Deliverable report

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TESTIMONIES FROM USERS OF TRANSNATIONAL AND VIRTUAL ACCESS (2ND RELEASE)

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Authors:	Laurent Ghys (STIS/BELSPO)

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1. EXECUTIVE SUMMARY

The production of testimonies of users of transnational and virtual access services (TVAs) provided by research (e-) infrastructures is a similar and complementary activity to the production of the videos and animations. They are aiming at producing promotion and dissemination tools for the use of the RICH network and each individual RI NCP to fulfill the objectives of WP4:

- increase the awareness of the scientific community, the industry and other thematic NCP networks on the TVAs opportunities offered by the (e-)RI, targeting particularly specific/less familiar user communities (SMEs, other thematic NCPs, RI in the SSH field);
- providing tools to the network and to individual to promote TVAs during events, infodays.

For the 2nd release, we have collected testimonies from :

- A user of the Bronowice Cyclotron Centre, granted access through the ENSAR2 transnational access activities;
- Two users of 2 different facilities, accessed via the SFERA II transnational access programme.

The testimonies can be accessed on the RICH website at http://www.rich2020.eu/rich-success-stories.

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2. INTRODUCTION

The production of testimonies of users of TVAs is one of the activities from WP4 Task 4.5 aiming at promoting the TVAs to the wide scientific communities, the industry and the other thematic NCPs. The testimonies target specifically specific user communities (SMEs, industry, SSH researchers), multipliers as the other thematic NCPs and less-known, less-used research (e-) infrastructures (SSH,…).

The testimonies are available online on the RICH website and ad hoc, on paper for dissemination/promotion at events/conference with a RICH presence.

4 questions to the users are shaping the testimony:

1. What is your main research interest? Briefly explain the aim of the project submitted to access the (e-) RI
2. Why did you choose this particular (e-) RI? How crucial is TVAs for your project?
3. What is the purpose of your research? Basic or applied research?
4. Describe shortly your impression on the visit/use of the (e-) RI and of the submission process.

A template to collect further user testimonies is available on the RICH intranet website.

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3. CONTENT SECTION

European Nuclear Science and Applications Research – ENSAR 2

Short description
ENSAR2 is the integrating activity for European nuclear scientists who are performing research in three of these major subfields: Nuclear Structure, Nuclear Reactions and Applications of Nuclear Science.

Its core aim is to provide access to eleventh of the complementary world-class large-scale facilities: GANIL-SPIRAL2 (F), joint LNL-LNS (I), CERN-ISOLDE (CH), JYFL (FI), ALTO (F), GSI (D), KVI-CART (NL), NLC (P), IFIN-HH/ELI-NP (RO) and to the theoretical physics facility: ECT* (I).

Website: http://www.ensarfp7.eu/

These accelerators provide stable and radioactive ion beams of excellent qualities ranging in energies from tens of keV/u to a few GeV/u.

Few Facts:

- ENSAR 2 is a project funded under the H2020-INFRAIA-01-2014-2015 call for integrating activities
- Duration: 01/03/2016 – 29/02/2020
- Budget: EUR 10M
- Coordinator: GANIL, Caen, France
- Contact: ensar@ganil.fr
- N° of partners: 30

Dr. Fabio Crespi, researcher from the Department of Physics of the University of Milan / Italian Institute of Nuclear Physics

Can you explain your main research interest and briefly describe the research project that you have submitted to ENSAR2?

My research activity is in the field of experimental nuclear physics. In general, the aim of our research is to understand the nuclear structure and the way the protons and neutrons interact inside the atomic nucleus. The advance of the knowledge in nuclear structure has also significant impact in related ones. For example, it has to be considered that more than 99% of the mass of visible matter in the universe is nuclear matter, that nuclear fusion reactions are the source of the energy provided by the sun and that nuclear fusion in stars and other nuclear processes at the end of stellar life have formed the variety of elements we observe in nature. However, experimentally, how do we probe the structure of such a microscopic object like a nucleus? A general way to learn about the properties of a system is to subject it to external stress and then observe its response. To this aim accelerated ion beams are necessary to overcome the coulomb repulsion and bring nuclei into contact. We can then observe the response of the nuclear systems we want to study by measuring the electromagnetic radiation that is emitted following the motion of the charged protons: these are the gamma rays. Detecting gamma rays emitted from excited states of nuclei can tell us about the energy, spin or angular momentum, parity and lifetime of the state. In addition they can give us information on the quadrupole moment, magnetic moment and shape of the nucleus.

Why did you choose this particular infrastructure? Explain how crucial it is for your project?

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In the case of this experimental program at the Bronowice Cyclotron Centre (in Polish - Centrum Cyklotronowe Bronowice, CCB) we are interested to study collective vibrational modes of the nucleus. The combination of proton beams and the detection setup that are provided here fits our need. The atomic nucleus is a quantum mechanical system that exhibits a fascinating variety of shapes and excitation modes. One of the most studied and better known vibrational modes of nuclei is the so called giant dipole resonance (GDR), originating by a collective oscillation of all the protons against the neutrons. Recently, a new kind of collective mode has been proposed in neutron rich nuclei, originated from the oscillation of the core of the nucleus (with an equal number of protons and neutrons) against the neutron skin (formed by the excess neutrons). This has been called the pygmy dipole resonance (PDR). Despite the relatively small strength exhausted by this mode (the name comes from this fact), the existence and the characteristics of the PDR have important implications. For example, the occurrence of such low-lying dipole strength plays an important role in predictions of neutron-capture rates in the r-process nucleosynthesis, and consequently in the calculated element abundance distribution. This research field is very active and new experimental data on the subject are highly demanded: the measurements done using the proton beams and the detector setup at the CCB combined with the measurements at other laboratories will definitely contribute to the understanding of the nature of the PDR mode. Nuclear vibrational modes of other multipolarities (like the giant quadrupole resonance, GQR) will also be studied. To this aim a very efficient detection system for high energy gamma rays (10-20 MeV) is needed and this is available here at CCB and there are not so many setups like this in the world.

What is the meaning of your research – purely basic or applied?

My research can be defined as purely scientific, in fact its aim is to understand the nuclear structure and the way the protons and neutrons interact inside the atomic nucleus. However, it has to be mentioned that major progresses in nuclear physics research have been often prompted by advances in radiation detection techniques. In particular for the case of nuclear structure studies the technological advance in the gamma spectrometers was of particular relevance. Historically, such novel technologies (initially developed with the only aim of pure scientific research) always found applications in different fields of social relevance. Let's think for example about the instrumentation for nuclear medicine (x-ray, magnetic resonance imaging and positron emission tomography) or radiation therapies for cancer treatment.

What is your opinion on the visit? Can you tell us also a bit on the practical details (submission process, arrangements for your visit,…)?

I am presently here at the CCB for the realization of an experiment that was proposed in close collaboration with researchers from the Henryk Niewodniczanski Institute of Nuclear Physics (IFJ PAN). The data taking is currently ongoing. However, it has to be mentioned that before this phase there is a time consuming preparatory phase that is crucial because we have to deal with complicated detection, electronics and data acquisition systems that need to be ready at the moment the proton beam is provided. This work was done in an excellent way by my colleagues from the IFJ PAN. The application procedure was very smooth and clear: I made a presentation in front of the Advisory Committee, explaining if the experiment is suitable for the equipment accessible in CCB, and answered questions that referees were asking. I am contributing now to the so called online analysis of the data that is crucial to obtain a first idea of the quality of the data we are acquiring and eventually to take some decision to change parameters in the experimental setup. However, the final results of the experiment will be obtained only after a subsequent offline data analysis that usually lasts for several months. Apart from the experiment realization itself, I would like to stress the

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importance of these visits also for the opportunity of having discussions with my colleagues with are scientifically productive in respect of clarifications of some aspects of our work and, most important, for prompting new ideas for the future activity.

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Solar Facilities for the European Research Area-Second Phase
SFERA-II

Short description	**Few Facts:**
The purpose of this project is to integrate, coordinate and further focus scientific collaboration among the leading European research institutions in solar concentrating systems which are partners of this project and offer European research and industry access to the best-qualified research and test infrastructures. **Website:** http://sfera2.sollab.eu/	- SFERA-II is a project funded under the FP7-INFRASTRUCTURES-2012-1 call for integrating activities - Duration: 1/01/2014 - 31/12/2017 - Budget: EUR 8.560.764,37 - Coordinator: CIEMAT, Almeria, Spain - Contact: Isabel Oller - access-sfera@sollab.eu - N° of partners: 12

Dr. Anton Meier (PSI)

Dr. Anton Meier was Head of the Solar Technology Laboratory at the Paul Scherrer Institute (PSI) until July 31, 2016 (now retired). He served as Operating Agent for Solar Chemistry Research of IEA's SolarPACES Program and as Coordinator for Solar Fuels within the CSP Joint Program of EERA (European Energy Research Alliance) and the EU-FP7 Programme STAGE-STE.

Can you explain your main research interest and briefly describe the research project that you have submitted to SFERA-II?

The main research interest includes high-temperature thermochemical processes for the production of solar fuels and energy-intensive materials.

Research project Solar2Zinc-3 submitted to SFERA-II: Following the technical demonstration with a 10 kW_{th} solar reactor prototype, a 100 kW_{th} solar pilot plant for solar thermal dissociation of ZnO has been designed, fabricated, and experimentally tested in two experimental campaigns in 2011 and 2012 (both partly funded by SFERA) at the 1 MW Solar Furnace (MWSF) of PROMES-CNRS in Odeillo, France. For the 3rd experimental campaign, conducted in September/October 2014 at the MWSF, the solar thermochemical reactor has been substantially modified in order to optimize the reactor performance and reliability. The goal of the 3rd experimental campaign (Solar2Zinc-3, partly funded by SFERA-II) at the MWSF was to demonstrate reliable reactor operation including aerodynamic window protection at very high temperature (up to 1800°C) and to optimize the reactor performance in order to reach a Zn yield exceeding 50% and a solar-to-chemical energy conversion efficiency approaching 10%.

Please select the infrastructure you requested access to: CNRS-PROMES*. Why did you choose this particular infrastructure? Explain how crucial it is for your project?*

The MWSF at Odeillo, France, is the only solar facility in Europe capable of delivering the necessary solar thermal power of 100 kW_{th} at high concentration (> 3500 suns), required to reach reactor temperatures exceeding 1700°C – a temperature that is requisite to drive the ZnO dissociation process. Furthermore, the MWSF provides horizontal beam irradiation, which allows operating the rotary reactor in its currently preferred horizontal position. We greatly value the experience obtained by performing on-sun experiments with our 100 kW_{th} solar reactor in the MWSF.

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What is the meaning of your research – purely basic or applied?

Successful demonstration and characterization of the 100 kW_{th} solar reactor pilot plant for thermal reduction of ZnO was finally achieved after nearly 15 years of intense fundamental and applied research and development. The results from this research extend the ability to store solar energy as a fuel – such as Zn, H_2, or syngas – in a manner that increases the chances of having a sustainable solution to the current world problem of being dependent on a limited supply of fossil fuels.

What is your opinion on the visit? Can you tell us also a bit on the practical details (submission process, arrangements for your visit,…)?

The stay at the PROMES-CNRS MegaWatt Solar Furnace (MWSF) in Odeillo was well prepared and supervised by skilled and helpful staff. Besides having access to the solar facilities, we very much appreciated the continuous availability of the staff at CNRS-PROMES, in particular the SISIA team lead by Emmanuel Guillot. We thank Emmanuel for his dedicated technical and administrative support, and both Jean-Louis Sans and Nicolas Boullet for their technical support and for operating the MWSF. We also wish to thank Marie Prouteau for her kind help with SFERA administration, travel arrangements and accommodation.

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Short description	Few Facts:
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Dr. Mindaugas Milieška

I am working in Lithuanian energy institute Plasma processing laboratory as a Senior research associate. The main research area of the laboratory is the development and research of DC plasma sources for wide range of applications. One of the applications which I am focusing is the plasma spraying technique which provides the opportunity to form and modify the constructional material surfaces. The other research area is the interaction between the plasma jets and substances in various plasma-technological processes.

Can you explain your main research interest and briefly describe the research project that you have submitted to SFERA-II?

As we are focusing on the formation of functional coatings the heat impact assessment of the formed coatings working in hostile environments is crucial. Especially, if it can be done in heating-cooling intervals. So I brought few samples of prepared coatings and tested their response to the heat treatment in steady heating and heating-cooling intervals. Before and after this research project we made some material analysis, testing and evaluation and tweaked our future research plans accordingly.
The second type of experiment I brought was the graphite waste, which was used as a moderator in NPP reactor, as the the inner part is 'clean' and may further be reused. The thermal resistance of this type of graphite is one of the main merits in further his employment. So, during the research project we measured the mass losses of the graphite after heating it in 600 ^{o}C – 2000 ^{o}C temperature ranges.

Please select the infrastructure you requested access to: CIEMAT-PSA. *Why did you choose this particular infrastructure? Explain how crucial it is for your project?*

The concentrated sun light provides the opportunity to test the heat resistance of the materials. One of the main advantages of this infrastructure which is important for us is that it doesn't pollute the samples with other materials and is environmentally friendly. The ability to control the temperature of obtained concentrated sun light in wide ranges is crucial to our research.

What is the meaning of your research – purely basic or applied?

Our research is applied because we are forming the functional coatings using plasma technology and the reuse of graphite is also practical.

What is your opinion on the visit? Can you tell us also a bit on the practical details (submission process,

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arrangements for your visit,…)?

The visit was very helpful as we obtained some valuable information about our samples. The submission process was very clear and fast. The staff at the PSA was very friendly, professional and appointed the whole week for our research. They arranged my trip and accommodation. So, the visit was real pleasure.

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