



**Grant Agreement Number: 661910**

**H2020 – NFRP-2014-2015**

**ANNETTE PROJECT**

**Advanced Networking for Nuclear Education and Training and Transfer of Expertise**

**DELIVERABLE D 4.6**

**EVALUATION OF THE EXCHANGES AND  
RECOMMENDATION FOR FUTURE ECVET  
IMPLEMENTATION**

Nature of the deliverable		
R	Report	X
P	Prototype	
D	Demonstration	
O	Other	

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Date of issue: 28/03/2019 3<sup>rd</sup> Reporting Period

Start date of project: **01/02/2016** Duration: **48** Months

Project co-funded by the European Commission under the Euratom Research and Training Programme on Nuclear Energy within the H2020 Programme, Call NFRP 2014-2015		
<b>Dissemination Level</b>		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
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CO	Confidential, only for partners of the ANNETTE project	

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Dissemination level: PU

Date of issue of this report: **28/03/2019**

## DISTRIBUTION LIST

Name	Number of copies	Comments
European Commission	Electronic copy via email	
All Partners	Electronic copy via website	

Scope	ANNETTE / WP 4	Version:	0
Type/No.	Deliverable Report 4.6	Total pages	11
Title:	Evaluation of the Exchanges and Recommendation for Future ECVET Implementation	Chapters:	7
Access:	Public	Appendices	0
Filename:	WD4.6 Evaluation of the Exchanges and Recommendation for Future ECVET Implementation	Suppl. pages:	0
Internet	<a href="http://www.enen.eu/en/projects/annette.html">http://www.enen.eu/en/projects/annette.html</a>		

RESPONSIBLE BENEFICIARY: JSI

## DOCUMENT TRACKING

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### ABSTRACT:

This report, following the completion of the second, final part of the exchange, summarizes the findings obtained from the whole experience of this precedent cross-border transfer of nuclear professionals. Recommendations and conclusions, gathered through the whole process, are given to enhance future widespread application of ECVET in the nuclear field.

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## LIST OF ABBREVIATIONS

ANNETTE	Advanced Networking for Nuclear Education, Training and Transfer of Expertise
ECVET	European Credit System for Vocational Education and Training
EHRO-N	European Human Resources Observatory for the Nuclear Sector
ENEN	European Nuclear Education Network AISBL
KSC	Knowledge, skills and competences
VET	Vocational education and training
WP	Work package

## 1. INTRODUCTION

The ANNETTE project is addressing enhancement and networking of the Europe-wide efforts initiated in the past decades by different organizations to maintain and develop education and training in the nuclear fields.

This report is the sixth deliverable of the WP4 of the ANNETTE project. The main objective of WP4 is facilitating cross-border transfer of expertise by application of ECVET (European Credit System for Vocational Education and Training) and its technical components for qualification, assessment, validation and recognition of KSCs in the nuclear industry, preparing and running a cross-border pilot exchange of nuclear qualified professionals between industrial partners [1] [2]. Therefore, it provides an important basis for a widespread application of ECVET in the nuclear field [1].

In the report, a summary and evaluation of the performed steps in the actual exchange and of the experiences made so far are presented (as presented in previous reports [1– 5]). It provides recommendations for further ECVET implementation in the nuclear industry, identifies areas of improvement and documents lessons learned.

## 2. ABOUT ECVET

ECVET is a European credit system for vocational education and training. Its aim is to help individuals on their way to achieving a qualification with the transfer, recognition and accumulation of learning outcomes. This system would increase transparency of qualifications, support mobility and provide a systematic and transparent approach to present, document and validate the professional's knowledge, skills and competence (more in [1]). The term competence is in this case limited to meaning autonomy and responsibility.

With the ECVET principles implementation, the education would be divided into modules and the professional's qualifications would be described in terms of learning outcomes, defined as "a coherent set of knowledge, skills and competences that can be assessed and validated with a number of associated ECVET points". A credit is given for assessed and documented learning outcomes of a learner. It is important that the learning outcomes are recognised regardless of country or education sector. Both will facilitate the cross-border exchange and mutual recognition of knowledge, skills and competences from different stakeholders.

One of the major conditions for the ECVET principles implementation, defined by Cedefop, was a description of a qualifications framework and national qualifications in terms of units of learning outcomes. The implementation of ECVET was one of the triggers to start developing a national qualification framework. Although the Member States are progressing and increasingly committed to ECVET, Europe is still far from a fully operational credit system in VET. As stated in [1], it seems that ECVET will take various national shapes that will share one common principle: the learning outcomes. Most countries do promote the use of ECVET mainly to aid transnational mobility rather than for recognition and transfer of learning outcome in their

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countries and EU-funded projects have so far been a significant driver for development, trial and implementation of ECVET principles, components and its promotion.

Regarding the nuclear sector, projects of the Euratom Fission Training Schemes (such as ENEN-III, ENETRAP II, PETRUS II, etc.), are already designed such that training is structured to establish a common certificate for professionals throughout the EU and gradually all of these projects started to develop, test and implement the ECVET principles. The JRC-IET (Joint Research Centre - Institute for Energy and Transport) has developed a strategy and a road map for the European Credit System for Vocational Education and Training (ECVET) implementation in the nuclear energy sector (NES). The progress has reached the stage of Development of the Competence-Based Qualification System, so the design of the Training Programmes based on learning outcomes is possible (more in [1]).

The learning outcomes approach as a basic aspect of ECVET has been adopted by numerous projects, but still has to evolve towards qualification and education standards, assessment and recognition. It has to take into account all stakeholders. As of now, different stakeholders are already involved in numerous projects such as EHRO-N, which work relatively isolated. Benefits of collaboration is clear with increased transparency, quality assured learning processes and transferable competences. Similar to other sectors, unified occupational standards, regulations for minimum education and training, qualifications and assessment methods remain a challenge. An idea was also given in [1] to lift the initiative to a higher level where other domains besides nuclear engineering can follow the same approach in defining qualifications linked to competences.

### 3. SOFTWARE TOOL

For developing ECVET based professional training competences programs in the nuclear field a software tool can be of great help. The requirements and specification of a software tool capable to support the users in the handling of job profiles, learning outcomes, qualification, certification and mutual learning recognition issues is described in [3]. Its purpose is to support cross-border exchange and professionals' competence management in the nuclear field. The whole competency management chain consists of job profiles, learning outcomes, qualification, certification and learning recognition as outlined in the ECVET Framework and Methodology. This kind of a software tool has a clear advantage over classical paper documentation [3]. However, it should be noted, that the tool is not a complete human resource management system.

A competency model derived from the ECVET methodology is translated in a form of a software and identifies the competencies needed to operate in a specific role within a job, occupation, organization, or industry. A competency model can prepare the current and future employers and employees to meet the job requirements and other needs of employers. It can also equip the users with the knowledge of their individual competency strengths and weaknesses, enabling them to manage their future career pathway.

The system should present a database of nuclear competencies and nuclear job profiles available to all users. All users should also be able to see the definitions of the nuclear KSCs and information on job profiles as well as consult on them [3].

The competency software should present a practical working method at a European level between the three main stakeholders: the employee, employer and training institutes. It would enable the connection of competency, job profile and the ECVET level system with those stakeholders to facilitate the creation of a standardized qualification system. In the long term, it should enable all personnel in the nuclear industry to produce and update the records on their individual professional pathway and commonly (also transnational) understand those

qualifications. Therefore, it would be possible to evaluate competences, identify possible competence gaps and promote cross-employer and cross-border mobility [3]. A comparison of persons KSCs and those envisaged for the certain job should be facilitated. For the employer, a clear job profile and competencies associated to a job are required.

The software should enable the split of nuclear jobs into blocks of competency and associated learning outcomes. Depending on the work and organizational environment, a group of 7 to 9 total blocks of competency are usually required for a particular job [3]. This would also help the training organizations to specify certificated training to make them transferrable. A block of competencies may vary depending on the job position and their associated tasks [3]. The blocks have to be fixed, the learning outcomes levelled and the number of blocks per job clearly set. This should be done through interviews of national experts.

Overall, report [3] suggests that four type of software users should be defined. The type of user would then further define the level of access and corresponding available functions.

Based on the requirements and specification mentioned, a tool and a test profile has been chosen for a pilot trial with the help of a specific tool provided by one of the WP4 participants [3]. For the choice of tool, it is recommended to have at the earliest possible stage of implementation, a pilot case such as presented here, to avoid over specification and establish correctly the required processes [3].

For the test, a specific competence management tool, Skills Assured was used. It was used to demonstrate if it could be used for supporting a cross-border exchange. With this pilot case, some important knowledge and evidence has been collected [3].

#### **4. EXCHANGE PREPARATION**

TECNATOM and AREVA (now FRAMATOME), as industrial partners, prepared a pilot cross-border transfer of expertise that serves as a precedent for the future implementation of the ECVET system for the qualification, assessment, validation and recognition of nuclear professionals throughout Europe [2]. An overall exchange process diagram is in Appendix 2 in [4].

In the preparation of the ECVET pilot exchange, a specific job profile from NPP Job Taxonomy was analysed [5]. The scope was on defining a measureable set of learning outcomes for a selected job profile agreed by the two industrial partners in the pilot exchange. With this method, ECVET points were allocated according to the relevance of each learning outcome in the normal duty of a training officer. It should be stated, that this methodology of ECVET does not represent time but the relevance of learning outcomes. Both industrial partners agree, that from the perspective of an industrial environment, the ECVET points assigned to a job profile cannot be taken literally from the definition: "Allocation of ECVET points to a qualification is based on using a convention according to which 60 points are allocated to the learning outcomes expected to be achieved in a year of formal full time VET".

The initial profile chosen for the pilot exchange was an "electrical supervisor from maintenance area". However, based on a common decision of both industrial partners, TECNATOM and FRAMATOME, the job profile "training officer" has been chosen for the actual exchange. The job profile qualifications were divided into Knowledge, Skills and Competences (as a new definition with Responsibility/Autonomy instead of Competences was considered to be still clarified).

Based on the documented learning outcomes, the competence gaps of candidates were identified by each home organization and consequently the competences to be developed were determined, together with their suitable learning and qualification measures [4]. A learning path can be defined as a set of activities, which enables a professional to develop the KSCs of a certain job profile.

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The definition of the learning outcomes, the method followed for the allocation of ECVET points to each learning outcomes and the criteria for the design of suitable learning path is further explained in document [2].

The requirement for the design of training programme as described in [1] is that the training should address a specific qualification/occupation. Additionally, ECVET input should consists of job description linked to the targeted qualification and qualification structural elements (learning outcomes).

Regarding the participant of the training, report [1] distinguishes two training programme types. Complete training programme is dedicated to learners debutants while for learners with work experiences a customized training programme is meant.

## 5. PILOT EXCHANGE

The result of all the preparation effort was the first cross-border exchange of nuclear professionals that could serve as an example for the future implementation of the ECVET system in the European nuclear field.

The cross-border exchange was divided into two periods and this convenient strategy should be followed until sufficient experience will be gained by the ECVET. In the first half of the exchange, a first contact is established and the workers familiarize themselves with the work in a new environment. Based on the experience gained during the first part of exchange and lessons learned, the second half can be arranged accordingly to make most of it.

Participant A and Participant B took part in the first exchange. The host organization prepared activities as the learning path for the guest participant to cover numerous learning outcomes from the training officer job profile. Participants together with the supervisor filled an exchange journal to show the learning outcomes that were developed during each learning activity. Participants completed it in cooperation with the supervisor in order to promote the dialogue and exchange of views about the activities performed and the objectives achieved [6]. Additionally, both participants made a personal journal with a list of activities performed each day, which gave the candidates an opportunity to express their impressions on the activities and exchange.

However, for the second part of the exchange, TECNATOM could not send the same participant as in the first part of the exchange. Therefore, a new candidate was selected. For the third candidate, the same steps were followed as for the first two.

If a learning path for the first part of the exchange was mainly designed by the host organization, for the second part of the exchange, a larger role was given to the participants, who also selected a topic within their domain of expertise and delivered a training session about it to an audience, applying the SAT (Systematic Approach to Training, [7]) methodology as much as possible [6]. Before, they had 7 days to collect the information, formulate the objectives to be accomplished by the trainees, produce the questions for the examination, select the appropriate contents and produce the training materials. For the 8<sup>th</sup> day, the training session to a selected audience from host organization was delivered. At the end of lecture, they collected the exams and the trainees' questionnaire about satisfaction with the course. After that, the exams were marked, the questionnaires were analysed and improvements of the training materials, according to the suggestions of trainees were made. At the last day, the closing meeting with the host instructor took place and exchange journal was completed [6].

At the end, the signed ANNETTE Exchange Journal and results of the feedback given by the trainees were uploaded to the Skills Assured System.

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## 6. RECOMMENDATIONS

This pilot exchange successfully demonstrated the creation of job profile, associated learning outcomes and determining competence gaps with appropriate learning path, which was executed during the exchange.

### 6.1. ECVET POINTS AND SYSTEM

However, some deficiencies were observed in using ECVET tools. It is important to link the ECVET points and learning outcomes together [4]. Another concern is the idiomatic barrier. With certification of an individual's abilities, it implies that this person is capable of performing the function attributed to a certain job profile. Even though this is true from the technical point of view, his/her suitability may also depend on mastering the local language of the workplace.

In [4], several observations and recommendations regarding the ECVET system were made. Currently, there is no independent accreditation body neither a compulsory measure at European level reinforcing Nuclear Job Taxonomy, which would enhance mutual recognition of transferable learning outcomes. Three possibilities are suggested in [4]: a top down approach form, popularization and dissemination or individual partners' solution. Further, the Nuclear Job Taxonomy as it is today can provide a good starting point, but is not comprehensive enough.

For the application of the ECVET system in the nuclear industry for job profiles, a thorough analysis shall be required to determine whether certain job profiles should stay under their current state of regulation or might be adopted to the ECVET system. In this procedure, the ENEN national entities, as described later, shall play an important role in discussion with the national regulatory bodies [2].

In [2], a possible implementation of ECVET is described. A common ECVET system for the nuclear industry throughout Europe requires an independent supranational authority that would supervise the correct enforcement of the ECVET policy. ENEN, due to its nature, is considered as the chosen institution for starting a voluntary accreditation process, where all ECVET leading institutions could share best practices, and mutually recognize each other. ENEN (European Nuclear Education Network) is a non-profit international organization whose mission is the preservation and the development of expertise in the nuclear fields.

However, to enhance spread of the ECVET system across Europe, national entities of ENEN was recommended in order to adapt the ECVET guidelines to the domestic situation of the nuclear industry in each country [2]. Those national entities shall perform an external assessment of the training programmes and methodologies being followed by education and training providers related to the nuclear field, as well as the qualifications of their workers. The report [2] stated as necessary to create a quality programme and the procedures to be followed by aspiring ECVET training institutions in order to be awarded with the ENEN seal of accreditation upon the successful completion of the whole accreditation process. In the report [2] suggestion for the aspects to be considered for the evaluation are given.

The participant of the accredited training would be automatically certified in the KSCs related to the area of expertise being treated during the training, acquiring the corresponding ECVET points. A training, obtained in an ENEN accredited organization from a foreign country, would be recognized in the same way, granting great cross-border mobility. In addition, in report [2] a recognition of non-certified KSCs obtained by an individual at the request of the interested party may be also performed by national entities. This model may present a substantial advantage, as said in [2], since the constitution of a tool shall promote the interest on the nuclear industry among the future generations of young talented people, who may feel attracted by a sector supported by a consolidated network.

## 6.2. EXCHANGE PREPARATION

As stated in [2], it is essential to perform a thorough analysis of all nuclear job profiles in the sense that each KSC is expressed in terms of learning outcomes. By making good analysis of competence gaps and designing an appropriate learning path, recognition of the KSCs of an individual is possible in much shorter time than going him through the entire training for a job in a different organisation. This saves time and money to both, individual and company.

It is recommended to use proven methodologies, such as SAT, to define objectives. As seen from experiences, industrial bodies will seldom have a completely compatible job taxonomy. Therefore defining a set of learning outcomes for selected job profile agreed by both two industrial partners must become an integral part during the preparation process for an exchange [4]. From the competence assessment steps, the joint review and submitting the agreed scoring by the line manager might be the most important one and special attentions should be granted to it.

The intensity of the training measure from the involvement point of view should increase gradually from self-study to independent work package assignments. The training method, which should be preferentially used, is coaching with a training manager [4].

It is recommended to all stakeholders to reinforce the usage of a single tool. To ensure consistency, all the activities need to be documented in the central tool of the project [4]. The information of the participants shall be treated and presented in such a way as to guarantee the protection of their personal data.

All the conditions of the exchange between both industrial partners shall be set by signing a Memorandum of Understanding (Appendix IV in [2]).

## 6.3. EXCHANGE

Several challenges, related to an external member included in the host organization activities, were identified during the pilot exchange [2].

An important aspect of the exchange is the language of communication. Usually, cross-border exchange means also different official language. The exchange period has to match with training activities in the host organizations being performed in language, understandable to both sides. In order to make the training acceptable for both sides, English is suggested as the first language during the exchange. All parties should be aware of that and agree in advance. In this case, all parties represent participant, supervisor and possible third persons involved in the education process. With agreement among all parties, a different language can be chosen, if it would bring advantage, for example more thorough understanding of the lecture.

A sufficient knowledge of the language is needed for the learning activity not to be affected by this. A B2.2 level (according to international standards) should be sufficient to follow the activities if they are based on reading of technical documentation and participation in meetings and team work. For training where activities involve writing of technical documentation or explaining technical NPP behaviour, a level C1.2 shall be required.

As the exchange candidate would participate in the working process of other industry partners, they should be aware that there are also certain activities that require permission from the customers to allow the participation of an external member. Because of confidential issues agreed in the contractual terms of certain projects, participation in these projects might have to be discarded.

The country specific nuclear regulatory framework may represent a challenge, such as applicability of the ECVET system to licensed nuclear job profile. Increased attention should be given to preparation of the learning path for participant from that kind of job profiles.

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Based on the participants' feedback, some additional recommendations can be made [6]. It would be beneficial for the participant, if the learning process would involve a variety of different activities to be performed. Therefore, the timing of exchange should be thoroughly planned, so the participant can be actively involved in as many beneficial activities as necessary to achieve the maximum number of learning outcomes.

## 7. CONCLUSIONS

This report present summarized finding gained as a part of WP4 of the ANNETTE project. A precedent cross-border exchange of professionals in nuclear field, based on the ECVET principles approach, was successfully planned and executed. With first experiences gained, some guidelines and recommendations are given for further ECVET principles implementation, mutual recognition of knowledge, skills and competences and successful cross-border exchange.

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