LASERLAB-EUROPE and the European Scene of Laser Research

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LASERLAB-EUROPE

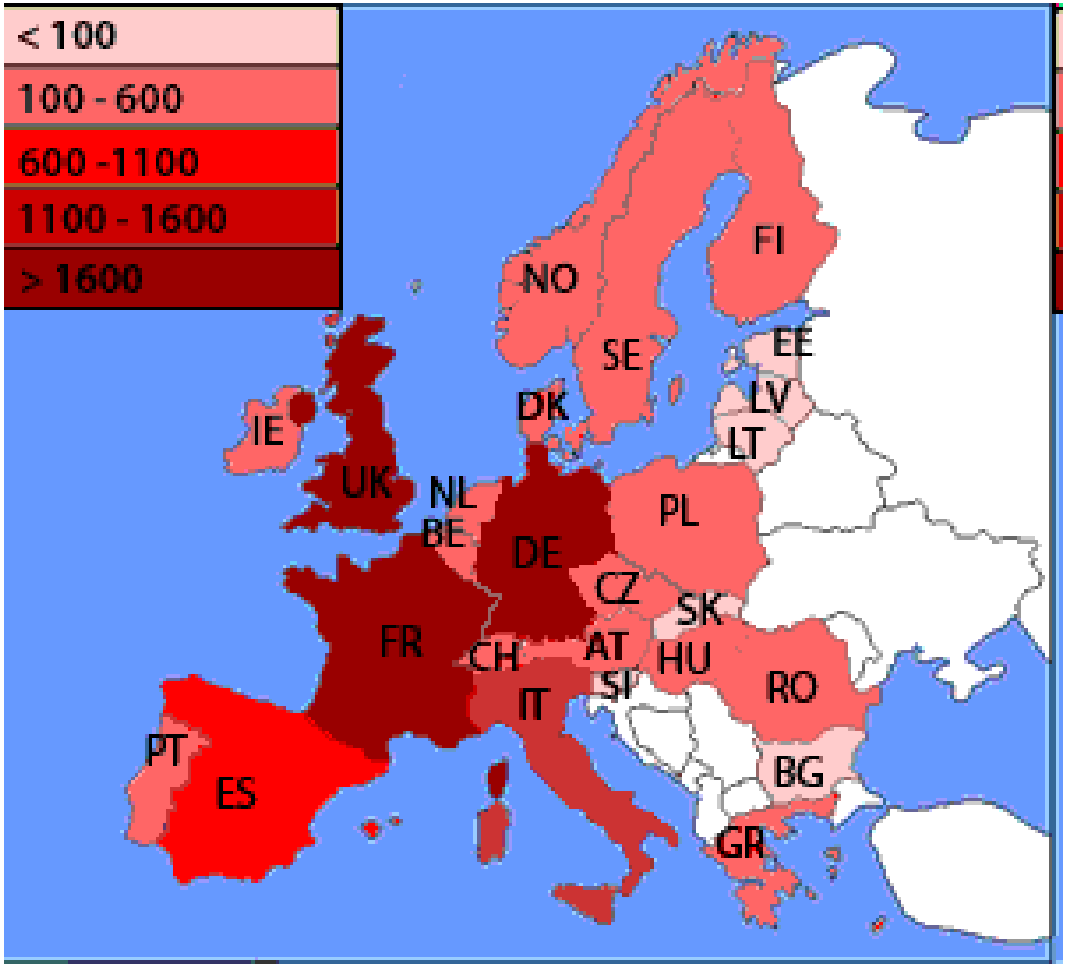
Max Born Institute

ERF-Workshop „*The Socio-economic Value of Research Infrastructures*“
Hamburg, May 31, 2012

The starting point (I)

a) Human Capital: Scientific activity and output

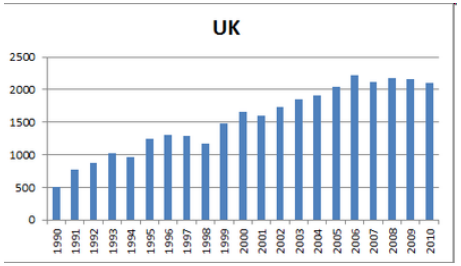
The European academic basis: Scientific output measured by laser publications

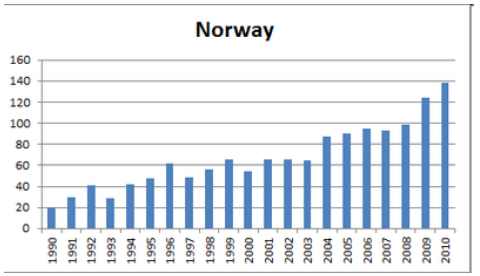


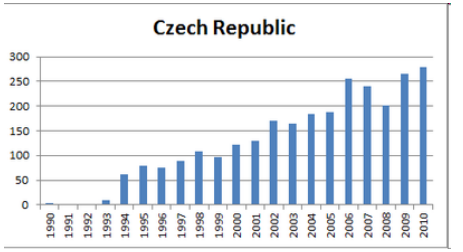
Annual laser publications, per country (2007-2010)

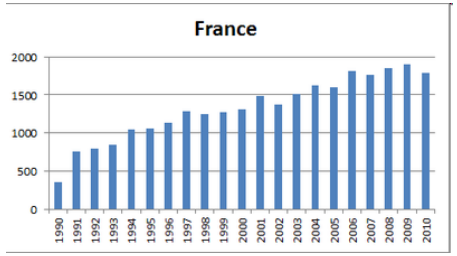
Laser publications – the temporal gradient
(1990-2010)

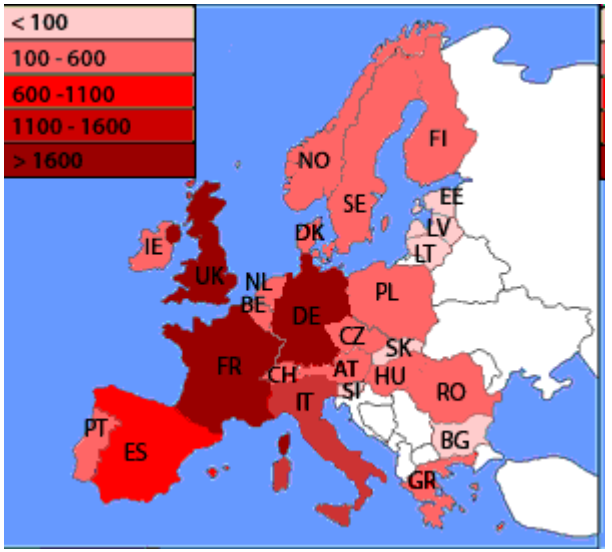
Laserlab Europe

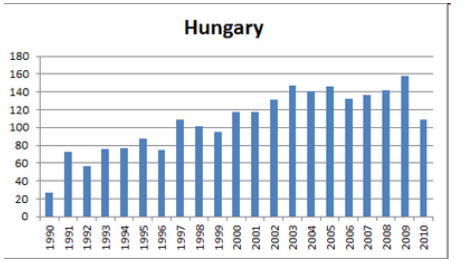


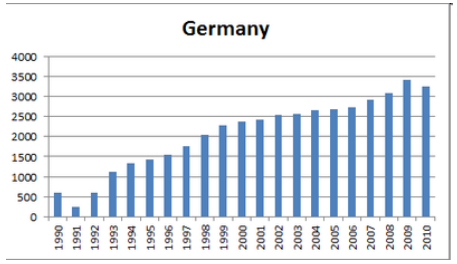


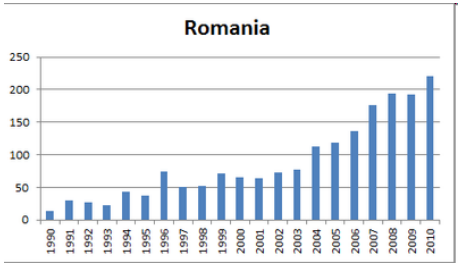


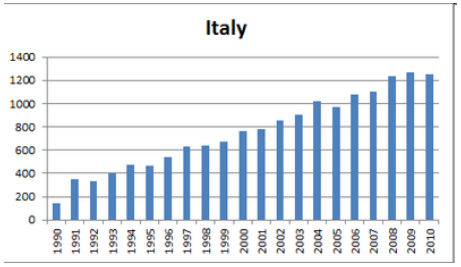


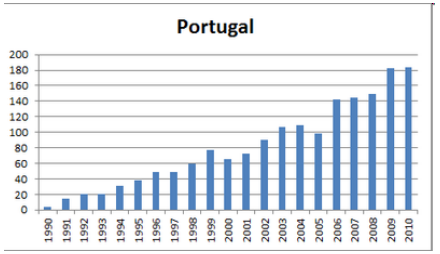


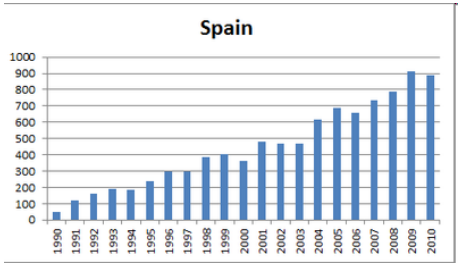












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Observations and conclusions:

1) Laser publication activity is
   - *Higher in Europe than in other global regions*
   - *Higher than in neighboring physics subfields*

2) There is a positive gradient in all countries => lasers are the future !

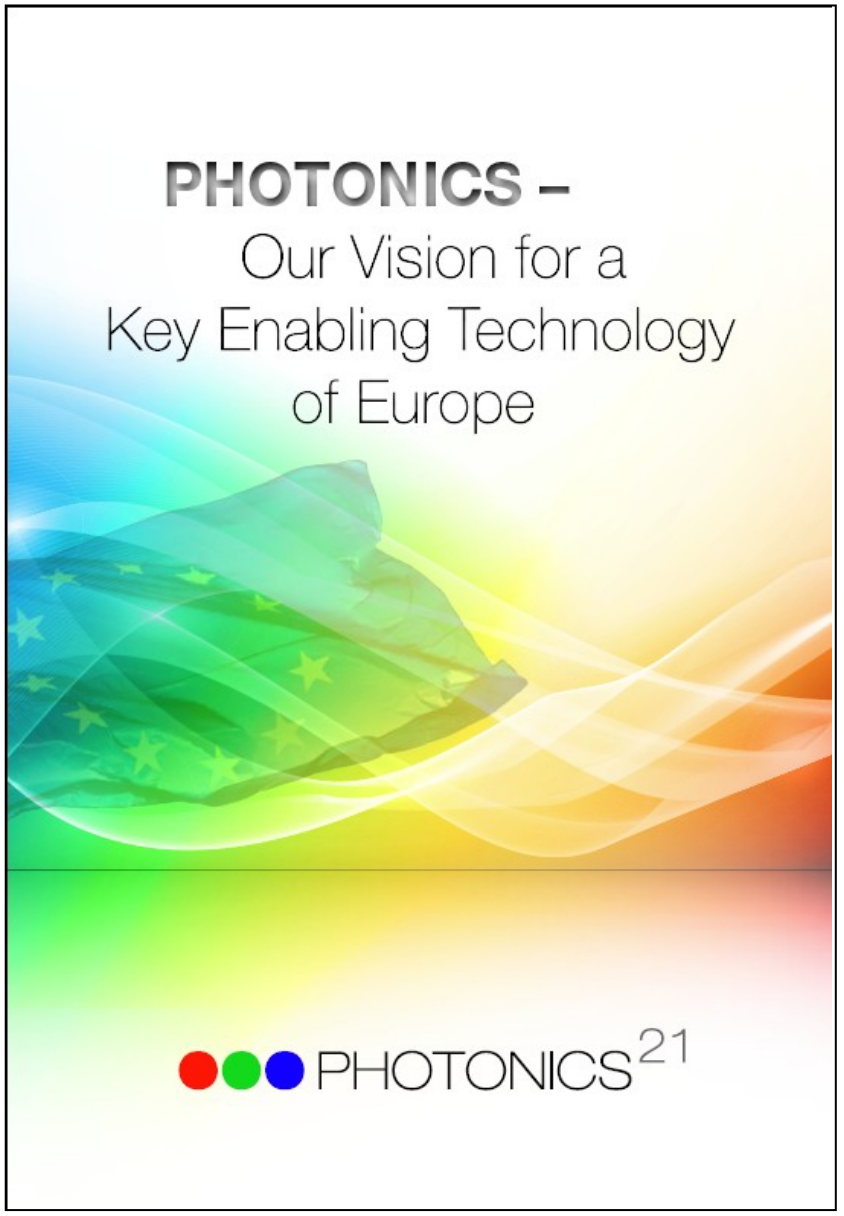
3) There is still considerable variation in the absolute scale between European countries

=> ***Room for regional policy and RI impact!***

Starting point (II)

b) Regional and socio-economic impact

Lasers and Photonics:
One of five „Key enabling technologies“ of the EC



Photonics21:

An European Technology Platform

currently being established as Private Public Partnership

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Global photonics market ~ €300 billion,

Leveraged impact in enabled industries is substantially greater!

Europe:

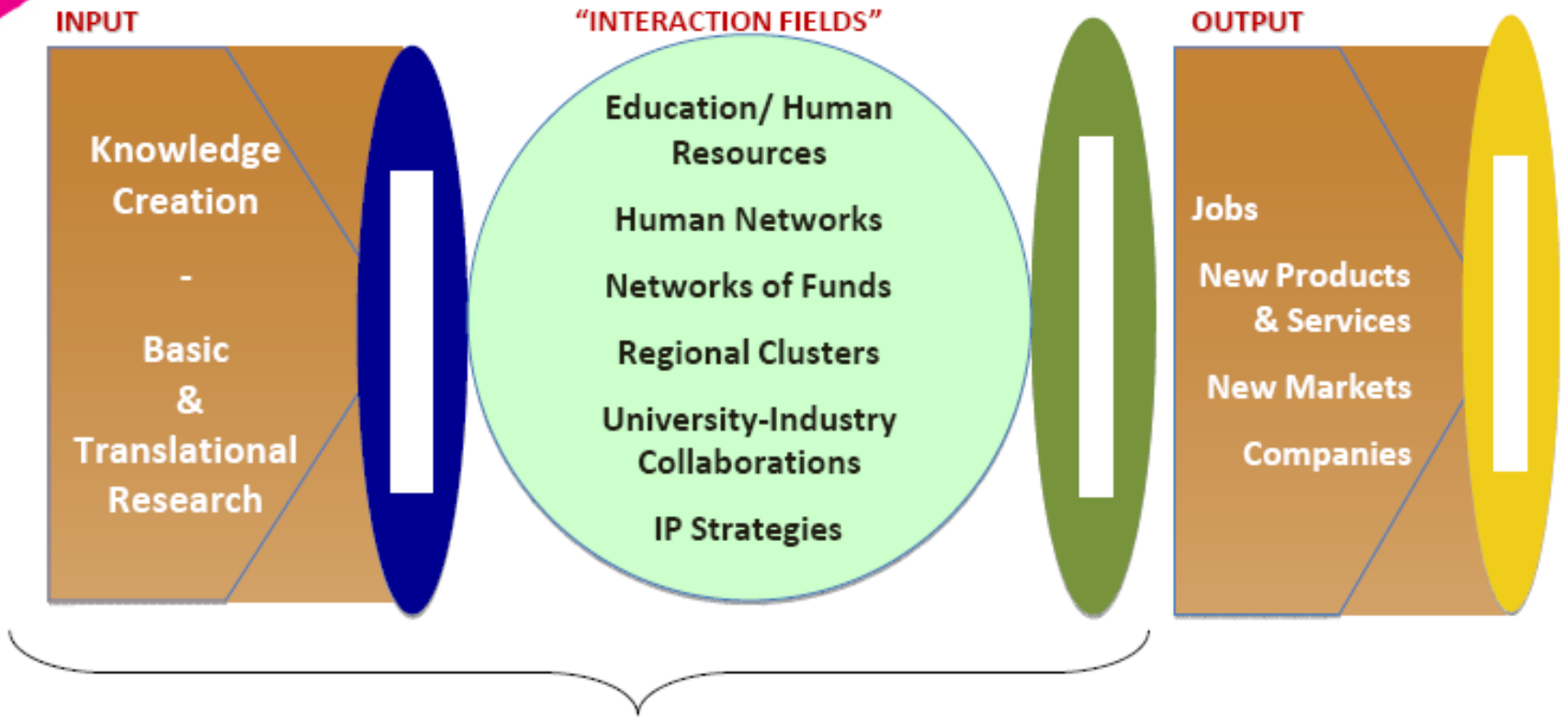
- Overall share of 20%, rising to as much as 45% in specific key sectors.
- ~290,000 employees. The sector is largely based on SMEs,.
- Estimated annual growth > 10%, i.e. 2-3 times faster than European GDP and faster than the growth of the global market.
- 40,000 new jobs being created between 2005 and 2008,

Laserlab Europe

The role of laser research infrastructures in innovation

EUROPEAN COMMISSION
Community research

The role of laser research infrastructures in innovation



Pan-EU RIs cover the area between knowledge creation and proof of relevance

Courtesy Carlo Rizzuto

EC concepts and impact

Laserlab Europe

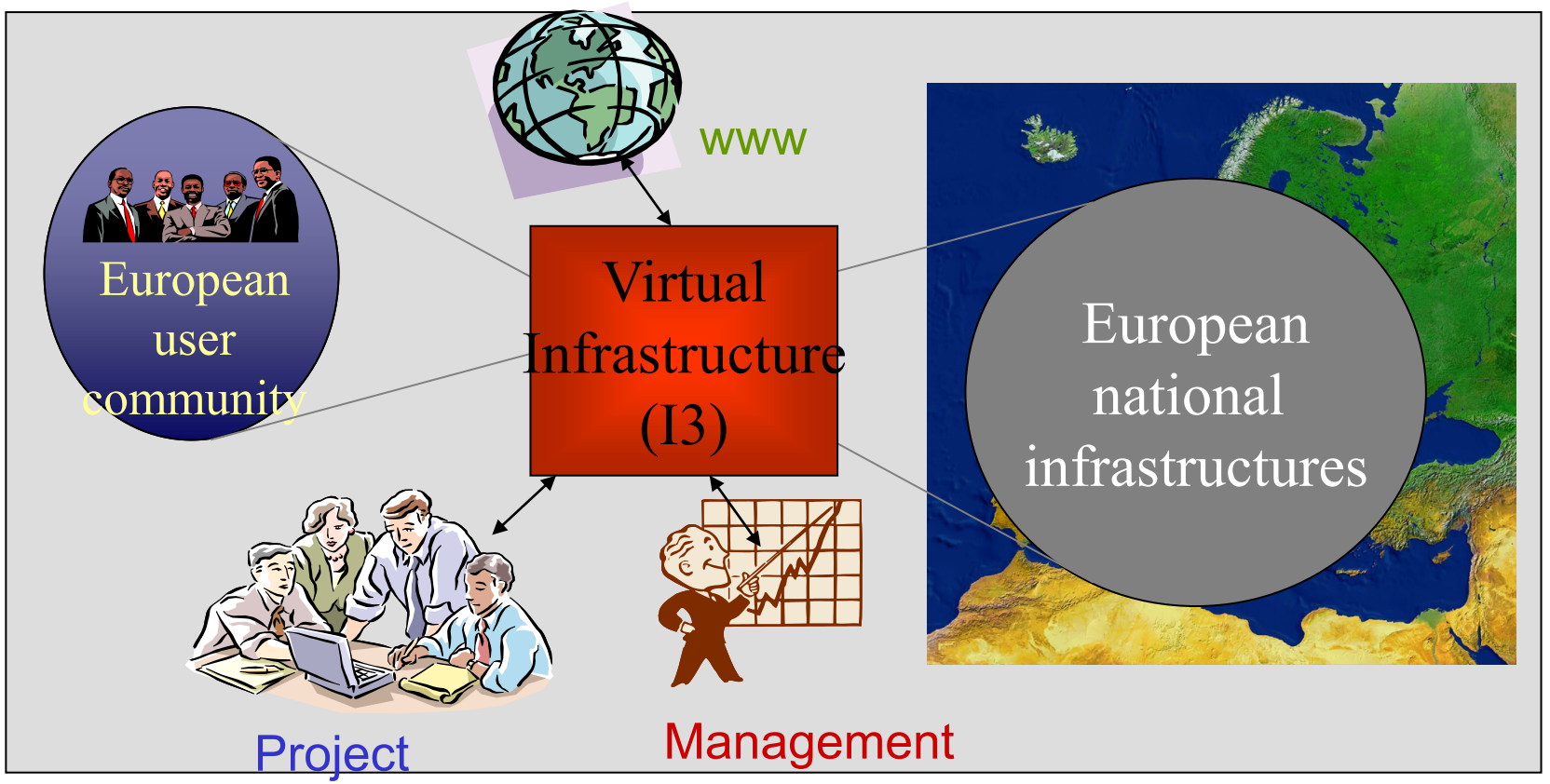
„*Structuring the fabric of national Research Infrastructures*”

=> Integrated Activities (LASERLAB-EUROPE) and
ESFRI Infrastructures (ELI and HiPER)

Integrated Activity:
The incarnations of LASERLAB-EUROPE

LASERLAB-EUROPE (2003-2007 and 2008):

- *First vision of a unified "European Distributed Laser Infrastructure" with ambitious structuring elements:*



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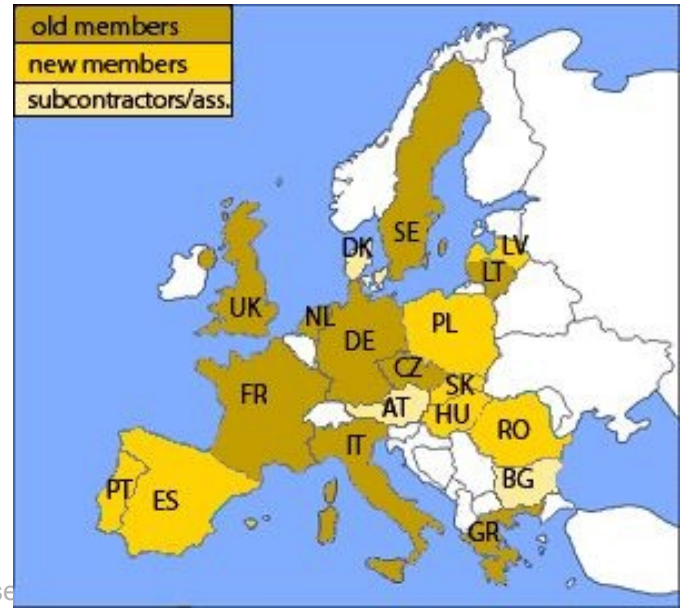
- *"Extending the European dimension"*
  Growing from 17 to 27 individual laser infrastructures from 16 countries, participants from 19 European countries.



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LASERLAB-EUROPE III (2012 – 2015)

- Assisting Europe in the creation of new laser infrastructures
- Increasing the basis of human resources
- New science and applications
- Sustainability: preparing for an ERIC

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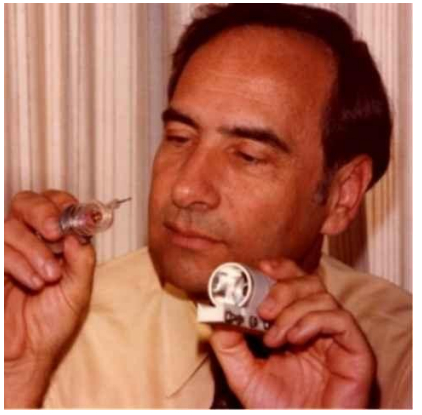
After structuring:

The European laser community going global...

50 years after the invention of the laser

Theodore H. Maiman
1960



A world premiere

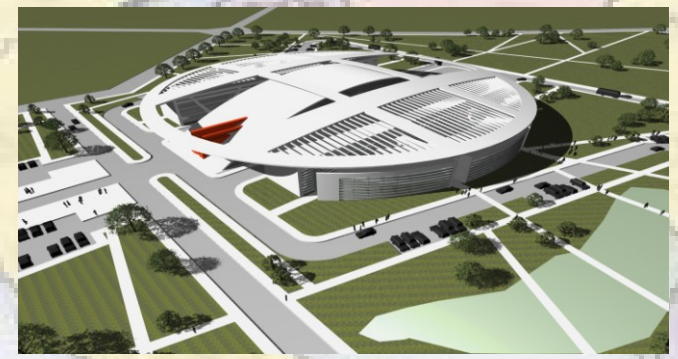
ELI will be the first laser research infrastructure world-wide resulting from the co-ordinated effort of a multi-national scientific laser community.

It will be the first major new Infrastructure in new EU member states
⇒ New communities and human resources

It will be implemented Using Structural Funds
⇒ socio-economic relevance!

Prague

Szeged



Magurele

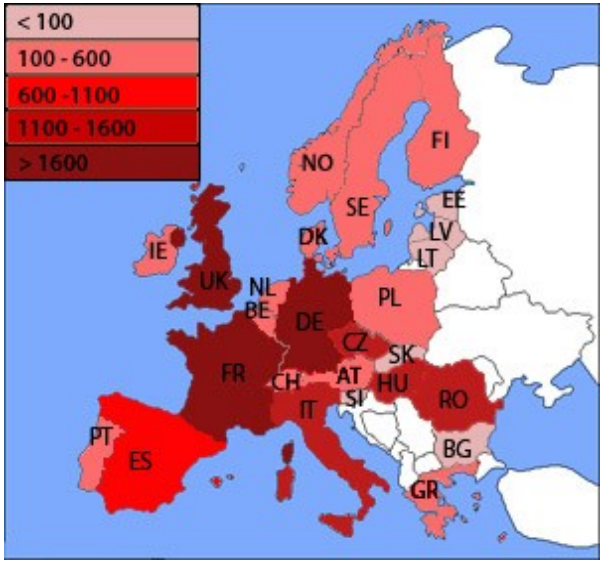
Lasers in Europe

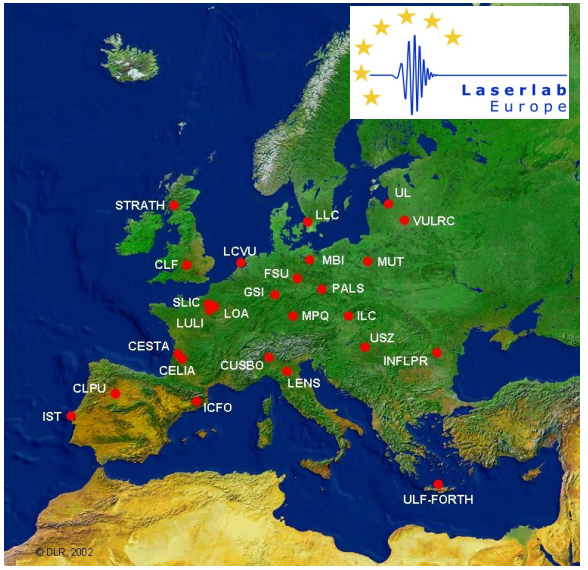
A structured research landscape to meet scientific and socio-economic challenges

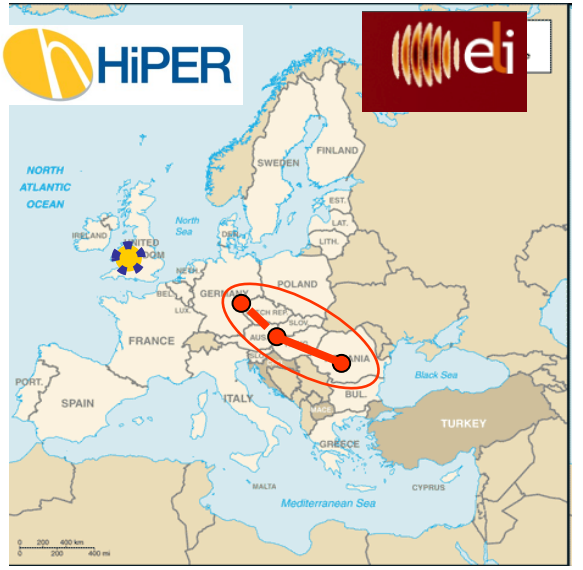
The academic basis and Human resources

Structuring the national Investments: Infrastructure Network Laserlab-Europe

ESFRI projects ELI and HiPER
the first international laser projects







The basis

Flexible instrument to perform and initiate new science beyond the national scale

Mission-oriented single entities to meet global challenges

Structuring:
Mission accomplished?

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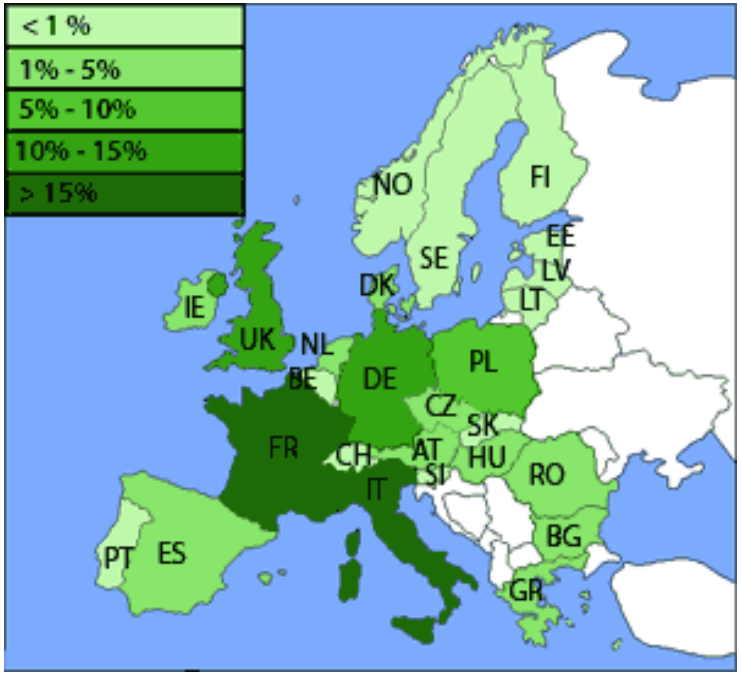
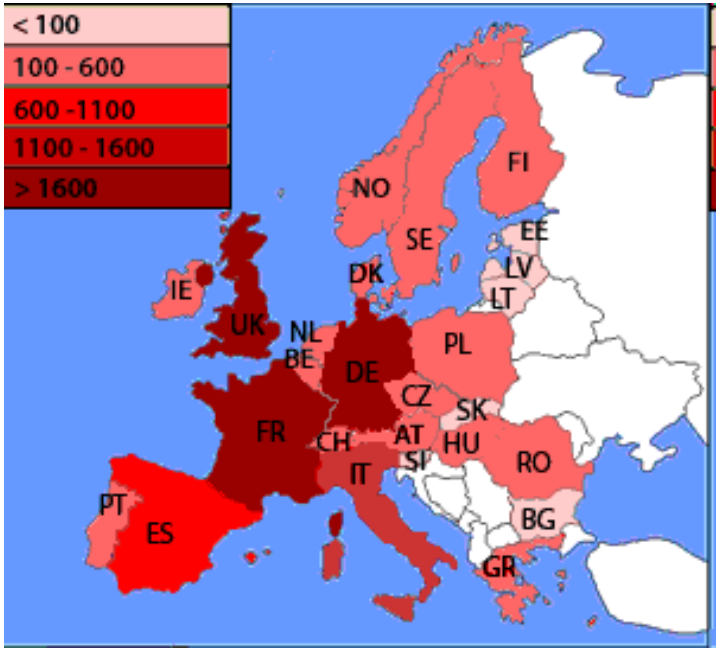
The user paradoxon



Geographic distribution of users



Geographic distribution of research activities and infrastructures

Users come from highly developed laser countries (counter-intuitive!)
⇒ Positive correlation between infrastructures and scientific communities
⇒ New infrastructures may be seminal for new communities!

Trans-national access

- creating an *European added value* for national infrastructure investments

- providing *services to the scientific user community* and *developing human resources*

What lasers have learned so far:

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Access* is a key element of *Structuring

- It is an element of *competition* and *networking* at the same time => quality improvement of infrastructures

- It helps to *avoid doubling of structures* at the national level

- It brings benefit not only to the Research Infrastructures but to the laser community in general

Laserlab-Europe‘s access policy

Lasers are leading within Europe

- in the *unified and co-ordinated selection of Access proposals*

- in *a coordinated and dynamic implementation* of the Access opportunities and EU funding (!)

- *Such dynamic implementation requires*

- Mutual agreement between all participating RI‘s
  - Close monitoring and quality control by an Access Board
  - Co-operative spirit in setting up the dynamic implementation plans

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The loose end: global human resources

Laser development challenge:
Cumulated installed power will increase by a factor of 10 by 2015

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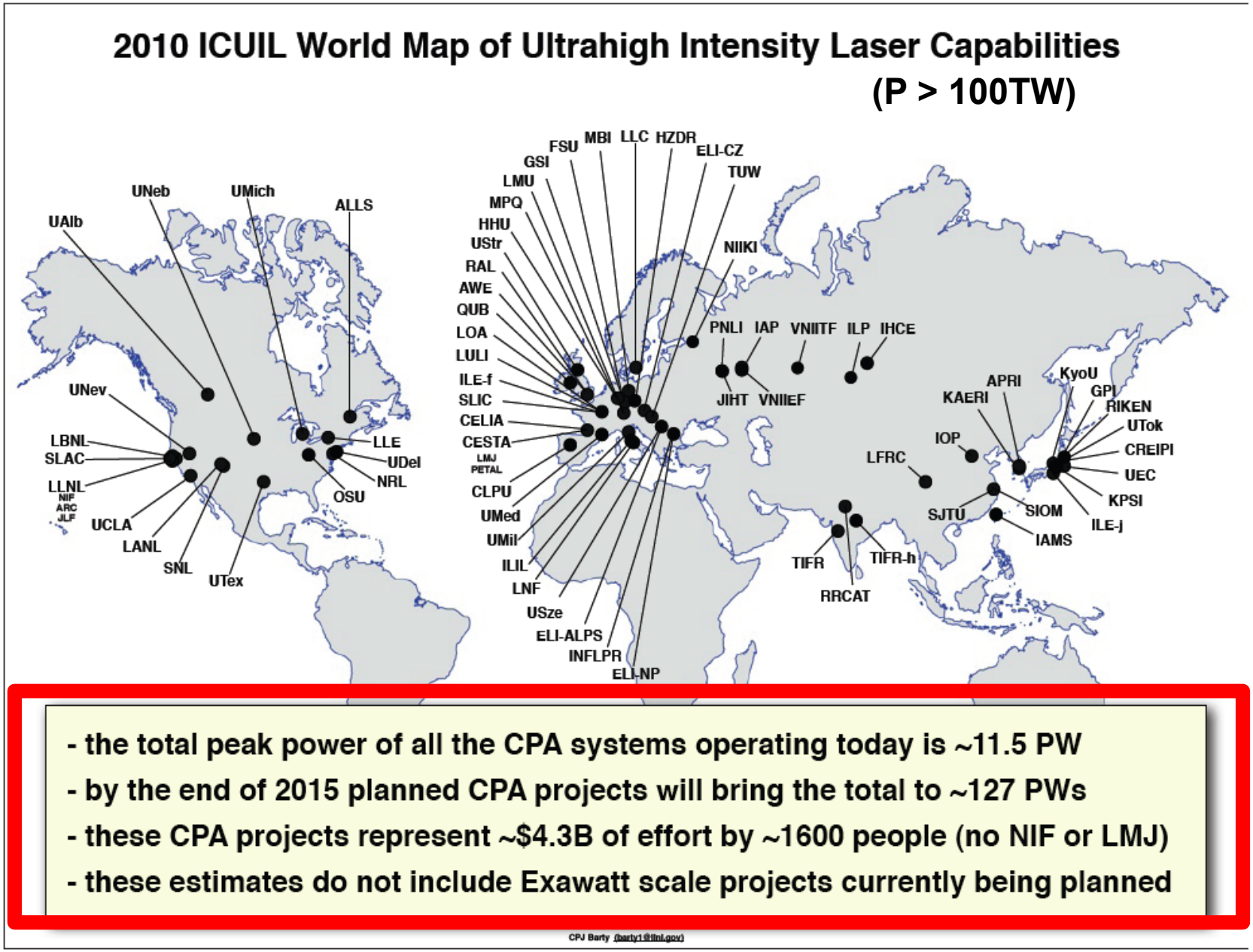
Chris Barty, 2011
http://www.icuil.org

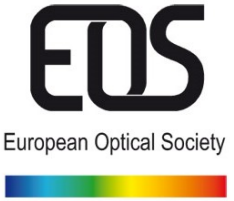


Laserlab Europe

There are more laser projects than human resources world-wide

This is not an European problem, nor an isolated problem for specific projects – *the global community is all in the same boat*

Berlin, July 2010: Start of a European joint initiative to develop human resources in lasers and photonics



Memorandum of Understanding:

- work together on the definition of a common strategy by
  - collecting and quantifying information on the current and future European demand for scientists, engineers and technicians in the field
  - collecting and quantifying information on the existing offer in training and educational activities (ITN, Marie Curie, ERA-Net….)
  - collecting information on funding opportunities for education and training programs and for staff mobility
- Implement such strategy on an European level
- ICUIL and Laserlab-Europe to initiate training and mobility program