



From IRUVX-PP to EuroFEL

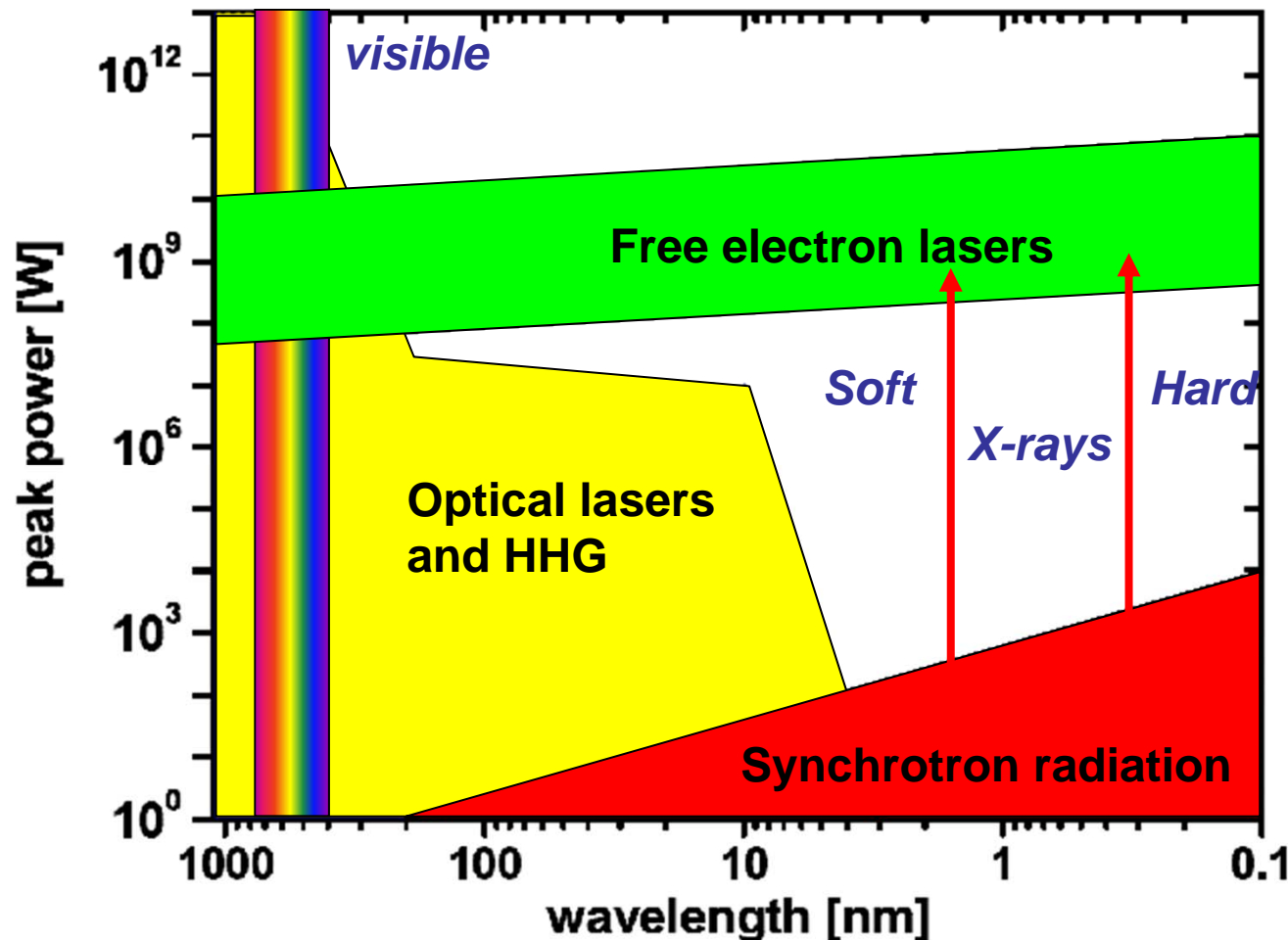
Josef Feldhaus, DESY

- Reminder: What is it all about?
- IRUVX-PP: Challenges and achievements
- How to continue?

Lasers - Synchrotrons - FELs

FELs are the most advanced accelerator based light sources:

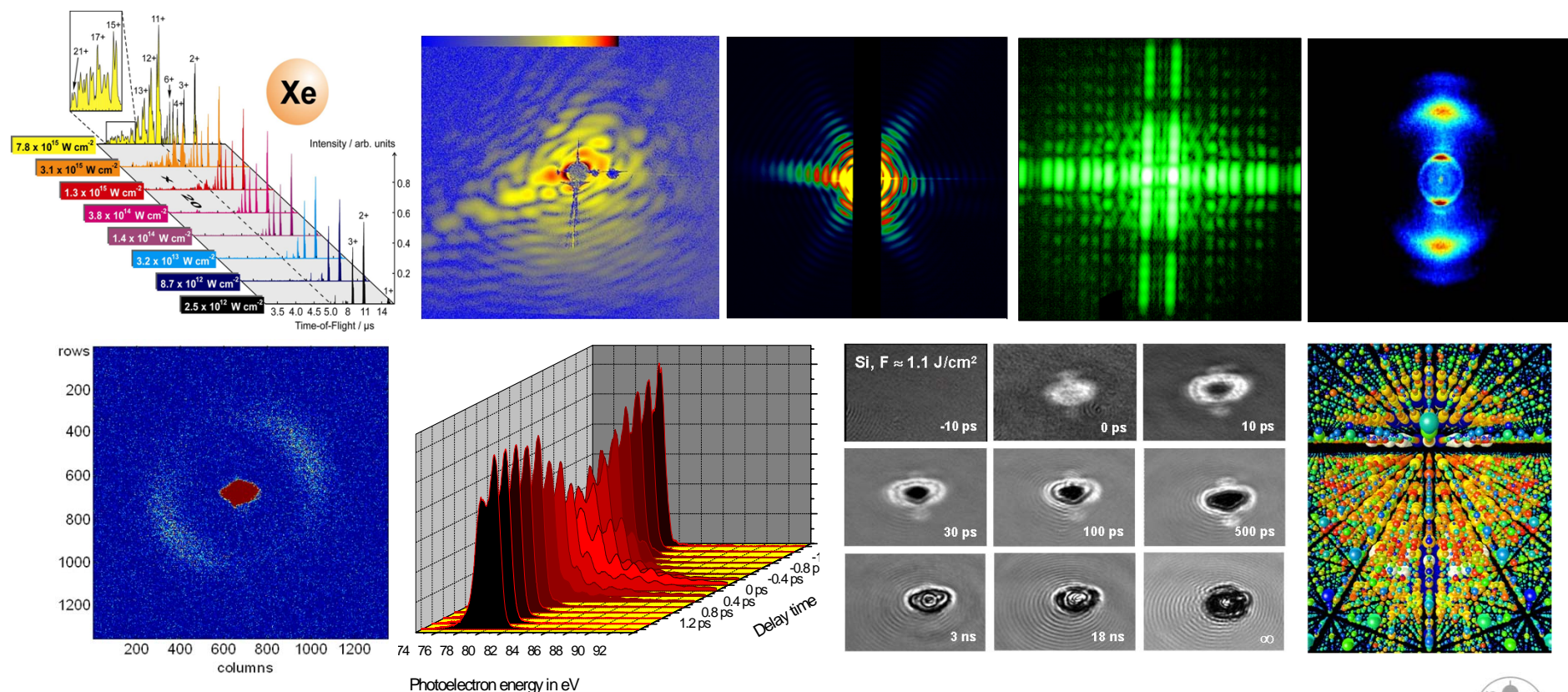
- they cover a wide spectral range, from THz to hard X-rays
- they produce fs flashes of light with high intensities at short wavelengths
- they are continuously tunable



**Huge
expectations**

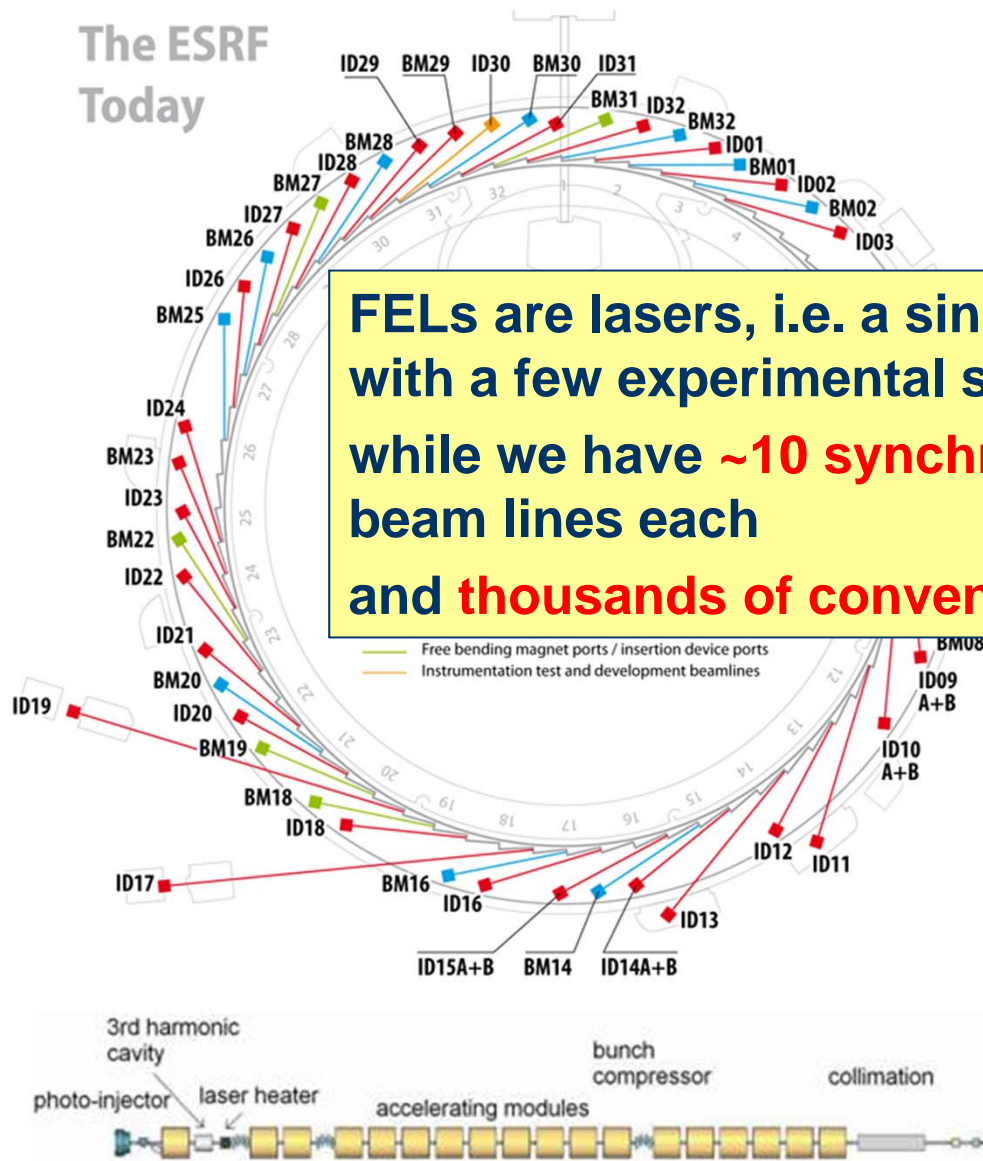
Experiments at FLASH and LCLS

- FELs really work up to hard X-rays
- Many successful experiments, large variety of applications
- Growing user community needs beamtime



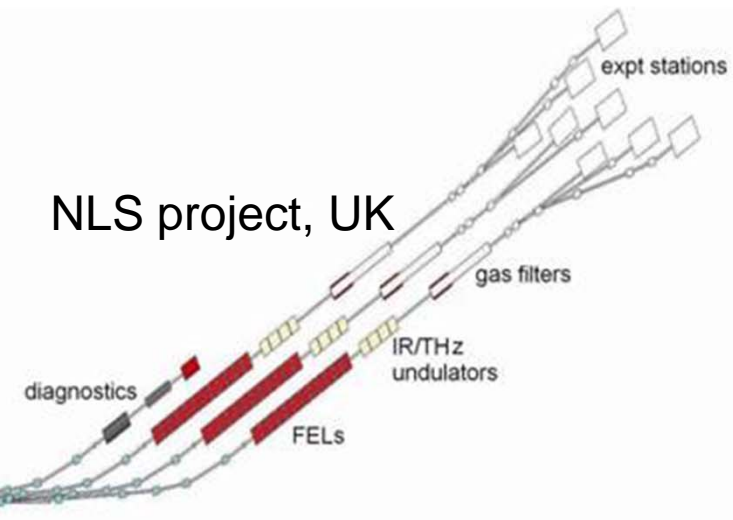
Synchrotron vs. FEL

The ESRF
Today



FELs are lasers, i.e. a single facility has only 1-3 beam lines with a few experimental stations each while we have ~10 synchrotrons in Europe with ~15-50 beam lines each and thousands of conventional lasers in University labs

NLS project, UK



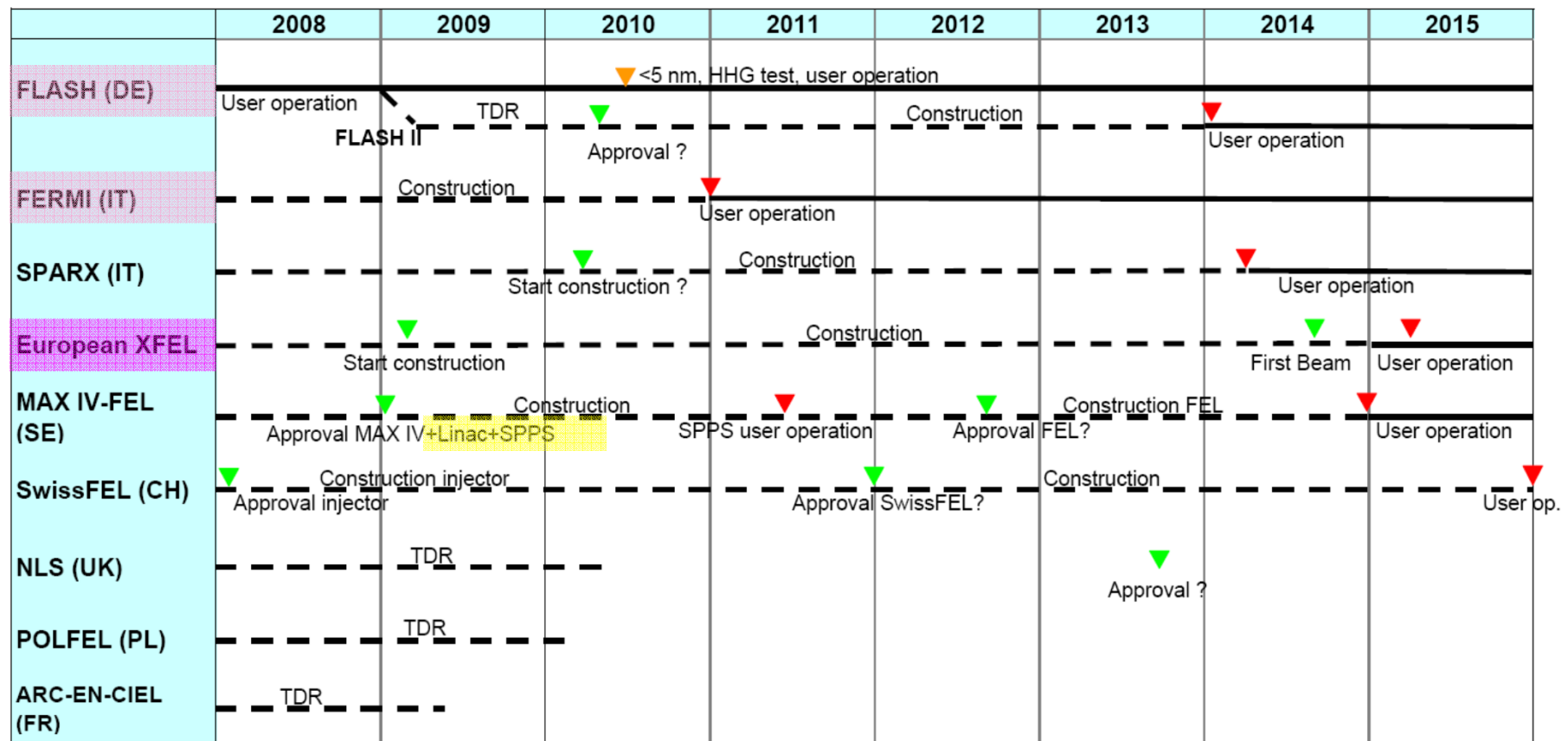
FELs in Europe – what is required?

- We need a set of FEL facilities to exploit the full science potential and satisfy the demand of a growing multidisciplinary user community.
- The facilities need to be financed and constructed with limited resources.
- New techniques and scientific opportunities need to be explored.
- New technologies require continuous further development.
- A strategy and coordination on the European level would be very useful.



Close collaboration between FEL builders and the user community

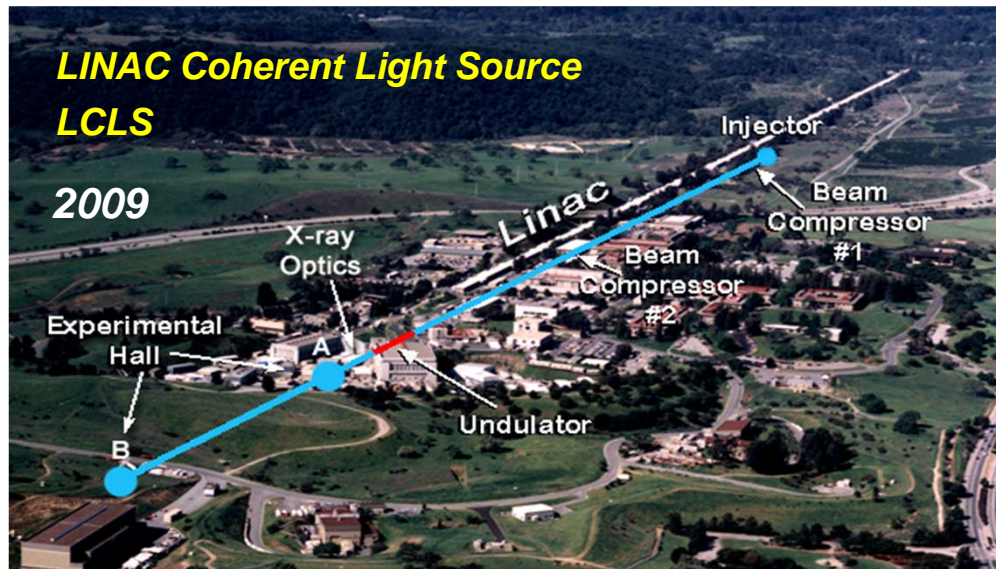
FEL projects in Europe



Other accelerator based short-pulse photon sources

- IR FELs: CLIO, ELBE, FELIX
- Short pulse facilities: MAX IV; BERLinPro (R&D)

International competition



- Try hard to keep pace; need continuous further development
- Europe's advantage for users:
 - combination of individual national facilities and a large international facility
 - great potential in collaboration in R&D and user groups
 - **We need to work together to exploit this potential!**

- **2002: ESFRI working groups on FELs:**
 - (1) R&D requirements (M. Poole) and
 - (2) science case (IR-UV-X) (C. Rizzuto) : *“complementarity”*
- **2005-7: EUROFEL Design Study project, funded by FP6 (~9 Mio €)**
 - a single proposal requested by EC and ESFRI
 - included *all* interested groups in Europe
 - built trust on the working level; positive experience with R&D coordinated on the European level
- **2006: 1st ESFRI Roadmap with European XFEL and IRUVX-FEL (EuroFEL)**
- **2008-11: IRUVX-PP continued R&D plus other joint activities (workshops, training, communication...) under the label „EuroFEL“ and developed long-term vision (~3 Mio € for technical work)**



Spirit of European FEL collaboration,
strongly connected with “EuroFEL”

It seemed to be very important to be on the 1st ESFRI roadmap (there was hope that substantial funding for construction and operation might become available), therefore a MoU was signed to demonstrate our intention to move towards a Consortium (“IRUVX-FEL”),

but:

- **We did not know what was required to belong to this privileged class of RIs.**
- **We did not know if such kind of substantial funding would ever come.**
- **We did not know what we really wanted.**
- **More challenges, e.g. those who initiated the project did not participate.**

Memorandum of Understanding

between

- Berliner Elektronenspeicherring Gesellschaft für Synchrotron strahlung, BESSY
- CCLRC
- Deutsches Elektronen-Synchrotron DESY, Notkestr. 85, D-22603 Hamburg
- MAX Lab
- Sincrotrone Trieste

given

- That the above Laboratories are developing projects of facilities, based on 4th generation light sources, operating from the IR to the soft X-Ray range
- That these facilities apply "open access" policies, to potential users and to collaborations and contributions, based on scientific quality
- That there are strong complementarities and potential synergies between the projects, with a great potential to develop, as a "common scope", an European international facility integrating these projects by exploiting and further developing these complementarities,
- That this development will serve in the best way to respond to the scientific requirements and proposals of potential world-level users, in particular from the EU, and to establish and maintain world leadership in this field,
- That this approach has been encouraged by several Science Policy bodies, including ESFRI and the ERF,

Agree on the following points

1. The participants will activate joint initiatives to further evolve the present complementarities of the FEL sources, building on the present stage of development of the facilities and the fast evolving technology, which leave open the possibility of adjustments of the final designs of the photon sources and of appropriate choices of the beamlines and experimental stations.
2. As an initial step the Members will set-up, within this MOU, one or more joint Scientific Advisory Body(ies), to advice on the best way to respond to potential users requirements and to make the best use of potential complementarities.
3. Further steps, to be agreed within the scope of this MOU, will aim at setting up a longer term "Consortium" or other type of "Joint Initiative", which will define the specific legal framework for the cooperation between the participants, detailing the areas of activity and allowing to implement agreed specific actions towards the common scope, while respecting the autonomy of decision and the property rights of each Member

[Handwritten initials: J, S, E]

4. This initiative is open to other participants who can contribute to the common scope. The entry of new participants will be approved by consensus of the signatories of the present MOU.
5. The common scope may be implemented by planning and adding internationally funded beamlines and experimental stations to previously planned and/or national beamlines/stations, activating possible contributions from other Countries, allowing to prioritize the build of beamlines over all the facilities, aiming to a best-fit between instruments and source specifications, thus overcoming the limitations due to the small number of beamlines of each facility and increasing the capability to respond to wider national and international users requirements.
6. To support the realization of the overall project, the participants will help joining existing human resources to develop the single facilities in a scaled time sequence, allowing to overcome lack of key competences, producing continuous improvements in technology, and enhancing training and availability of new resources.
7. Clear procedures will be developed for the design, exchange, provision and accounting of in-kind contributions between the members of the Consortium and from other contributors, enhancing the capabilities of each participant, and improving the possible industrial involvement, as well as achieving cost reductions.
8. The members will jointly offer, to the EU and to Countries not involved in developing own facilities, the opportunity to invest resources in this cutting-edge technology and in related top competitive scientific fields.

Duration and modifications

This Memorandum will be valid until the definition and fulfilment of point 4 above, or for a maximum of two years. Any modification or renewal will require written consent from the participants. Any eventual controversies arising from this Memorandum will be settled in a friendly manner.

Signatories and dates of signature

	Name	Signature	Date
For BESSY	W. Eberhardt	<i>[Signature]</i>	Nov 9, 2006
For CCLRC	Brian A. Sedd	<i>[Signature]</i>	11.12.06
For DESY	J. Ahnert	<i>[Signature]</i>	
For MAX Lab	M. H. H. H.	<i>[Signature]</i>	
For Sincrotrone Trieste	Rob. P.	<i>[Signature]</i>	



Goal of IRUVX-PP (from the proposal)

The main objective
of the IRUVX-FEL Preparatory Phase is

**to prepare the integration of national FEL facilities into
one distributed European FEL facility** in order to

- => fully exploit the complementary features and
expertise of the individual member facilities and**
- => maximise the benefits for both the member
facilities and the users.**



IRUVX-FEL - Why???

**Just being on the ESFRI Roadmap is not sufficient,
the only direct consequence might be funding for IRUVX-PP!
(EC will not finance RIs but wants to catalyse)**

The real question is:

**How would facilities and users profit
from an IRUVX-FEL Consortium?**

IRUVX-FEL - guidelines

Guiding questions

- **How can an IRUVX-FEL Consortium support the construction and operation of individual FEL facilities?**
(financing, exchange of know-how and personnel, training, joint R&D programmes, interaction with industry, more efficient, etc.)
- **How can a Consortium better provide optimum conditions for a broad user community, i.e. optimise the scientific output of the RIs?**
(sufficient beamtime, high-quality instrumentation, complementary features)

Complementarity

- How much is needed?
- Do we need to control this actively, or is it a self-organising process?

Structure of the Consortium

- The facilities compete for
 - the best technical performance and
 - the most prestigious scientific output, i.e. the best user groups.
- Competition between the facilities enhances
 - complementarities,
 - scientific and technical excellence,
 - quality of service for users.
- Collaboration
 - uses resources more efficiently
 - enhances the transfer of know-how and best practices
 - enhances the overall scientific and technical quality

Objectives of the Preparatory Phase project

- Define the mission and scope of the future EuroFEL consortium
- Define the organisational structure of EuroFEL
- Draft a consortium agreement and agree on a legal form
- Develop critical FEL technology

Facts and figures

- Funded under FP7 – Capacities as a preparatory phase project
- Funding: 5,700.000.- Euro
- Duration: 3 years (04/2008 – 03/2011)
- Beneficiaries: DESY, Elettra, HZB, MAX-Lab, STFC; INFN, PSI
potential beneficiaries: Soleil, IPJ
- Coordinator: DESY

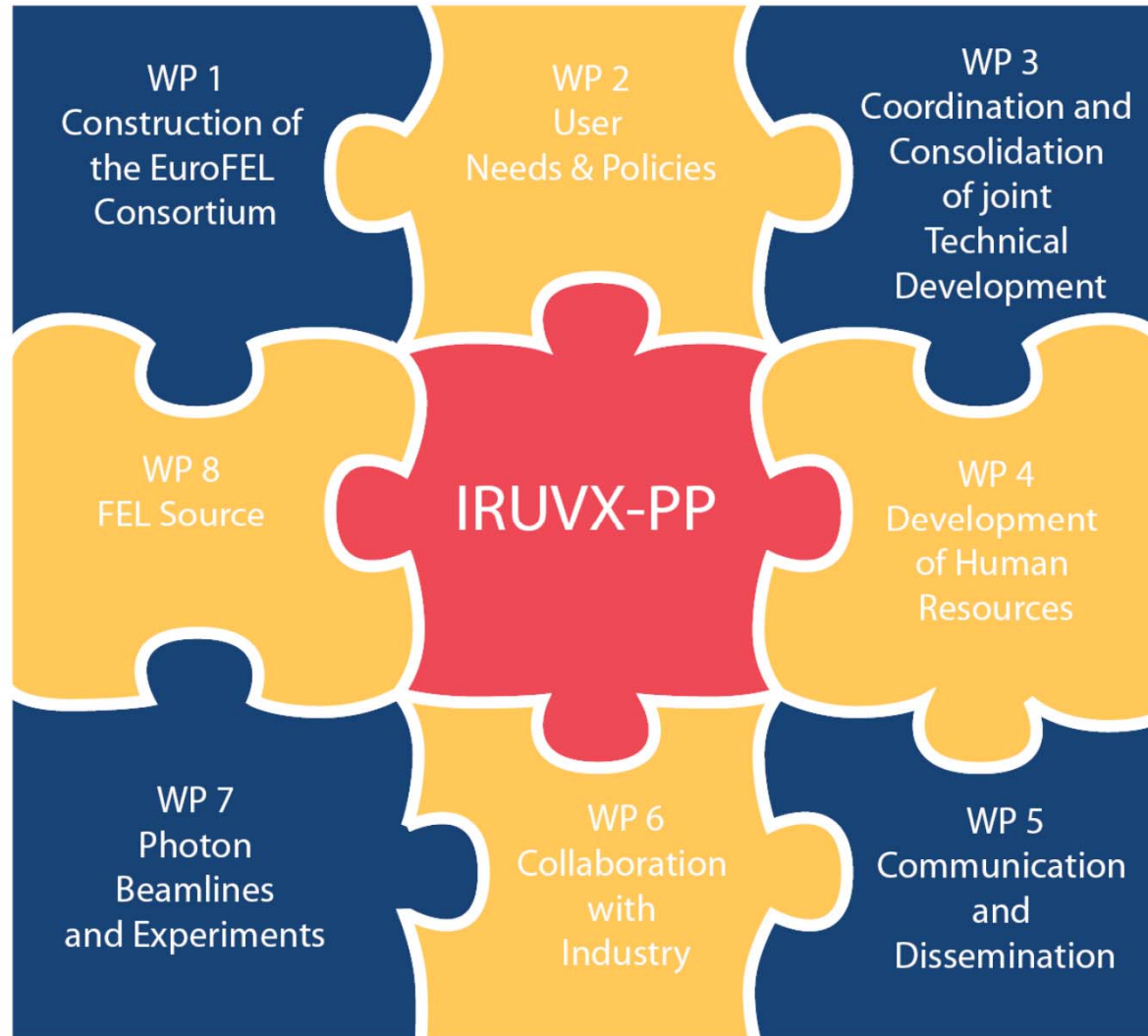


IRUVX-PP Overview

Work packages



Steering Committee

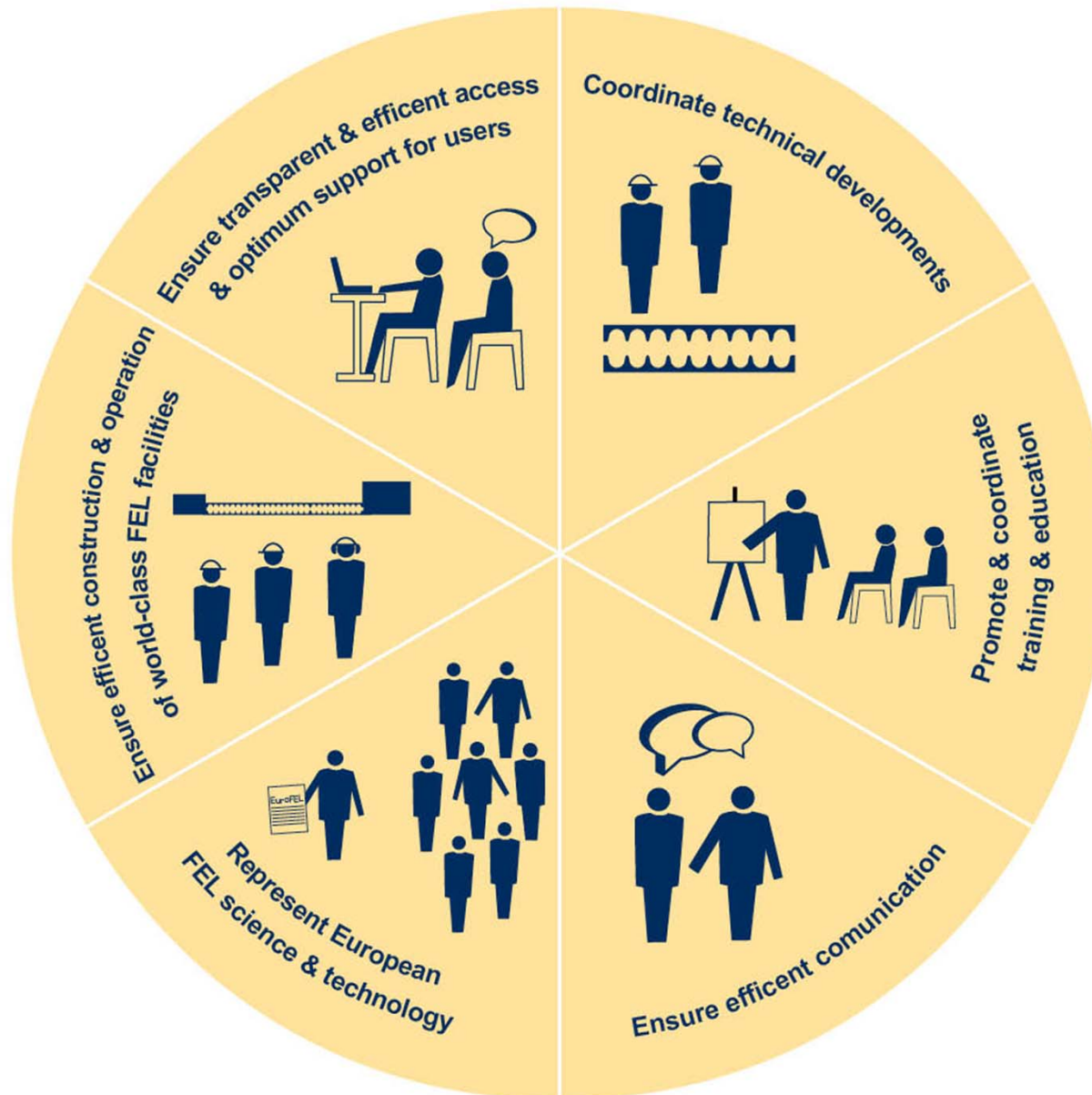


Task Force:
**“EuroFEL Consortium
- First draft -”**

**WP results
will be presented
tomorrow**

- EuroFEL will **integrate the national activities in Europe** to deliver a unique, distributed European research infrastructure of Free Electron Laser light sources. It will offer a set of complementary facilities to provide the experimental conditions needed by the large, multi-disciplinary FEL user community.
- **Coordinated research and development** of relevant technologies and **joint efforts in education and training** will make optimum use of resources and know-how and will maintain the EU's technological infrastructure at a world-class level.
- EuroFEL will **involve all of the European stakeholders** in FEL science and technology. It will allow them to join forces in a coherent programme and to **speak with one voice** on matters affecting us all.

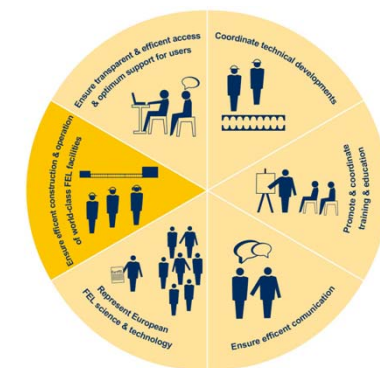
Core Activities of EuroFEL



- 1. Promote the development, construction and operation of complementary, world-class FEL or short-pulse facilities for multidisciplinary research with open access**
- 2. Ensure transparent and efficient access and optimum support of users**
- 3. Coordinate technical developments**
- 4. Coordinate training and education**
- 5. Ensure efficient communication, external and internal**
- 6. Represent European FEL science and technology**

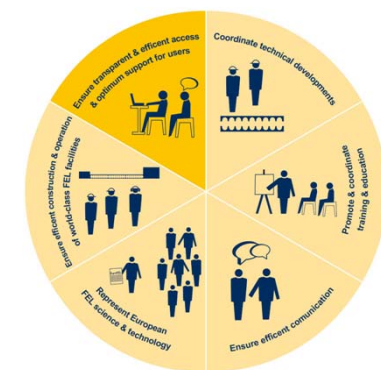
1. Promote the development and construction of state-of-the-art FEL and SPS facilities for multidisciplinary research with open access

- 1.1 Promote the construction of complementary, state-of-the-art FEL and SPS facilities requested by a multidisciplinary user community
- 1.2 Ensure state-of-the-art operation of all FEL and SPS facilities



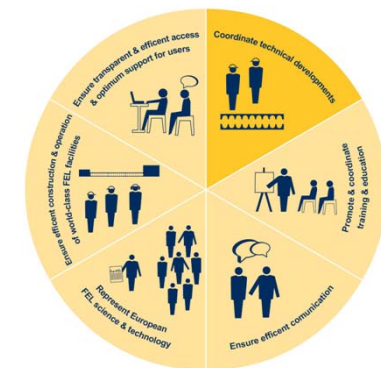
2. Ensure transparent and efficient access and optimum support of users

- 2.1 Offer a common information and guidance portal for the FEL user community
- 2.2 Coordinate and harmonise application and information on proposals at the participating infrastructures
- 2.3 Provide a platform for joint coaching and training of new users
- 2.4 Develop a common user strategy and outreach to users



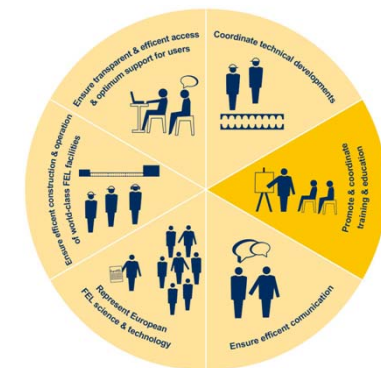
3. Coordinate technical developments

- 3.1 Develop a strategy for & coordinate future technical developments
- 3.2 Initiate and support expert groups and centres of excellence and the exchange of staff
- 3.4 Support coordinated use of test facilities
- 3.5 Support collaboration with neighbouring communities and industry



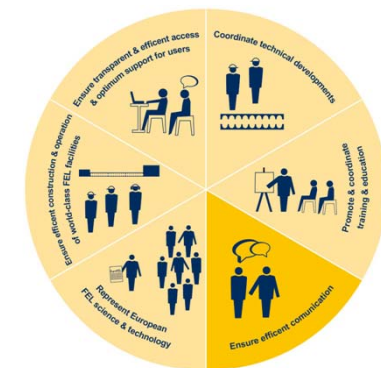
4. Coordinate training and education

- 4.1 Promote and coordinate training of technical and supporting staff
- 4.2 Promote and coordinate training of students and early career staff and summer schools
- 4.3 Support the attraction and exchange of staff



5. Ensure efficient communication, external and internal

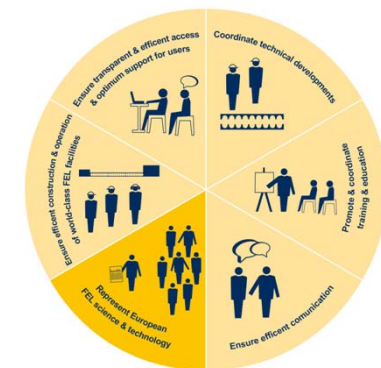
- 5.1 Communication with funding agencies, politicians, media and the general public on the EU level
- 5.2 Communication with industry
- 5.4 Communication with related technical and scientific communities



6. Represent European FEL science and technology encompassed by the consortium

6.1 Provide scientific and technical expertise and expert opinions

6.2 Initiate and respond to policy initiatives



Definition by ESFRI (see ESFRI roadmap 2008):

- A European distributed infrastructure, as recognised by ESFRI, is a *singular* research infrastructure, having a *unique Name* ✓ and *legal status*, *Director or board of directors* ✓, *Management Structure* ✓, *Strategy and Development Plan* ✓, *Access point for users* ✓, *Annual Report and Fiscal address* although its research facilities have multiple sites.

⇒ reflected in the planned organisational structure

- A European distributed infrastructure has to have a *pan-European interest*, i.e. *unique laboratories* or facilities rendering services for the efficient execution ✓, with critical mass ✓, of top-level Community research, ensuring *open access* to all interested researchers based on scientific excellence and on the quality of the user proposals ✓, creating a substantial added value with respect to facilities with a more limited scope. ✓
- A European distributed infrastructure must bring significant improvement in the relevant scientific and technological fields, establishing a common standard and metrology of the technical offer in all sites, and addressing a clear integration and convergence goal of the scientific and technical standards offered to the European users in its specific field of science and technology. ✓

⇒ covered by the Core Activities of EuroFEL

ERIC as legal framework?

- Adopted in June 2009
- Complication:
The members are the governments
- Still problems with implementation in MS (e.g. Germany, Switzerland)

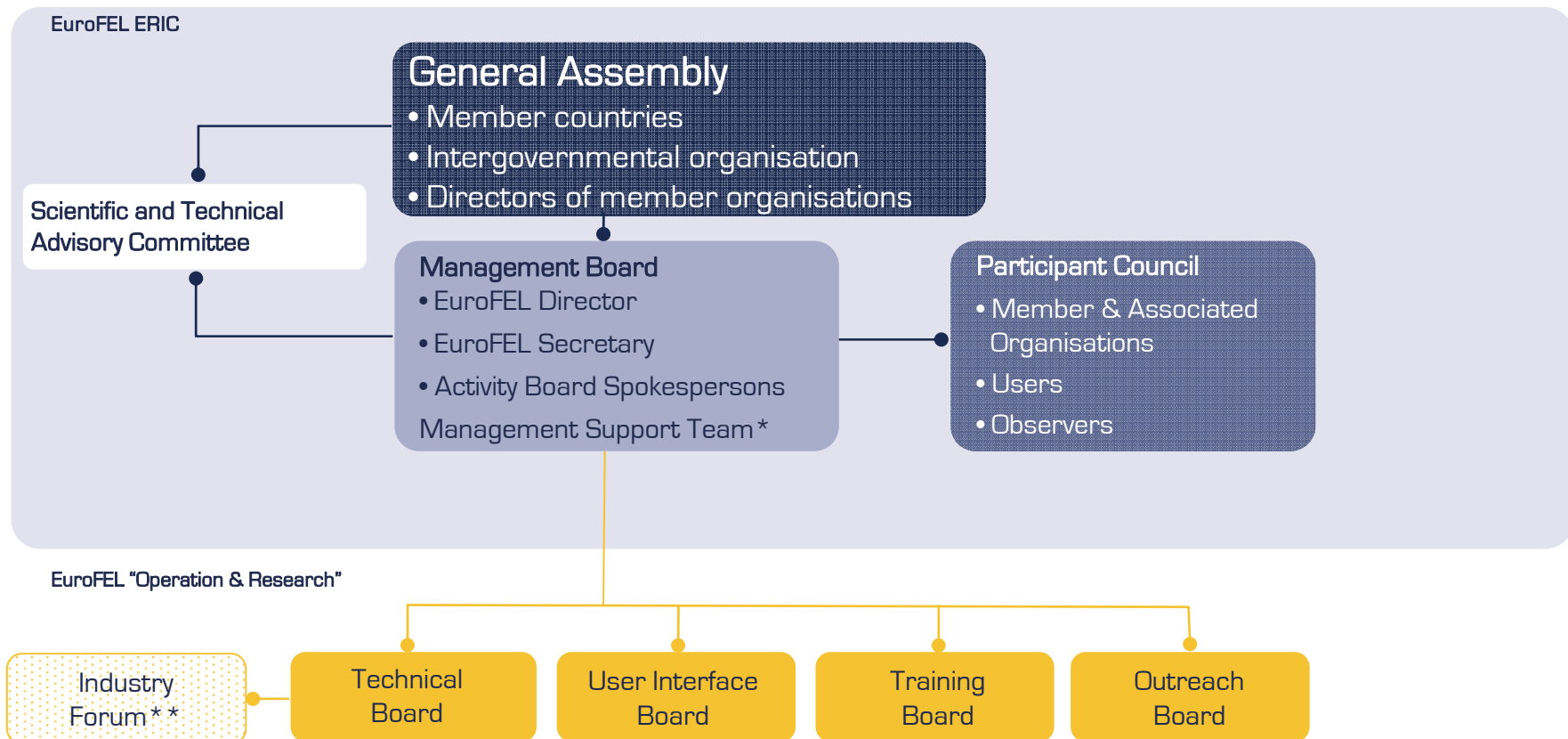
An abstract graphic showing a bright blue light source, possibly a laser or particle beam, with a grid of lines and a circular pattern, suggesting a scientific or technological theme.

COMMUNITY LEGAL FRAMEWORK FOR A EUROPEAN RESEARCH INFRASTRUCTURE CONSORTIUM (ERIC)

COUNCIL REGULATION (EC) No 723/2009 of 25 June 2009

1. Flexible framework offered by EC
2. Expectation of future financial support
3. Fiscal advantages
4. Underlines the pan European character
5. Stronger coordinating effect than a network
6. Better supports the realisation of the RI as a whole

Organisational structure



** Through which industrial partners meet and express their needs and receive direct communication by paying a fee to EuroFEL

* **Management Support Team**

- Secretariat
- Communication person
- Webmaster
- Industry Contact person

EuroFEL Statute

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Preamble

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- Art. 32. Disputes
- Art. 33. Entry into Force

Definitions

References

DRAFT

Statute of the European Research Infrastructure Consortium EuroFEL (EuroFEL ERIC)

PREAMBLE

- The Government of the Federal Republic of Germany
- The Government of the Italian Republic
- The Government of Kingdom of Sweden
- The Government of Swiss Confederation
- The Government of the United Kingdom of Great Britain and Northern Ireland
-
-

HEREINAFTER

referred to as the Parties

CONSIDERING their respective interests in the field of Free Electron Lasers and accelerator driven short pulse facilities;

DESIRING to establish a close coordination among their national Free Electron Lasers and accelerator driven short pulse laboratories in the framework of a distributed European facility (EuroFEL) for Pan-European use in order to fully exploit the complementary features and expertise of the Parties installations, including Regional Partner Facilities, as well as to maximize the benefits for both the Parties and the external users;

DESIRING to implement structures and working methodologies of their facilities in order to allow efficient construction and operation of EuroFEL facilities as well as to

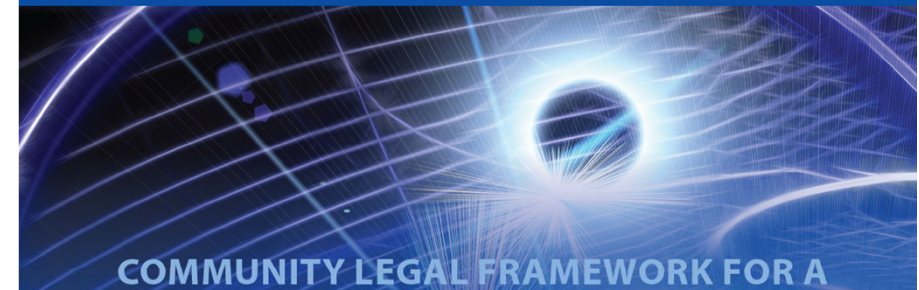
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1. Membership Criteria for New Parties
2. Core activities of EuroFEL
3. Organisational Structure
4. Scientific and Technical Advisory Committee (STAC)
5. Operation of EuroFEL as distributed Research Infrastructure with pan-European access
6. Users Access
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12. Principles for financing consortium activities
 - Financial Rules
 - In-kind Contributions
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Annex: Model contract for R&D projects

ERIC as legal framework?

- Adopted in June 2009
- Complication:
The members are the governments
- Still problems with implementation in MS (e.g. Germany, Switzerland)



COMMUNITY LEGAL FRAMEWORK FOR A EUROPEAN RESEARCH INFRASTRUCTURE CONSORTIUM (ERIC)

COUNCIL REGULATION (EC) No 723/2009 of 25 June 2009

- Directors' meetings:
25-26 Nov 2010 (PSI), 25 Feb 2011 (DESY); TelCo 04 Feb 2011
- General MoU as framework for continued collaboration
- European XFEL included as partner
- MoU based on IRUVX-PP “core activities”
- SC consisting of facility directors or their representatives
- 1st SC meeting in May (?) to decide on activities, financing, structure
- Appendices to MoU for individual activities => *meetings tomorrow*
- Vision:
establish a strong “Collaboration of European FEL and SPS Facilities”,
seen as a coherent entity, in close contact with lasers and synchrotrons,
and the science community

Joint technical activities

Questionnaire, ranking by MAX-lab, STFC, PSI, DESY

	Activity	1	2	3	4	5	D
1	High QE, long lifetime photocathodes		1		2	1	
2	High gradient, accelerating structures and peripherals		3		1		
3	Electron beam diagnostics		4				
4	Joint undulator development (In-vacuum, superconductive, multi-wavelength)		4				
5	Laser/Seeding (HHG etc.)		3	1			
6	Concept for attosecond FELs		1	2	1		
7	Beamline optics for FELs		2	1			
8	Metrology of optical components		2	2			
9	Damage studies of FEL relevant optics		1	3			
10	Photon diagnostics		1	3			
11	Readout electronics and software		1		1		
12	Simulation software (3D LSC, CSR, wavefront propagation, etc.)		2		1		
13	Joint test beamline			1	2		
14	Fs-timing and synchronization for pump-probe experiments on FEL accelerators		4				
	further suggested technical collaborations:						
	RF source developments		1				

1: very important, is part of our current RTD plan, no collaboration needed or wanted

2: very important, is part of our RTD plan for the next 2-3 years,
significant own resources, collaboration welcome

3: necessary development within the next 3 years, little own resources, collaboration needed

4: less important but beneficial for us, interested to collaborate

5: no interest in topic or collaboration

Joint training, communication, etc. activities

	Activity	1	2	3	4	5
1	White paper on the European FEL landscape in 2020 - FEL science & infrastructures in EU		3		1	
	Joint Training Activities					
2	Joint FEL Machine Schools for PHD and Postdocs (like MC-FEL proposal)	2	2			
3	Joint FEL Photon School for PHD and Postdocs (like MC-FEL proposal)	1	3			
4	Joint User Experiment School for PHD and Postdocs (like MC-FEL proposal)	1	2	1		
5	Joint FEL Introduction Courses based on FEL book by A. Lindblad	1	1	1		
6	Joint FEL Summer School for students	1	2		1	
7	Joint Management Schools for PhDs and Postdocs (like MC-FEL proposal) on e.g. project & self management, intercultural team work, writing, CVs		1	1	1	1
8	Courses on softskills together with joint technical/scientific workshops		1	1	1	1
9	Training courses for engineers	1	2	1		
	Communication/Outreach activities					
10	EuroFEL website	3	1			
11	Central user portal	1	1	1	1	
12	Brochure "What is EuroFEL"	2	1	1		
13	Brochure "Research opportunities at FELs"	2	1		1	
14	Brochure "What is a FEL"	1	2	1		
15	EuroFEL quarterly newsletter	1	2	1		
16	Lobbying event in Brussels for politicians and stakeholders	1	2	1		
17	Presentation on FEL conference 2011, Shanghai	1	3			
18	Presentation on ESOF 2012, Dublin		1	1	1	
19	Tour with journalists to FEL facilities & partners		2		2	
20	Joint industry workshops e.g. μ TCA electronics	1	1		2	
	Further suggestions:					
PSI	EuroFel Workshop: Quantum optics at an XFEL (fundamental research) see details in word	x				
PSI	Training on how to collaborate with Industry (legal framework and procedures) for scientists and engineers	X				
PSI	Training on IPR for scientists, including using patent research in preparation of scientific project		X			



- IRUVX-PP almost completed
- We know much better
 - why we want to collaborate
 - in which areas we want to collaborate
 - how we can organise our collaboration
- IRUVX-PP partners and European XFEL agree to establish jointly a strong European Collaboration of FEL and SPS facilities => MoU
- The first step will be a number of activities under the new MoU, initially with little external funding
- FP8 funding schemes will help supporting and structuring EuroFEL

**Thank you,
HZB,
for hosting the Annual Meeting!**