



Exploring



Socio-economic Benefits



Impacts



of Large Research
Infrastructures

4th National Day Large Research Infrastructures

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Missions

Not-for profit, typically publicly-owned, organisations that have been established for a specific purpose other than economic profit are said to be **‘mission-based organisations’**.

They have a ‘mission’ to do a specific thing

‘Mission-based’ organisations in daily life:


- *Police*
- *Fire brigades*
- *Hospitals*
- *Schools*

What are the ‘impacts’ and ‘socioeconomic’ returns of these organisations?




Science in Our Lives

The benefits of research are all around us



The 'mission' of research infrastructures:
"Do (Excellent) Science!"



Energy

Heritage science

Hydrogen-fuelled society

Sub-zero survival

Disease resistant crops

Tackling chemical waste in the pharmaceutical industry

Super superconductors

Tracking cholesterol

Enhanced oil recovery

Infection sensors

Stress relief in the air

Flexible plastic solar cells

What (really) is the Mission of a Research Infrastructure?



The **main scope of activities** a research infrastructure is supposed to perform, usually ... **‘facilitating’** research for **others**

*The **complexity and cost** of the instruments requires a specific investment and the tool is shared by a community of researchers.*

A single **stakeholder** (country or region) or a consortium of **stakeholders** hires a dedicated team of experts to maintain and manage the facility – and access to it.

What's the Mission of a Research Infrastructure?

Scientific Access

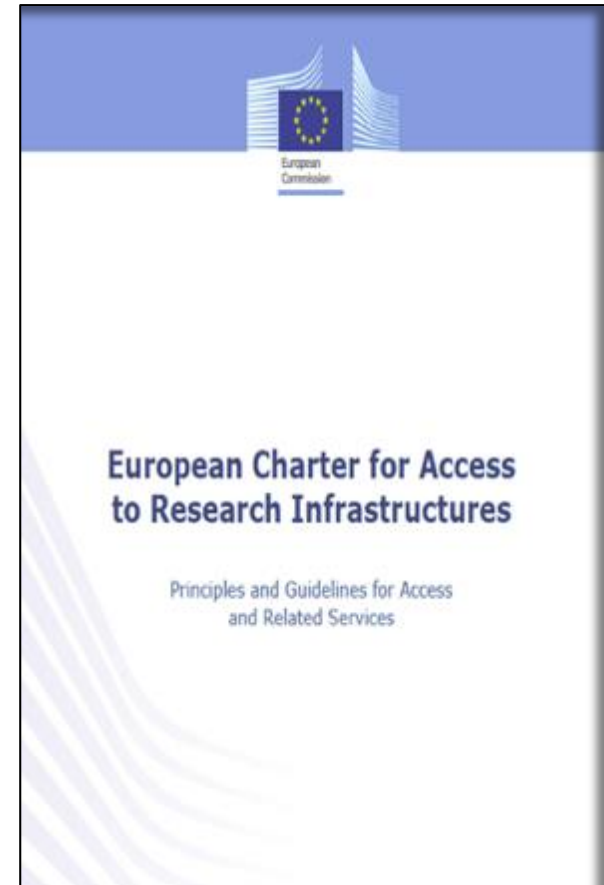
Excellence-driven Access for Users

Peer-reviewed, depends on scientific excellence, originality, quality and technical and ethical feasibility of a proposal. No cost to user. Open data...

- Studies - must be published and open;
- Member contributions are linked to usage by their scientific community through a 'look-back' mechanism;
- Data and IPR policies are essential early on
 - ELI will keep and maintain the data, to be embargoed for the original researcher for a period of time (usually 3 years)

Proprietary Access

This is paid access, and results are proprietary. Prices are determined on a case-by-case basis.





EMBL: to promote molecular biology across Europe, and to create a centre of excellence for Europe's leading young molecular biologists.



Mission Statements



LIGO: to open the field of gravitational-wave astrophysics through the direct detection of gravitational waves.



ESO: to provide state-of-the-art research facilities to astronomers and astrophysicists, allowing them to conduct front-line science in the best conditions.

Mission Statements



ITER is not a user facility!
It was intended to have a technological and socioeconomic impact...

nature

Review of

Capitalism Without Capital: The Rise of the Intangible Economy

Jonathan Haskel & Stian Westlake. Princeton University Press



“Now that science is an investment, **its funders will expect it to behave as such.** That means that there will be extra strain on the principle by which politicians don't interfere in the setting of academic research priorities — known in Britain as the Haldane principle, after First World War minister and troubleshooter Richard Burdon Haldane. **The era of scientists being left to run their own show may be drawing to a close if science is expected to make economic returns.** You have been warned.”*

- Ehsan Masood

Nature volume 551, pages 297–298

16 November 2017

** 2014 U.K. decision by G. Osborne to reclassify R&D as ‘investment’ in public books*

Key Stakeholder Groups

The Environment is complex and stakeholders have many interests...



FACILITY

SCIENCE

Effective governance and management work in the areas where interests overlap...

SOCIETY

Key Stakeholder Groups

FACILITY

Staff

Governance and Funding Agencies

Host Countries

Committee Members

Licensing Authorities

EU Institutions and Funds

Collaboration and Grant Partners

Commercial Suppliers

Neighbours

SCIENCE

Scientific and Academic Users

*5,200 unique users and
3,500 principal
investigators in Globally*

Potential Users from the following science fields: laser-science, high-energy density, high-field, fusion, life science, soft condensed matter, chemistry of materials, energy, superconductivity, heritage conservation, engineering materials, and fundamental and particle physics

Multipliers: European and national societies and associations

SOCIETY

Direct Beneficiaries: Region, local and regional governments, municipalities, funding agencies, businesses, business associations

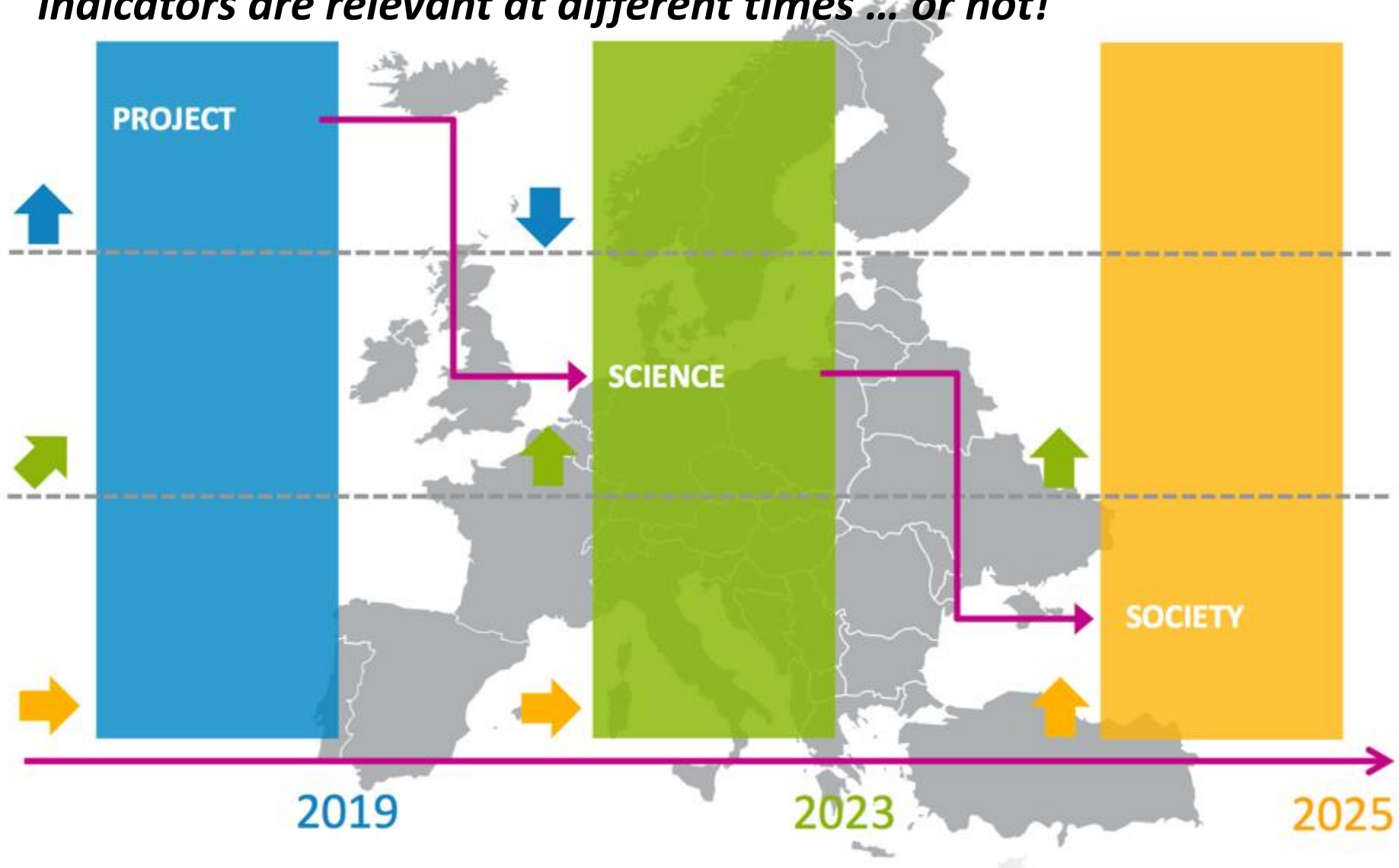
Indirect Beneficiaries: society as a whole benefiting from research driven innovation, industrial users, and actors in the innovation ecosystem

MEDIA

National and international news agencies, newspapers, TV and radio stations, and online news portals

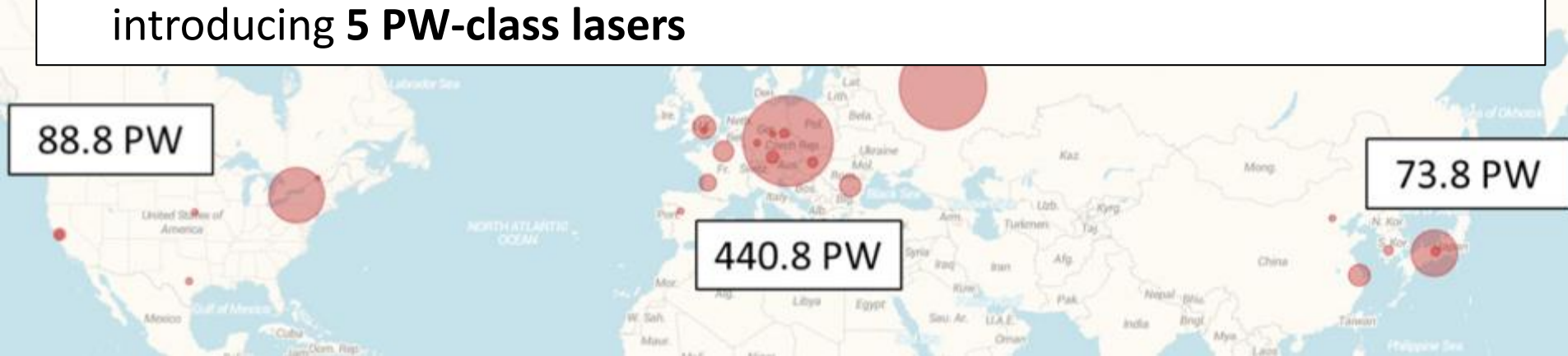
Emphasis Over Life Cycle

Stakeholder emphasis may shift as different socioeconomic indicators are relevant at different times ... or not!



Social and Economic Impact Starts Immediately in the Life Cycle of a Research Infrastructure. They are both local and global. But they offer opportunities – not guarantees.

- **Investment** is driving **development and attractiveness** in Dolní Břežany.
- **Investment** is driving **recognition** in Prague and the Czech Rep. with spillover effects for institutions and industry.
- **Investment** is driving **European leadership** in laser and photonics, especially for state-of-the-art systems
- Projected total peak power for high power laser systems operational and under construction is by far world-leading with ELI Facilities introducing **5 PW-class lasers**



The Extreme Light Structure has a mission to develop and provide access to the world's leading lasers for research.

30,000 m²
€300 Million



24,462 m²
€275 million



33,000 m²
€311 Million



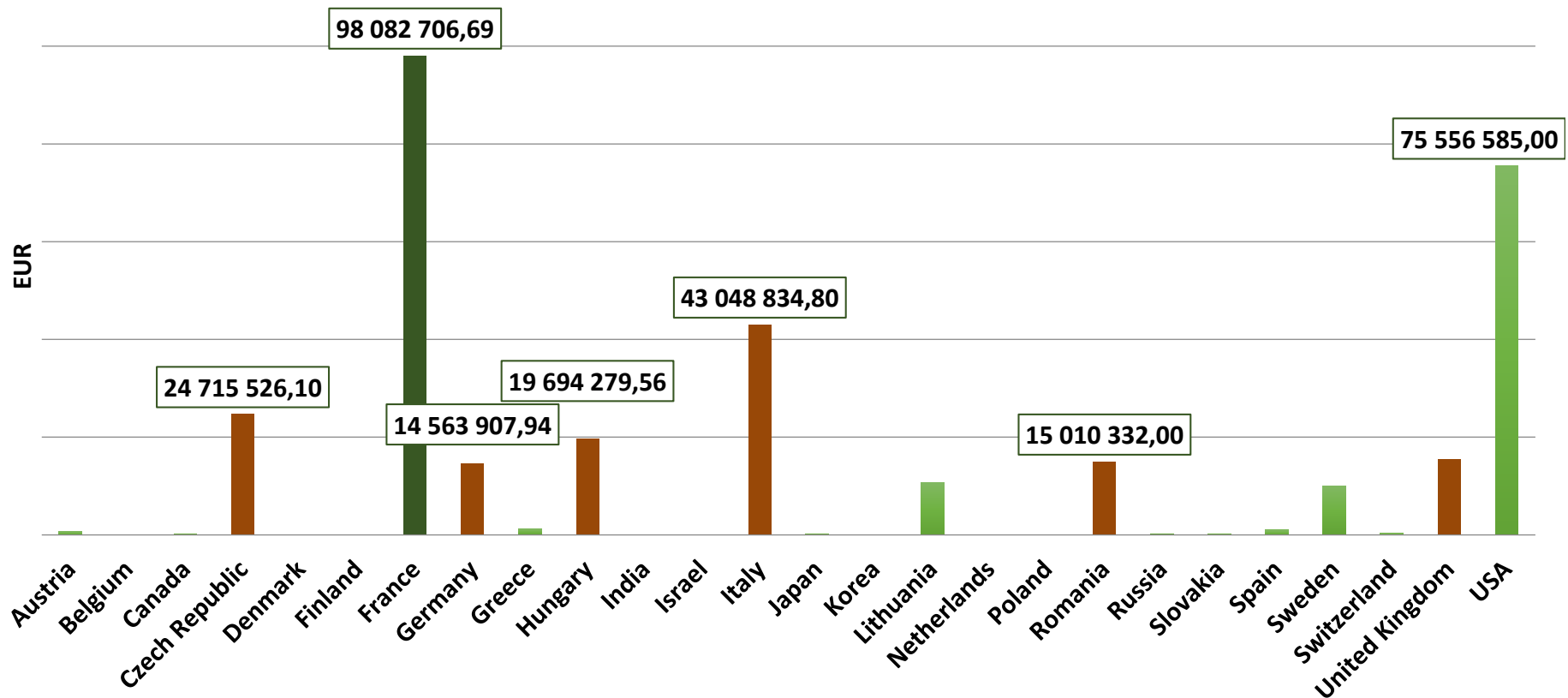
- *ELI is transitioning from Construction to Operations*
- *ELI facilities being delivered for users beginning in 2020*
- *The users' access is excellence-based and open*
- *Built with European Regional Development Funding*
- *Integration of ELI ERIC enables a single, Member-led consortium*

ELI is a driver for development in industry:

- The global market for lasers is estimated at **€13.5B in 2018**
 - up 5% over 2017 (*Laser Focus World, Mar. 2019*)

Over the construction period **ELI Facilities** report procurement:

- More than **€455 million in technical contracts**
- Companies from **19 European countries**



What are the **Political, Economic, Social, and Technological** Indicators (**PEST**)?

Indirect

easy -- measure -- hard

- Impact on Competitiveness
- Advanced Materials
- Regional Attractiveness
- Kids interested in science
- Community acceptance
- Return on Investment (?)

- Increased expert interest
 - Community acceptance
 - “Buy-in” from Scientists
 - Sense of Pride and positive identification
 - Enhanced reputation
- ‘soft-indicators’*

- ***Jobs***
 - ***Responsible spending***
 - ***Earned Value***
 - ***Buildings built***
 - ***Industrial Return in contracts***
- ‘hard-indicators’*

- Publications
- Jobs
- Companies involved
- Expanded Science Community
- Return on Investment (?)

Direct

Short-Term (1-yr)

Long-Term (5-yrs+)

ESFRI is Charged by Competitiveness Council to Develop Key Performance Indicators

ESFRI



*“...Such KPIs must be **easy to use, adjustable to different systems and types of RIs** (new as well as existing) and yet **robust to ensure high a level of confidence**. They could serve as **one element of the monitoring carried out by RIs and their governance bodies to monitor their performance**.” – EU Compt. Council, May 2018*

‘Mission-oriented’ Access

The Interim Evaluation of Horizon 2020, chaired by Pascal Lamy found that Horizon Europe (Framework 9) should:

- *make it easier for citizens to understand the value of investments in research and innovation*
- *maximise the impact of investments by setting clearer targets and expected impact when addressing global challenges*

‘Missions’ are research with an aim.

Horizon Europe will incorporate research and innovation missions (€50B) to increase the effectiveness of funding by pursuing clearly defined targets.



‘Mission-oriented’ Access

In this context RIs have to evaluate their place in the landscape and determine if their strategies will be proactive or reactive. ***Stakeholders must be clear about their expectations!*** Mission criteria include:

- Bold, inspirational, with wide societal relevance;
- Targeted, measurable, and time-bound;
- Ambitious, but realistic R&I actions;
- Cross-disciplinary, cross-sectoral and cross-actor innovation;
- Drive multiple, bottom-up solutions.

Climate-neutral cities

Healthy soil and food

Cancer

Healthy oceans

Climate change



Some Things to Think About

- Is it still the 'mission' of Research Infrastructures (just) to facilitate excellent science, or are we asking more from them?
- Are socio-economic impacts equivalent to scientific impacts?
- Can a Mission-oriented approach satisfy both aims?

Remember:

Electricity was once basic science...

