



ORIENT- NM
**Organisation of the European
Research Community on Nuclear
Materials**

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 issues, resource needs and implementation**

Deliverable 3.11:

Education and training, mobility and dissemination plan

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Table of contents

Disclaimer.....	2
Table of contents.....	3
List of abbreviations	4
Summary.....	5
Introduction.....	6
Nuclear Materials Competence Platform.....	6
Training initiatives	7
Mobility actions	8
Integration of students and junior researchers.....	10
Organisational structure	10
Budget.....	11
Key Performance Indicators	12
Conclusion.....	12

List of abbreviations

APC	Article Processing Charge
CEP	Co-funded European Partnership
CEP-NM	Co-funded European Partnership on Nuclear Materials
CSA	Coordination and Support Action
CV	Curriculum Vitae
E&T	Education and Training
EC	European Commission
EJP	European Joint Programme
ETMAI	Education, training, mobility, and access to infrastructures
EU	European Union
IAEA	International Atomic Energy Agency
IG	Innovation Group
NM	Nuclear Materials
ORIENT-NM	Organisation of the European Research Community on Nuclear Materials
SAB	Scientific Advisory Board
SAT	Systematic Approach to Training
SME	Subject Matter Experts
WP	Work-package

Summary

This deliverable describes a proposal for setting up a structure dealing with education and training (E&T), mobility, and the integration of students and junior researchers. This organization will aim at maintaining and further developing competences in the area of nuclear materials science and technology. The “Nuclear Materials Competence Platform” will act as an executive body to (i) set up a portfolio of needs- and quality-driven training courses in the field of nuclear materials, (ii) develop a mobility programme to financially support end-users in performing mobility actions such as internships and attending conferences, and (iii) provide a platform to stimulate the integration of students and junior researchers into the field of nuclear materials. This deliverable describes the foundation of the “Nuclear Materials Competence Platform”, which will be established in the upcoming Co-funded European Partnership on Nuclear Materials. It includes proposed tasks, the organisation structure, a proposed budget, and key performance indicators.

Introduction

This document concerns the Task 3.5 of ORIENT-NM and describes the strategy to manage in a future co-funded European Partnership (CEP) on nuclear materials the following items: (i) set up a portfolio of needs- and quality-driven training courses in the field of nuclear materials; (ii) develop a mobility programme to financially support end-users in performing mobility actions, such as internships and attending conferences, training courses, summer schools, scientific exchange visits; and (iii) provide a platform to stimulate the integration of students and junior researchers into the field of nuclear materials.

Nuclear Materials Competence Platform

Nuclear materials (NM) play a crucial role in power generation, healthcare and other nuclear applications. Knowledge about the performance and behaviour of these materials is directly linked to the safe use of the involved technologies. Therefore, it is of great importance that, on the one hand, the current knowledge about nuclear materials is maintained and preserved and, on the other hand, that it can be extended to serve new innovative technologies and applications. Moreover, the inherently multidisciplinary nature of the modern materials science research lines pursued in the projected CEP on nuclear materials (CEP-NM) and their close link with advanced digital techniques are expected to attract young researchers from different fields towards the nuclear energy domain. This potentially helps to alleviate the current difficulty to ensure appropriate turnover of experts.

To facilitate competence building related to nuclear materials, this project foresees the launch of an “Nuclear Materials Competence Platform” that will manage and execute all knowledge transfer activities (e.g. training, mobility actions) that will be organized within a future CEP-NM, with the aim to preserve and extend the required knowledge, skills and attitudes (i.e. competences) to progress nuclear materials research and its applications.

The Nuclear Materials Competence Platform intends to be needs- and quality-driven:

- It will tackle training activities in topics for which a need is identified within the research lines pursued by the future CEP-NM, which inherently require multidisciplinary profiles that may not be currently available. In particular, emphasis will be given to match materials science knowledge with expertise in the use and development of digital techniques, as well as with the skills that are required to promote innovation. To obtain information on these specific needs a basic survey will be launched amongst the partners to monitor the current training offer and to identify future needs. This type of survey can be repeated during the CEP-NM should the needs of the community change. Where possible, existing initiatives will be used and added to the portfolio of the Nuclear Materials Competence Platform. To bridge the identified gaps, new activities will be developed based on state of the art information in the field.

- The Nuclear Materials Competence Platform will combine the scientific expertise of the Subject Matter Experts (SME) involved in the research lines pursued by the future partnerships and the didactic expertise of the experts involved with the management of the Nuclear Materials Competence Platform itself to ensure the efficiency and effectivity of the Nuclear Materials Competence Platform's deliverables. The involvement of the members of the Scientific Advisory Board (SAB) and of the Innovation Group (IG) will be fostered.

Furthermore, to inform all stakeholders on the activities of the Nuclear Materials Competence Platform (and its related actions), a dedicated and user-friendly webpage will be developed and ideally be embedded within the website of the CEP-NM. This webpage, in addition to being used for the organisation/announcement of the Nuclear Materials Competence Platform's activities, will provide suitable links to pages that provide information of interest in connection with the research lines of the CEP-NM. Where possible, links will also be made to existing related initiatives, such as courses, workshops and conferences, of international organisations dealing with competence building (e.g. IEAE, OECD-NEA, Nucleareurope, EHRO-N, GIF, EUROfusion, etc.).

The Nuclear Materials Competence Platform will focus on three main pillars: (i) training initiatives, (ii) mobility actions, and (iii) attention for the integration of students and junior researchers (MSc thesis students, PhD students, post-docs, and junior professionals) in the involved scientific and technical community. These pillars will be discussed in more detail in the following sections. The mission of the Nuclear Materials Competence Platform can be extended during the CEP-NM runtime according to the needs identified in and by the NM community.

Training initiatives

The Nuclear Materials Competence Platform will contribute to competence building via training courses, webinars, short informative sessions and other similar initiatives. To this end, a portfolio of basic and specialised training courses will be established. This portfolio will include newly developed training courses under the CEP-NM, as well as courses from already existing initiatives (i.e. project partners, IAEA, OECD-NEA). One of the tasks of the Nuclear Materials Competence Platform will consist of identifying relevant and complementary initiatives and to strive to appropriately coordinate and complement them. These initiatives will be summarised in a publicly available database, which links to the original source. Collaborations with other training providers could be established in order to maximise the training efforts.

The main aim of developing new training courses will be to bridge gaps between the existing training offer and the identified needs of the partners and stakeholders in the field of nuclear materials. Therefore, a survey will be developed and distributed among L&D departments of the main European organisations in NM in order to identify the current training offer and, more importantly, the training needs. In addition, the survey can be distributed among interested end-users (that are no partner in the CEP-NM). Finally, the survey can be complemented by a web search (e.g. CORDIS database) to make sure that most relevant training offers are included in the database. Based on the existing training offers and the identified training needs, a gap analysis will be performed.

Once these gaps in the existing landscape are identified, priorities will be defined and training materials will be developed according to these priorities by the SMEs from the R&D WPs/Research Lines. These priorities will be determined based on:

- The indicated urgency (i.e. how many times was it labelled as ‘urgent’);
- The number of times a certain training need was listed.

New training materials will be developed based on the International Atomic Energy Agency’s (IAEA) Systematic Approach to Training (SAT). The SAT includes the following steps:

- Analysis of training needs
- Design of the training programme based on translation of the desired competences to be acquired into learning outcomes
- Development of the training materials
- Implementation of the training course
- Evaluation of the effectiveness of the training.

This approach will form the basis for training initiatives using different learning formats (e.g. classroom training, online learning, distance learning, practical sessions, ...) that will be organised within the CEP-NM. These courses will take into account the appropriate educational levels while targeting the needs of the end-users and having proper learning outcomes in line with the desired competence building.

This “training initiatives” pillar of the Nuclear Materials Competence Platform includes the following (sub-) tasks: (i) list the current training initiatives in the field of nuclear materials (deliverable 1), (ii) identify the training needs of the project partners and end-users (deliverable 2), (iii) perform a gap analysis and compile a priority list (deliverable 3), (iv) develop quality criteria by which newly developed training materials can be appreciated (deliverable 4), (v) develop, implement, and evaluate training courses (deliverable 5).

Mobility actions

Besides courses and related initiatives, the Nuclear Materials Competence Platform will also build competences through its mobility programme (second pillar). With this mobility programme, the Nuclear Materials Competence Platform aims to develop competences (i.e. knowledge, skills and attitudes) via pathways other than the traditional (academic) approach (i.e. classroom or online learning and practical exercise sessions). It will support students and (junior) professionals to participate in conferences, training courses, summer schools, internships, workshops and/or scientific exchange visits. The mobility programme targets both (junior) professionals to improve their competences in the frame of Continuous Professional Development (i.e. life-long learning), and MSc students, PhD students, and post-docs (for internships and/or thesis work) to acquire and/or develop their competences. Furthermore, the mobility programme will support access to dedicated infrastructures (e.g. experimental facilities, laboratories) associated with nuclear materials science (located at the project partner institutes). A database of available infrastructures (including their mobility offer) in nuclear materials science will be maintained and will support the mobility programme. In addition, the mobility programme could link to similar initiatives, such as the OFFERR project, which also facilitates access to infrastructures.

The mobility programme (deliverable 6) will be developed by the E&T WP in the future CEP-NM to be complementary with already existing initiatives (e.g. ENEN++, NEA Nuclear Education, Skills and Technology Framework (NEST)). Its basic principles, however, will be as much as possible in line with the mobility programmes from these other E&T networks and projects.

The first task for setting up the mobility programme will be to develop application guidelines and eligibility criteria. These should be converted into convenient templates that will be completed by the end-users. A template for a mobility mission report should also be developed. These mission reports will serve as a valuable output of the mobility programme as they will demonstrate the knowledge transfer and competence building resulting from each mobility action. All this information will be integrated into the Nuclear Materials Competence Platform's website, including an online application and evaluation platform (cfr. EURAD₇ and PREDIS).

The mobility programme will also be responsible for improving access to infrastructures (in the field of NM). This action can be complemented by collaborating with the OFFERR project (<https://cordis.europa.eu/project/id/101060008>).

The mobility programme will be managed by the E&T WP and the CEP-NM Evaluation Committee (EvaCo). The main tasks of this EvaCo in the mobility programme will be to evaluate the applications and report on the decisions made.

The EvaCo will consist of the following members:

- Representative from the CEP-NM's E&T WP (pre-review of applications);
- Another Representative from the Executive Board (ExB);
- Representatives from the Scientific Advisory Board (SAB) – possibly external;
- Representatives of the Innovation Group (IG) – possibly external
- One expert from each Research Line (optional).

The members of the EvaCo will meet within 1 month after each application deadline to discuss the evaluations and select the beneficiaries for that application round. Afterwards, they will report their decision to the General Assembly for endorsement. The Management Support Office of the CEP-NM will deal with the practical aspects, such as notifying the applicants of the result of the evaluation process. The CEP-NM's E&T WP will follow-up of the execution of the various mobility actions. During the evaluation process, the applications will be scored on predefined criteria, such as (cfr. EURAD, PREDIS, ENEN++ and NUGENIA mobility grants):

- Application (proposal) is in line with the project scope/topics;
- Motivation;
- Application form is consistently filled up with sufficient details and justification;
- Requested budget is realistic and well justified;
- Training benefits for the applicant.

Upon completion of the mobility action, the beneficiaries will be obliged to submit a mission report, which will be reviewed on completeness by the E&T WP.

Integration of students and junior researchers

Students and junior researchers are the next generation of experts in the field of nuclear materials. It is important to provide them as early as possible with a platform for competence building and networking. This platform can be included in the CEP-NM's website and could include a forum and chat functionality. This allows them to easily come into contact with each other. Furthermore, they can use the platform to enrol in training initiatives and make use of the mobility programme (via links to the Nuclear Materials Competence Platform's webpage). In addition to this, actions for these students and junior researchers should be organized, such as:

- Dedicated networking events;
- Discussion sessions;
- Dedicated sessions during CEP-NM events.

To successfully implement these actions, it is important to create a dialogue between the established scientific and technical community within the CEP-NM and the students' community and to consider them as important end-users. The webpage of the Nuclear Materials Competence Platform (part of the CEP-NM website) will include a section with all relevant information for students, which could include:

- A list of relevant training courses, summer schools;
- A list of relevant conferences, workshops;
- A list of subject matter experts for the relevant fields of research (networking);
- An overview of all students involved in the project (networking);
- An overview of all scientific publications made by students involved in ORIENT-NM;
- A list of available MSc and PhD thesis topics at the CEP-NM partner institutes.

Input for these lists will be gathered by the E&T WP. All CEP-NM partners will be tasked to actively contribute to keeping these lists as up-to-date as possible. This can be easily achieved if they all systematically inform the E&T WP of all their activities, internship offers, and publications.

Organisational structure

The Nuclear Materials Competence Platform is part of a CEP-NM transversal WP "Education, training, mobility, and access to infrastructures" (ETMAI). This WP will report directly to the ExB and the General Assembly. The ETMAI WP will be able to make use of the services of the Management Support Team. More information on the organisational structure of the CEP-NM can be found in ORIENT-NM Deliverable D3.5 and D3.10.

The ETMAI WP itself will be led by the WP Leader, which may also serve as the Nuclear Materials Competence Platform's Coordinator. The Nuclear Materials Competence Platform's Coordinator will be supported by (sub)Task Leaders, one for each of the main three pillars described above, namely (i) implementation of training courses, (ii) mobility actions, and (iii) integration of junior researchers (MSc thesis students, PhD students, post-docs, and junior professionals) in the involved scientific and technical community. In addition to these leadership roles, 3 to 5 partners may support each (sub)Task. These

are CEP-NM partners who express an interest and willingness to contribute to the ETMAI WP.

Budget

In order to organize the Nuclear Materials Competence Platform’s activities, budget needs to be foreseen for organizing training courses, for funding and maintaining a mobility programme, and for networking events to support the young generation. These activities will be executed by the ETMAI WP within the CEP-NM, with support of the Coordinator and members of the ExB, SAB and IG, who will form the EvaCo for the mobility programme. For the estimations for the mobility programme costs, other EU-funded projects were used as a benchmark (e.g. PIANOFORTE, EURAD, PREDIS). Based on this benchmarking, which was performed in December 2022, it is estimated to pay a maximum lump sum of 1200 euros per mobility action.

In addition, budget needs to be reserved for online tools (e.g. webinar platform, dedicated webpage, mobility application portal,...). These tools are necessary to perform the key education and training activities.

Next, costs need to be foreseen for the integration of students and junior researchers. In order to allow them to network efficiently, the CEP-NM will organize network events and discussion sessions.

Estimated costs for training and mobility are shown in Table 1.

Table 1: Estimated costs for educational, training and mobility activities.

Task	Item cost	Number of events/calls	Target yearly	Yearly cost	Total cost
Student (M.Sc. and Ph.D.) mobilities	1,200	2 calls yearly	20	24,000	120,000
Short courses, workshops (live)	4,000	1 call yearly	2	8,000	40,000
Short courses, workshops (virtual)	2,000	1 call yearly	2	4,000	20,000
Short laboratory trainings	7,000	1 call yearly	2	14,000	70,000
Summer schools	30,000	1-2 calls	3 per 5 years		90,000
Professional trainings (radiation protection, grant writing, use of standards, etc.)	4,000	1 call yearly	2	8,000	40,000
TOTAL					380,000

All costs in Table 1 are net costs, without overheads. On top of the amounts listed in Table 1 additional costs for developing necessary tools for virtual actions (webpage, internet learning and meeting tools etc) with an estimated value of 25,000 EUR should be added.

Efforts will be made to coordinate the actions listed in the table above, especially summer schools, with actions taken in other frameworks, e.g., projects or international organisations, in order to optimise costs.

Key Performance Indicators

Key performance indicators (KPIs) are essential in evaluating the effectiveness of the Nuclear Materials Competence Platform's training and mobility activities. These KPIs provide specific, measurable, and quantifiable data that help the ETMAI WP determine if the training and mobility initiatives are achieving their desired outcomes. By tracking KPIs, the ETMAI WP can identify areas for improvement, and adjust its strategy to better meet the needs of its end-users.

For the Nuclear Materials Competence Platform, the following KPIs are proposed:

- Number of courses provided: ≥ 5 (at least one per year)
- Sign up rate: $\geq 80\%$ of the available seats (for classroom-based learning)
- Participant satisfaction (Kirkpatrick level I): $\geq 75\%$
 - To be monitored after training courses, mobility actions, and webinars
- Knowledge retention (Kirkpatrick level II): $\geq 70\%$
 - To be monitored after training courses
- Impact on performance: $\geq 75\%$ 'positive'
 - Self-assessment in mobility report, which needs to be scored on a 4-point scale: insufficient, poor, good, excellent. 'Positive' is the sum of 'good' and 'excellent' scores.
NOTE: this can be part of the participant satisfaction form for mobility actions as well.
- Number of supported mobility actions: ≥ 20 (per year)

By applying these KPIs the ETMAI WP can ensure that it is using its resources effectively and efficiently to develop the competences (i.e. knowledge, skills, and attitudes) of its end-users, which ultimately supports the formation of a competent workforce in nuclear materials science in Europe.

Conclusion

Maintaining and extending competences in the area of nuclear materials science and technology is an important objective of the upcoming Co-funded European Partnership on Nuclear Materials (CEP-NM). Additionally, it is also important to attract students and junior researchers to the field of nuclear materials. To this end, a "Nuclear Materials Competence Platform" will be founded in the upcoming CEP-NM. This deliverable outlines the foundation and actions taken within said "Nuclear Materials Competence Platform". It will act as the executive body to (i) set up a portfolio of needs- and quality-driven training courses in the field of nuclear materials, (ii) develop a mobility programme, which financially supports end-users in performing mobility actions such as internships and attending conferences, summer schools and (iii) provide a platform to stimulate the integration of students and junior researchers in the field of nuclear materials. The

Nuclear Materials Competence Platform will be founded by a transversal “Education, training, mobility, and access to infrastructures” (ETMAI) work package. This ETMAI WP reports directly to the Executive Board and the General Assembly, and can make use of the services of the Management Support Office. This deliverable outlines the foundation of the Nuclear Materials Competence Platform, which will be an integral part of the future CEP-NM.



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