


# ERIC Landscape: 21 ERICs & 11 prep-ERICs

WHAT is  
an ERIC?

- **European Research Infrastructure Consortium (ERIC):** Specific legal form that facilitates the establishment and operation of research infrastructures with **European interest**
- Partnership of EU Member States (and Associate and non-Members States) that have agreed to **integrate their resources** to respond to global societal challenges in **various science fields**
- ERICs are the **backbone of the European Research Area**

Map of Europe showing  
**countries which host a  
statutory seat of an ERIC**  
and  
**countries which are a  
member of an ERIC**



Science areas of the ESFRI Roadmap

Energy



Environment



Health &  
Food



Physical  
Sciences &  
Engineering



Social &  
Cultural  
Innovation





# ► New ideas by ERIC Forum members to refresh Transnational Access

1. **Reduce the bureaucratic burden** e.g. by giving RIs an annual budget to manage
2. **More outcome-based funding**, whether it be
  - a. linked to missions/challenges, interdisciplinary research or joint action between RIs
  - b. diversity – targeted at underrepresented groups, underperforming nations
  - c. training
3. **Matching funding** e.g. by requiring national co-funding as a condition of EC funding







## How can National Contact Points (NCPs) support ERICs?

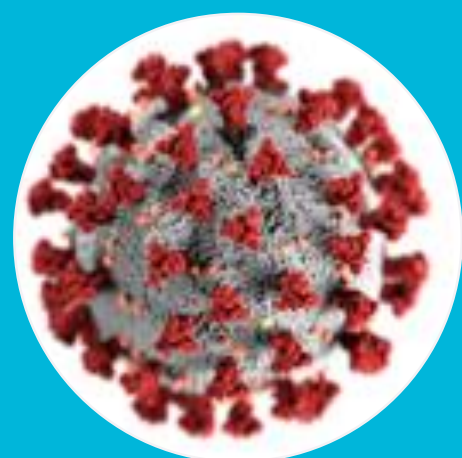
- **Build knowledge** in areas that are relevant to ERICs
- **Provide support and consultation services** to ERICs no matter where they are located





# ► Now is the time to invest in RIs

## Research Infrastructures have shown their value



•Research hubs to address Covid-19



Nodes of pan-European collaboration



Pooling of effort and sharing of data





## Now is the time to invest in RIs

- Europe's economies will require an **investment stimulus to drive recovery from Coronavirus**
- Wide consensus that **investment in infrastructure is a smart way** to do this (because you are **building for the future**)
- Especially now, investment in **research and research infrastructure is the best investment**
  - Epidemic has shown the need and value of research capacity to **address unexpected challenges**
  - We need to **rebuild our industrial capabilities** - globalized supply chains no longer viable – low-carbon, **knowledge-based economy** requires research and innovation







Open data  
and EOSC

?

Transform  
the way  
science is  
done?



Act as pillars of  
excellence across  
all of Europe

?

Strengthen  
ERA?

HOW CAN  
RIs:

?

Deliver  
solutions to  
pressing  
problems  
for Europe?



Missions and challenges,  
Covid-19, and economic  
competitiveness