

HORIZON 2020  
RESEARCH INFRASTRUCTURES

H2020-INFRAIA-2014-2015  
INFRAIA-1-2014-2015 INTEGRATING AND OPENING EXISTING NATIONAL AND REGIONAL RESEARCH  
INFRASTRUCTURES OF EUROPEAN INTEREST



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*LIST OF ACRONYMS AND ABBREVIATIONS*

EEN	Enterprise Europe Network
NuPIA	Nuclear Physics Innovation

## *INTRODUCTION*

### **Foreword**

In reference to subtask 2.1: Bridging, the University of Warsaw had prepared the workshop “Nuclear Physics Research-Technology Coaction” on 11-12 October 2018 in Warsaw, Poland at the Heavy Ion Laboratory of the University of Warsaw and “Nuclear Physics Innovation” brokerage event for scientist and industry, which was supported by Enterprise Europe Network in the same days. The second workshop “Nuclear Physics Research-Technology Coaction 2” was held on 6-8 November 2019 in Seville, Spain. Like in Warsaw, the workshop “Nuclear Physics Innovation - Sevilla” brokerage event for scientist and industry was supported and prepared by Enterprise Europe Network. The main goals of brokerage workshops and meetings were future cooperation with main actors from the nuclear industry on the basic research level, research, and development level. Future cooperation with companies from the medical sector is foreseen on radioisotopes, radiopharmaceuticals and medical devices. Future cooperation is foreseen with companies, which produce tools and equipment for nuclear science. This requires identification of enterprises from the end-user side and establishing cooperation with them as the main actors of the commercial network. In addition, it is the aim to create various forms of cooperation in production with business partners (commissioning of production, co-production, construction of complete research tools and devices).

### ***SECTION 1 NUCLEAR PHYSICS RESEARCH-TECHNOLOGY COACTION - WARSAW***

The University of Warsaw organised the workshop “Nuclear Physics Research-Technology Coaction” on 11-12 October 2018 in Warsaw, Poland at the Heavy Ion Laboratory of the University of Warsaw. The workshop “Nuclear Physics Research-technology coaction” made room for Laboratories-Industry meeting. Keynote speakers from nuclear physics research centres and technology companies presented the current state of the art in research techniques and proposed commercial solutions. Achievements of both fields were presented to attract prospective customers and collaborators. During the workshop, the directions for improvement of methods for transfer technology between laboratories and industry were discussed.



Picture 1. Nuclear Physics Research-technology coaction - Warsaw

Twenty speakers participated in the event. The workshop had 40 participants from seven countries: Czech Republic, France, Italy, Poland, Russia, Spain and Germany. During the workshop, an exhibition of companies from selected enterprises was organised as well.

The workshop allowed to present recent achievements and challenges in the following areas:

- Medicine
- Radiopharmaceutical production
- Detectors and nuclear instrumentation
- Computation and information technology (Big Data application, data analysis)
- Energy and environmental technologies
- Radiation
- Lasers
- Numeric machine tools and 3D printing – services
- Metallurgy
- Collaborative research, innovation networks, technology transfer

A brokerage event meeting was organised simultaneously by the Enterprise European Network (EEN) in the same place, which allowed to bring more companies to both workshops.

The promotion of NuPIA workshop and EEN brokerage meetings was made through the NUPIA website and the Enterprise Europe Network.



### **Nuclear Physics Innovation - brokerage event for scientist and industry - Warsaw**

The brokerage event at Nuclear Physics Innovation brings together scientists and companies (buyers as well as suppliers) from a large number of European countries. This is a unique opportunity to generate new cooperation contacts and contracts. Meetings took place in a dedicated area and were arranged in advance by means of this website.

The companies and scientists participating in the brokerage meeting had the opportunity to present product, services and research achievements during the workshop "Nuclear Physics Research - Technology Coaction"

The nuclear physics laboratories had the chance to establish links with international industry and SMEs. The goal of brokerage event was to create a strong network of laboratories and industrial partners in a close relation of all them (better knowledge of the existing facilities for beam industrial users, wider market for technology transfer possibilities).

The forum explored recent achievements and challenges in the following areas:

- Medicine
- Radiopharmaceutical production
- Detectors and nuclear instrumentation
- New space instruments
- Computation and information technology (Big-Data application, data analysis)
- Energy and environmental technologies
- Radiation
- Lasers
- Numeric machine tools and 3D printing services
- Metallurgy
- Collaborative research, innovation networks, technology transfer

The brokerage event was open to any of the following players willing to set up collaborations with foreign partners and access to Innovation Nuclear Technology and new markets:

- Companies,
- Universities and research institutions, laboratories,
- Government representatives, policy makers, first responders,
- Clusters,
- Investors,
- Organisations & services

The event targeted a wide spectrum of laboratories, universities, power-plant companies, medicine and pharmaceutical industry, space industry and beyond to foster the creation of technology transfers, collaborative research, innovation networks and innovation activities.

The brokerage event created opportunity for laboratories and industry to:

- Enter into contact with potential partners for future co-operation
- Meet providers of innovative technologies from throughout Europe and beyond
- Establish cross-border contacts for long-term business relationships
- Find new partners for research projects
- Use the event to initiate new businesses

### **Nuclear Physics Research-technology coaction 2 – Sevilla**

The workshop was organised by the Heavy Ion Laboratory of the University of Warsaw, the Centro Nacional de Aceleradores (CNA) laboratory as part of the Nuclear Physics Innovation ENSAR2 (NuPIA-ENSAR2) activity. During the workshop, brokerage meetings were organised by DELab UW Enterprise Europe Network and Agencia Andaluza del Conocimiento - Junta de Andalucia Enterprise Europe Network.

The event was directed to scientists, technologists, laboratories and companies dealing with nuclear physics and related technologies. The latest technologies such as accelerators, particle detectors, vacuum systems, electronics, data processing, isotope production, irradiation, PET imaging, dosimetry, environmental radioactivity, radiation therapy, and proton therapy were presented during the workshop. The main goal of the workshop was to intensify the process of technology transfer, research and development cooperation as well as scientific and innovative activities, and above all:



- Present the latest scientific achievements in the field of nuclear technologies that can be implemented in industry.
  - Demonstrate industry achievements in the field of new equipment and tools that can be used in nuclear research.
  - Identify the needs for key nuclear technologies for innovative products, processes and services.
  - Organise broker meetings to facilitate networking, cooperation and exchange of ideas between research laboratories and companies in the field of nuclear physics.
  - Discuss the existing sustainability gap and priorities to optimise research and technology efforts.
- Discuss the challenges and opportunities in new areas of science and industry as well as activities to intensify cooperation of laboratories and industry in the area of developing European innovative products, processes and services based on nuclear technologies.

During the workshop, 25 presentations were given focusing on aspects of cooperation between science and industry. Laboratory presentations were presented, with particular emphasis on research infrastructure and services offered to industry, scientific presentations on new discoveries that may lead to or require new industrial products, company presentations on new products that may be useful in current research, presentations of successful cooperation between research institutions and industry. (Agenda: <https://www.ensar2-nupia.eu/workshop-sevilla>).

Representatives of the following workshops and brokerage meetings:

- Laboratories, research centres: ENRESA, CEA, CSIC, CNA, FLNR JINR, GANIL, HIL UW, IFC, IPNE, LNL, UCM, UM, USC.
- Industry: ANTEC Magnets, AVS, DVC, ELI Beamlines, ELYTT ENERGY, INEUSTAR, Nucleopolis, SUPRASYS, TTI NORTE.



Picture 2. Nuclear Physics Research-technology coaction 2- Sevilla

During the workshops, a discussion panel on laboratory-industry cooperation was conducted. Below are the conclusions prepared by Marie-Helene Moscatello and Joaquin Jose Gomez Camacho and presented at the end of the workshop. These conclusions were included in the report.

*“We have had the second Nuclear Physics Research Technology Coaction workshop at the CNA Seville, along with the Nuclear physics innovation Brokerage event, from the 6th to the 8th of November of 2019. Overall, there were 36 participants, from 8 different countries, “24 talks were presented, from which 8 were from industries and 16 from laboratories and academic centres. Several B2B encounters events were established. Apart from numerous informal contacts, there was an open and frank discussion on the cooperation of scientists with industry in Europe. Some common ideas that came out of the discussion were the following:*

*Nuclear physics laboratories, by their own nature, are more fragmented than particle physics, fusion or space laboratories, which are often concentrated on a single European facility. The nuclear physics laboratories and research groups should present a common scenario of their technological requirements in terms of instrumentation that they require from industries, as well as the variety of services and technologies that they can provide for industries. In this way, they can have a more effective impact of the planning of companies, approaching to the impact that single facilities such as CERN, ITER or ESA have in related fields. This coordination is especially important for the smaller laboratories, which do not have the size to make them relevant to companies.*

*A common forum of the European industries, which interact with the nuclear physics laboratories, would facilitate the exchange of information and the interaction of nuclear researchers with industries. The scheme of the Spanish industry of science, INEUSTAR, which coordinates SMEs active on scientific facilities, is an adequate model that could be extended to Europe.*

*Taking into account the dynamic nature of the activities of the small and medium enterprises involved in the science industry, it is very important that the scientific projects of the nuclear physics research laboratories be implemented with more agility than presently. Delays associated with the decision process of the construction and upgrade of research facilities, volatility in the funding, as well as excessive regulations, hamper the interaction of nuclear researchers and industries, and diminish the mutual benefits of the collaboration.”*

### **Nuclear Physics Innovation - brokerage event for scientist and industry - Sevilla**



The international workshops "Nuclear Physics Research-Technology coaction 2" and brokerage meetings "Nuclear Physics Innovation" were held in Sevilla, Spain on November 6-8, 2019. Brokerage meetings were organised by the DELab UW Enterprise Europe Network and Agencia Andaluza del Conocimiento Junta de Andalucia.

Like in Warsaw, the brokerage event at Nuclear Physics Innovation brings together scientists and companies (buyers as well as suppliers) from a large number of European countries. This is a unique opportunity to generate new cooperation contacts and contracts. Meetings took place in a dedicated area and were arranged in advance by means of this website <https://nupinno-sevilla.b2match.io/>

Here also, the nuclear physics laboratories had the chance to establish links with international industry and SMEs.

During the workshop, 31 bilateral meetings (brokerage meetings) were organised between researchers and companies in which 23 participants took part (<https://nupinno-sevilla.b2match.io/>). The purpose of bilateral

meetings was to establish initial contacts that may or may not lead to further research cooperation and to intensify the transfer of innovative technologies.

## CONCLUSION

### Recommendations for future

- Workshops should be continued. Workshops should be organised in different places in Europe (i.e. as it was done as part of the NuPIA task - the first workshop took place in Warsaw and the second in Sevilla). Organising workshops in various places in Europe gives the opportunity for small and medium-sized enterprises whose range is local or regional and they are interested in cooperation at European level to participate.
- Workshops should be supported by an organised form of bilateral meetings. In this activity, NuPIA used the support of the Enterprise Europe Network managed by the European Commission. The synergistic operation of the NuPIA team and Enterprise Europe Network consultants is the proof of the possibility of achieving added value for this type of activity. We believe that such activities should be practiced.
- Workshops organised in laboratories give industry representatives an opportunity to familiarise themselves with the infrastructure of the given laboratory and the services offered. Such action is conducive to building awareness on the topic of nuclear infrastructure applications for industry.
- Workshops and brokerage meetings are very good activities enabling familiarisation with the achievements of laboratories and industry in the field of nuclear physics. This is conducive to establishing contacts and creates conditions for the construction of research and development consortia.
- Workshops and brokerage meetings are part of the so-called "Open innovation"[1,2], which we recommend as part of the D8.2 and D8.4 reports. In this model, one of the important factors affecting the success of an innovative product, process or solution is a greater number of interactions between participants of the innovation process, which speeds up processes related to technology transfer. Workshops and broker meetings are in this case an acceleration platform for innovative processes - in particular in terms of technology transfer from laboratories to industry.