



WP11 NA – Innovation and networking activities

D11.21

**Final report on networking activity
programmes**

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Executive Summary

This report describes the main work carried out to date in the Networking workpackage (WP11). The main activities planned in the original NFFA concern:

- ORGANISATION AND DEFINITION OF A TECHNICAL LIAISON NETWORK TO ASSIST THE USER ACCESS TO THE NFFA FACILITY
- THE DEFINITION OF A PROPER NFFA-EUROPE BRANDING
- THE OUTREACH ACTIONS TO PROMOTE THE NFFA ACCESS AND IMPROVING THE VISIBILITY OF THE AVAILABLE RESOURCES AND OF THE MAIN OUTCOMES, BOTH FOR INDUSTRY AND ACADEMIA
- AN ADVANCED TRAINING PROGRAMME
- A COORDINATED SURVEY SPECIFICALLY DEVOTED TO DEFINE A SUITABLE METADATA SET FOR NANOSCIENCE

Furthermore, a set of extra activities will be reported in the domain of nanosafety and outreach for general public which were not specified in the original proposal, but that emerged as a strategic element for the success of the proposal during the mid-term review.

1. Description of the activities

One of the main aims of the networking activities (WP11) is to expand and enhance the services provided by NFFA-Europe by creating a robust dissemination programme, reaching out to science and industrial communities. A proper dissemination programme is crucial to enlarge and give visibility to the NFFA community and to the main NFFA achievements. This activity is promptly supported by Promoscience that provide branding tools and high quality supporting materials.

A key component of NFFA-Europe is the TLNet. It has multiple functions within the project organisation: a) it acts as the hub for users to optimally formulate their proposals and is in charge to guarantee an optimised and smooth access; b) it assists the ARP with the technical feasibilities; c) it is responsible for the planning and schedule. Furthermore, the TLNet also performs an important internal function by identifying the best ways to integrate the technical platforms into a consistent and clear user offer, and to transfer the best practices amongst the Partners to provide optimal services to users, but also an improved (technically, economically) management of resources within the consortium. The link to industry and use of the NFFA-Europe facilities by industry is an important component and concern. The industry and business development staff of the NFFA-Europe nodes works closely together with TLNet to develop market understanding, an effective awareness/marketing effort and provide an efficient access for industry. The outreach to industry is operated both at centralised level (mainly under the impulsion of the ESRF, task 11.5 leader), and by each node which has resources to perform its own proactive outreach to industry in its regional eco-system.

A training and mobility programme is also an important part of WP11. This allowed NFFA to organise 2 schools and a short term visiting programme that contributed to raise competence in the target user community. Last but not least, an important set of activities on metadata management contributed to collect from partners, analyse and synthesize the definition of the set of metadata finally implemented in the IDR. P.

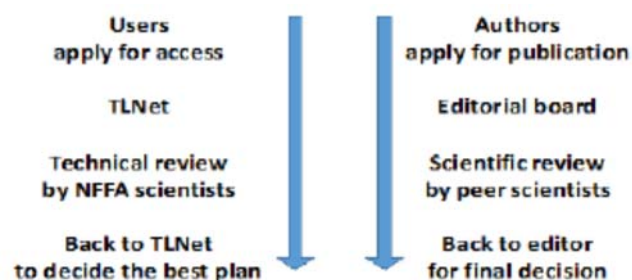
WP11 represents the 15% of the overall NFFA budget. The 46% of that budget is spent for activities related to dissemination/outreach, 11% for training, and the remaining 46% for activities related to the TLNet. Single Entry Point implementation and data sharing.

Task 11.1: Implementation of a Technical Liaison Network “TLNet”

The Technical Liaison Network (TLNet) coordinates the exchange of all the technical information needed for managing transnational access, and its task include:

1. TECHNICAL EVALUATION OF PROPOSALS
2. SET UP OF THE WORKFLOWS (SITES, TIME SCHEDULING)
3. TECHNICAL SUPPORT OF INEXPERIENCED USERS (ONE-STOP-SHOP)
4. TECHNICAL SUPPORT FOR INDUSTRIAL TASKS
5. CONTRIBUTE TO STATISTICS, FEEDBACK, METRICS, KPI
6. CONTRIBUTE TO DATA REPOSITORY
7. TAKE A LOOK TO METROLOGY ISSUES

The concept of the TLNet originates from the fact that the transnational access covers multi-technique, multi-site and multi-chance, meaning that the same research project can be carried out with different site-paths. The NFFA-Europe access is a complex system where decisions about what can be done, where and when, should be taken in a bottom up approach. For this motivation the TLNet approach reproduces the peer review mechanism of scientific publishing:



At the initiation of the TLNet activity, several remote meetings were held to foster the collection of the technical descriptions for the online catalogue as well as to discuss and optimise procedures for technical feasibility evaluation, the choice of the site(s) to carry out the proposals and their scheduling. After the first call of proposal, used as a beta test for the TLNet, the full timeline to process the proposal from the submission deadline to the final access calendar has been defined in detail.

At the NFFA-Europe kick-off meeting in Milano the terms of reference for the TLNet engagement have been shared amongst all the partners. These are:

- THE TECHNICAL FEASIBILITY HAS TO BE EVALUATED BY THE FACILITY STAFF/RESPONSIBLE;
- THE TECHNICAL LIAISONS WILL BE CARRIED OUT IN A DISTRIBUTED STRUCTURE (TLNET NODES);
- EACH NODE WILL MANAGE LOCAL OPERATIONS AUTONOMOUSLY;
- THE TECHNICAL EVALUATION SYSTEM MUST BE OBJECTIVE, RELIABLE, TIMELY AND EFFICIENT, THEREFORE AUTOMATIC PROCEDURES SHOULD BE USED AS MUCH AS POSSIBLE;
- FITTING ALSO THE SPECIFIC INTERESTS OF THE INVOLVED GROUPS (USERS AND STAFF) WILL BE ENCOURAGED.

In the Annex 1 of the GA eight TLNet nodes have been expected in eight major NFFA.EU core nodes, i.e. Trieste (CNR), Grenoble (CEA/LETI), Paris (CNRS), Villigen (PSI), Barcelona (CSIC), Heraklion (FORTH), Munich (Juelich) and Lund (LU). One contact person per node is defined that coordinate the TLNet operations for each node. Other people also started to collaborate both from minor sites

like DESY, as well as from structured sites in order to take into account for different institutions in a same place, such as UAB, Alba and ICN2 in Barcelona, or Soleil and LLB in Paris. The final membership to the TLNet is listed in the table below:

Table 1: The final membership to the TLNet

TLNet node	Partner affiliation	TLNet node representative	Assigned NFFA TA sites	Additional local contact (included in the TLNet mailing-list)
Trieste (IT)	CNR-IOM	Roberto Gotter	central HUB, CNR	Roberto Gotter Daniela Orani
			UMIL	Paolo Piseri
			TUG	Heinz Amenitsch
Grenoble (FR)	ESRF	Ennio Capria	ESRF	Ennio Capria Dorian Martin
			CEA	Narciso Gambacorti
Barcelona (ES)	PRUAB	Juan Sanguesa	PRUAB	Juan Sanguesa
			ICN2	Gustavo Ceballos Miguel Alonso Pruneda
			CSIC-CNM	Miguel Zabala Arnau Fatjo Luis Fonseca
			CSIC-ICMAB (Alba) UAB	Xavier Obradors Jorge Perez Barrio Emma Rossinyol
Villigen (CH)	PSI	Dimitrios Kazazis	PSI	Dimitrios Kazazis Yasin Ekinci
Paris (FR)	CNRS	Dominique Mailly	CNRS	Dominique Mailly
			SOLEIL	Rachid Belkou
			LLB	
Munich (DE)	Juelich	Flavio Carsughi	Juelich	Flavio Carsughi
			DESY	Thomas Keller
Lund (SE)	LU	Martin Stankovski	LU	Martin Stankovski Ivan Maximov Anna Ntinidou
Heraklion (EL)	FORTH	Alexios Pagkozidis	FORTH	Alexios Pagkozidis Emmanuel Stratakis Magda Kokolaki
Theory (distributed)	CNR-IOM (IT), CNR-ISM (IT), UMIL(IT), UPV/EHU(ES), ICN2(ES), EPFL(CH), Juelich(DE)	Stefano Fabris	distributed	

The activities of the TLNET have been provided across various sub-tasks. We report below the summary of what has been done in each single task.

All the NFFA partners excepted KIT, EPFL and STFC participate in task 11.1, and its budget is equal to the 34% of the overall NA activities.

Subtask 11.1.1: TLNet team information gathering

Technical specifications of the instruments offered in the catalogue have been collected by the TLNet central node for the completion of the three levels of information for the most relevant instruments listed in the online catalogue of the Single Entry Point.

A forum tool used has been also implemented for a more systematic interaction with users during the feasibility evaluation and access scheduling phases. This is now accessible by direct links on the “Feasibility_Matrix” (technical evaluation) and the “TransAccess_Input” spreadsheet (scheduling); in this way the experts do not need any more to open, for each proposal, the notification emails sent by the ICT platform, where the links are notified. Unfortunately, although everybody recognise the usefulness of the forum, the adoption of the system by the TLNet member is hesitant.

Three face-to-face meeting of the TLNet teams of all the TLnet nodes have been executed (in Barcellona, Trieste and Heraklion), in order to discuss the optimisation of the operations for the access assignment/scheduling of the calls. A particular effort has been devoted to shorten the delay between proposal acceptance and access scheduling, in particular for the last set of calls.

Subtask 11.1.2: Creation of a platform catalogue

The online catalogue, already operational since the beginning of transnational access activity, was continuously developed. In particular, a new feature allowing the comparison between the different characteristics (described in datasheets) of the techniques offered at multiple facilities has been added to the platform catalogue. The feature is found at the bottom of the detailed description of the selected technique (e.g. Molecular Beam Epitaxy- MBE) and is a useful tool for helping users choose the facilities they want to access for their project more appropriately. The tool is described more in detail in the First Periodic Technical Report.

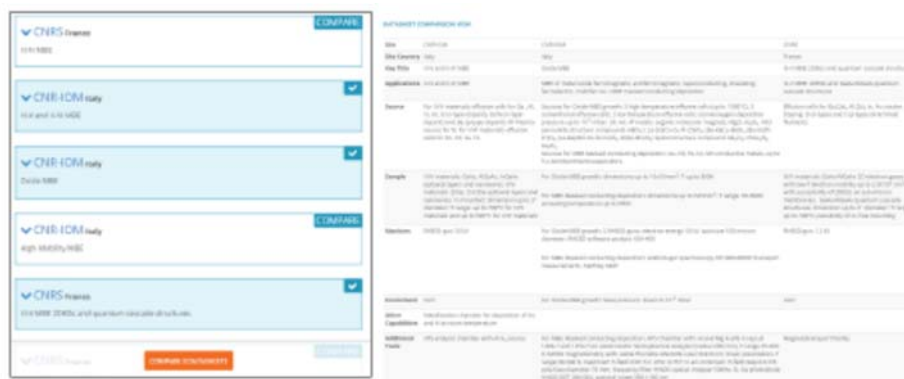


Figure 1: Left - List of facilities for MBE technique at the different sites; Right - Facilities selected for comparison - www.nffa.eu/offer/growth-synthesis/installation-2/mbe/ Right – Datasheet comparison view for selected facilities providing MBE technique.

The catalogue has been also updated with new tools made available, in particular as a result of the JRAs. New data sheets have been included, also for tools available at singles/few NFFA-EU sites, that is also in those cases where detailed technical specifications are not aimed to a clear comparison among different offers, but only to provide a better understanding of the real capabilities of the installations and the subsequent more reliable feasibility of the user projects.

Subtask 11.1.3: Implement a one-stop-shop for potential users

A one-stop-shop has been developed and is accessible to users via the reserved area of the project website. It provides users with an easy-to-use interface through which they can communicate directly with the TLNet in order to obtain support and information on different topics. The interface is divided into two sections (NFFA Helpdesk and NFFA Internal), both described in the first Periodic Technical Report.

To fix some critical issues that could arise in the future, due to the increasing numbers of files that the system manages, Promoscience designed and implemented an updated Authentication Portal Interface. This is currently operational. The IDRP and the NFFA.EU portal share the same authentication process, with a single "sign-up" that allows users to be authenticated to both systems with one credential only. Moreover, this system allows the users to access all resources with the correct permissions.

Subtask 11.1.4: Drive the development of a common metrology and the repeatability of the procedures.

All the effort of this sub-task was focused on the growth&synthesis installation, motivated by the fact that, while for characterisation techniques, as well as for lithography, the level of reproducibility is typically high, and the activity in metrology and standardisation is well established, this is not the case for technologies devoted to the synthesis of advanced nanostructured materials. Among these, again, while for MBE, PLD and ALD, which are widely used technologies also in the industrial sectors, identical recipes carried out with different apparatuses likely produce similar and comparable results, this is not the case for Cluster Beam Deposition (CBD). In this case the final result strongly depends on the specific apparatus, and sometime even similar apparatuses may produce slightly different results in terms of cluster size distributions. For this reason it was decided to perform a comparison study of CBD, by applying the same recipe on similar apparatuses located in different access sites: one in Trieste at the Elettra synchrotron laboratory and one in Milano at UNIMIL partner premises. The work is still in progress. The activity planned for comparing the synthesis of advanced nanostructured materials, in particular by implementing similar recipes in similar Cluster Beam Deposition apparatuses, is in progress. A report will be provided and published on the NFFA-IDRP.

In general, there was a certain difficulty to implement what promised in the present subtask. The reason is that it revealed quite difficult to obtain beamtime via TNA to carry on actions which, although useful and technically important, are not considered scientifically excellent. For this reason NFFA granted the opportunity to carry on accesses supporting subtask 11.1.4, using some resources available in task 11.5, for feasibility access.

Subtask 11.1.5: Technical information for and from common data.

As far as this task is concerned, unfortunately no request or interaction have been received from the metadata specialists despite having offered availability several times. The feeling, compared to what is actually available in terms of IDRP, is that there is still much to be done on the question, which is also very complex, of adoption of workflows and best practices which effectively would take advantage of metadata. The possible activities involved in this sub-task will be discussed during a round table at a next and imminent EUSMI / NFFA-Europe Joint School on Data Management.

Subtask 11.1.6: Technical support for NFFA-Europe industry and business liaison offices

The partner's industry and business liaison offices provided the contacts to potential/perspective industrial users to the central TLNet Hub that promptly provided to the potential users all the relevant

Figure 2: novel elements of the website after mid-term review.

With similar objectives, a new homepage has been designed after the mid-term review of the NFFA project, developed and published to cope with the recommendations of the review committee.

The homepage presents a layout based on a “card-based” design, that allows to:

1. LIST THE INSTALLATIONS, INFORM ABOUT THE NEXT DEADLINE AND PROMOTE THE “CALL-TO-ACTION” BROWSE THE OFFER AND APPLY FOR FREE ACCESS
2. INFORM ABOUT THE PROJECT OUTCOMES – FROM THE USERS AND FROM THE JRAS
3. PRESENT THE LATEST PROJECT NEWS
4. BROWSE JOB OFFERS
5. PROMOTE THE VIDEOS THAT HAVE BEEN PRODUCED
6. PROMOTE EVENTS OR SCHOOLS
7. HIGHLIGHT THE AVAILABILITY OF A DEDICATED SUPPORT TO THE INDUSTRY
8. PROMOTE EDUCATIONAL ACTIVITIES
9. PROVIDE ACCESS STATISTICS (E.G. NUMEBER OF CALLS, NUMBER OF SUBMITTED VS ACCEPTED PROPOSALS, ...)
10. LOCATE AND LIST THE PARTNERS



Figure 3: new website main page

New pages have also been published to advertise specific events/news:

- A FULL PAGE DEDICATED TO THE OPEN CALLS FOR SHORT-TERM VISITS (HTTPS://WWW.NFFA.EU/ABOUT/NETWORKING/SHORT-TERM-VISITS/)
- A FULL PAGE DEDICATED TO THE SECOND NFFA-EUROPE SUMMER SCHOOL (HTTPS://WWW.NFFA.EU/SUMMER-SCHOOL-2018)

In particular, the second describes the event, and has full details on the programme and poster sessions, the school organisers and lecturers, as well as basic information on the venue, registration, accommodation, etc.

A separate website, linked to the home page of the project website by means of a web banner, was developed especially for the Second Scientific Workshop (20-21 February 2019 - Milan, Italy) <http://workshop2019.nffa.eu/>.

NFFA-Europe's website performance is monitored with Google Analytics. According to this tool, in the reporting period going from the 08/2018 to the 07/2019 NFFA-Europe's website has recorded more than 20.000 users and 75.000 page views. The image below shows an overview of the metrics of the website's performance in this reporting period.

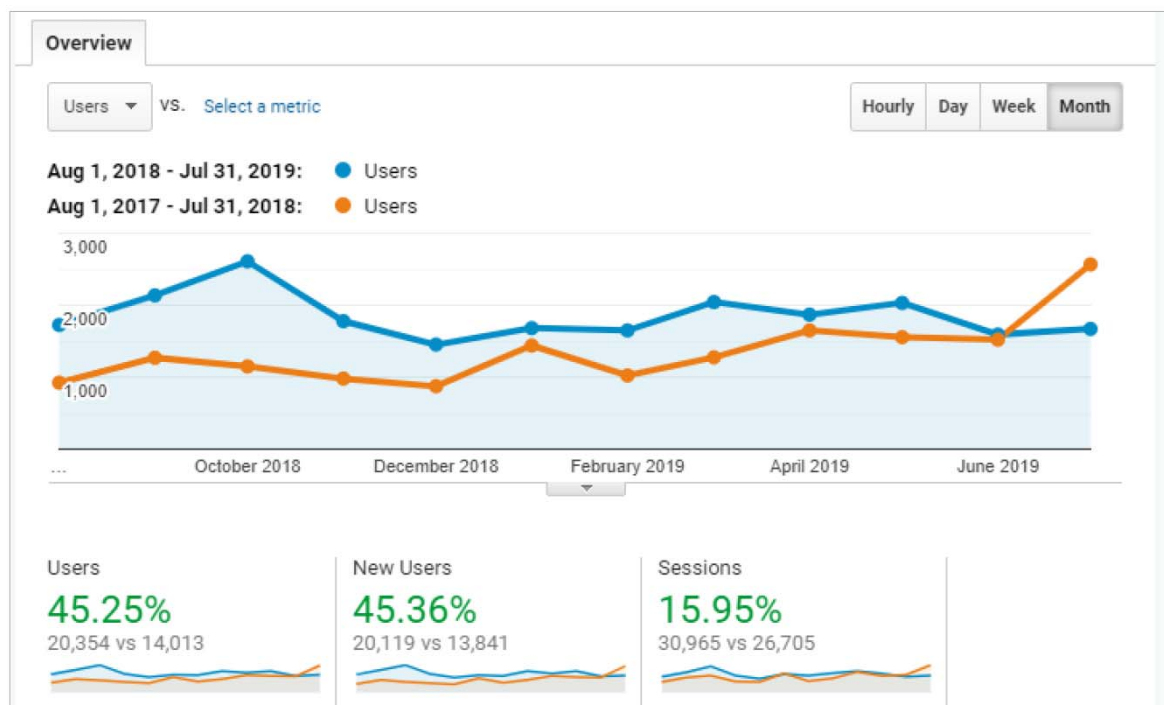


Figure 4: results from Google Analytics

In comparison with the previous period (08/2017 – 07/2018 orange line), in the last 12 months the number of users increased by 45% and the sessions increased by 16%. This confirms the continuously increasing community.

Subtasks 11.2.2: Videos and presentations

After the second NFFA.EU school, Promoscience produced a set of videos to share interesting lessons of the training event. The published video are:

- SCIENCE FRONTIERS AT FERMI - FREE ELECTRON LASERS - DR. CLAUDIO MASCIOVECCHIO
- IR MICROSCOPY AND NANOSCOPY WITH SYNCHROTRON RADIATION - DR. LISA VACCARI
- TIME-RESOLVED SPECTROSCOPIES - DR. TOMMASO PINCELLI
- LASER DEPOSITION: GROWTH OF PEROVSKITE THIN AND HETEROSTRUCTURES - DR. PASQUALE ORGIANI

Similarly, Promoscience edited all the recordings of the presentation talks of the second NFFA.EU scientific workshop. These video have been published on the NFFA EU YouTube channel and promoted via the NFFA EU newsletter.

These are the produced videos:

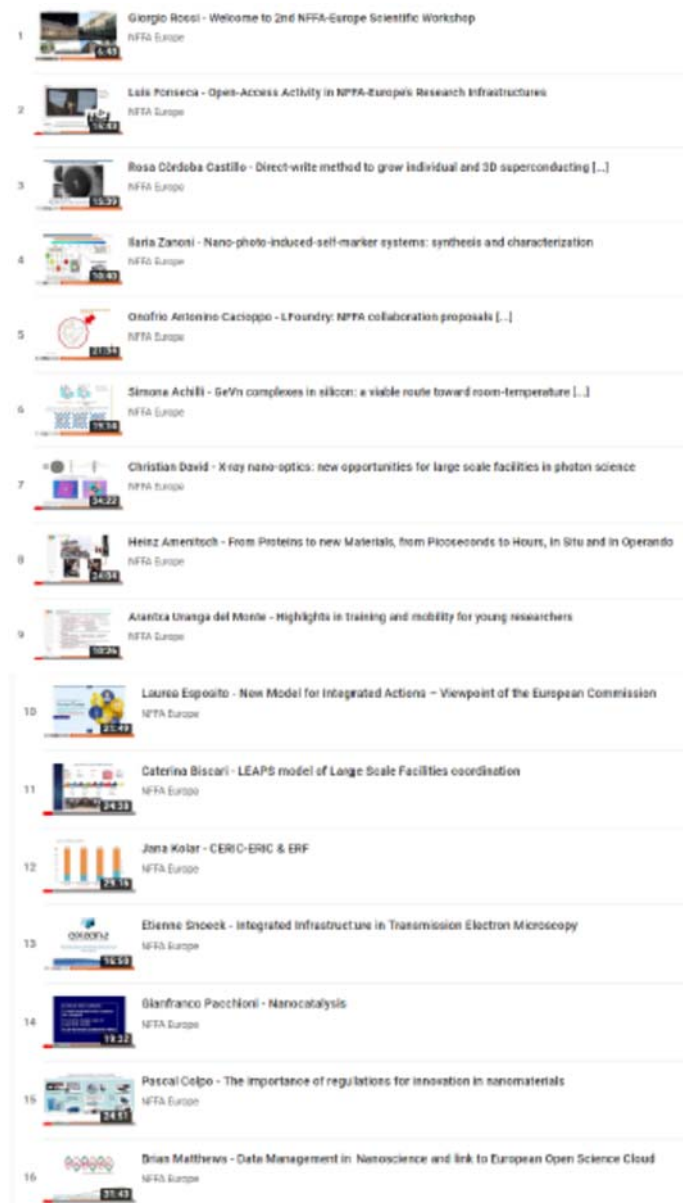


Figure 5: produced videos

Subtask 11.2.3: Create marketing material for industry

A number of marketing materials have been developed:

- AN ADVERTISEMENT HAS BEEN DESIGNED FOR SCIENTIFIC JOURNALS
- A FLYER TAILORED FOR INDUSTRY



Figure 6: industry leaflet

More details about videos and marketing material are available in the Deliverable 11.7, delivered in M24.

Subtask 11.2.4: Success stories.

Promoscience has defined a “news release template form” to collect in a standardized way the stories of accomplishments achieved by users or JRAs. The template guidelines help to effectively describe the outcomes, defining the length of the different sections and providing suggestions on how to present the news.

The template has been used to collect contributions for the third issue of the newsletter, and it has been used in the editing process of the latest four stories that have been published in the newsletter, as well as in the website.

Two new success stories have been published and promoted (<https://www.nffa.eu/news/scientific-highlights/>)

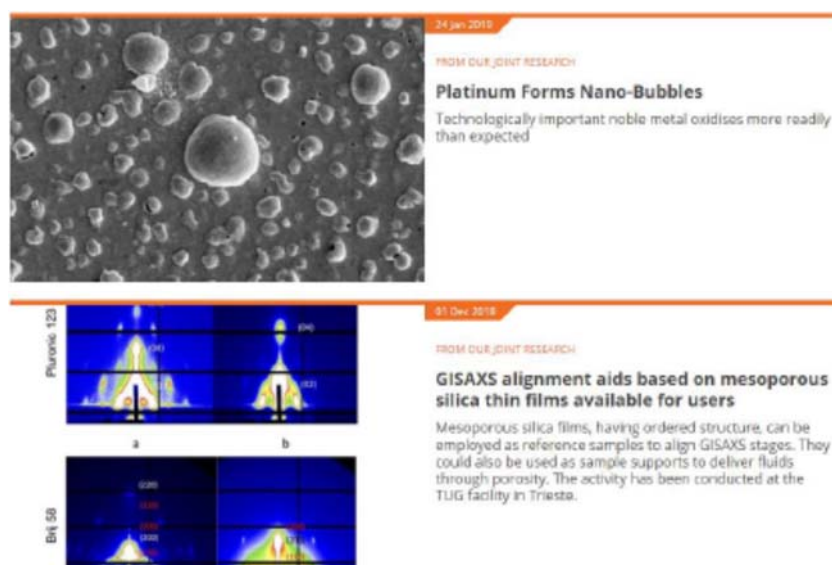


Figure 7: success stories for the website

Task 11.3: Dissemination

The dissemination task is strategic for the NFFA-Europe project and contributed to the very successful results of the project. The NFFA-Europe is now a brand well recognized not only within the European Research Area, but also outside Europe.

The Dissemination activity of the NFFA-Europe project includes four different subtasks, namely:

- 11.3.1 Building up scientific awareness
- 11.3.2 Advertisement campaign
- 11.3.3 Dissemination programme
- 11.3.4 Outreach programme

The funding for this activity, equal to the 15% of the overall NA, are assigned to Julich (to support the activities) and to Promoscience (for the production of supporting material and some marketing using the NFFA marketing tools).

Subtask 11.3.1: Building up scientific awareness

This subtask has the strategic role to spread the NFFA-Europe opportunity to the European scientific community, with the goal of increasing the number of submitted proposals.

First of all the Terms of References for the Dissemination programme have been defined by the NFFA-Europe project. In these ToR, we defined the rules for accessing the NFFA-Europe financial contribution for: a) organising special session in conferences; b) NFFA-Europe members who help in the talks and poster presentations; c) conference booths. In this respect, two bodies have been established: the Dissemination Review Panel (DRP), with the task to manage the NFFA-Europe dissemination activity, and the Editorial Board (EB), with the task to manage the advertisement campaign and newsletters.

The NFFA-Europe was presented in many different ways, among which, the most effective one is a plenary presentation during the conference. However posters as well as brochures distributed in the conference bags are also important. A NFFA-Europe booth was also used especially in connection

with conferences with a large industrial participation. The total number of scientists reached by the activity of the NFFA-Europe task 11.3.1 is 3.841, with about 13% of industrial ones.

NFFA participated in 114 events so far. The full list of events where the NFFA-Europe project is available in dedicated reports.

At the call N. 4 we started to collect data on how the users got to know about the NFFA-Europe project and the statistics are supporting the actions taken, as more than 10% of the proposals have been submitted by users who learnt about the opportunities offered by the NFFA-Europe project at conferences. The results of this investigation are shown in Figure 8.

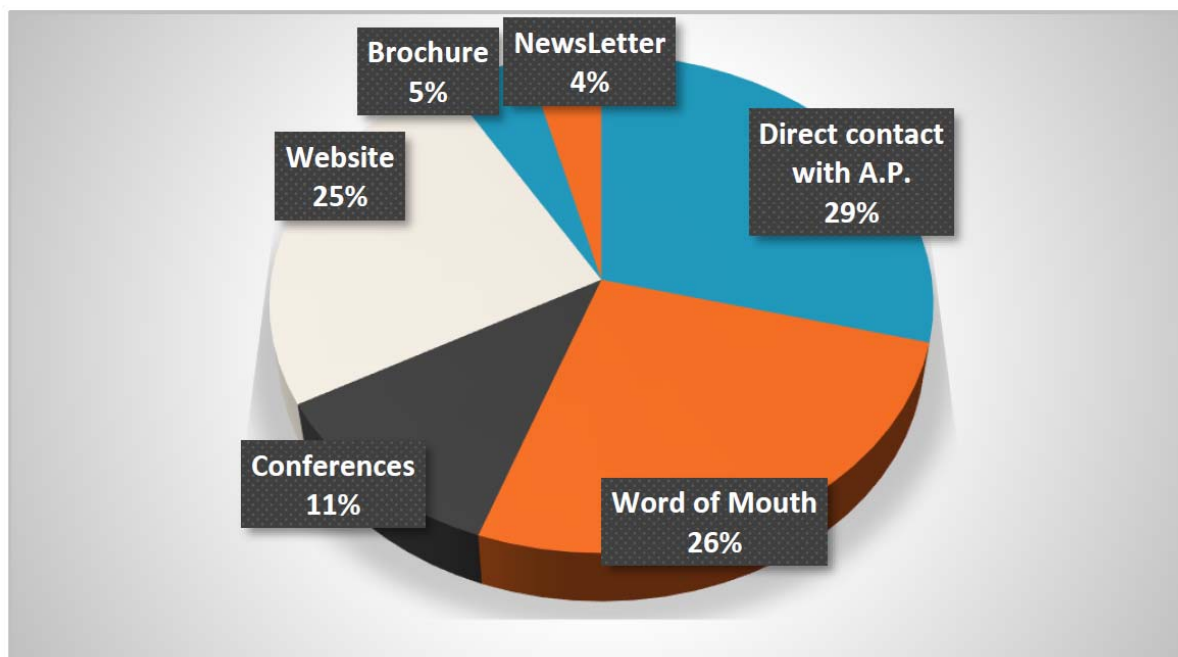


Figure 8: The data show how the applicant learn on the offer of the NFFA-Europe project. The data show the different possible.

Despite most of the applicants have learnt on the NFFA-Europe offer by a direct contact with the Access providers and through some colleagues, about 45% of them were reached by the activity of the task 11.3. Last but not least, despite the subtask coordination of FZ-Juelich, it is worth to mention that all the NFFA-Europe members contributed to the success of this activity with a very positive and efficient approach.

Subtask 11.3.2: Advertisement campaign

The main action related with this sub-task is the production of the NFFA-Europe electronic newsletter, which has been issued 4 times since the beginning of the project. The newsletter normally contain the following sections:

1. EDITORIAL
2. FOCUS ON METHODOLOGIES AND/OR SCIENTIFIC ACHIEVEMENTS ENLIGHTENING THE CORE CHARACTERISTICS OF NFFA (E.G. EMPHASIS ON THE INTEGRATED AND MULTIDISCIPLINARY CHARACTER OF THE PROJECT)
3. HIGHLIGHTS ON SIGNIFICANT RESULTS (E.G. RELEVANT PAPERS OR INSTALLATIONS OF NEW INSTRUMENTATION AT ONE OF THE NFFA SITES)
4. NEWS OF RELEVANCE FOR THE PROJECT (EXAMPLE, ROSSI CHAIR @ESFRI, NFFA PRESENT AT SPIE)
5. FORTHCOMING EVENTS
6. JOB POSITIONS
7. HOW TO APPLY FOR ACCESS, RELEVANT CONTACTS FOR THE PROJECT.

Exceptionally, for the first issue of the NFFA-Europe Newsletter a more general description of the project was given, and the sections defined above have been used from the second issue onwards.

Two formats of the same newsletter are usually developed:

- AN ONLINE VERSION – THE STRUCTURE OF WHICH IS DYNAMIC, THANKS TO THE IMPLEMENTATION OF A NEW FEATURE WITHIN UMBRACO AND WILL BE USED FOR FUTURE NEWSLETTERS AS WELL
- AN EMAIL VERSION – ITS LAYOUT AND FORMAT ENSURE COMPATIBILITY WITH ALL EMAIL CLIENTS.



Figure 9: Left: NFFA-Europe online newsletter- first issue - www.nffa.eu/news/newsletters/issue-1/ Right: Newsletter format for email - www.nffa.eu/first-issue/

During the period covered by the present report, 4 NFFA-Europe Newsletters have been produced and distribute according to the online and email formats, and a further one is planned before the end of the project. They have been sent to all users in the NFFA-Europe database. The Newsletters include major information of the NFFA-Europe both in terms of available infrastructure as well as scientific news of experiments performed through the NFFA-Europe Trans National Access programme.

Beside the newsletter, an attractive NFFA-Europe brochure has been also developed and printed for advertising at events. The brochure was printed in about 10.000 copies and a revised version was also developed and printed for the same amount of copies.

Last but not least, a full page advertisement has been published on the magazine Physics World Focus on Nanotechnology of the Institute of Physics (see Figure 11). The publication was issued last May 2017 and offered 12 months visibility. It was distributed in many events in the delegate bag and in the IOP booth (more than 100.000 copies) and also per email through the IOP Newsletter reaching about 150.000 recipients.



Figure 10: The advertisement page published on Physics World Focus on Nanotechnology.

A number of means to advertise the NFFA-Europe project has been extensively used: Social media

- FACEBOOK: [HTTPS://WWW.FACEBOOK.COM/NFFAEUROPE/](https://www.facebook.com/nffaeurope/)
- LINKEDIN: [HTTPS://WWW.LINKEDIN.COM/COMPANY/NFFA-EUROPE](https://www.linkedin.com/company/nffa-europe)
- YOUTUBE: [HTTPS://WWW.YOUTUBE.COM/CHANNEL/UCJTbDM3f6EMNMqvJyIzEJCW](https://www.youtube.com/channel/UCJTbDM3f6EMNMqvJyIzEJCW)

Subtask 11.3.3: Dissemination programme

The NFFA-Europe dissemination task foresees the possibility to organise a NFFA-Europe session in a scientific event. The financial contribution is intended to cover all of the costs associated to the NFFA-Europe session.

In the period June 2017 – May 2018 two events have been organized within the present task.

- 1) COMBINING ELECTRONS WITH X-RAYS FOR INTEGRATED IN-OPERANDO EXPERIMENTS (COEX), SEPTEMBER 23-24, 2017, TRIESTE, ITALY. DETAILS ARE AVAILABLE AT [HTTPS://COEX.IOM.CNR.IT/](https://coex.iom.cnr.it/). THIS WAS A SATELLITE WORKSHOP OF THE 13TH MULTINATIONAL CONGRESS ON MICROSCOPY, HELD IN ROVINJ, CROATIA, 24-29 SEPTEMBER 2017.
- 2) A NFFA-EUROPE SESSION WITHIN THE EMRS FALL MEETING, SEPTEMBER 18-21, 2017, WARSAW, POLAND. THIS EVENT AIMED TO SHOW THE OFFER OF THE NFFA-EUROPE TO THE WIDE PUBLIC AVAILABLE AT THE EMRS CONFERENCES.

These two meetings are marked with § in the list above.

These events were a great success and we are confident that the NFFA-Europe spread there reached many additional scientists who learnt what NFFA-Europe can do for them and many proposals for the use of the available infrastructure are surely related to this activity, as demonstrated.

Subtask 11.3.4: Outreach programme

Contacts have been established with other similar international projects, such as, the US DoE Nanoscale Science Centres and the Australian National Fabrication facility. Contacts and collaborations with similar organizations have been carried out for the benefit of the international networking. Prof. Rosie Hicks of the Australian National Fabrication Facility (ANFF) attended the NFFA-Europe meetings. Contact with Stefano Cabrini and Alison Hatt of the US Molecular Foundry at the Berkeley National Laboratory has been established, but they were not conclusive.

Im May 2018, two members of the NFFA-Europe management team attended as external observers the First Annual Meeting of CALIPSOplus, another H2020 RIA project.

Task 11.4: Training and mobility programme

The objective of this task is to organize a set of training actions to support the community of NFFA present and potential users and the members of the consortium. In particular the organisation of two summer schools and a support offered to mobility actions for researchers are main actions of this task.

The funding for this activity, equal to the 11% of the overall NA, are assigned to PRUAB (to support the activities) and to Promoscience (for the production of supporting material and some marketing using the NFFA marketing tools).

Subtask 11.4.1: Organisation of two schools

Deliverable 11.4 reports in detail on the first training school held on 18-22 July 2016 at the UAB campus in Barcelona. In brief:

- THE SCHOOL WAS FOCUSED ON THE EXPLOITATION OF SYNCHROTRON RADIATION FOR NANO-SCALE SCIENCE AND ORGANISED WITH LECTURES (14 EXPERT SCIENTISTS PRESENTING AND DISCUSSING WITH THE PARTICIPANTS), VISITS TO THE LOCAL LABORATORIES AND TO THE SPANISH LIGHT SOURCE "ALBA" AND POSTER SESSIONS.
- 45 REGISTRATIONS WERE RECEIVED; 2 STUDENTS DID NOT OBTAIN A VISA IN TIME, 8 FINALLY DECLINED TO COME AND 6 DID NOT GIVE ANY REASON. FINALLY, 29 STUDENTS ATTENDED THE SCHOOL, COMING FROM 9 DIFFERENT COUNTRIES: 13 STUDENTS FROM SPAIN, 5 FROM UKRAINE, 4 FROM LATVIA, 2 FROM UNITED KINGDOM, 1 FROM GERMANY, 1 FROM AUSTRIA, 1 FROM KAZHAKSTAN, 1 FROM LITHUANIA, 1 FROM NETHERLANDS.
- THE POST-SCHOOL SURVEY SHOWED A HIGH DEGREE OF SATISFACTION WITH THE ORGANISATION, SCHOOL CONTENTS, LECTURERS, ETC.
- TRAVEL SUPPORT UP TO 400€ WAS GIVEN TO 16 STUDENTS COMING FROM DIFFERENT COUNTRIES.



Figure 11: The student cohort in the training school and the poster session.

45 registrations were received; 2 students did not get the visa in time, 8 finally declined to come and 6 did not give any reason. Finally 29 students attended the school. 16 were granted with travel support and 2 with free registration. 3 students were attendees from UAB and were helping in the organisation, and consequently they did not pay the registration fee.

The 29 students were coming from different European countries:

13 from Spain, 5 from Ukraine, 4 from Latvia, 2 from United Kingdom, 1 from Germany, 1 from Austria, 1 from Kazhakstan, 1 from Lithuania, 1 from Netherlands

The second NFFA-Europe Summer School has been organized in July 2018, 9th to 13th in Basovizza Campus, Trieste (Italy). The school was open to graduate students, post-docs and young researchers, but including technicians, engineers and in general to all scientists from academic and industrial communities interested in acquiring knowledge and hands-on experience of the NFFA-Europe instruments and techniques, emphasizing the possibilities and synergies of combining Nanotechnology and Fine Analysis techniques.

This second school was devoted to growth techniques towards quantum materials, to nanocharacterisation methods with selected focus on neutron scattering, microscopy and time-resolved spectroscopy, and to data management methods for compliance with FAIR criteria and

EOSC goals. Every topic was developed in a one-day format with introductory lectures, lectures on specific applications/methodologies and some practical work. Additionally visits were made to see first-hand all the most relevant facilities and infrastructures available for NFFA-trans-national access at Basovizza Campus (lab-tours): Elettra-Synchrotron, FERMI-Free electron laser Radiation, specific labs at IOM-CNR (Istituto Officina dei Materiali), Supercomputer at SISSA (International School for Advanced Studies).

Two scheduled poster sessions were also programmed. In this sessions participants had the opportunity to widely discuss with lecturers and colleagues their research topics and main results (the sessions included a best poster award).

42 registrations were received from the web-site. 11 declined their presence (2 from India, 2 from Algeria, 1 from Ukrania, 1 from Spain, 2 from Italy, 1 from France, 1 from Greece, 1 from Germany). Finnally 31 students from around Europe attended the school:

Austria (1), Lithuania (2), Denmark (3), Norwegian (1), France (1), Russia (11), Germany (3), Spain (1), Greece (2), Sweeden (1), Italy (3), Switzerland (1), Latvia (1).

Most of the students were granted with some travel support (15 students trip and hotel, 13 students hotel and 2 students only registration).

According with the 42 registrations from the students, 36 where informed about the Summer School from a colleague or directly their supervisor, 5 through the website, and only 1 from a Nanotech conference.

Subtask 11.4.2: Assembling of specialised courses

In relation with task 11.4.2 (assembling of courses), all the seminars provided during the 1st NFFA-Europe School are freely available for downloading from the NFFA-Europe website inside the OUTCOMES at NFFA for Education section. These courses where designed to provide knowledge about the different techniques available inside the NFFA-Europe consortium. They have been organised according to the 4 general Transnational Access pillars: a) Lithography and Patterning; b) Growth and Synthesis; c) Theory and Simulation and d) Characterization. In each of these areas, tutorial seminars are provided, introducing the main concepts and considerations. Also specific examples in relation with each of the techniques have been provided, to show their capabilities in the nanotechnology area. Specific seminars focused on Synchrotron radiation-based techniques.



Figure 12: Webpage dedicated to Lithography in the "NFFA for Education" section of the website.

The videos are already available through the website of the NFFA and also directly in YouTube. All the educational material is summarized in the following lists:

- A) SEMINARS BY SPECIALISTS (28, WEBSITE, ONLY SLIDES):

- 14 SEMINARS DEALING WITH CHARACTERIZATION TECHNIQUES
- 3 SEMINARS DEALING WITH LITHOGRAPHY AND PATTERNING TECHNIQUES
- 7 SEMINARS DEALING WITH PHYSICAL AND CHEMICAL GROWTH TECHNIQUES
- 2 SEMINARS DEALING WITH THEORY AND SIMULATION TECHNIQUES
- 2 SEMINARS DEALING WITH DATA MANAGEMENT

B) SHORT EDUCATIONAL VIDEOS (8, WEBSITE AND YOUTUBE):

- PHOTOLITHOGRAPHY, 10.40 MINUTES, BY FRANCESC TORRES, 5173 VISUALIZATIONS
- ELECTRON BEAM LITHOGRAPHY, 8.59 MINUTES, BY FRANCESC TORRES, 8481 VISUALIZATIONS
- EXTREME ULTRAVIOLET INTERFERENCE LITHOGRAPHY, 6 MINUTES, BY YASIN EKINCI, 454 VISUALIZATIONS
- DIRECT SELF-ASSEMBLY OF BLOCK COPOLYMERS, 3.52 MINUTES, BY STEVEN GOTTLIEB & MARTA FERNANDEZ-REGULEZ, 184 VISUALIZATIONS
- OVERVIEW OF SCANNING PROBE LITHOGRAPHY, 4.24 MINUTES, BY MATTEO LORENZONI, 898 VISUALIZATIONS
- NANOCHARACTERIZATION TECHNIQUES BASED ON NEUTRONS, 4.44 MINUTES, BY ANNIE BRULET, ISABELLE MIREBEAU, FREDERIC OTT, FLORENCE PORCHER, 56 VISUALIZATIONS
- SCANNING PROBE MICROSCOPIES, 5.29 MINUTES, BY MARIA JOSE ESPLANDIU, 47 VISUALIZATIONS
- OVERVIEW OF SIMULATION TECHNIQUES AT THE NANOSCALE, 5 MINUTES, BY XAVIER CARTOIXÀ, 75 VISUALIZATIONS

C) SEMINARS AS VIDEO-CONFERENCES (4, WEBSITE AND YOUTUBE):

- IR MICROSCOPY&SPECTROSCOPY WITH SYNCHROTRON RADIATION BY LISA VACCARI
- FREE ELECTRON SOURCES BY CLAUDIO MASCIOVECCHIO
- TIME RESOLVED SPECTROSCOPIES BY TOMMASO PINCELLI
- PULSED LASER DEPOSITION: GROWTH OF PEROVSKITE THIN FILMS AND HETEROSTRUCTURES, BY PASQUALE ORGIANI

In order to find specialized courses on the NFFA-Europe research subjects, several MOOC courses offered by some universities have been identified. These courses aim to be useful for remote learning, but due to its duration they are not the most convenient for a rapid assessment of the usefulness of a technique for a specific research. On the other hand, the already provided seminars explaining the techniques and possibilities for the above mentioned areas are preferred in the framework of the NFFA-Europe project. From these seminars, we have been working to design several short educational videos (around 10 minutes) of the most important techniques. The structure and contents for the videos were explained in Deliverable 11.10 Educational videos (October 2017). The edited videos are detailed in the following table. The videos are already available through the web-site of the NFFA and also directly in Youtube.

Title of the video	Duration	Authors
Topic: Lithography and nanopatterning		
Nanofabrication techniques: Photolithography	10'40"	Francesc Torres, UAB
Electron Beam Lithography	8'59"	Francesc Torres, UAB
Overview of Scanning Probe Lithography	4'24"	Matteo Lorenzoni, IMB-CNM
Bottom-up: direct self-assembly of block copolymers	3'52"	Steven Gottlieb and Marta Fernández-Regúlez, IMB-CNM
Extreme Ultraviolet Interference Lithography	6'18"	Yasin Ekinci, PSI
Topic: Theory and Simulations		
Overview of Simulation Techniques at the Nanoscale	5'	Xavier Cartoixà, UAB
Topic: Characterization		
Scanning Probe Microscopies	5'29"	Maria Jose Esplandiu, ICN2

Nanocharacterization techniques based on neutrons	4'44"	Annie Brûlet, Isabelle Mirebeau, Frederic Ott, Florence Porcher, LLB- CEA-CNRS
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Subtask 11.4.3: Organisation of short-term visits to NFFA-Europe facilities

In regards to the short-term mobility programme for young researchers, a Scientific and Executive Committee has been created to manage the access and evaluate the candidates. After the first call for hosting laboratories, a list of available facilities has been determined. According to this list, most of the techniques offered for NFFA-Europe Transnational Access are available. In this sense the aim for these specific trainings or hands-on experience is to act as a seed for future trans-national access applications. Being a member of the NFFA-Europe consortium is not a requirement, condition that guarantee the promotion of the nanoscience and nanotechnology techniques around Europe.

Installation 1: Lithography and patterning	UVL: Optical UV lithography (contact and proximity and projection-Stepper)
	EUV-IL: Extreme UV interference lithography
	EBL: Electron beam lithography
	NIL: Nano Imprint Lithography
	DXRL Deep X-ray lithography
	Laser Surface and in-volume Patterning
	FIB: Focused ion beam
	AFML: Lithography based on atomic for microscopy
	RIE: Reactive Ion Etching
	Ion implantation
	Chip packaging
	Electrochemical deposition
Installation 2: Growth and Synthesis	MBE Molecular Beam Epitaxy
	PLD Pulsed Laser Deposition
	ALD Atomic Layer Deposition
	Thermal Processes (including CVD Chemical Vapour Deposition)
	Soft Matter preparation
Installation 3: Theory & Simulation	Atoms and molecules in motion
	Excited-state properties
	Magnetic properties
	Structural and ground-state electronic properties
	Transport properties
Multiscale modelling of materials under extreme irradiation	
Installation 4: Structural & Morphological characterization	Confocal microscopy
	AFM Atomic Force Microscopy
	SEM Scanning Electron Microscopy
	TEM Transmission Electron Microscopy
	XRD X-Ray Diffraction
	SAXS Small-angle X-ray scattering
	Fluorescence Microscopy
	XPS X-ray Photoelectron Spectroscopy
	Pump-probe

Installation 5: Electronic & chemical characterization	Raman
	IPES: Inverse Photo-Emission Spectroscopy
	ARPES Angle Resolved Photoelectron Spectroscopy
	Optical spectroscopy
	FTIR Fourier Transform Infra Red
	XPD/RESPES/RESPED resonant photoemission spectroscopy/diffraction
	XAS: X-ray Absorption spectroscopy
Installation 6: Magnetic, optical, electric	SQUID
	Magnetometry
	Magneto-transport
	Magnetic/ferroelectric/dielectric characterization

We propose below a detailed summary of the 3 calls of short term visits.

FIRST CALL → AUGUST 2017, 12 APPLICATIONS, 5 APPROVED

Technique//Facility	Host lab	Working Organization	Position
<i>Instal. 1: Atomic force microscopy lithography. (AFML)</i>	PRUAB-CNM (Spain)	Faculty of Sciences, KU Leuven (Belgium)	Post-doc
<i>Instal. 5: X- Ray Photoelectron Spectroscopy</i>	ICN2 (Spain)	National Centre of Physical and Technological Sciences, Vilnius (Lithuania)	Post-doc
<i>Instal. 2 & Instal. 4: Pulsed Laser Deposition & Transmission Electron Microscopy</i>	ICN2 (Spain)	Norwegian University of Science and Technology, (Norway)	PhD Student
<i>Instal. 6: Magnetic Characterization</i>	Forth (Greece)	Institut de Physique et de Chimie des Materiaux Strasbourg University (France)	PhD Student
<i>Inst. 2: Atomic Layer Deposition</i>	Lund University (Sweden)	PRUAB-CSIC-CNM (Spain)	Post-doc

SECOND CALL → APRIL 2018, 4 APPLICATIONS, 4 APPROVED

Technique//Facility	Host lab	Working Organization	Title
<i>Instal. 5: XPS (X-ray Photoelectron Spectroscopy)</i>	ICN2 (Spain)	University of Trieste (Italy)	PhD- Student
<i>Instal 5: Raman Spectroscopy</i>	PRUAB-ICMAB (Spain)	Università degli Studi di Cagliari (Italy)	PhD- Student
<i>Instal. 5: XAS: X-RAY ABSORPTION SPECTROSCOPY</i>	CNR-IOM, Trieste (Italy)	PRUAB-ICMAB (Spain)	Technician
<i>Instal. 3: Siesta</i>	ICN2 (Spain)	Università degli Studi di Catania (Italy)	PhD- Student

THIRD CALL → APRIL 2019, 16 APPLICATIONS, 14 APPROVED, 13 COMPLETED, 1 TO BE DONE IN NOVEMBER 2019

Technique//Facility	Host lab	Working Organization	Title
<i>Instal. 2: Pulsed Laser Deposition, PLD</i>	CNR-IOM (Trieste, Italy)	Instituto ciencias materiales Aragon (ICMA) (Zaragoza, Spain)	PhD student

Instal. 4 FE-SEM	PRUAB-CSIC-ICMAB (Barcelona, Spain)	Aristotle University of Thessaloniki (Greece)	Post-doc
Instal . 5: Raman	Institute of Electronic Structure and Laser, Forth (Heraklyon, Greece)	University of Cyprus (Cyprus)	Post-doc
Instal . 5: XPS X-ray Photoelectron Spectroscopy	CNR-IOM (Trieste, Italy)	Institut de Recerca en energia de Catalunya, IREC, (Barcelona, Spain)	PhD student
Instal. 4: SAXS: Small-Angle X-ray Scattering	CNR-IOM (Trieste, Italy)	Institut de Recerca en energia de Catalunya, IREC, (Barcelona, Spain)	PhD student
Instal. 5: IPES (inverse photo emission spectroscopy) and ARPES (Angle- Resolved Photo-Electron Spectroscopy)	CNR-IOM (Trieste, Italy)	Instituto de Microelectrónica de Barcelona (IMB-CNM-CSIC), (Barcelona, Spain)	PhD student
Instal . 5: Raman	PRUAB-CSIC-ICMAB (Barcelona, Spain)	Institute of Electronic Structure and Laser, Forth (Heraklyon, Greece)	PhD student
Instal. 4 TEM	CNR-IOM (Trieste, Italy)	Institute of Electronic Structure and Laser, Forth (Heraklyon, Greece)	PhD student
Instal 4. non-linear optical spectroscopy	CNR-IOM (Trieste, Italy)	Institute of Electronic Structure and Laser, Forth (Heraklyon, Greece)	PhD student
Instal 1. UVL: Optical UV lithography	PRUAB-CSIC-CNM (Barcelona, Spain)	Southampton Nanofabrication Centre (Southampton, United Kingdom)	Technician
Instal 5: XAS: X-ray Absorption Spectroscopy	CNR-IOM (Trieste, Italy)	Freie Universitat Berlin, (Berlin, Germany)	Post-doc
Instal 1. EUV-IL lithography	PSI (Villigen, Switzerland)	CNR-IOM (Trieste, Italy)	Technician*
Instal 1. EUV-IL lithography	PSI (Villigen, Switzerland)	CNR-IOM (Trieste, Italy)	Technician*
Instal. 4: SAXS beamline: small angle scattering	TUG-Elettra (Trieste, Italy)	Institute of Electronic Structure and Laser, Forth (Heraklyon, Greece)	PhD Student**

*2 DIFFERENT PERSONS FROM THE SAME LAB, **TO BE DONE DURING NOVEMBER 2019

Task 11.5: Industrial innovation and knowledge transfer

NFFA-EU is enhancing European industry competitiveness by making available state of the art equipment in nanotechnology via the Transnational Access programme. Private companies can in fact apply for TNA with or without an academic partner, under the prescription to publish the results. This last constraint is released for SME. NFFA arranged also a procedure to allow confidential access, when needed. Finally, a feasibility access mode has been implemented to allow small experiments

to test the viability of a certain technique in the perspective to prepare a TA proposal or prepare a confidential access.

Task 11.5 is dedicated to promote NFFA towards the industrial community and contribute to the innovation. The actions related with this task can span between actions especially taken with the objective to help industry and actions taken to improve the exploitation of the knowhow generated via the JRAs. As a results of actions taken in task 11.5 the amount of application from industry grew constantly during the project and a percentage of applications of 10% have been obtained, compared with the target metric of 5%.

In the original version of the NFFA proposal the institution of an Industrial Liaison Network has been proposed, in order to deal with industrial requested in a way more tailored with the specificity of industrial needs. Nonetheless, at the first TLNet/ILNet meeting in November 2016 in Barcelona, it has been decided to merge the two structures. Reflecting the desire to engage more with industry, in that meeting, we focused on the organisation and planning of NFFA upcoming events, finding new ways to communicate for NFFA and its nodes, managing NFFA-EU online presence and monitoring of the project development and evaluating of its outcomes. The confidentiality concerns have been also addressed and they have been developed in occasion of a further meeting held in March 2017 in occasion of the General Assembly. At that meeting, a report and strategy for industry engagement was prepared containing advices on the following aspects:

- A) HOW MAY THE OPEN DATA POLICY OF THE IDRП (INFORMATION DATA REPOSITORY PLATFORM) CONTAINING DATA OF NFFA-EU EXPERIMENTS BE BETTER EXPLOITED?
- B) CAN BE INDUSTRY ATTRACTED IN NAVIGATING THE IDRП?
- C) WHICH KEYWORD OR ASPECT OF THE METADATA COULD BE RELEVANT FOR INDUSTRY?
- D) DO WE NEED TO ADD SPECIFIC MARKET-RELEVANT ASPECTS TO THE NFFA-EU PROPOSAL FORM? CAN EVALUATION OF THESE MARKET-RELEVANT ASPECTS BE MADE BY THE ARP IN THE EVALUATION STEP (SHOULD AN INDUSTRIAL SCIENTIST BE INCLUDED IN THE ARP FOR SUCH REQUESTS)? WHAT ARE SUITABLE METRICS TO EVALUATE PROPOSAL IMPACT ON EUROPEAN MARKET?
- E) IN YOUR OPINION, IS THE NEED TO ACCESS AT LEAST TWO DIFFERENT INSTALLATIONS LIMITING THE POSSIBILITY TO ATTRACT INDUSTRIAL USERS?
- F) SHOULD NFFA CONSIDER A RAPID ACCESS MECHANISM FOR SMALLER-SCALE REQUESTS?

The key points of SIAP feedback are provided below:

- CAPTURE THE TRUE EXTENT OF INDUSTRY INVOLVEMENT WITH AN ENHANCED APPLICATION FORM (THE FORM WAS ALREADY ADAPTED FOR THE LATEST NFFA-EUROPE APPLICATIONS ROUND)
- CONSIDER RELAXING THE PROPOSAL REQUIREMENTS TO ALLOW SMES TO ACCESS A SINGLE INSTALLATION AND HENCE MAKE IT EASIER FOR THEM TO START USING NFFA-EUROPE FACILITIES, POSSIBLY WITH A DEDICATED ARP ASSESSOR.
- MAKE CASE STUDIES OF SUCCESSFUL COLLABORATION WITH INDUSTRY (NOT NECESSARILY FROM NFFA PROJECTS) FOR SPECIFIC APPLICATION AREAS.
- TARGET INDIVIDUAL AND CORPORATE CONSULTANCIES AS INTERMEDIARIES TO REACH SMES
- ATTEND TRADE ASSOCIATION EVENTS AND FAIRS RATHER THAN ACADEMIC MEETINGS (THIS HAS BEEN THE STRATEGY FOR INDUSTRIAL OUTREACH IN THE FIRST HALF OF THE PROJECT WITH EVENTS SUCH AS REINEU, TECHINNOV AND CARNOT)
- USE AN ORGANISATION LIKE SCIENCE BUSINESS TO RUN TARGETED INDUSTRY EVENTS"

This set of advices has been taken on board and implemented all across the extension of the project. The actions have been declinated across various sub-tasks and are described below.

All partners of NFFA participate to this activity, excepted KIT, Promoscience, STFC and EPFL, which represents the 25% of the overall budget of NA.

Subtask 11.5.1: Networking between the NFFA-Europe facility business and industry liaison offices

This subtask has the objective to bring together business-oriented staff from the NFFA-Europe partners. However, as mentioned earlier on, many partners do not have active “industry offices”. It was therefore decided early on in the project to merge much more the TLNet and Industry Liaison Network (ILNet) activities for reasons of efficiency in dealing with potential industrial users and representativeness of the NFFA-Europe nodes and partners.

On top of things that have been set in place to develop liaison between ILOs, the RI Village dynamic has been developed to address industry through a critical mass of ILOs among several European projects. The RI Village is a road show, bringing together European and regional projects, that wants to weight in European events while coming together to engage with industry.

ReInEU2016 – Bratislava – October 2016: In this context, 2016’s NFFA attendance to Bratislava’s have been interesting in two ways: it allowed Giorgio Rossi and Ed Mitchell to have a talk about NFFA possibilities concerning European re-industrialization, and it also has been the occasion to do joint outreach with three other European initiatives, the Science & Innovation with Neutrons in Europe in 2020 (SINE2020), the Central European Research Infrastructure Consortium (CERIC) and the European Synchrotron Radiation Facility (ESRF).

EuroNanoForum – Malta – June 2017: On the basics of the success of Bratislava, the EARIV initiative has been conducted again for the 2017 EuronanoForum in Malta, a milestone event aiming to strengthen the competitiveness of European manufacturing industries through nano and advanced materials technologies and open innovation.

German Materials Society (DGM) – Dresden - September 2017: NFFA-Europe offer has also been disseminated at the Materials Week, held by the German Materials Society (DGM) in cooperation with the Steel Institute VDEh (VDEh) in September 2017 in Dresden (Germany). The exhibition “Materials for the future” was the ideal opportunity to meet industrial partners. NFFA was present with a stand shared with SINE 2020 and Calipso plus. Many contacts with industrials have been established, and in particular with Daimler, Volkswagen, Areva, Benteler, Lufthansa and more.

IndTech 2018 – Vienna – October 2018: a conference with the objective to present new industrial applications for applied research on Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing. NFFA was present with a stand shared with SINE 2020, Calipso plus and EUCall.

International Conference for Research Infrastructures - Vienna – September 2018: a conference to provide the opportunity to discuss current and future challenges for research infrastructures from all over the world. EARIV was present with a stand, for the first time under a coordinated branding.



Figure 13: snapshots from EuronanoForum participation in Malta.

Subtask 11.5.2: Marketing towards industry

Outreach campaign

An outreach campaign with industry as a target has been carried out. NFFA has been present at a series of selected events, in some cases in partnership with other institutions to amplify the impact and mutualize the costs. They combine brokerage events and live talks, at least 10 events a year, while targetting public-private partnership events as well as BtoB events. They are the most effective dissemination tool for NFFA-Europe. The various target audiences includes NFFA-Europe main audience (small and medium and start-ups enterprises looking for peer review or eventually commercial access, mainly from seven core markets : pharmaceuticals / biotechnologies, nanomaterials / chemicals, nanoelectronics / superconductivity, and energy) as well as its secondary audience (big national & international industries looking for commercial access motivated by confidentiality). Potential partners are also a secondary target (new H2020 strategic partners, european clusters wanting to bond with large scale research facilities).

The NFFA-Europe presence at these meetings has been funded mostly by the Grenoble node.

Event NFFA attended	Year	Month
9th Plenary meeting of the European TTO circle (San Sebastian)	2016	May
5th World Congress on Materials Science & Engineering (Alicante)	2016	June
NanoCity 2016 (Amsterdam)	2016	June
Industrial Technologies 2016 (Amsterdam)	2016	June
Carnot 2016 (Lyon) and Carnot 2018	2016 - 2018	October
ReInEU2016 (Bratislava)	2016	October
MicroTech (Lyon)	2017	February
German Materials Society (DGM) – Dresden	2017	September
TechInnov (Paris)	2017	February
TLNet/ILNet meeting (Trieste)	2017	March
MICM (Bordeaux)	2017	May
EuroNanoForum2017 (Valletta)	2017	June
NanoPhotonics 2017 (Barcelona)	2017	September
Nanoinnovation2017 (Roma)	2017	September
Brokerage Event on Nanotechnology and Advanced Materials (Munich)	2017	November
4th International Conference on Smart Materials (London)	2017	November

Additive manufacturing technologies & capabilities (AMEF) (Brussels)	2018	October
Carac 2018 (Grenoble)	2018	October
RI Industry Summit (Amsterdam)	2018	March
Techinnov 2018	2018	February
Imagine Nano 2018 (Bilbao, Spain)	2018	March
IndTech 2018	2018	October
ICRI (Vienna)	2018	September
Energy Materials Nanotechnology 2018 (Heraklion, Greece)	2018	May
Bulgarian Presidency Flagship Conference on Research Infrastructures 2018 (Sofia, Bulgaria)	2018	March
KET NMBP (Straburg)	2019	June
Synergi [SYchrotron and NEutron Research Go Industrial] 2019 (Lyon)	2019	May



Figure 14: FA-Europe booth at Industry Technologies (Amsterdam).



Figure 15: The NFFA-Europe information stand at Industrial Technologies and the REinEU “RI Village” session flyer.

Marketing toward potential industrial prospects has been largely reduced during the 4th period, with respect to the previous 3 periods, due to the lack of resources. Dorian Martin, an ESRF marketing officer on time limited contract dedicated to run Task 11.5 initiatives ended his contract in July 2018. No further resources were then available at the ESRF, excepted for a 6 months marketing assistant internship that contributed to digital marketing actions. Moreover, the ESRF also run out of resources

to finance the participation to relevant events, and this resulted in a consistent reduction of the participation. We would like to point out that in NFFA also partners other than the ESRF are expected to participate to task 11.5 promotion, and some budget has been also allocated for this activity, but it remained unfortunately only marginal. Nonetheless, as showed in the table above, although with limited resources, a certain number of promotion actions have been carried out.

Industry section in the website

An industry-specific section of the NFFA website has been also implemented; in order to gather together our media and social-media presence, our forthcoming and past events, and a simplified explanation of the application process, followed by the answers to the most frequently asked questions concerning privacy and IP.

A few hooks disseminated on NFFA-Europe website welcome page, leading to a short registering form, then to a simple question box, designed to harvest the users needs & questions.

After this quick process, the user request is transformed into an interactive discussion feature, gathering in one page the detailed issue encountered by the user, the response of the ILNet coordinator, and the comments of the TLNet members invited by the ILNet coordinator on the request. Every component of this feature is readable on any kind of device (responsive design) and easily understandable by anyone in a minimal time, thanks to a first-in-first-out approach for the discussion threads.

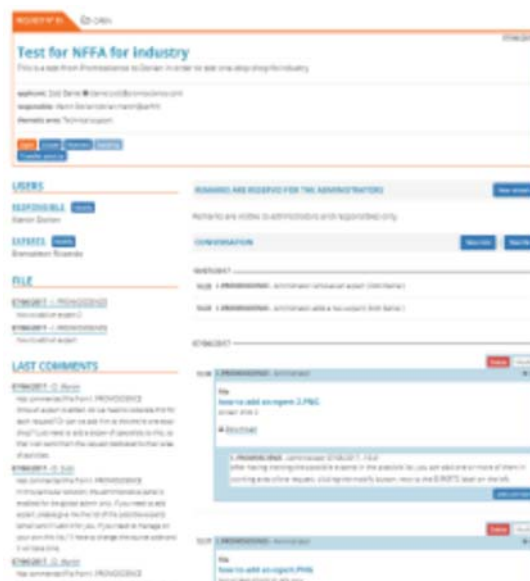


Figure 16: Online NFFA---Europe help---desk for industry.

Other actions

This online dissemination towards industry was completed by a dedicated industrial flyer, designed by Promoscience and the Grenoble node. It's basically a smaller and straight-to-the-point version of the general NFFA flyer, depicting the main markets NFFA-Europe may target, embodying the single entry point with an industrial email address that goes directly to the TLNet.



Figure 17: Snapshot of live- broadcast from EuroNanoForum 2017.

The Grenoble node held a Facebook Live event on NFFA-Europe booth in EuroNanoForum2017 in Malta, to promote NFFA toward industry during a lively and dynamic event. While preparing it, we requested the email address of the social-media manager from every nodes, for obvious outreach reasons, and we coordinated the sharing of this event.

The resulting video from this live had more than a hundred views in a view day, which is quite a success regarding the specificity of NFFA-Europe, and encouraged the Grenoble node to reiterate the experience at each NFFA-Europe talk that would be given in the upcoming events.

Finally, an industry corner has been implemented in the NFFA Newsletter which report and interview to industrial users of the TNA access to inspire further potential users.

Subtask 11.5.3: Incentivised knowledge transfer

NFFA-EU has received one request for feasibility access, which was performed at the end of March 2017. In addition, one commercial (paid-for) request has been passed onto the NFFA-Europe TLNet from the ESRF Business Development Office, where the request could not be performed using ESRF facilities but could benefit from the NFFA-Europe platforms.

A request has been received for technical information on SAM analysis or other microscopies with chemical sensitivity. CEA/LETI and CNR-IOM provided an extended discussion on the Forum opened by the helpdesk, and a feasibility test has been carried out using SPEEM at CNR-IOM. At the end the SME decided to apply for a proprietary research directly to the Facility.

IKT is mainly a tool that has been developed in cases where: a) an industrial confidential access is potentially considered and a proof of concept is demanded; b) a doubt exists, in case of industrial experiments, on the feasibility of an experiment and a preliminary feasibility can improve the chances of success of the technical feasibility.

Overall, the incentivised knowledge transfer (IKT) remained poorly exploited, because most of the industrial access has been directly provided using the transnational access (TNA). Therefore, the scarce use of this tool can be interpreted more as a consequence of the very successful implementation of the TNA, than of the failure of the tool per se.

Subtasks 11.5.4: IPR management and technology transfer opportunities

This subtask has been launched at the end of 2017 in particular with reference to technology transfer actions with respect to main JRA outcomes.

After a dedicated campaign of assessment of the main achievement from the JRAs, a series of opportunities of valorisation and technology transfer have been identified. They are reported below:

JRA1

- MICROJET SETUP: AN EVALUATION OF NOVELTY AND IP HAS BEEN DONE WITH THE SUPPORT OF THE IPR OFFICE AT CNR. THIS IS CURRENTLY UNDER WAY. IT IS NECESSARY TO WAIT FOR THE FINAL SOLUTION AND PROOF THE NOVELTY AGAIN. ON THE BASIS OF THE RESULTS THE VALORISATION STRATEGY WILL BE EVALUATED.
- MICROREACTOR DROP: AFTER A CHECK BY THE PATENT OFFICE OF CNR IT HAS BEEN PROVEN THAT BRUKER HAS NO PATENT IN EUROPE, AS INITIALLY SEEMED THE CASE. THEREFORE THE PATH FOR VALORISATION IS CLEAR AT THE MOMENT.
- TEM/SPECTROSCOPY OPERANDO SYSTEM: AN AGREEMENT WITH A LARGE COMPANY COULD BE CONSIDERED, BUT NOTHING HAS BEEN CONCLUDED SO FAR.
- FAST-SCAN STM AND AFM: A BACKGROUND PATENT ON THE CONCEPT OF THE MODULE IS RENEWED YEARLY. COMMERCIALIZATION BY A LOCAL COMPANY IS POSSIBLE AND DISCUSSION WITH CNR FOR NON-EXCLUSIVE LICENSING OF THE BACKGROUND PATENT IS ONGOING. A LARGE COMPANY MADE AVAILABILITY ITS MARKETING NETWORK TO SPREAD THE INFORMATION AMONG THE STM COMMUNITY.
- NEW X-RAY OPTIC ELEMENTS: A MECHANISM OF TECHNOLOGY TRANSFER IS ALREADY IN PLACE AT PSI TO SERVE A NICHE MARKET.

JRA2

- NANOLITHOGRAPHY SYSTEM: A MECHANISM OF TECHNOLOGY TRANSFER IS ALREADY IN PLACE AT PSI TO SERVE A NICHE MARKET. THE TECHNOLOGY CAN BE OFFERED AS A SERVICE ON COMMERCIAL BASIS IF REQUESTED.

JRA3

- ACTIVITIES ON A DATA REPOSITORY PLATFORM: THESE ARE SYNERGIC WITHIN CNR/IOM SCIENTIFIC DATA RESEARCH INTERESTS. THE DATA REPOSITORY DELIVERED AT THE END OF THE PROJECT WILL ALLOW TO COMPLETE AND ENHANCE DATA SERVICES FOR THE SCIENTIFIC COMMUNITY AND TO PROPOSE HIGH LEVEL SERVICES FOR SME AND INDUSTRIAL USERS. FOR THIS AIM WE ENVISAGE THREE DIFFERENT ASPECTS OF EXPLOITATION:
 - A. PROVIDING AD-HOC/TAILORED SOLUTION/CUSTOMIZATIONS OF THE SCIENTIFIC DATA MANAGEMENT INFRASTRUCTURE (NOT ONLY FOR SCIENTIFIC INSTITUTION BUT ALSO IN OTHER ENVIRONMENTS); EXAMPLES:
 - I] PROVIDE A DATA REPOSITORY FOR STORING WEATHER DATA (SOMETHING THAT IT IS CURRENTLY DONE WITH ARPA-FVG THROUGH THE EXACT LAB COMPANY A SPIN-OFF COMPANY OF CNR/IOM);
 - II] INVOLVEMENT IN THE EUSMI EU PROJECT TO PROVIDE A DRP FOR SUCH PROJECT
 - B. EXPLOITATION/VALORISATION OF THE EXPERTISE IN PROVIDING HIGH LEVEL DATA SERVICES ON THE TOP OF THE INFRASTRUCTURE. SEVERAL HIGH LEVEL SERVICES ARE IN THE PROCESS TO BE SETUP AND HOPEFULLY SOME OF THEM CAN BE PROMOTED TOWARD OTHER SCIENTIFIC RESEARCH INSTITUTIONS AND AGAIN SMES (FOR INSTANCE: VISUALIZATION TOOLS, INTEGRATED DATA ANALYSIS PACKAGES, CLASSIFICATION/REGRESSION TOOLS ON LARGE AMOUNT OF DATA BASED ON MACHINE LEARNING ALGORITHMS AND SO ON).

EXAMPLES:

 - I] A PORTAL WITH VISUALIZATION TOOLS EMBEDDED FOR WEATHER DATA REPOSITORY (AGAIN SOMETHING AS TRIED WITH ARPA-FVG);
 - II] AN ONLINE SERVICE WHERE EVERYBODY CAN CLASSIFY HIS/HER OWN IMAGES (FOR FREE IN CASE OF SMALL BUNCHES, UNDER SOME AGREEMENT FOR LARGE DATASETS);
 - III] A PAY PER USER SERVICE FOR SOME SOPHISTICATED ANALYSIS ON SOME DATA.
 - C. EXPLOITATION OF THE EXPERTISE IN MACHINE LEARNING AND DATA ANALYTICS TOOLS FOR A WIDER MARKET. THE EXPLOITATION COULD TARGET COMMUNITIES AND COMPANIES WITH INTERESTS IN IMAGING IN A BROADER SENSE. SPECIFICALLY, INSTITUTIONS WITH A DATASET SIZE THAT REQUIRE HIGH PERFORMANCE ANALYTICS, HIGH PERFORMANCE DATA ACCESS AND ADVANCED CLASSIFICATION METHODS SUCH THE ONES PROVIDED BY ML/DL.

EXAMPLES:

 - I] PROPOSE A WELL-TRAINED ML ALGORITHM TO SEM PRODUCERS AND TO ANY SCIENTIFIC INSTRUMENTS COMPANY WHICH PRODUCES A LOT OF DATA.

FOR ALL THE ABOVE THREE AREAS, THE EXPLOITATION COULD BE CARRIED OUT THROUGH WORKSHOP PRESENTATIONS AND LIVE DEMONSTRATIONS OF THE OUTCOME OF THE DATA MANAGEMENT ACTIVITY, AND COULD BE INITIALLY DIRECTED MAINLY TOWARDS SMES, MOVING TO LARGER COMPANIES ONCE THE SUGGESTIONS AND CASES COLLECTED FROM ACADEMIA AND INDUSTRY WILL BE INTEGRATED IN THE DATA MANAGEMENT SYSTEM. THE COLLABORATION WITH THE EXACT-LAB SPIN-OFF COULD BE CONSIDERED IN ORDER TO USE IT AS AN OPEN CHANNEL TOWARDS THE SME MARKET.

JR4

NO EVIDENT IP EXPLOITATION OPPORTUNITIES.

JRA5

- MULTI-INSTRUMENT-MULTI SCALE-MICROSCOPY CORRELATION SAMPLE HOLDER: A PROJECT OF COLLABORATION WITH ZEISS IS ONGOING FOR THE CO-DESIGN OF A MULTI-INSTRUMENT-MULTI SCALE-MICROSCOPY CORRELATION SAMPLE HOLDER. ZEISS IS KEEN TO GUARANTEE THE EXPLOITATION OF THE TECHNOLOGY WHEN THE FINAL DESIGN WILL BE AVAILABLE. THE DEFINITION OF AN AGREEMENT IS ON-GOING TO DEFINE THE TERMS OF REFERENCE OF AN EVENTUAL LICENSING.

Subtasks 11.5.5: Future business models.

Actions on this subtask are running. One of the main conclusions of the TLNet/ILNet debate conducted about NFFA-Europe business model is that it required the creation of a one-stop shop that would guide potential industrial users from scratch to an ad-hoc solution responding to their needs. This one-stop shop is the beginning of the user experience, and has to be presented as the main entrance to NFFA_europe three pillars: facilities, academic know-how and a transnational network.

It has been later determined that the one-stop shop should be materialised as a “button to push” on the industrial part of the new NFFA-Europe website, button that will directly ring a bell at the TLNet/ILNet designated person. This mechanism must be the top priority to have a fully functional network, so that any potential industrial user can push this unique button, on our unique website, and get relieved of the longest and dullest part of the application process by entering in contact with any person able to answer his questions, and to shape his challenge/need with the right technique or application for it.

This one-stop shop has been materialised in september 2017 as an interactive helpdesk feature on <https://www.nffa.eu/about/networking/industry/>, directly connected with the TLNet/ILNet coordinator, in order to interact within a few minutes with its pluridisciplinary expert hubs from all over Europe.

In an increasingly remote and digital industrial environment, reaching the decision maker is not an easy thing to do. To effectively attract the attention, NFFA-Europe need to get creative by updating old approaches and trying new ones, through an online service due to the distant nature of the technical and industrial liaison networks.

The NFFA-Europe one-stop shop is the very core of the industrial user experience, and the center of its business model. Reducing the amount of actions that a potential user has to take to submit his application, while augmenting the interaction between the Technical Liaison Network, the Industrial Liaison Network and the potential user, is the key to an increased industrial access to NFFA.

A continuous attention is dedicated by the management of WP11 toward the possibility to develop new opportunities, new ways to engage with industry and to valorise the know-how produced by NFFA. In this context various initiatives have been taken, which will, in the next future, converge toward the production of D11.20 (Position paper on sustainable business models). The initiatives are listed below:

- **JRC Workshop on Technology Transfer in Nanotechnology (18/10/2019-Lecce)**: this workshop, organised by the JRC tried to define the main trends and key elements for technology transfer in the world of nanotechnology; a report has been developed after this meeting, which will be taken in consideration to define the strategy of NFFA.
- **Joint ICO meeting (09/04/2019 – Crete)**: the EU project SINE2020 and Calipso+ organised a meeting where they invited the Industrial Contact Officers (ICO) from the various partner organisations to discuss about how better engaging with industry. In the occasion of this event a special session on NFFA has been organised to collect feedback and suggestions about the actions taken in the context of task 11.5. This meeting has been hosted by Forth.
- **EMCC workshop (10/06/2018-Brussels)**: Ennio Capria, the manager of the Networking Activities in NFFA was invited by the European Material Characterisation Council (EMCC) for a talk on the role of the Analytical Large Scale Infrastructures in the context of the Characterisation landscape in Europe followed by an open discussion.
- **IndTech 2018 (29/10/2018-Vienna)**: the EMCC invited Ennio Capria for a talk on the role of distributed infrastructure in the actual landscape of research in Europe and about how some synergies could be established among different distributed infrastructures across various TRL level and various topics.
- **NFFA Workshop (18/02/2019-Milan)**: during the NFFA workshop and General Assembly, the WP11 activities and in particular the one related with Task 11.5 have been explained and challenged by the audience, and in particular by the SIAP members. This provided a useful set of feedback which will be considered for further improvement of the task 11.5 activity and for the elaboration of D11.20.

D11.20 has been post-poned from M48 to the end of February. D11.20 will be a position paper that would contain a series of evaluations on the best strategies to put in place to better contribute to innovation in nanotechnology. This paper will consider all the similar work already carried out in the past, but also some more recent working group in which NFFA, participated in connection with other similar and complementary realities, like Calipso+, SINE2020, but also in collaboration with institutional partners like EMCC or the TTCircle. Moreover this proposal would take into consideration the feedback from the SIAP, expressed during the past and the next general assembly and a general assessment of our activities to date.

The recommendations expressed in the position paper will be set at the foundation of all actions proposed to promote innovation in a proposal that the Consortium is preparing for the coming INFRAIA-3-2020. In particular, this proposal would contain specific actions addressing nanosafety which have never been specifically addressed so far. For this reason the NFFA consortium is planning a workshop which will happens in Jan 2020. At this workshop, among other, the questions of the needs from industry in the topic of nanosafety will be addressed, and would be beneficial to integrate such a considerations and consequent recommendations in the position paper. For this reason we considered worth to postpone the deadline of this deliverable after the nanosafety workshop, in order to have a more complete and useful deliverable.

Following an advise from SIAP, in order to improve the NFFA engagement with industry, NFFA implemented the possibility, for SME, to relax the constraint of the 2 installations as a minimum requirement, when accessing TNA. Nonetheless the requirement of scientific excellence remain unchanged, and the access still needs to be granted after a full peer review procedure.

Task 11.6: Metadata management

Metadata is a formal annotations associated with data to provide information on the content and context of the data in question, which is used to assist the discovery and sharing of data. As metadata needs to be understood across communities, it is appropriate that its definition is developed across communities. Thus NFFA-Europe task 11.6 wants to propose and define a metadata standard to catalogue data from nano-science experiments, with particular application to the experimental and simulation data that is managed by the NFFA-Europe IDRP.

Task 11.6 is working very closely with WP8-JRA3 on e-infrastructure for data and information management; WP8-JRA3 is using the metadata standard within its toolset, and thus provide a reference implementation. WP8-JRA3 and Task 11.6 have a strong overlap in their membership, and are used to hold regular combined coordination meetings to track progress. To facilitate the community networking required to develop recognised standards, the task has been undertaken within the context of the Research Data Alliance (RDA), allowing the activity to consult with the wider materials science community, whilst coordinating with other research data experts in other domains around the world.

The majority of the work of the task has been completed with deliverable D11.14. (M30, Feb 2018). Nonetheless, some follow up activities have been undertaken to continue the relationship with the RDA and to embed the work of the task in WP8-JRA3.

This activity has been carried out by the following partners: CNR, ESRF, FORTH, KIT, STFC and EPFL. The budget represents the 12% of all NA activities.

Subtask 11.6.1: Survey of existing metadata standards

A survey of the state-of-the-art in the relevant practices, frameworks and metadata standards was presented in D11.2. This considered information design framework such as FRBR and OAIS, together with a consideration of metadata for dataset description and analysis. This work is strongly influenced by the existing CSMD model used by the STFC's ICAT tool; however, this was felt to be too facilities focussed and a more project focussed approach would be suitable for NFFA-Europe.

This work has continued and developed. Metadata systems designed more specifically for materials science and nano-materials in particular have been considered. Particular focus has been on: the CODATA-VAMAS Joint Working Group on the Description of Nanomaterials; the NOMAD (NOvel MAterials Discovery) Laboratory, a European Centre of Excellence (CoE); and the Materials Genome Initiative in the USA. The initial work reported in D11.2 defined a framework of a metadata model for nano-science data collection and management. The metadata from these initiatives informs domain specific fields.

Subtask 11.6.2: Establish an RDA Interest Group on data management for nano-science

The RDA is an international body intended to promote best practise for data sharing within and across research communities. It operates through two main mechanisms: Interest Groups which bring together communities to discuss general issues, and Working Groups, time limited groups which have specific outputs (e.g. standards, best-practice guides, software etc).

Members of Task 11.6 have been working in within the RDA to develop standards and tools, attending RDA plenaries in Barcelona (April 2017), Montreal (Sept 2017) and Berlin (March 2018).

Rather than establish a new interest or working group within RDA, it was decided to work within existing groups and work closely with those groups to promote the NFFA-Europe metadata model

and to extend the model in conjunction with the wider community. In particular, NFFA-Europe has been interacting with:

- RESEARCH DATA NEEDS OF THE PHOTON AND NEUTRON SCIENCE COMMUNITY INTEREST GROUP
- RDA/CODATA MATERIALS DATA, INFRASTRUCTURE & INTEROPERABILITY INTEREST GROUP
- METADATA INTEREST GROUP
- CHEMISTRY RESEARCH DATA INTEREST GROUP
- RESEARCH DATA REPOSITORY INTEROPERABILITY WORKING GROUP
- VOCABULARY SERVICES INTEREST GROUP
- PERSISTENT IDENTIFICATION OF INSTRUMENTS WORKING GROUP

Task 11.6 has presented its results at these groups and participated in discussions on how to best develop metadata models.

Task 11.6 has worked with the RDA/CODATA Materials Data, Infrastructure & Interoperability Interest Group to establish an International Materials Resource Registries Working Group. This Working Group has defined an interoperable registry for materials resources, covering a wide area of materials science including nano-materials. Task 11.6 has contributed to the metadata modelling and design tasks, and has considered how to best integrate the resulting metadata into the NFFA-Europe metadata standard recommendation.

Task 11.6 is at present leading a task group on Semantic Assets for Materials Science, with a view to establishing a new RDA activity within the Vocabulary Services Interest Group. This is to consider how to best select, develop and maintain semantic assets used for data management in Materials Science, such as controlled vocabularies, ontologies, metadata schemes, glossaries, and lists of common terms. This is with a view to develop further working group activities within the RDA.

Task 11.6 is also working with the working group on Persistent Identification of Instruments, which is developing a scheme to provide persistent identifiers and associated metadata to instruments used in experiments; this is a key component in the interoperable metadata framework required for materials science information management, which requires an unambiguous experimental context for correct interpretation of data.

Subtask 11.6.3: Collect requirements from the community

This task have been completed, but we continue to consult on the application of the metadata standard within the IDRPs.

Subtask 11.6.4: Evaluate standards

This work is continuing in collaboration with WP8 to further refine the metadata standard presented in D11.2 as the IDRPs architecture is developed. The metadata standard has proved robust, with relatively few refinements required. This work has included mapping to other metadata standards within the framework; developing a serialisation of the metadata standard into JSON; mapping the metadata to the EUDat B2Share and B2Find metadata standard, so that NFFA-Europe data and metadata can be stored within EUDat services, and also discovered using EUDat discovery services. The ongoing work on developing and interoperating the metadata standard is discussed in deliverable D11.14.

A paper "Metadata for nanotechnology: interoperability aspects" was presented at 11th International Conference on Metadata and Semantics Research (MTSR 2017), Tallinn, Estonia , 28 Nov - 1 Dec 2017, and subsequently published in Metadata and Semantic Research. Communications in Computer and Information Science 755 edited by E Garoufallou, S Virkus, R Siatri, D Koutsomiha, 247-252. Springer International Publishing, 2017.

2. Evaluation of the activities

Below we report a series of evaluation about the results achieved so far in the various task of WP11.

2.1 Achievements, difficulties and perspectives by task

Task 11.1: Implementation of a Technical Liaison Network “TLNet”

All the activities planned in this task have been executed successfully. A SEP has been setup, with a catalogue useful and easy to access. Moreover, a Technical Liaison Network (TLNet) have been setup, together with all the processes and workflows needed to treat the requests from users, plan the experiment, support the ARP peer review with a technical review and provide access.

The idea to merge TLNet and ILNet (Industrial Liaison Network), although efficient in terms of use of the resources and effective for industrial users with a good technical expertise, demonstrated some limitations with respect to the possibility to attract new comers. The idea of a structure that could take in charge the interface with industrial users is still crucial in order to stimulate and run a successful industrial programme. This structure should mimic the modus operandi of Industrial Contact/Liaison Offices already present in some facilities, where a dedicated competence is made available to bridge the solution focused approach needed by companies and the technic focused approach available via the scientific staff at the facilities. This structure should be capable to understand the real need of industry and address the right technical solution, to complete the necessary hand holding and matching excercise.

In this task an activity dedicated to metrology has been already proposed, the extent of which has been mainly exploratory due to the very modest resources invested, some activities of which are still running.

Task 11.2: Building NFFA-Europe branding

This task was fully accomplished and allowed NFFA to have access to a full set of high quality supporting material and branding tools. The material produced, in some cases adapted for some ad-hoc actions, supported the activities of the Management and the Outreach actions toward both the Academia and Industry.

The task 11.2.4, focused around the production of “success stories” was only partially pursued. In particular, the suggestion from the SIAP of creating some case studies to inspire potential industrial users did not materialise. The main reason for this was an underestimation of the resources needed for this activity, which would need the support of dedicated time of an editors for harvesting the contents and of a writer for the content production, which has not been budgeted.

Task 11.3: Dissemination

An extensive and wide campaign of dissemination and outreach have been accomplished by the partners of NFFA under the coordination of Julich. The presence at selected relevant events has been promoted, adopting various approaches. NFFA has been presented with oral presentations, posters, in some cases also with booths and with the organisation of selected events or the sponsoring of some parallel.

A part from the events, the promotion has been pushed using some digital marketing tools, like the website, the newsletter and some social network (although in a very limited way). Finally an action of advertising on a scientific journal has been also tempted.

These actions of dissemination contributed to increase the visibility and building the popularity of NFFA.

Some actions have been also pursued to increase the connection of NFFA with similar realities in the US and in Australia, but this did not materialised in real concrete collaborations.

It is important to consider that, after the midterm review, the reviewer and the Commission suggested to open more the NFFA range of action to the field of nanosafety and to new challenging fields, in particular in material science. For this reason, a certain set of dissemination actions has been taken toward in those fields. With respect to the new challenges, particular attention has been paid to join the Additive Manufacturing community. Furthermore, at the same review it was suggested to take some actions directed toward general public. Although no resources were originally planned for this activity, the management decided to take on-board this suggestion and proposed the participation of NFFA to the next EuroScience Open Forum (ESOF) 2020 Conference in Trieste.

Task 11.4: Training and mobility programme

The training and mobility programme was a complete success. All the expected outcomes have been accomplished. Two schools have been organised with a good level of participation complemented by a programme of short term visits that allowed the possibility to increase the size of the NFFA target community and create awareness and expertise. Furthermore, a consistent repertoire of on-line training material has been developed, which demonstrated the capability to reach a wide web audience.

Task 11.5: Industrial innovation and knowledge

An ambitious programme of outreach and engaging of industrial partners and users have been operated. The success of the programme is proven by the fact that the number of industrial users constantly grew during the proposal and that the amount of submitted proposal that were connected with industry reached the 10%. This number is in line, or even higher to the quota which is normally declared by scientific research infrastructures much more mature than NFFA.

Although the core NFFA-Europe nodes have been asked to propose contact points (e.g. in their industry liaison or tech transfer offices) to act as components of the Industry Liaison Network (the industry complement to TLNet), only Grenoble, Lund, Barcelona and Heraklion nodes have responded. It was therefore decided to merge TLNet and ILNet into one entity.

A decision was taken, at the beginning of the project, to distribute resources to most of the node to allow the possibility to operate industrial outreach. This idea demonstrated fallacious, since, a part from the ESRF and Lund, no partner exploited these resources. After an enquiry carried on with the partners, it emerged that one of the reason for this lack of results is related with the transnational character of the NFFA access. The partners are in fact mildly motivated to advertise access to industrials in their local ecosystem if they have to tell them to access every other facility except themselves. In this context, with only 2 partners being actives in industrial outreach, the budget effectively available for this activity has been drastically reduced with respect to the nominal figures. This imposed to reduce the ambitions and in particular to drastically reduce any activity after the 3rd year.

With respect to the valorisation and the exploitation of the IP generated within the NFFA actions some success stories can be listed. Some IP have been developed in collaboration with private partners and some IP have been produced that contributed to the issuing of patents. Although some good results have been obtained we realised that a more structured action for monitoring, assessing, managing and valorising the IP generated within the project is needed. Many partner were reluctant to discuss about IP generated, because they had some difficulty to place the boundaries between the IP generated by the consortium and the one already present in the partner laboratory. Furthermore, in some case the IP was even difficult to identify.

A very low use of the incentivised knowledge transfer is registered, essentially by big companies sensible to confidentiality issues and thus aspiring to a proprietary research access to NFFA-Europe infrastructure, which can be eventually achieved only by the single Partners as legal entities and therefore originating a misunderstanding between the NFFA-Europe offer as a whole, and single Partner specific procedures for services with fee. On the other hand a very high industrial access of SME, around 10%, that is well above the 5% targeted, has been achieved as standard open-access to NFFA-Europe.

A position paper discussing about the best lessons learned and suggestions on the way to engage with industry is expected by the end of February.

Task 11.6: Metadata management

The planned work has been fully accomplished. A set of metadata standards has been suggested, as a results of the interactions within the NFFA consortium and with the Research Data Alliance (RDA), exploiting international collaboration in connected standardisation activities. STFC has helped to establish a working group on Materials repositories, and will standardise the metadata framework developed in NFFA-Europe via this group in conjunction with other Task 11.6 team members, thus giving it international credibility and impact.

2.2 Impact of the Networking Activities with respect to the pre-defined KPIs

When the NFFA proposal has been defined, a set of Key Performance Indicators (KPIs) has been defined in order to estimate the outcome of the project and the impact. Among all of them, the Networking Activities play a role in the KPIs listed below:

Activity	KPI	Threshold	Contingency Plan	Actual value
Web Portal/ Access Platform	Number of visits	50 visits/months	Improve Web portal and dissemination and its timing	6250
Proposals	Number of proposals at beginning (<24 months)	70% of TA capability	Improve advertisement and user support	140%
	Number of proposals at advanced (>24 months)	> 150% of TA capability		153%
	Distribution of proposals (disciplines, countries)	No anomalous concentrations (50% disciplines, 20% countries)	Targeted advertisements	39.5% disciplines, 11% countries
Dissemination	Participation to international events	Every 4-6 months	Encourage partners to participate as NFFA delegate	14 every month
	Number of leaflets / brochures produced	4 in the first 24 months	Exploit success cases for dissemination material Training	6 including posters
Training	Number of students at schools	20	support for young students, involve more partners and expert users to contribute	30 (average)
	Number of request for targeted courses	6	scouting among nano-oriented PhD and in collaboration with industries	8 (average)
	Number of accesses of multimedia tools	5-10 accesses per month per tool	Promotion in social networks, google and high impact science portal Industry involvement	690 (average)
Industry involvement	Number of Industrial proposals/service requests/collaborations	5%	Revise KT strategy and dissemination programme, feedback from industrial associations	10%

All these KPIs have been met and in most case the value was above the threshold. This is a further proof of the fact that the NA have been successful.

3. Conclusions

This report presented a detailed description of the Networking activities operated to date. Most of the activities promised in original proposal have been completed successfully apart from few punctual activities that still need to be completed. All the KPIs which would rely on the implementation of an efficient networking activity have been met, and this is a further proof of the fact that WP11 was properly deployed with a good level of coordination with the Transnational Access and the Joint Research Activities.

Furthermore, some actions have been also carried out in the domain of nanosafety and in the domain of outreach toward general public. These actions were not planned in the original proposal, but were especially requested at the end of the mid-term review of the project.