On the European Scene of Laser Research

Wolfgang Sandner

On the European Scene of Laser Research (tentative)

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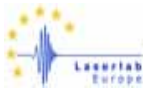
On the European Scene of tentative Laser Research

Wolfgang Sandner



On the tentative European Scene of Laser Research

Wolfgang Sandner

Is there an European Scene of Laser Research ?

Wolfgang Sandner

Max Born Institute

Yes!

And it is different.

European Laser Research

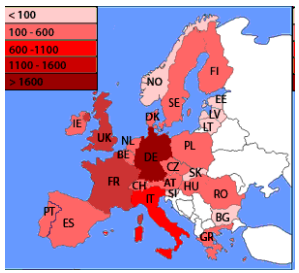
- Scientific activity and output

- National organisation
- Regional and socio-economic impact

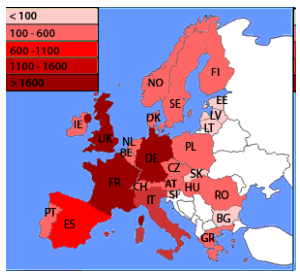
- A few brilliant EC ideas:
  - organized Trans-national access
  - „Structuring the fabric of national Research Infrastructures" - Integrated Activities
  - Pan-European Infrastructures and ERICs

- The loose end: human resources

The European academic basis

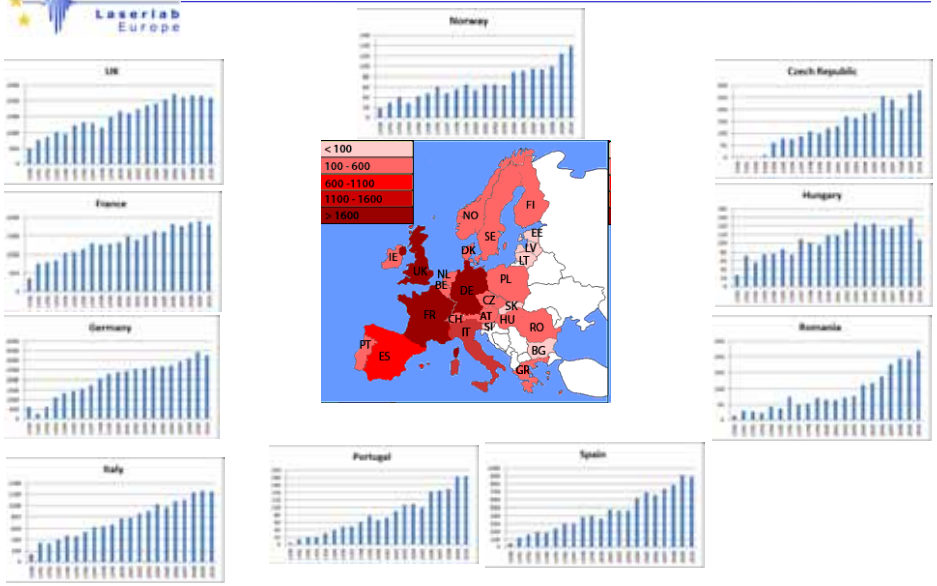


Annual laser publications, per country (2005-2007)



Annual laser publications, per country (2007-2010)

Laser publications – the temporal gradient
(1990-2010)



Scientific activity and output

- Laser publication output is high compared to other disciplines and to other global regions

- There are still significant differences between European regions => *room for regional policy*

- There is a positive temporal gradient in all regions => *lasers and photonics are the future*

National Organisation and National Laser Research Infrastructures –

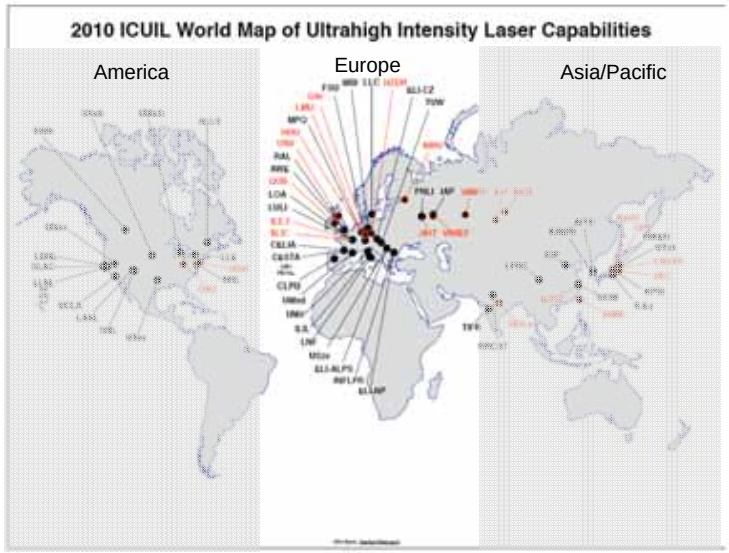
Europe is leading

Europe:
High degree of national organisation

National Research infrastructures

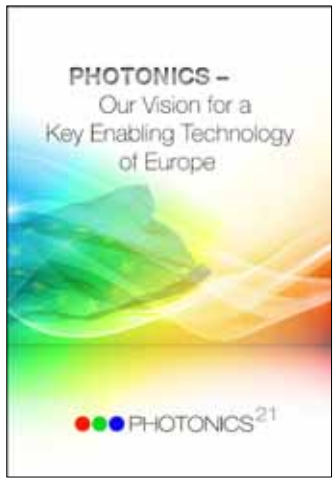
P > 100TW

2009
2010



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

Lasers and Photonics: One of 5 „Key enabling technologies“ of the EC



Global photonics market ~ €300 billion,

Leveraged impact in other 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 2005 and 2008,

A few brilliant EC ideas:

1. Organised Trans-national access –

European added value for national infrastructure investments

Access

***Access to the Research Infrastructures* is a key element of European Networking Policy**

- **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

- ***a coordinated and dynamic implementation* of the Access opportunities and EU funding**
- **the *unified and co-ordinated selection of Access proposals***

Competition and Cooperation

1) ***The distribution of Access and funds (!) onto the individual RI's is dynamically adjusted,*** **updated every 12 months.**

2) ***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**

Dynamic access implementation: days, projects and users

Individual hosts: dynamic adjustments

Network deliverable: > ~100%

100% (EU proposal)

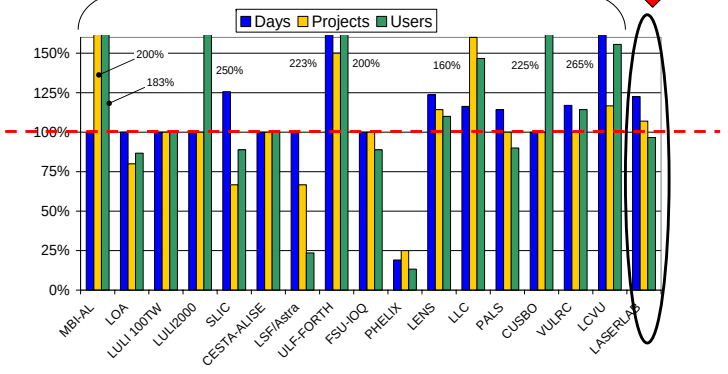
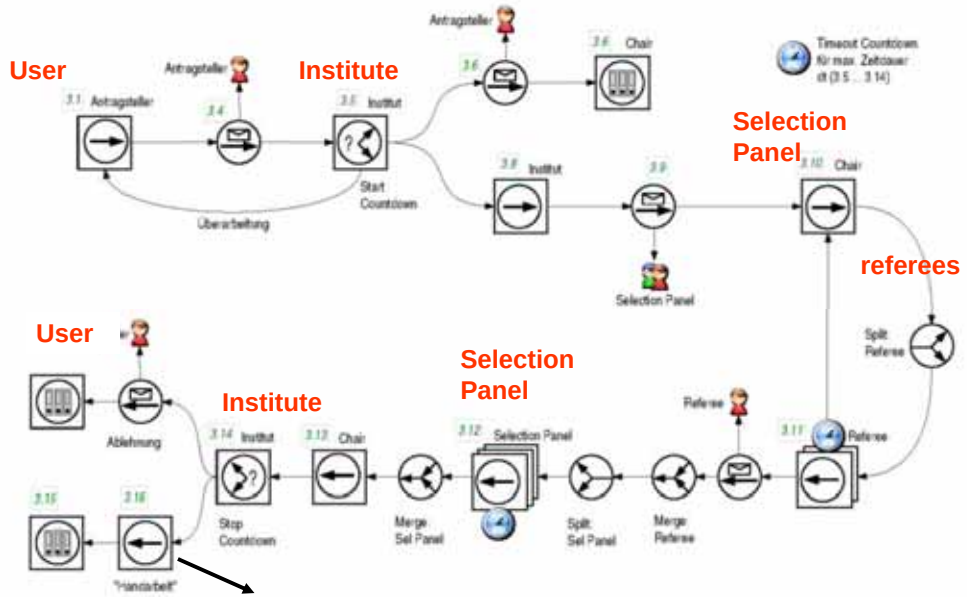


Figure 1 : Transnational Access provided by LASERLAB partners in 2007 compared to the 4th Implementation Plan

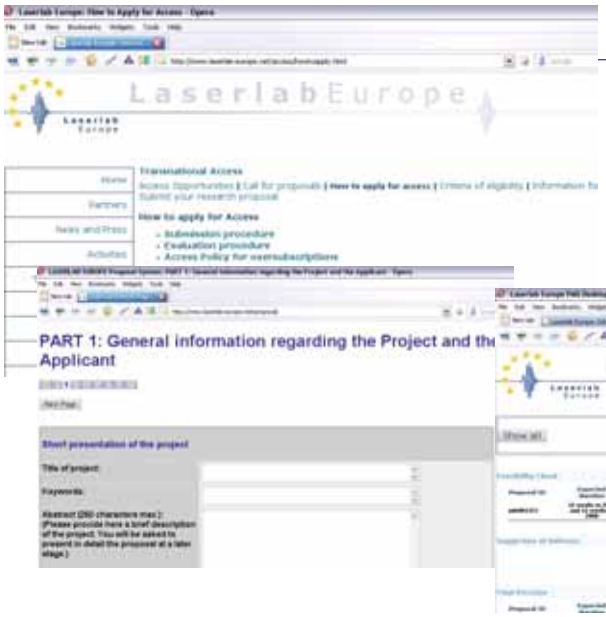
Proposal quality management: joint external (!) Selection Panel

Action		Responsible
Proposal submission (electronic)	⟷	**User** (eventually after first contacts with the installation)
		↓
Technical feasability? Availability of financial resources? suggestion of 2 referees submission to Selection Panel	⟷	**Large Scale Installation**
		↓
Submission to referees	⟷	**Selection Panel**
		↓
Scientific quality ?	⟷	**Referees**
		↓
Conformity with EU goals ? Priority (if necessary) ? Re-direction to other Installation? **Final Selection**	⟷	**Selection Panel**
		↓
Approval from EU Management of visits	⟷	**Large Scale Installation**

Workflow of the Access Proposal Management System



Possibilities for extension of workflow

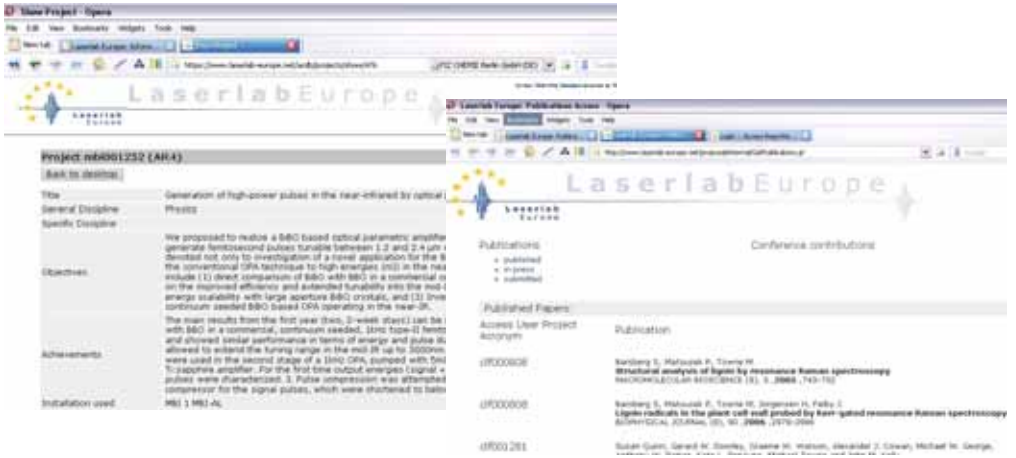


Online proposal submission and management:

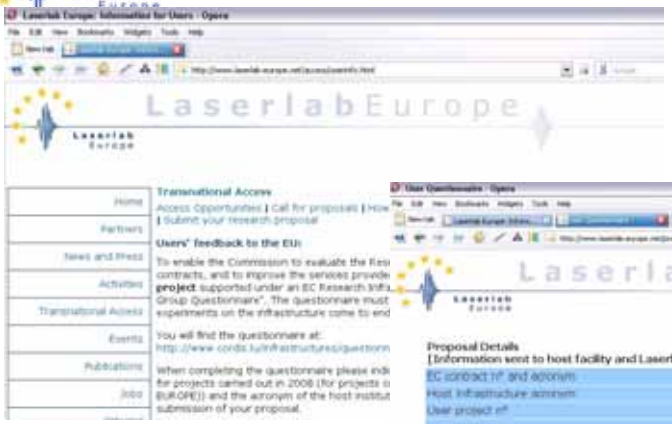
Single entry point

Output monitoring

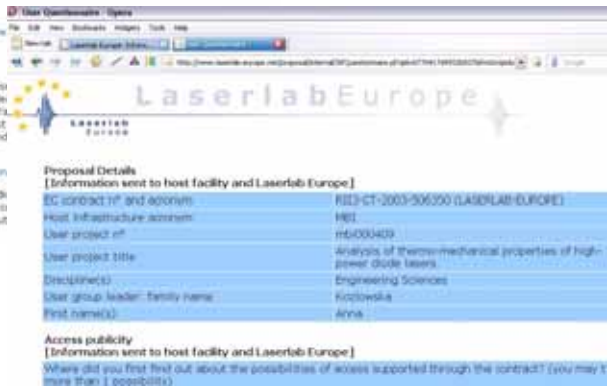
- **Online Access Reporting Database**
- **Automatic Update of Access Publications List**



Access quality management



User questionnaires linked to individual projects



A few brilliant EC ideas:

2) „Structuring the fabric of national Research Infrastructures"

Integrated Activities

ERA 2020 Vision

*As part of a real **research eco-system**, "major infrastructures should promote scientific excellence on a globally competitive basis.*

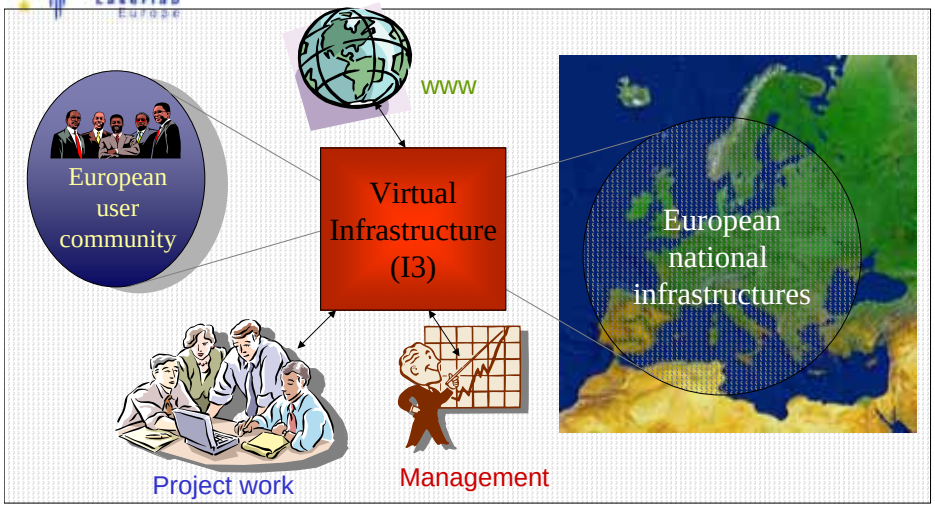
Integrated Activity: The incarnations of LASERLAB-EUROPE

LASERLAB-EUROPE (2003-2007 and 2008):
- *First vision of a unified "European Distributed Laser Infrastructure" with ambitious structuring elements:*

LASERLAB-EUROPE II (2009-2011)
- *"Extending the European dimension"*
  Growing from 17 to 27 individual laser infrastructures from 16 countries, participants from 19 European countries.

LASERLAB-EUROPE III (2012 – 2015)
- *Assisting Europe to create new infrastructures in member states where they are still lacking (special focus on ELI)*
- *Increasing the European basis of human resources*
- *Laying and maintaining the research basis for future areas in laser science and application*
- *Sustainability: preparing for an ERIC*

LASERLAB-EUROPE as an European virtual Infrastructure



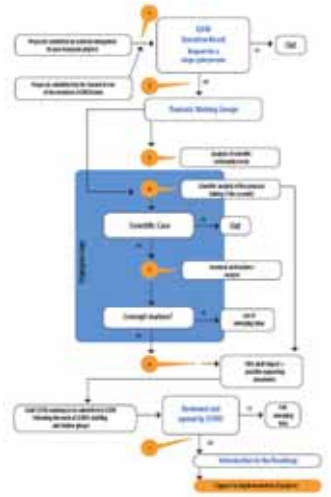
"The overall *structuring effect* of laser Integrated Activites appears to account for their most visible impact, setting Europe apart from other global regions and cumulating in the new *Pan-European infrastructures*."

The ESFRI process and Roadmap

Europen Strategy Forum for Research Infrastructures

A strategic instrument to develop the scientific integration of Europe and to strengthen its international outreach.

Tuesday 3 May 2011



ELI – „Extreme Light Infrastructure“

A world premiere

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

Other communities (high energy physics, synchrotrons, astronomy etc.) have long standing traditions in the operation of international user facilities.

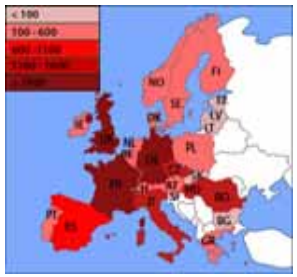
Lasers, having evolved 50 years ago from small table-top devices, are only now at the edge of such mode of operation, and ELI is the first installation world-wide to make that step.

ELI White Book, 2011

Lasers in Europe

A structured research landscape to meet global challenges

European Laser Community



The basis

ESFRI
Infrastructure Network:
Laserlab-Europe

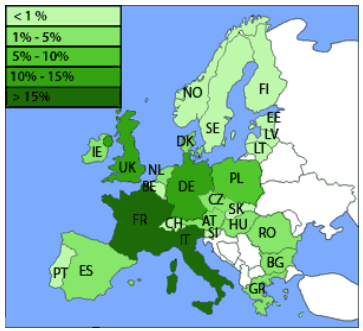
Flexible instrument to perform and initiate new science beyond the national scale

ESFRI
Pan - European Research Infrastructures – the first international laser projects

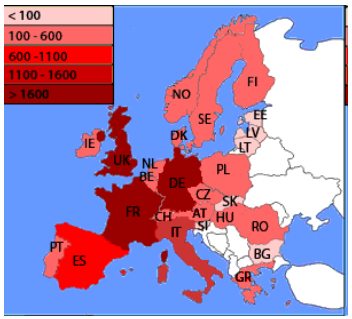
Mission-oriented single entities to meet global challenges

Structuring: Mission accomplished?

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

Overall objectives of LASERLAB-EUROPE III

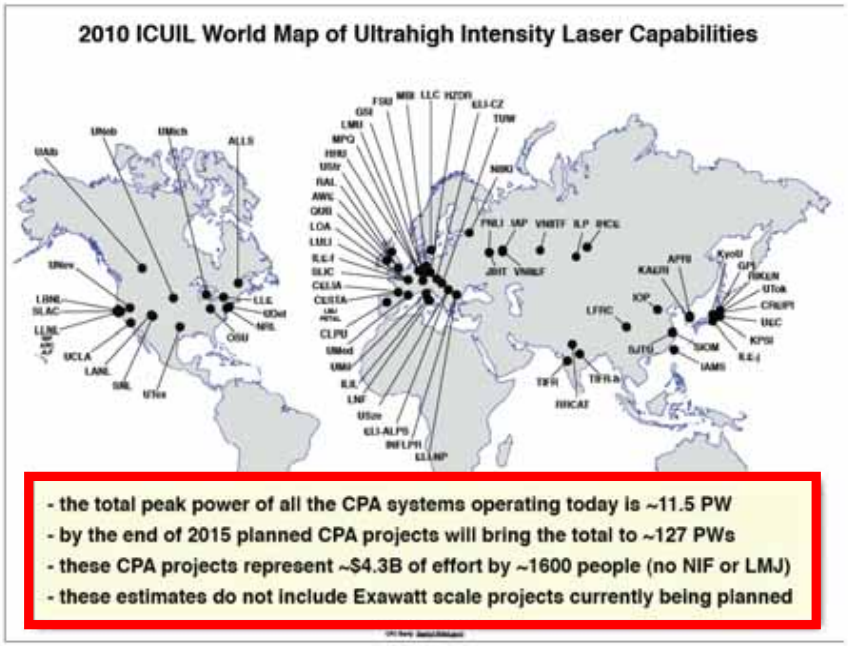
- *Assisting Europe to create new infrastructures in member states where they are still lacking*
  Particular emphasis is on the ESFRI infrastructures ELI and HiPER.

- *Increasing the European basis of human resources.*
  Measures: National Contact Points, user training, new approaches on staff mobility and training, coordination of education activities with other projects and industry, and Access

- *Laying and maintaining the research basis for future areas in laser science and applications*.
  A genuine, forward-looking objective for an I3 located in between the scientific basis and mission-oriented Pan-European RIs.
  It includes a roadmap towards an ERIC.

The loose end: human resources

Global challenge: Human resources



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

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

Draft 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

Budapest, November 19, 2011: ICUIL and Laserlab-Europe to initiate training and mobility program