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VALIDATIO

VALIDATIOn and verification of SIMMER code model for Lead-Lithium water and non-condensable gases chemical interaction

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WP1

D1.1 - Career Development Plan

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Summary

In this deliverable the first version of Career Development Plan (CDP), characterized as "the lifetime process of balancing study, employment, leisure, and transformations in order to progress toward an individually defined and growing chosen future, is briefly discussed. The main aim of this deliverable is the support and assist the career development plan of the Marie-Curie researcher in exploring job options and setting objectives. Additionally, the plan may be changed as abilities improvement, interests shift, and professional goals.

Approval

Version	First Author	WP leader	Project Coordinator
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1. INTRODUCTION

The VALIDATIO Project is aimed to enable me to broaden my knowledge and research field significantly while also gaining much-needed experience and skill diversity in the discipline. The DICI is a key player in fusion science and technology development. In particular, Prof. Nicola Forgione's and Prof. Sandro Paci's research groups perform high-quality research in the areas of ITER and the EuroFusion project development. Prof. Forgione and his research group are now working on the SIMMER code's modification, validation, and connection with other thermal-hydraulic codes such as RELAP5 in order to make it capable of performing the comprehensive thermo-dynamic safety study of the European WCLL blanket. As a result, the experience, research environment, and experimental facilities as LIFUS5/Mod3 at ENEA Research Center of Brasimone (Italy), where I will perform the proposed work as an essential part of my fellowship, will provide me with an excellent environment in which to complete the proposed work and expand my knowledge. My six years of experience in the field of thermal-hydraulic safety analysis of the Indian Test Blanket System (Lithium-Lead ceramic breeder (LLCB)) with the system code RELAP5, which includes RELAP5 code modification for insertion of single-phase lead-lithium as a working fluid and validation by running sample problems, will perfectly match and integrate within the host organization research team. The complementary and high-quality skills and expertise of the research environment I will meet in Pisa, together with my past experiences and career goals, will guarantee that the research activities are high quality and that my research and training objectives are met. This exercise will give expertise in modifying the RELAP5 algorithm to execute the safety analysis of the Indian breeding blanket under ITER environment circumstances once the VALIDATIO goal has been completed.

Along with the project, I also get an international platform in very prestigious organizations, the University of Pisa and ENEA Brasimone, where I can learn many things and I can perform important activities. I also get a very bright platform to grow my overall personality in the coming two years. Along with the technical skills, my focus will be on other beneficial activities like learning the basics of the Italian Language, participating the local and international platforms like conferences, workshops, lectures related to my fields. The roadmap of my preferred career development plan is illustrated by the figure reported below.

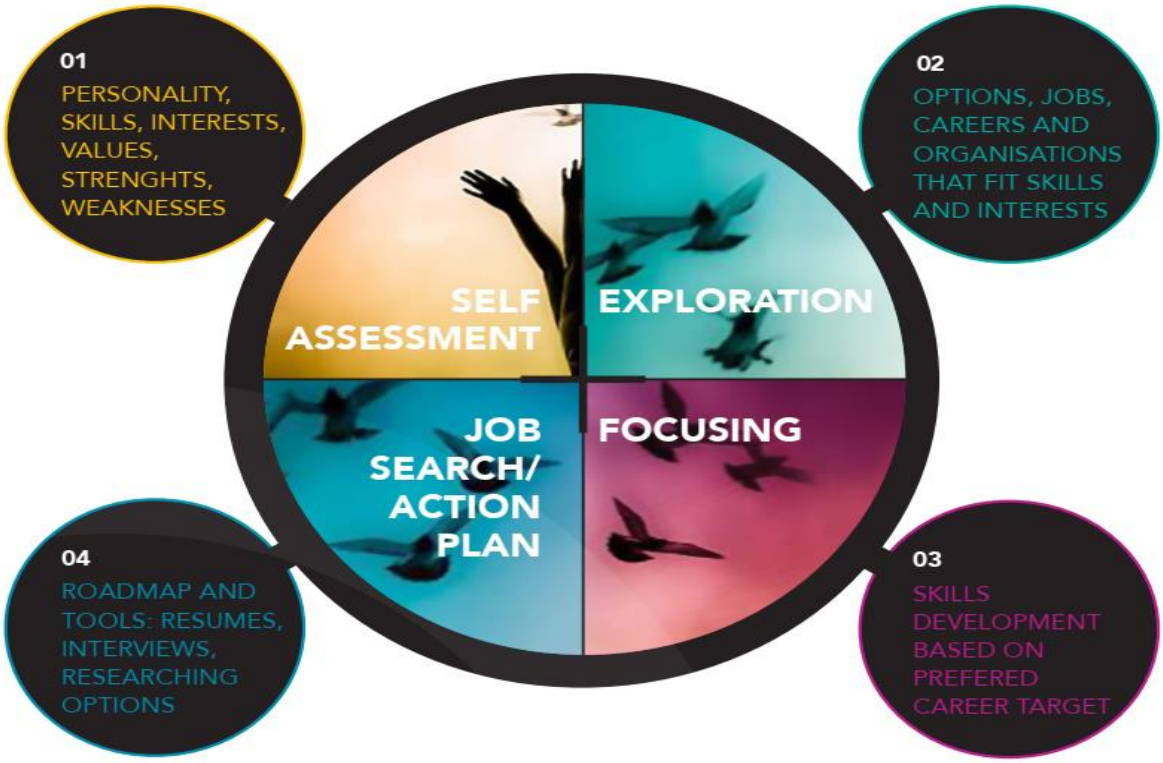

Figure 1 Layout of the career development plan (from EU web page)

2. SELF-ASSESSMENT, INTERESTS & SKILLS

Communication

During my work at UNIPI, I convey my expectations to my team (Co-Ordinator: Prof. Nicola Forgione and other colleagues) clearly and concisely. I will communicate successfully at all levels of our organization through emails, virtual and physical meetings, presentations, etc.

In case of project priority, I welcome the criticism and tackle delicate issues with sensitivity. I routinely share pertinent information with my colleagues so that our whole team benefits.

Workplace Performance

I take pride in my work and place a high emphasis on performing a good job. I regularly volunteer to help with tasks like training masters and Ph.D. students that aren't directly related to my employment. To develop a team-oriented work atmosphere, I will present my work with presentations, papers, conference attendance, posters, online platforms, etc.. My performance targets developing scientific data and models that will help the global scientific and public communities. I often set goals for myself in order to improve my performance. I am always willing to answer inquiries from my peers.

Reliability

I honour my promises to others and keep them informed about any obstacles I have. I am good at managing my time and prioritizing my tasks. I am considerate of the requirements of my coworkers, and I arrange my vacation time ahead of time. I consistently arrive on time and am completely prepared to begin my day. I am not scared to seek help when I need it. I react to emails from customers and colleagues promptly.

Creativity and Innovation

I am always looking for ways to enhance and simplify our work procedures. I approach each problem with a new perspective and search for unconventional answers. When it comes to brainstorming and problem-solving, I typically work with others. I often examine the viewpoints of others and attempt to create solutions that benefit everyone. I can swiftly adjust to new conditions and, if required, alter direction. I am dedicated to my own development and establish personal objectives on a regular basis. I keep up with the latest advances in my profession by reading research papers, reading news to update myself with the cross-cutting technologies in my field. I am dedicated to my professional development and have completed many courses and degrees to enhance my career in research and educational institutes with my abilities. I make an effort to communicate with and learn from individuals in my profession on a daily basis. I have a long-term professional goal in mind and am always working toward it. I am a fast learner who can adjust to new situations and a firm believer in lifelong learning, and I actively seek out chances to do so.

3. OPTIONS, CAREER AND ORGANIZATIONS

I have chosen the scientific research field after my graduation and have successfully performed many previous goals related to my area of interest.

Now, as a Marie Curie Post-Doctoral Fellow, I am at peak of my career plans to be part of the scientific and educational system by getting an adequate job that I currently perform here. This HORIZON 2020 program has given me this opportunity to enhance my abilities, skills, and interest. As I get more into the work proposed and environment provided by the UNIPI and Prof. Forgione research labs, I will definitely find my professional achievements and goals with a balance in the quality of life.

4. SKILLS DEVELOPMENT BASED ON THE PROJECT TARGET

1. Detailed literature review on the chemical interaction of Lithium-Lead, water, and non-condensable gases to collect the state of knowledge, explain apparent inconsistencies, uncover research gaps, and even forge consensus where none previously existed in the field of Lithium-Lead, water, and non-condensable gases chemical interaction and efforts made by European Union towards the verification and validation for the numerical simulation of such an event with SIMMER code about WCLL breeding blanket design safety-related simulations.

2. Get used to the SIMMER code structure by reading manuals and getting an internal training course (by senior researcher Dr. Francesco Galleni) in the DICI, UniPi.

3. Start developing a Project website in the UniPi space to acknowledge research activities going on the project so the other researchers and the public can quickly know the project overview and achievements.

4. An internal seminar is planned (tentative to the last week of November 2021) to acknowledge the students of Master of Science students of the department; the main outlines of the seminar would be the introduction of my previous work and how it is related to the current project (VALIDATIO). Also, to encourage the students to explore the future research projects funded by European Union (MSCA IF and MSCA Ph.D. funding).

5. I will also participate in the research-related internal courses run by the DICI UniPi to enhance my expertise in the field and the other course of interest that are beneficial to develop my overall personality (like language courses, etc.).

6. I am also planning to participate in future international conferences and workshops in regular periods to present my work at the international platform to know what the other researchers are performing in my field.

7. While doing the project work, I would publish my project achievements and results at regular intervals as planned in the proposal of the project, to some prestigious international journals of the field (Fusion Engineering and Design, Annals of Nuclear Energy, Progress in nuclear energy, etc.)

5. ROAD MAP

The road map of my career development plan during and after the granted project VALIDATIO will be implemented in the following phases:

Phase I: Acquire training that will make me experienced professional in systems code as I already worked on a similar safety analysis code RELAP5 this learning process of SIMMER will be quite a great addition to my current knowledge.

For this, I will attend the Internal courses and training on SIMMER code by interacting with my project coordinator and experienced researchers in the Prof. Forgione group.

Phase II: Expertise in Experiment which will help me in getting future grants in the field

1 During my secondment at ENEA Brasimone, I will develop experimental expertise. Instrumentation training: by organizing a recent visit to the experimental facility LIFUS5/Mod3 (Brasimone, Italy) and a longer research tour in continuation of the initial visit for experimental facility operation training (8-10 days) and The instrument's basic principle and functioning (5-10 days) and To comprehend the alterations and modifications necessary in the facility to do a specific experiment, such as mixing lead-lithium with water and air at various temperatures and pressures and measuring essential parameters (1 month) and demonstrating experiments for various sample environments (3-4 months).

2 Perform various small-scale experiments in order to obtain the chemical interaction properties of Lead-Lithium eutectic and water. For this purpose, the PISA University has MOU with ENEA laboratories to use their existing experimental facilities.

Phase III: Expertise in Modification of SIMMER Code

After successfully obtain the two-phase properties of Mixture of Lead-Lithium Eutectic and water the SIMMER code will be modify by incorporating the chemical interaction properties of Lithium-Lead, water and non-condensable under the different environment conditions into the code. This will help me in getting expertise in the source code modification which is a very critical and diverse field and this experience allow me to find my future goals.

Phase IV: Expertise in Code Validation

After modification of code, the code validation shall be performed through solving Benchmark problems, which should address all relevant issues under the identified PIEs. Guidelines can be obtained from Safety analysis of EuroFusion program and previous research articles and internal reports. By this activity, I will be capable to apply in the field of code validation process.

Phase V: Expertise in Safety Analysis

The safety analysis is a very important and critical part of the nuclear industries and getting experience in the field will benefit me to explore more in the nuclear industries and find a suitable job.

After code validation, I will perform the safety analysis for the four cases of the WCLL system model.

1. In-vessel TBM coolant leaks,
2. In-TBM breeder box coolant leaks,
3. Ex-vessel TBM ancillary coolant leaks, and
4. A complete loss of active TBM cooling.