



## **IRUVX-PP**

*Preparatory phase for the EuroFEL  
(ex-IRUVX-FEL) consortium*



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Authors:	A. Wrulich
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# IMPACT of EuroFEL

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*A. F. Wrulich, May 18, 2011*

## 1. Introduction

It is widely recognized that knowledge in general and scientific knowledge in particular is the basis of competitive, modern economies and that the existence of and access to leading research infrastructures plays a key part in maintaining Europe's competitiveness in research and innovation. Research in curiosity-driven science is also an important driver for technological innovation and economic success. In this context, Research Infrastructures play a clear socio-economic role by generating discoveries and opportunities for new industrial applications. FEL science is an extremely demanding environment in terms of the development of high-tech equipment and generates novel technical approaches That might create significant benefits for many research disciplines such as medical technology, life sciences or instrumentation and ultimately the society.

Due to the international character of EuroFEL, its large scale and the commitment of the EuroFEL partners to strongly cooperate within the EuroFEL project, substantial impacts can be anticipated which are of general societal nature and lead to benefits being created for the EuroFEL partners:

The key success factors for these positive impacts are the stated objectives of the EuroFEL project:

- To develop a common user platform providing support for access of European users, including EU wide unique user identification; in the first. prototype phase, the platform is intended for the FEL user community. In the second phase, the tool will be extended to the full photon / neutron facility user community.
- to integrate their national FEL laboratories into one distributed European FEL facility for Pan-European use in order to fully exploit the complementary features and expertise of the partner facilities;
- to implement structures and working methodologies of their facilities in order to allow efficient construction and operation of EuroFEL facilities as well as to prepare critical technology thus ensuring that all the partner facilities will be exploited with highest efficiency;

- to optimize the cost-benefit ratio through the coordination of activities and efficient use of the resources of members;
- to identify and tackle common scientific and technical challenges;
- to support the joint training of scientific and technical personnel and to establish common training concepts;
- to ensure efficient internal and external communication
- to advance the transfer of its scientific and technological results through an active collaboration and the transfer of intellectual property to industry.

The above stated mission will create different types of impact as direct and indirect contributions to the development of the regions and societies where partner facilities are located and to the performance of the single partner facilities as well as on the performance of the Consortium as a whole. The effects can therefore be grouped in:

- **Societal Impact:**
  - are direct and indirect impacts on economy and capacity building
- **Impact on EuroFEL partners:**
  - are impacts on EuroFEL as a whole and the benefits created for the EuroFEL partners.

## 2. Societal impact

There is a pure economic impact, which is the direct impact of the expenditure, the indirect impact of stimulated additional activities of suppliers and the induced impact by spending of employees and suppliers. Societal impacts are also generated by capacity building in form of contributions of EuroFEL to the human capital in terms of education and training.

European companies will profit from this collaboration which is also a unique chance for them to stay at the forefront of technological developments and remain competitive in the global market.

EuroFEL will stimulate and better control the knowledge generation process and its transfer to industry. The more effective interaction with the industry will lead to new products and consequently to the opening of new markets. Furthermore the concentrated R&D and procurement activities of the EuroFEL partners will increase the attractiveness of the accelerator market for industry. Own investments of the companies will be justified by the size of the accelerator market. The new competencies gained will benefit the companies in this new

market as well as in their traditional markets. Contributions to companies commercializing the innovations (spin-off companies) will be made.

In the long term, major societal impact can also be expected by the advances in science originating from the experimental results of the high performance facilities. The understanding of biological processes at the molecular level will lead to new methods for curing diseases and better pharmaceutical products. New products, new materials and new drugs can be expected in the long run from research with Free Electron Lasers and Short Pulse Facilities.

Although the benefits of these actions are immediately obvious, it is difficult to quantify them. Mechanisms have not been identified yet, and methods have not been fully developed to evaluate the socio-economic impact of scientific accelerator projects.

### **3. Impact on EuroFEL partners**

The implementation of EuroFEL will promote the research field of Free Electron Lasers (FEL) and Short Pulse Facilities (SPF). It will strengthen the leading role of Europe in this scientific area and enhance the attraction of researchers to this field.

In addition there are direct and indirect impacts that the EuroFEL project has on strengthening research capacities in the collaborating labs and in Europe in relation to the objectives of the European Research Area net and EU 2020 vision. Major political, scientific and economic impact for the EuroFEL partners is expected by the envisaged joint actions originating from the commitment of the EuroFEL partners to strongly cooperate within the EuroFEL project.

#### **3.1 Impact overview for the partner facilities**

In comparison to the societal impact, the impact on the development of research infrastructures, generated by coordination effects and strategy actions is self-evident. The impact of EuroFEL on the partner facilities will be immediate economic effects and an enhancement of excellence which in a long term will also have an economic repercussion.

Major impacts and direct economic benefits for the EuroFEL partners are generated by:

- structural effects
- joint activities
- support and services provided by the EuroFEL team

### **3.2 Structural effects**

By improving the visibility of the science a corporate identity will be created for EuroFEL having significant political influence. It will be a strong discussion partner for science policy which will open new opportunities in the interaction with the EU and in this way also potentially improve the national funding situation. It is a chance for Europe to lead this scientific field and become an attractive place for researchers. As an EU-wide organisation it will lead to higher quality service to the research community. Fundamental science and accordingly the exciting field of short pulse generation and their scientific exploitation will attract students to enter this field. A centralized participation in EU programmes can be envisaged.

### **3.3 Joint activities**

Joint technical developments will be pursued, leading to a quality enhancement and an acceleration of the production process. Higher resource effectiveness will be reached through sharing concepts and ideas and introduction of common standards. Technologies and their key characteristics will be identified and the future FEL requirements analyzed. A central organization of training will complement and extend partner activities. A centralized outreach programme will satisfy and enhance the public interest, creating in this way a higher acceptance for FEL activities. Dissemination activities will improve the internal and external information exchange. Contributions to capacity building by intensive exchange of know how and expertise are expected. A coordinated and therefore more effective interaction with the industry will be established. Joint procurement and contracting activities of the partners increase the volumes and thus reduce the risks and the fixed costs for the industrial partners leading to more competitive pricing being offered to the partner facilities.

### **3.4 Support and services**

Will avoid duplication of expertise and infrastructure to the benefit of all partners.

## **4. Impact for the partner facilities resulting from the joint core activities of EuroFEL**

### **4.1 Coordination of User Affairs**

The enhanced political visibility of the science will create a FEL user corporate identity. Representing FEL/SPS user interests towards those determining science policy and strategy will become easier and the interaction with neighboring research fields will be improved.

In addition, benefits for the partner facilities will result from:

- improved EU-wide access to new potential users
- central access portal (Umbrella); a central portal for FEL users
- pool of referees
- high potential for novel possibilities based on the new system
- federated EU user data base
- improved user friendliness and minimized administrative overhead
- avoiding multiple applications
- synergies due to evaluation standards
- expert support for novice users (coaching)
- potential funding of transnational user access

### **4.2 Joint technical developments**

The sharing of concepts will lead to standardization and consequently higher effectiveness. It will enhance the quality and shorten the realization time for new developments. Key technologies will be evaluated and new technologies promoted. Also here, the stronger identity will improve the fund raising capabilities.

In addition, benefits for the partners will result from:

- identification of key technologies
- provision of a portal for collaboration support
- provision of web based tools for the coordination of the collaboration
- support for setting up the basic organization
- support for following up the process
- monitoring of overlapping areas of all development projects

- support for applications to the EU
- active fund raising for collaborative activities
- provision of web based tools for the execution of joint projects
- recognised support for partner fund raising will be given

### **4.3 Joint training and education**

A central organization of training will avoid duplication of activities and will reduce the workload for the partners. EuroFEL will be an attractive, centralized contact for students and its strong identity will enhance fund raising capabilities for joint training activities.

In addition, benefits for the partners will result from:

- exchange of personnel working on FEL design
- organization of training courses and workshops
- training of FEL/SLS operators (exchange of know how and experience, sharing best practice, standardization of concepts, equipment, operation tools)
- raising interest for students to enter the field
- advising workshop organizers on emerging technologies, new developments, key issues of the field
- generation of additional funding for the activities
- organize staff training by exchange of personnel: will lead to a standardization of software tools and also improvements in measurement equipment
- organize joint training for software developers

### **4.4 Strengthened relations with industry**

EuroFEL will also enable a much more efficient collaboration with industry by providing a central point of contact and a long-term strategy. It will be an attractive and powerful partner for industry, strong partner for the development of new key-technologies, will combine the interest of all partners and speak with a single voice to industry. This will be essential for the development and commercialization of cutting edge technologies that are required for the construction of the new facilities.

Technologies and their key characteristics will be identified and the future FEL requirements analyzed. New technologies will be opened to new application



domains. Developments of standardized systems for FEL/SPS facilities will be initiated with industry. Common procurement within joint developments or expert teams, or even beyond that, will bring financial advantages.

In addition, benefits for the partners will result from:

- negotiation of competitive contracts with industry
- coordination of developments having wider application with industry
- construction of a data base for qualified and approved suppliers

#### **4.5 Dissemination and outreach activities**

Improved information exchange will ensure efficient dissemination of know-how. Outreach activities to satisfy and enhance public interest will lead to higher acceptance for FEL activities and consequently influence the funding situation. A centralized interaction with neighboring fields will improve the development of overlapping areas. Complementarities will be enhanced by intensive exchange of information.

### **5. Conclusions**

Benefits for the partners are generated by strategic actions, coordination, support and services.

Specifically, the EuroFEL Consortium will improve cost efficiency for the members and the user community, and open new opportunities in the interaction with the EU. It will act as:

- **Science driver:** by enhancing quality and making new developments available to all partners;
- **Economic driver:** by solving technology challenges faced during construction and operation that is exploitable in other areas;
- **Societal driver:** by pursuing an effective approach to education and training and attracting students. The developments with FELs for the benefit of humanity (eg: medicine) will be enhanced;
- **Political driver:** by increasing visibility and enhancing international activities.
  
- The advantages for EuroFEL Partners will be:

- **Economic benefits:** resulting from joint activities and joint developments that will lead to standardization and shorter realization times; furthermore by acquiring additional funds for joint programmes;
- **Enhancement of excellence:** joint training and joint developments will lead to better solutions;
- **Widening of expertise:** by improved dissemination that brings scientists closer and promotes the exchange of ideas;
- **Improved funding situation:** by joint outreach activities that will satisfy and enhance public interest and increase the acceptance of FEL/SPS projects;
- **Support and Services:** for joint collaborations, interaction with industry, user support