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# A system for the documentation and validation of non-formal and informal learning of engineers (NFIF)

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# Inhaltsverzeichnis

1. Introduction.....	2
1.1 The project idea – background information.....	2
1.2 Continuing Professional Development of engineers – background information.....	3
a.) The FEANI approach.....	3
b.) The importance of CPD.....	4
c.) Prerequisites for successful CPD.....	5
1.3 Documentation and validation of learning – international background.....	7
a.) Documentation – General.....	7
b.) Documentation – Engineering Specific.....	8
c.) Validation – General.....	9
d.) Validation – Engineering Specific.....	11
1.4 Non-formal and informal learning in the project countries – national background.....	12
a.) Austria.....	12
b.) Croatia.....	14
c.) Czech Republic.....	15
d.) Germany.....	18
e.) Portugal.....	20
f.) Slovenia.....	21
2. Documentation and validation of non-formal and informal learning of engineers.....	24
2.1 The documentation and validation of learning activities.....	24
a.) Introduction.....	24
b.) Non-technical learning activities.....	25
c.) Technical learning activities.....	25
d.) Documentation and validation of learning activities (e-portfolio).....	26
e.) Self-evaluation.....	26
2.2 The process of documentation and validation of learning activities.....	27
a.) Personal Data.....	27
b.) Engineering education.....	28
c.) Professional experience.....	28
d.) Continuing Professional Development –formal.....	28
e.) Continuing Professional Development – non-formal/informal.....	29
f.) Payment method.....	31
g.) Summary of application and acknowledgment.....	32
3. Lessons learned – main challenges in the creation of a documentation and validation system.....	33
a.) Documenting and referencing competences.....	33
b.) Validating competences.....	34
4. Glossary.....	35
5. Literature.....	38

# 1. Introduction

## 1.1 The project idea – background information

Mobility plays an important part in our modern globalized societies, for everybody, including engineers. On one hand because of the demand for flexible deployment on an ever more international labor market. On the other hand because of the varying availability of highly qualified engineering personnel on the national level. In order to facilitate mobility, it is of the utmost importance to increase transparency. Employees as well as employers require user-friendly tools that offer competence profiles based on internationally recognized standards.

In the year 2010, a group of European engineering associations under the umbrella of the European Federation of National Engineering Associations (FEANI) began issuing a professional card for engineers in Europe.

The engineering card ever since that day follows the aim to create more transparency on the European labor market for engineers and to facilitate mobility of highly-qualified personnel by offering an instrument for the documentation and validation of engineering education, professional experience, and continuing professional development (CPD). Thus, the engineerING card functions as an important addition to the Bologna process and works within the framework established by the European Commission in the field of recognition of professional experience and training.

The system of the engineering card has been undergoing constant enhancements. Two important developments have led to the decision to start a project to modernize the card:

1. The rapid technological development cycles have led to an increased need with engineers for continuing professional development as part of life-long learning.
2. In addition to formal learning, non-formal and informal learning have become increasingly important as parts of the personal professional development strategies of engineers.

Before this background, several national FEANI member organizations grouped together with the idea to start a project in order to cope with these current trends, thus adding to the benefits the card has to offer to their members and all engineers in Europe.

The coordination of the project to enhance the engineering card lay with VDI - The Association of German Engineers as the largest engineering association in Europe. In addition to FEANI as the European umbrella organization, engineering associations from Croatia, Slovenia and the Czech Republic were equal partners in this project. Furthermore, the University of Porto added its expertise as an outstanding research institution in the fields of engineering education and continuing professional development. All organizations that participated in the project have several years of project experience with the engineering card and many other projects.

Furthermore, they brought into the project a vast amount of knowledge and experience in engineering education and further education of engineers.

The main goal of the entire project was the creation in several phases of an overall concept, i.e. a system, for the documentation and validation of non-formal and informal learning activities. This initial development phase was followed by a “implementation phase”. This meant the integration of the concept into the already existing database system of the engineering card of VDI by creating a prototype application for testing and marketing purposes. The entire process included the revision of VDI’s engineering card database as well as the creation of a blueprint for a handbook and several working documents.

During the course of the project, dissemination by FEANI and the project partners of the project goals and achievements to as many engineering organizations and other stakeholders as possible played a major part. This included information and consultation processes with different stakeholder groups on the European as well as the national level. However, dissemination was rather difficult and only three of the originally planned multiplier events were realized during the final phase of the project. Thus, some stakeholders were integrated into the project. From the view of the project partners, this has led to an increased publicity and broader acceptance of the project in particular and the engineering card in general.

In the long run, the wide dissemination of the engineering card as the only professional card exclusively for engineers will hopefully lead to growing transparency on the European labor market for engineers. This would benefit the European economy in two ways. On one hand, it would be highly beneficial for companies looking for qualified labor, thus helping to reduce the lack of qualified personnel in some countries. On the other hand, in countries with a large surplus of highly qualified personnel, professional mobility will increase with the availability of an instrument simplifying the often very complex and time-consuming recognition processes.

For European political decision makers the engineering card offers a prototype for a simple, non-bureaucratic and well-tested system for recognition of professional qualifications and training. The engineering card may therefore function as a blueprint for projects with similar goals.

## 1.2 Continuing Professional Development of engineers – background information

### a.) The FEANI approach

FEANI has always believed that Continuing Professional Development (CPD) is of the utmost importance for engineers. In particular, since CPD is the core of life-long-learning of professional engineers at all levels of proficiency. Therefore, the need for CPD for engineers in Europe will continue to grow. CPD is a prerequisite for the maintenance of high-quality professional standards throughout an engineer’s entire working life.

An important question to be answered before going into detail is: What is Continuing Professional Development (CPD)? Simply speaking, it is the acquisition of knowledge, skills, and competences in the field of a person’s professional occupation. It comprises the acquisition of completely new as well as the further development of the already existing knowledge, skills, and competences.

CPD promotes the employability and mobility of individual engineers and may act as a personal job assurance on the increasingly globalized labor market. CPD is an individual's personal responsibility. However, it has to be planned and requires the cooperation, encouragement, and support of employers as well as professional and academic institutions.

CPD is of crucial importance for sustaining the competitiveness of the European industry on the global market, where competitive advantages can be gained by the application of high-end skills in the development of leading-edge technologies.

To deal with the CPD issues most efficiently, FEANI in 1993 established a Continuing Professional Development Committee (CPDC). The CPDC continued to work until 2011, when it became part of the European Monitoring Committee (FEANI-EMC). The CPDC worked intensively on the formation of the FEANI Policy on Continuing Professional Development as well as on the encouragement and promotion of CPD within the FEANI national member organizations and also internationally.

The FEANI General Assembly in Lillehammer, Norway, approved the first version of FEANI's Policy on Continuing Professional Development on September 26, 1997. The FEANI General Assembly in Bucharest, Romania, approved the revised version on October 3, 2008

#### b.) The importance of CPD

A common opinion based on the current speed of development of technologies is that twenty percent of an engineer's knowledge become obsolete each year. This illustrates how important lifelong learning is for those working in the field of engineering.

In the past, an engineer completed their formal education and went through their working life based mostly on the knowledge, skills and competences gained during basic education or formal further development programs. Today, achieving the initial professional qualification is only the start of a long process of professional development. CPD can have a positive effect on salaries, personal motivation, and career progression in general. Therefore, it plays a prominent role in many countries and fields of occupation. Several professional associations are active in the promotion of CPD. However, there is still much room for improvement.

One result of the need for constant learning is that the nature of learning activities is undergoing rapid change, too. The general development of the increase of non-formal and informal learning acquisition therefore plays an important role for engineers.

This leads to a very important question: What is non-formal and informal learning? There is a lot of discussion going on concerning this question and sometimes they are highly theoretical. The project team has for reasons of practicability decided to pick out the definition used by CEDEFOP<sup>1</sup> and stick to it for the job at hand.

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<sup>1</sup> CEDEFOP (2008): Terminology of European education and training policy. A selection of 100 key terms. Luxembourg.

1. Non-formal learning is defined as learning embedded in planned activities not explicitly designated as learning (in terms of learning objectives, learning time or learning support). Non-formal learning is intentional from the learner's point of view.
2. Informal learning is defined by CEDEFOP as not organized or structured in terms of objectives, time or learning support. Informal learning is in most cases unintentional from the learner's perspective.

Looking at the engineering card, so far the system offers engineers the option to document only formal learning activities, which are characterized by having a learning objective and a fixed time frame and by culminating in a formal certificate.

There is currently no possibility to document non-formal or informal learning activities and the classification even for formal learning activities was a very crude one based on highly simplified categories. This situation is very unsatisfactory, as a wide range of learning activities which are very important to an engineer in need of presenting a comprehensive competence development profile could not be documented and validated. The need to modernize the system to adapt it to current trends was one reason for starting this project.

#### c.) Prerequisites for successful CPD

There are three key elements for successful Continuing Professional Development from the individual or an organizational point of view.

Firstly, there must be a commitment by the individual to a process of self-development. Personal development plans are one valuable instrument to help people with evaluating their own situation and with projecting their further development. Key competencies have to be taken into account. Documentation and validation instruments support the creation of personal development plans, as they include self-reflection and self-evaluation.

Secondly, organizational structures must be adapted to make staff coaching and development one of the central activities of managers with personnel responsibility. Managers too, have to be trained, developed, rewarded, and promoted based on their performance in human resources management. Here again, documentation and validation systems support managers with HR responsibility by offering them all the valuable information to evaluate their employees' competences, thus allowing them to plan with the employees their further professional development.

Thirdly, organizations must be learning organizations, meaning that they strive to enhance the learning processes of their employees and that they possess a consistent and cohesive value system. Documentation and validation systems are again of great value here, as they allow an insight in many aspects of the development of the employees, e.g. their learning activities, topics relevant to the employees, etc. Far too many individuals leave continuing professional development to others. The bigger the company, the more there seems to be a tendency to look to the training department or human resources to provide CPD. This mind-set is dangerous, because responsibility passes from the individual to the or-

ganization. However, as mentioned above, no approach to CPD can work unless the individual is committed to its self-development. Success is to a large degree dependent on the frame of mind of the individual. People have to ask themselves how they want to develop their career, over the next year, over the next five years, or over an even longer period.

As illustrated above, one important element in the planning of a structured learning and career development process is the creation of a profile of a person's key competences. The engineering card offers a way to do this.

### 1.3 Documentation and validation of learning – international background

There are several initiatives and organizations around the world dealing with the documentation and validation of learning, be it formal, non-formal or informal in character. The following chapter offers a short overview of these organizations, initiatives, projects and systems from the field of documentation and validation of learning. They are not all engineering-specific and cover a wide range of instruments and methods for documentation as well as validation. The project team resorted to some of those initiatives and systems in the development of its system to document and validate non-formal and informal learning.

#### a.) Documentation – General

The **Association for Authentic, Experiential and Evidence-Based Learning (AAEEBL)**<sup>2</sup> in the United States of America is a leading non-profit professional association for advancing learning which uses digital technologies, especially e-portfolios. The AAEEBL community consists of academics promoting change in higher education through their practice, research, and the dissemination of ideas. These academics are working both from the bottom up and from the top down. The community is at the center of change on campuses, leading by example and by initiatives. AAEEBL is not a technology association, as such but rather an association of academics already adapting to the digital era, inventing practices and learning designs based in the reality of information technology as the default knowledge medium.

The **Europortfolio Project - European Network of e-portfolio Experts & Practitioners**<sup>3</sup> is a project that started in 2013, funded by the European Commission. The project ended in 2015, but the portal and the community of e-portfolio experts and practitioners communicating here remain alive and vivid. The aim was to contribute to the realization of a European area for lifelong learning, using e-portfolios as a means to support reflective learning and practice as well as transparency and trust amongst the actors involved in education and employment. This was achieved by bringing together the community of European e-portfolio experts and practitioners and developing a Learning Community Portal as a space to publish, share and review data and resources on e-portfolio practices and technologies. So far, the Europortfolio community has been active and has developed guidelines, frameworks, training courses and other resources, as it is a forum open to everybody.

The **Centre for Recording Achievement (CRA)**<sup>4</sup> in the United Kingdom is a national network organization and a registered educational charity. It seeks to promote the awareness of recording achievement and action planning processes as an important element in improving learning and progression throughout the world of education, training and employment. The CRA offers a range of services to further and higher education institutions, employers and professional bodies. This includes expert consultancy to support the implementation of Personal Development Planning (PDP) and e-portfolio,

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<sup>2</sup> <http://www.aacebl.org/>

<sup>3</sup> <http://www.e-portfolio.eu/>

<sup>4</sup> <http://www.recordingachievement.ac.uk>

evaluation of existing practice, whether in relation to PDP/e-portfolio, employability or other initiatives, and an initiative seeking to implement Problem-Based Learning, and another looking to support student retention. CRA offers services for those interested in documenting professional records and achievements. Its members contribute at several levels to the process of documenting non-formal and informal learning.

#### b.) Documentation – Engineering Specific

**Professional Development How to (PD How2)**<sup>5</sup> is a product of the Professional Development Partnership from IMechE, IMAREST, IET, IOP and RAeS in the United Kingdom. The partnership of several engineering and technology training organizations, professional organizations and companies provides many examples and guidelines for planning, doing, recording, reviewing, and applying for a qualification and for supporting employers.

The idea behind the project is that professional development can provide the drive to progress the career. It keeps engineers across the industry competitive and leads to better employability. Although Professional development is something each one does every day, only being conscious of this development will allow recording it and developing it in a systematic way in order to maximize the potential for lifetime employability. The fast changing job market has increased the demands on professionals to maintain documentary evidence of their continued competence themselves. With technology and scientific development advancing so swiftly, this is especially important to engineers.

Taking a structured approach to their professional development will enable engineers to demonstrate continuing commitment to the profession. Regularly reviewing the needs, and selecting appropriate learning activities will give the career focus and meaning.

**Valuation and Qualification of Professional Engineers (VALORIE)**<sup>6</sup> is a system developed by the northern section of Ordem dos Engenheiros in Portugal. It is a website-based procedure available for engineers to record the activities of professional development on an individual basis. This record allows experts and officials of the association to analyze and validate the activities of each engineer allowing the valorization of the engineer's curriculum and professional status. The general objective was to develop a model of valorization and qualification of professional skills of engineers in order to increase their cross-border mobility. The Mutual Recognition Project for Certification of Valuation and Qualification of Professional Skills (VALORIE) is part of the range of initiatives designed to stimulate and develop common services, which aim to energize cooperation between entities, economic and social agents in the border area, facilitating partnership work between public and private entities in favor of perfect mobility of engineers.

**EURORECORD - Professional Record of Achievement in Engineering**<sup>7</sup> proposes a system for documentation based on the recording of CPD for an engineer and on a competence framework with general and specific competences for each discipline. This approach allows the creation of personal

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<sup>5</sup> <http://www.pd-how2.org/introduction/index.cfm>

<sup>6</sup> <http://valore.oern.pt/>

<sup>7</sup> <http://info.tuwien.ac.at/hsk/sefi/papers/hagstrom.htm>

development plans and the implementation of a periodic assessment of the qualification done by the employer, the engineer or a professional organization. The assessment is achieved through the comparison of achievements with the professional framework.

Eurorecord is based on the fact that individual commitment to lifelong learning is increasingly recognized as a key for improved business performance for employers and career progression for individuals. Continuing education therefore needs to be based on an individually driven education system – or rather “learning system” – where individuals have learning agreements with a variety of parties, including their employer, their professional body, and different academic and other providers. This requires a common language and currency both to improve communication and coordination between the partners, and to enable individuals to achieve coherence in their overall learning plans and activities. At the same time, the growing awareness and recognition of the need for lifelong learning creates a demand for greater transparency of qualifications, competences and achievements across corporate and national boundaries.

#### c.) Validation – General

**Observal Net – European Observatory of Validation of NFIF<sup>8</sup>** is a system set up in Europe with the aim of creating a stakeholder centered network of organizations supporting the validation of non-formal and informal learning in Europe based on the formation of national working groups in the eight participating countries of the project. Each national working group worked towards bringing together key stakeholders in VNIL (validation of non-formal and informal learning) and political decision-makers at national level in order to coordinate policy implementation in the field. These national networks were supplemented by a cross-national level of networking, which focused on the following three thematic areas: the role of grassroots initiatives in supporting VNIL and strategies towards mainstreaming these, the competence profile required for VNIL practitioners, and the success factors in the implementation of VNIL in employment settings.

The **European Guidelines for Validating Non-formal and Informal Learning (CEDEFOP)<sup>9</sup>** are written for individuals and institutions responsible for the initiation, development, implementation, and operation of validation arrangements. The ambition of the guidelines is to clarify the conditions for implementation, highlighting the critical choices to be made by stakeholders at different stages of the process. This publication, together with other publications from CEDEFOP, is a reference for European stakeholders in the area of NFIF. It contains examples, guidelines, legislations, and rules for all European Union countries and associated countries that allow to understand local characteristics that may also affect the documentation and validation of non-formal and informal learning of engineers.

The **Organization for Economic Cooperation and Development (OECD)** is also active in the field of recognition of non-formal and informal learning<sup>10</sup>. As people are constantly learning everywhere and at all times, it is very likely that this learning, taking place at home, at the workplace or elsewhere,

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<sup>8</sup> <http://www.observal-net.eu>

<sup>9</sup> <http://www.cedefop.europa.eu/en/publications-and-resources/publications/4054>

<sup>10</sup> <http://www.oecd.org/edu/skills-beyond-school/recognitionofnon-formalandinformallearning-home.htm>

is a lot more important, relevant and significant than the kind of learning that occurs in formal settings. However, learning that occurs outside the formal learning system is not well understood, made visible or, probably as a consequence, appropriately valued. Until this OECD activity on the recognition of non-formal and informal learning involving 23 countries on five continents, it has also been under-researched (see also ongoing EU work). Most research has focused on learning outcomes from formal education and training, instead of embracing all types of learning outcomes, allowing visibility and portability of such outcomes in the lifelong learning system, in the labor market or in the community. In 1996, the OECD education ministers agreed to develop strategies for “lifelong learning for all”. Ministers of labor, ministers of social affairs and the OECD Council at ministerial level have endorsed the approach. The concept of “from cradle to grave” includes formal, non-formal, and informal learning. The importance of this approach may now be clearer than ever and non-formal and informal learning outcomes are viewed as having significant value. Policy-makers in many OECD countries, and beyond, are therefore trying to develop strategies to use all the skills, knowledge and competences – wherever they come from – individuals may have at a time when countries are striving to reap the benefits of economic growth, global competitiveness and population development.

The **American Nurses Credentialing Center (ANCC)**<sup>11</sup> uses e-portfolios and validation for renewal of professional certification of its members. Presents resources that are available online allow members to proceed with the recording of the professional developments, to present their records to accreditation committees, and to obtain certificates for employers.

ANCC offers the Advanced Genetics Nursing board certification through portfolio assessment. It provides a valid and reliable assessment of the entry-level clinical knowledge and skills of registered nurses practicing in the genetics nursing specialty after initial licensure and graduate education. Upon fulfillment of the eligibility requirements and successfully passing the portfolio review process, nurses are awarded the credential “Advanced Genetics Nursing-Board Certified” (AGN-BC). This credential is valid for 5 years. It is possible to continue to use this credential by maintaining the license to practice and meeting the renewal requirements in place at the time of the certification renewal.

The **Competency and Credentialing Institute (CCI)**<sup>12</sup> offers a documentation and validation procedure that is based on a self-management of the individual CPD activities. A peer committee based on the online documentation provided will analyze these. It is an example of personal development managed by the professional verified by peers.

The certified status of an individual RNFA is conferred by CCI for a period of five years, at which time a CRNFA may seek recertification.

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<sup>11</sup> <http://www.nursecredentialing.org/AdvancedGenetics>

<sup>12</sup> <http://www.cc-institute.org/home>

#### d.) Validation – Engineering Specific

**My CPD - Engineers Ireland**<sup>13</sup> is the result of the decision of Engineers Ireland to make CPD mandatory with a cycle of recording of one year. The tool to support members is online and allows a recording at own pace and for different purposes. The association performs the check of the records in accordance with internal quality rules. The new policy has become effective on 1 January 2017. All non-student members are required to undertake and record 35 hours of CPD activities each year. Having a record of CPD activities is essential to be able to demonstrate that one has undertaken the required 35 hours CPD per annum.

The **Board of Engineers Malaysia (BEM)**<sup>14</sup> has a system of mandatory CPD for its members based on a record delivered every three years with an annual minimum. This recording is based on a written form that states all CPD activities according to those accepted and to the limits for each type of CPD. The **FEANI CPD - Guidelines for issuing credits for CPD**<sup>15</sup> forms the basis for a system of awarding credits for Continuing Professional Development (CPD) of engineers. This system may be used by the FEANI member organizations on a voluntary basis. For the documentation of the CPD activities, the system provides several categories.

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<sup>13</sup> <https://www.engineersireland.ie/cpd-training/cpd-policy.aspx#>

<sup>14</sup> <http://www.bem.org.my/v3/index.html>

<sup>15</sup> <http://www.feani.org/site/index.php?id=287>

## 1.4 Non-formal and informal learning in the project countries – national background

### a.) Austria<sup>16</sup>

In accordance with the Austrian national strategy for the validation of non-formal and informal learning (NFIL), Austria adopted the recommendations of the European Council concerning the validation of non-formal and informal learning<sup>17</sup> as defined in the Law on the Engineering Profession 2017<sup>18</sup>.

With the help of this qualification process for engineers, the Austrian title “Engineer” can be better communicated and becomes comparable at European level. This qualification process, however, does not affect the legal responsibilities and competences of the institutions that have so far been involved in the validation process. Therefore, it does not automatically lead to the same formal and academic qualifications (e.g. grant access to further continuing education programmes or professional career pathways, such as master programmes, in particular).

The professional classification of the “Engineer” has been designed as a qualification on NQF/EQF-level 6. This qualification level is described in such a way that it is to be seen as independent of structural elements, such as the place of learning (university versus school/college) or the duration of learning. It is exclusively based on learning outcomes, e.g. the knowledge, skills and competences which the graduates have acquired after completing their education and which they must give evidence of. This procedure shall show that the Austrian engineer - through their technical education and training and work practice over several years - is the equivalent of a person that has completed a technical university education at bachelor level regarding the requirements of the economy and the labour market in another country.

The certification procedure itself consists of two parts: The first part is a **written application** in which the applicant has to prove that all formal requirements have been fulfilled. It includes a comprehensive description of all activities that are part of the job. This comprises all the evidence that confirms the professional practice, which also serves as the basis for the second part of the certification procedure. There, the applicants have to describe in detail the activities listed and give examples of projects in which they participated or which they led or managed. In these descriptions of the activities carried out in their jobs, the applicants shall demonstrate and explain plausibly, by means of examples from their work, that they have carried out genuine engineering activities and that those activities are characterised by all the features that have been defined as requirements for the acquisition of such a qualification.

The second part is an **expert interview** between the applicant and the certification commission, which consists of two technical experts. In the course of this expert engineering discussion, the applicants have the chance to give in-depth information on their professional practice. At the same time, the

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<sup>16</sup> The Austrian FEANI member organization offered to add an additional perspective concerning an active policy with regard to non-formal and informal learning. The project team therefore decided to add Austria here, despite the Austrian engineering association not being a partner of this project.

<sup>17</sup> COUNCIL RECOMMENDATION of 20 December 2012 on the validation of non-formal and informal learning 2012/C 398/01

<sup>18</sup> Federal law on the generic title of the qualification “Engineer” (Law on the Engineering Profession 2017 – IngG 2017)

members of the certification commission may inquire additional information on their activities, discuss those, and exchange with the applicant ideas and experiences from their own work practice. It is the goal of this expert interview to confirm the fulfilment of all criteria for the acquisition of the engineering qualification. A common positive result of such a certification must be achieved by both members of the commission unanimously and must be recorded in writing.

### **Certification Boards**

Certification Boards are appointed by the Federal Ministry of Science, Research, and Economy and must fulfil certain personal and organisational requirements laid down by the law, as well as have an internal system of quality assurance. In the fields of agriculture and forestry, the Federal Ministry of Agriculture, Forestry, Environment, and Water Management will carry out the certification, in cooperation with the University College for Agrarian and Environmental Pedagogy.

### **Certification commission**

The certification commission consists of two professional experts from the respective technical strand of education who also possess a professional qualification as an engineer themselves or have completed a technical study program in tertiary education. One member of the certification commission has to work in a study discipline that is related to the professional practice and experience of the applicants, the second member of the commission has to be a member of the teaching staff at a related Higher Technical College, a University of Applied Sciences, or a University. In addition, the two commission members must be qualified to assess the correctness of the submitted documentation of the attested non-formally and informally acquired knowledge, skills and competences, in particular with the help of reference projects which the applicant was involved in during his/her professional practice. In this connection, it is the task of the Certification Boards to provide appropriate training for the members of the certification commission.

### **Criteria**

The awarding of the qualification title “Engineer” is based on the submission of learning outcomes at NQF/EQF level 6 which the applicant has acquired through his/her work-practice activities in specific areas of engineering work, following the completion of a Higher Technical College or a comparable formal education. These specific engineering learning outcomes have been defined by a team of experts from the Trade and Industrial Associations, the Universities, the Universities of Applied Sciences and the Higher Technical Colleges under the coordination of the Institute for Research and Development in Vocational Education and Training (ibw) and were set in accordance with a Ministry Regulation<sup>19</sup>.

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<sup>19</sup> Regulation of the Federal Ministry of Science, Research and Economy, determining (according to § 3 of the Austrian Law on the Engineering Profession 2017) the technical and trade educational strands as well as the activities which are to be acknowledged as work practice activities in the technical sector.

## Quality assurance

In order to assure the quality of the awarding process of the professional education title “Engineer” within the whole quality management system and in the individual Certification Boards, an external scientific monitoring process shall be implemented. Within this framework, the Certification Boards will be monitored with regard to the legal requirements, their quality and their validity, as well as with reference to their impact on the economy and the labour market. The results and conclusions represent a suitable basis for the future development of the system and are going to be published on the websites of the ministries involved.

### b.) Croatia

Croatia adopted the Croatian Qualifications Framework (CQF) in 2014. The goal is to reform the education system. In order to do so, the CQF promotes:

- outcome orientation of educational programs,
- alignment of educational programs with the needs of the labor market,
- transparent criteria for assessment of learning outcomes,
- development of criteria and procedures for evaluation and recognition of outcomes of non-formal and informal learning,
- and strengthening and further development of lifelong learning and quality assurance of qualifications.<sup>20</sup>

The act established a national qualifications framework based on the European Qualifications Framework (EQF). It also creates a link to the Qualifications Framework of the European Higher Education Area (QF-EHEA) and indirectly to other national qualification systems in Europe.

In Croatia, 68 professional activities have been categorized as regulated professions. Eighteen of them belong to the field of engineering. All engineers of regulated or non-regulated professions have to complete a formal education. In addition, non-formal as well as informal education are an essential part of the professional life of the engineer as they are an indicator of personal development.

However, while formal education is mandatory, the non-formal education is in parts mandatory, but mostly voluntary. After finishing their formal education and with an obligatory professional experience engineers in Croatia have to pass a professional exam organized by different authorities. This is a prerequisite for becoming a certified engineer.

Many legal documents put strong emphasis on the need for non-formal and informal education for particular professions. It is widely recommended and sometimes is a requirement as it is seen as the best solution for continuous professional development (CPD) and the acquisition of knowledge and skills of professionals.

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<sup>20</sup> Act on the Croatian Qualifications Framework (Official Gazette, No 22/13, 41/16) <https://ec.europa.eu/migrant-integration/index.cfm?action=furl.go&go=/librarydoc/the-croatian-qualifications-framework-act-official-gazette-no-22/13>.

While the need for non-formal and informal education is highlighted, the only regulated engineering professions with mandatory non-formal education are energy certifiers (architects, civil engineers, mechanical engineers and/or electrical engineers) as the ones responsible for carrying out energy audits of buildings and issuing energy certificates.<sup>21</sup>

The mechanisms and methodologies of learning and the educational processes in non-formal and informal education are diverse and depend very much on the profession. Various institutions, associations, and chambers provide non-formal and informal education.

The Croatian Engineering Association (Hrvatski inženjerski savez, HIS) and some of its member associations are providers of non-formal education for the purpose of CPD in the field of engineering.

The Croatian Chambers of Engineers are autonomous and independent professional organizations focused on the regulation of engineering profession. They are also providers of non-formal and informal education as they provide training programs. They establish educational standards for professional training, encompassing contents, training conditions, and methods of implementation and monitoring.

In addition to HIS and the chambers, non-engineering associations and educational organizations are equally important providing informal education mainly in the field of soft skills.

In general, professional non-formal education is voluntary; however, it has its basis in a legal framework.

The Croatian Ministry of Construction and Physical Planning is the competent authority for the policy and the legal framework governing non-formal and informal education. This framework is based on several legal documents that have been issued by the ministry, e.g. Act on the Chamber of Architects and Chambers of Engineers in Construction and Physical Planning<sup>22</sup>, Act on Physical Planning and Building Tasks and Activities<sup>23</sup> and Ordinance on professional examination of persons carrying out Construction and Physical Planning<sup>24</sup>.

Based on the provisions created by these legal documents, persons may pass official examinations for continuing professional development that include different forms of competence acquisition.

### c.) Czech Republic

The non-formal education in the Czech Republic has very strong roots in the past. The system was originally developed with focus on children and adolescents. By now, there are different forms of non-formal education for all age groups.

State-run-institutions, various types of educational bodies and a wide range of private companies or NGOs are providing this non-formal education. The most important legal document in this respect is the Act on the Validation and Recognition of the Outcomes of CVET, effective since 2007. The law

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<sup>21</sup> Building Act (Official Gazette No 153/13)  
[www.mgipu.hr/doc/Propisi/Building\\_Act.pdf](http://www.mgipu.hr/doc/Propisi/Building_Act.pdf).

<sup>22</sup> Act on the Chamber of Architects and Chambers of Engineers in Construction and Physical Planning (Official Gazette No 78/15)  
[www.mgipu.hr/doc/Propisi/Act\\_on\\_Chambers.pdf](http://www.mgipu.hr/doc/Propisi/Act_on_Chambers.pdf).

<sup>23</sup> Act on Physical Planning and Building Tasks and Activities (Official Gazette No 78/15)  
[www.mgipu.hr/doc/Propisi/Act\\_on\\_tasks\\_activities.pdf](http://www.mgipu.hr/doc/Propisi/Act_on_tasks_activities.pdf).

<sup>24</sup> Ordinance on professional examination of persons carrying out Construction and Physical Planning (Official Gazette No. 129/15).  
<http://www.mgipu.hr/default.aspx?id=9858>.

creates a legislative framework for the recognition of qualifications acquired through non-formal education and informal learning.

The framework for **non-formal education for adult professionals** in the Czech Republic are the National Register of Qualifications (NSK) and the National System of Occupations, which are closely linked.<sup>25</sup> The NSK is based on the need of the labor market, which is reflected by the National System of Occupations. The NSK qualifications standards are used in the development of national secondary education curricula and for retraining programs.

The National Register of Qualifications (NSK) is a publicly accessible register of all vocational qualifications and the underlying qualification and assessment standards. It has been under development since 2005 and is based on the requirements for the performance within certain professions. One part of the NSK is a system of qualification levels. The eight levels correspond to the levels of the European Qualifications Framework (EQF). The NSK defines requirements for the competence of particular qualifications/skills regardless of the method of acquirement.<sup>26</sup>

The development of the framework and the register for vocational qualifications is a key instrument in the national strategy for lifelong learning aiming at a more permeable education and training system. One of the main elements of this strategy is the creation of a system for the recognition and validation of learning outcomes, irrespective of the way in which they have been achieved.

The employers define vocational qualifications by basing them on descriptions of occupations as defined in the National System of Occupations. Sector councils group employers together and are coordinated by a consortium representing the Chamber of Commerce of the Czech Republic, the Confederation of Industry of the Czech Republic, and Trexima, a consulting agency.

The **legal framework** is based on a policy approved by the Czech government in 2007 under the title “The Strategy of Lifelong Learning in the Czech Republic”. This strategy plays a major role in the validation of non-formal and informal learning. It is output-oriented and based on the premise that lifelong learning is a continuous process, which can follow multiple paths. This is a fundamental document for the other cross-sectional and individual concepts and policies in this field and constitutes a comprehensive concept for lifelong learning.

The recognition of the diverse educational paths is based on the recognition and validation of learning outcomes in standardized examinations. The legal framework is the foundation of the NSK . It defines its contents, how and by whom qualifications are defined and approved, and by what procedures qualifications are recognized and validated.

The NSK distinguishes between two types of qualification:

- complete (comprehensive) vocational qualifications, which means the ability to work in a particular occupation,

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<sup>25</sup> [www.narodnikvalifikace.cz](http://www.narodnikvalifikace.cz)

<sup>26</sup> The English version of the NSK portal provides simplified descriptions of vocational qualifications. Detailed descriptions of competences as defined in assessment standards are available in the Czech version of the portal [www.narodnikvalifikace.cz/en-us/](http://www.narodnikvalifikace.cz/en-us/).

- and vocational qualifications, which means the ability to perform particular activities or groups of activities which lead to employability in the labor market. Vocational qualifications can be part of complete vocational qualification.

A law specifies the procedures for awarding vocational and complete vocational qualifications. A pair of standards, a qualification standard (a list of expected units of learning outcomes) and an assessment standard (set of evaluation criteria) describes each vocational qualification.

In the Ministry of Education's directive 208/2007 the legal framework was improved by defining more precisely various aspects of its implementation, particularly the authorization of bodies to award qualifications, the conducting of examinations, and deadlines. The directive also established the sector councils, thus adding an important aspect to the NSK.

Concerning the recognition and validation of learning outcomes, the NSK provides a collection of standards, allowing the objective verification and recognition of competences. Authorized bodies in accordance with the relevant evaluation standards award vocational qualifications. Every organization, which wishes to conduct evaluations for a particular partial qualification, must request approval from the authorizing body, which must be an agency of the Czech government.<sup>27</sup>

At the examination, the applicant must demonstrate all the competences listed in the qualifications standard according to the criteria in the assessment standard. In case of success, the applicant is awarded the vocational qualification.

The awarding of complete qualifications can take place in two ways:

- by graduation from a program of study on successful completion of the examination required
- or by acquiring the corresponding vocational qualifications and then completing the examination for the corresponding program of study.

The Czech Republic does not yet have a comprehensive **National Qualifications Framework** (NQF for lifelong learning). Therefore, it referenced its present qualifications system and qualifications framework of the NSK to the European Qualifications Framework. Nevertheless, the members of the EQF Advisory Group stressed the importance and necessity of development of the comprehensive NQF, to make the Czech referencing to the EQF could be acceptable and comparable.

Many steps have already been taken in the Czech Republic. There are adopted level descriptors of the NSK and there is a proposal for the Qualifications Framework for Tertiary Education. Sector council working groups have been created. The members of the working groups are mostly external experts in the given field. More and more companies and other stakeholders involved in the labor market understand the advantages and benefits of participating in sector councils. Currently there are a total of 29 sector councils covering the needs of most sectors.

The NSK defines the rules **for referencing individual qualifications to qualification levels**. They are derived from the levels of the individual competences described by learning outcomes.

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<sup>27</sup> [www.narodnikvalifikace.cz](http://www.narodnikvalifikace.cz)

Summing the situation in the Czech Republic up, it can be said that further education is of marginal interest. There is no effective system of coordination, cooperation, and communication of related actors. The quality of further education is not regulated; a system of evaluation of educational organizations is not used. There is still no legislation on further education. The Ministry of Education, Youth, and Sports and the Ministry of Labor and Social Affairs have the biggest influence on the government-financed further education. However, their competencies have not been clearly defined. There is the functioning system of the National Register of Qualifications and the National System of Occupations. As said before, the National Register of Qualifications provides an overview of nationally recognized qualifications, which can be obtained by validation of non-formal and informal learning. However, validation only concerns vocational qualifications (up to level 4).

#### d.) Germany

Learning at work is an “integral part of the local culture” in Germany and the system of vocational training, which qualifies as non-formal learning, is widely used.<sup>28</sup> Further education is a major aspect of the professional development of an employee.<sup>29</sup> Non-formal and informal learning play an essential role in the German education system and above all in the “Dual System” of vocational education, but still there is no formalized system for their recognition.<sup>30</sup>

The system of formal education is still a condition sine qua non in Germany and the high acceptance and prominent position of formal learning has led to a rather limited need for action concerning non-formal and informal learning recognition.<sup>31</sup>

Traditionally, people learned and received recognition of the learning outcomes acquired within the formal education system; their work-life was based almost exclusively on this learning.<sup>32</sup> This sequential mode of learning has become obsolete because of rapid technological and social changes.<sup>33</sup>

Due to these developments, the interest in non-formal and informal learning has been growing since the 1990s; lifelong learning aiming on an extensive professional and personal competence development has become more and more important.<sup>34</sup>

The Bruges Communiqué of 2010 included an agreement by the states of the European Union on the objective to create systems for the recognition of non-formal and informal learning.<sup>35</sup> CEDEFOP’s “European inventory on validation of non-formal and informal learning 2014” states that in Germany a strategy is in development and in addition, multiple frameworks are in place covering different sectors

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<sup>28</sup> Werquin, Patrick (2010): Recognition of non-formal and informal learning. Country practices. Paris, p. 15.

<sup>29</sup> Federal Ministry of Education and Research (BMBF) (2008): Stand der Anerkennung non-formalen und informellen Lernens in Deutschland im Rahmen der OECD Aktivität “Recognition of non-formal and informal learning”, p. 10.

<sup>30</sup> Werquin (2010), p. 34.

<sup>31</sup> Münchhausen, Gesa and Ulrike Schröder: Erfassung von informell erworbenen Kompetenzen. Impulse aus europäischen Projekten nutzen. In: BWP Berufsbildung in Wissenschaft und Praxis 6 (2009), p- 19-23, p. 20.

<sup>32</sup> Gaylor, Claudia, Nicolas Schöpf and Eckart Severing (2015): Wenn aus Kompetenzen berufliche Chancen werden. Wie europäische Nachbarn informelles und non-formales Lernen anerkennen und nutzen. Gütersloh, p. 2.

<sup>33</sup> ibid.

<sup>34</sup> Federal Institute for Vocational Education and Training (BIBB) (2012): Erfassung und Anerkennung informellen und non-formalen Lernens. Diskussionsvorlage für Workshop 3 am 30.03.2012 in Bonn, p. 1.

<sup>35</sup> [https://ec.europa.eu/education/policy/vocational-policy/doc/brugescom\\_en.pdf](https://ec.europa.eu/education/policy/vocational-policy/doc/brugescom_en.pdf).

of the labor market.<sup>36</sup> The report also states that many challenges remain, e.g. access to the system, awareness, social recognition, fragmentation, and financial sustainability.<sup>37</sup>

In 2016, the Federal Institute for Vocational Education and Training (BIBB) conducted a survey on the recognition of informal and non-formal learning in Germany, asking experts for their appraisal. Seventy-five percent of the respondents said that they would like to see more recognition of non-formal and informal learning; seventy percent said they would like to see a national system of recognition.<sup>38</sup> In Germany, the National Qualifications Framework (DQR) implemented in 2013 explicitly includes non-formal and informal learning; however, so far there is neither a legal basis nor a uniform process.<sup>39</sup> Most experts that participated in the above-mentioned 2016 survey regard the pronounced goal to have a national system in place in Germany by 2018 as too ambitious.<sup>40</sup>

Despite this situation, it would be far from true to say that non-formal and informal learning and their recognition have no place in Germany. As mentioned above, the National Qualifications Framework takes into account non-formal and informal learning. Additionally, there are several systems in place that allow for non-formally or informally acquired learning outcomes to be recognized.

The “Externenprüfung” (external evaluation) is a process of having non-formally and/or informally acquired competences recognized for the purpose of getting a formal degree. It is a document-based validation of competences.<sup>41</sup>

ProfilPASS is an instrument for a systematic identification and documentation of competences, regardless of where they have been acquired or their field of learning.<sup>42</sup> The result is a competence portfolio based on a detailed competence analysis, achieved through a guided process of self-evaluation.<sup>43</sup> The goal is to create motivation and an awareness for personal strengths.<sup>44</sup>

The initiative ANKOM (Anrechnung beruflicher Kompetenzen auf Hochschulstudiengänge) aims on crediting professional competences as part of the acquirement of a higher education degree by developing a reference framework to support the recognition process, thus increasing the permeability within the education system.<sup>45</sup>

Other projects aim on identifying the demand for recognition of informally acquired competences, e.g. the project AIKO looking into the demand within the metal and electric industries, or on developing a credit system to facilitate the recognition of non-formal and informal learning in Germany, e.g. the pilot project DECVET (based on the European project ECVET).

Many interest groups in Germany have been looking into the question of recognition for some years and discussions continue. Some of the stakeholders ask whether an additional system is really needed

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<sup>36</sup> CEDEFOP (2014): European inventory on validation of non-formal and informal learning 2014. Executive summary, p. 2-3.

<sup>37</sup> *ibid.*, p. 8.

<sup>38</sup> Velten, Stefanie und Gunvald Herdin (2016): Anerkennung informellen und non-formalen Lernens in Deutschland. Ergebnisse aus dem BIBB-Expertenmonitor Berufliche Bildung 2015, p. 3.

<sup>39</sup> *ibid.*, p. 5.

<sup>40</sup> *ibid.*, p. 12.

<sup>41</sup> BIBB (2012), p. 6.

<sup>42</sup> CEDEFOP (2014), p. 4.

<sup>43</sup> Federal Ministry (BMBF) (2008), p. 45.

<sup>44</sup> *ibid.*

<sup>45</sup> *ibid.*, p. 49.

and warn of the creation of parallel structures; others emphasize the chances for employees since, until now, professional qualifications in Germany are recognized mainly based on formal training.<sup>46</sup>

The number of validation approaches on federal and state level reflects the pluralism in the German education system and there is no overall coordination.<sup>47</sup> The political structures of the federal system are a challenge when talking about the introduction of a national system for recognition, since there is a substantial need for coordination and a heterogeneity of interests.<sup>48</sup> Germany lacks a national strategy for validation so far and the country still seems to be in a phase of developing and testing validation concepts and methods that could lead to a federal system, however, the cultural change takes time in a country with a tradition of highly developed formalized education and further training structures.<sup>49</sup>

#### e.) Portugal

In Portugal, the validation process for non-formal and informal learning was instituted in public policies in 2001 with the creation of a network of six centers for the recognition, validation and certification of competences. These centers were called Novas Oportunidades (New Opportunities).

In these centers, through a process of recognition and validation of formal and non-formal learning, people over 18 years could obtain a school certificate for levels 1 to 4 of the European Qualification Framework (EQF). This validation process is part of a public policy that has progressively come to gain social visibility, revealing itself as a political asset in schools and as a part of the professional qualification of the Portuguese population.

In 2009, there were 459 centers of recognition all over Portugal. The process of validation of qualifications through competences consists of several parts: the presentation of a personal dossier, the profiling of the competences of the candidate, complimentary training, examinations in areas where the candidate shows shortcomings, and finally validation of the competences by comparison to the corresponding professional qualifications. Irregularities in the process of profiling and in the examinations led to a decrease in the activity with the imposition of stricter rules and procedures.<sup>50</sup>

Concerning higher education academic institutions since the 1980s are entitled by law to validate competences and concede equivalence to part of the academic program. The process consists in registration, an interview to analyze the curriculum and the candidate motivation, a test of knowledge in specific areas, and access to the academic program with eventual approval of parts of the program. A jury from the respective institution conducts the process. The candidates for this recognition of competences must not already have a degree from a higher education institution.<sup>51</sup>

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<sup>46</sup> Warum benötigen wir die Anerkennung von non-formalem und informellem Lernen. In: NABIBB (Hg.): Bildung für Europa. Journal der Nationalen Agentur beim Bundesinstitut für Berufsbildung, 21 (2014), p. 7-9, p. 7-9.

<sup>47</sup> CEDEFOP (2014), p. 9.

<sup>48</sup> Werquin (2010), p. 19-20.

<sup>49</sup> Erfahrungen einen anerkannten Wert geben. Interview mit Prof. Dr. Peter Dehnbostel zu Chancen und Bedingungen eines nationalen Validierungssystems. In: In: NABIBB (Hg.): Bildung für Europa. Journal der Nationalen Agentur beim Bundesinstitut für Berufsbildung, 21 (2014), p. 6-10, p. 6.

<sup>50</sup> More and latest information can be found at <http://www.anqep.gov.pt/>.

<sup>51</sup> More information can be found at <http://www.dges.mctes.pt/DGES/pt/Estudantes/Acesso/ConcursosEspeciais/FAQ/Maiioresde23/>.

Concerning continuing professional development, there is a system to record the achievements of each engineer in terms of acquisition of competencies. This system was developed by Ordem dos Engenheiros, Região Norte as part of the project called “VALORIE”.<sup>52</sup> The VALORIE recording system is an online system available for members only. The system provides the option for external users, e.g. companies or accreditation bodies, to validate the competences.

#### f.) Slovenia

In Slovenia two legal possibilities of documentation and validation of non-formal and informal learning have been established. The first option is the legal framework, which has its basis in the formal educational systems, with all necessary and well-defined requirements. The second possibility is the National Qualification Framework (NQF) with the basis in the European Qualification Framework (EQF).

The system of national vocational qualifications enables the possibility for validation of knowledge, which has been obtained outside the formal educational system during the work with free time activities, the participation in non-formal training programs, with voluntary work, self-learning, etc.

The analyses of possibilities show that the documentation and validation of non-formal and informal learning in Slovenia is set for professions according to the level of education and the Slovenian qualification framework for the levels from 2 to 6.

#### **Introduction**

Systematic solutions, which enable the validation of non-formal and informal learning, do not have an added value just for individuals but present an added value to the entire educational system and the economy.<sup>53</sup> The representatives of public, private and civil associations have pointed out reasons for validation of learning outcomes obtained in non-formal and informal forms of learning:

- Validation of experiences, obtained with non-formal and informal learning gives the opportunity for increasing mobility and flexibility on the labor market.
- Validation of non-formal and informal learning is an opportunity for employers for better recognition of educational needs of employees, their skills and in job requirements.
- Validation of non-formal and informal learning offers an opportunity to make access to the formal educational system easier.
- Validation of non-formal and informal learning can improve the effectiveness of the educational system: for an individual with obtained non-formal and informal learning the period of formal education can be accelerated, shortened and made more cost-efficient.
- Validation of non-formal and informal learning offers opportunities to excluded and de-privileged individuals: the validation of obtained competences can help excluded and socially de-privileged individuals at the re-integration to the labor market and the whole society.

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<sup>52</sup> <http://valore.oem.pt/>

<sup>53</sup> Ugotavljanje, vrednotenje in priznavanje neformalno in priložnostno pridobljenega znanja odraslih, Tanja Vilič Klenovšek, et al. Andragoški center Slovenije, ISBN 978-961-6851-34-3, 2013.

The first step in validation of non-formal and informal obtained knowledge in Slovenia was to set up a system of validation on national vocational qualifications, which is defined in the Law on National Vocational Qualification (NVQ) from the year 2000. The system NVQ was established according to the requirement which was articulated in the White Paper on Education and Training in the Republic of Slovenia, published in the year 1995.

The NVQ system enables individuals to gain national vocational qualification on the basis of work experiences which are verified by a professional body – commission. It enables the validation of knowledge, skills and competences, obtained outside the formal educational systems, to be recognized, validated, and documented in an official document, the certificate. The procedure for obtaining a certificate is faster than the procedure for achieving formal education, gives the possibility for rapid response to the changes of labor market, and offers more opportunities to individuals to get into employment.

The resolution about the national program for education of adults for the period 2013-2020 defines as a long-term goal the design of a national system for recognition and validation formal and non-formal obtained knowledge of adults.

The validation and certification process is closely connected with the certification process and the process of getting the certificate as a confirmation of obtained professional qualifications in the national system of professional qualifications.<sup>54</sup>

The normative regulation of the certification system is heterogeneous. With the Act of national professional qualifications, a unification of the systems has been started, but there are many professions with special features, which have their history in the nature of the profession.

The analysis of the normative regulation of the area of validation and evaluation of education and qualifications shows that the Slovenian legislation has very different forms of validation and evaluation of non-formal and informal education and learning. The Act of national professional qualifications has the intention to create a unique system to solve the difficulties (heterogeneity and diversity of the professions), but still there are terminological and conceptual differences to be solved. The validation and evaluation of knowledge and skills is in the legislation in acts and other documents defined very differently. This variety of definitions and procedures is not based on differences in professions but in the current way of solving on specific areas without a brighter and uniform methodology.

## **Conclusions**

First steps in the area of recognition and validation of non-formally and informally obtained competences in Slovenia have been taken in the area of professional qualifications with the introduction of the system of national professional qualifications. The goal was to recognize the competences of individuals and to validate it in the way that can be established on the labor market.

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<sup>54</sup> Zaključno poročilo o rezultatih opravljenega raziskovalnega dela na projektu v okviru CRP »Konkurenčnost Slovenije 2006 – 2013« Razvoj instrumenta za priznavanje znanja na postsekundarni ravni, Šifra projekta V5-0432, Dejan Hozjan, et al., Univerza na Primorskem, Fakulteta za management Koper, 2010.

The system of recognition and validation was spread into the area of formal education with the aim to enable individuals with the validation of former obtained competences easier access to the formal education, to further develop their education or to reach certain educational levels.

In the last years, under the influence of EU guidelines, the attention has transferred to the third area which is focused on documentation and description of knowledge and experiences of individuals for different purposes (included the employability and the participation on formal education system), especially the personal development of an individual and his key competences/basic abilities.

The increased visibility of the system for documentation and validation of non-formally and informally obtained learning and the development of the overall trust into the system are important. In addition, it is still a challenge for the future to set up a national system for the documentation and validation as the EU proposed it.<sup>55</sup>

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<sup>55</sup> Recommendation of the EU council about the non-formal and informal Learning, December 2012.

## 2. Documentation and validation of non-formal and informal learning of engineers

### 2.1 The documentation and validation of learning activities

#### a.) Introduction

The rapid development cycles in technology have led to a growing necessity for engineers to constantly develop their professional competences. Life-long learning is essential for their professional survival. As has been shown in section 1.3 of this concept, several organizations have developed systems to support engineers in the documentation (and validation) of their learning activities. The idea behind these mechanisms is to help employers and other interested parties to make decisions about whom they can trust to provide engineering based goods and services. On the other side, it supports the self-reflection process that is part of professional development and helps professionals to visualise their achievements, thus allowing them to come to an assessment of their competences.

The concept presented here joins this collection of systems by adapting and further developing already existing approaches. The proposed structure for the system to document and validate non-formal and informal learning activities of engineers results from the prior analysis of documents, experiences, case studies, projects, and professional practices. It does not represent a completely new method or procedure, but is the result of the reflection upon already existent systems and methods.

Political decision-makers in Europe have realized that learning opportunities and qualifications are crucial for the economic development and growth of the union. Therefore, several European reference frameworks have been developed to facilitate transparency and comparability of the educational systems and the learning outcomes they produce and to support mobility on the labor market.

In order to make learning comparable, reference frameworks define descriptors for different competence levels. The European Consortium for Accreditation (ECA) defines qualification descriptors as being generic statements of the outcomes of study. They provide clear points of reference that describe the main outcomes of a learning activity often with reference to national levels. Descriptors can work as examples of competences expected from a certain qualification.

The levels defined by descriptors form the basis for the documentation and validation of non-formal and in-formal learning outcomes (NFIF) of engineers. Level descriptors are essential elements of reference frameworks. While they are technical in their character, these descriptors define what an individual is expected to know (knowledge), be able to do, and understand (skills and competences), having acquired a qualification at a specific level. Level descriptors are thus the single most important element in the creation of an outcome-orientated documentation and evaluation system.

In order for descriptors to be effective, they have to

- be sufficiently detailed and multifaceted to capture the complexities of different types of learning,
- be sufficiently general to accommodate different national education and training systems,
- reflect the way qualifications are valued by economy and society,
- and be able to reflect how knowledge, skills, and competences increase in breadth, depth, and complexity when moving from lower to higher levels,

#### b.) Non-technical learning activities

In order to create a system to document and validate learning activities, the project team used several reference frameworks. For the **non-technical learning activities** it used:

- Common European framework of reference for languages<sup>56</sup>
- DIGCOMP: A Framework for Developing and Understanding Digital Competence in Europe<sup>57</sup>
- European Qualification Framework (EQF)<sup>58</sup>

The use of these frameworks is based upon the European Commission's reference framework for lifelong learning<sup>59</sup>, which defines several key competences. Not all of them were deemed relevant to the current project. However, four fields of activities are increasingly relevant to engineers, too. Therefore, the project team decided to include them into the system for documentation and validation of non-formal and informal learning activities of engineers. They are:

- *learning activities to enhance foreign language competences,*
- *learning activities to enhance digital competences,*
- *learning activities to enhance social and civic competences,*
- *and learning activities to enhance competences concerning initiative and entrepreneurship.*

The system for documenting and validating the non-technical learning activities will be described and explained in detail in section 2.2.

#### c.) Technical learning activities

For the documentation and validation of **technical learning activities** the project team developed its own system of categorization of learning activities. This list is based on FEANI's CPD policy as well as other documentation and validation systems and comprises most current forms of CPD for engineers that professional engineering organizations generally accept. This system for the classification of learning activities encompasses formal, non-formal and informal learning activities, offering the applicant an opportunity to present a wide range of learning activities.

- *in-company training*
- *post graduate academic*
- *external training*
- *engineering research*

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<sup>56</sup> <https://www.coe.int/en/web/common-european-framework-reference-languages>

<sup>57</sup> <https://ec.europa.eu/jrc/en/digcomp/digital-competence-framework>

<sup>58</sup> <https://ec.europa.eu/ploteus/content/descriptors-page>

<sup>59</sup> CEDEFOP (2007): Key competences for lifelong learning. European Reference Framework. Luxembourg.

- *teaching or instructing*
- *service in professional engineering organization*
- *development of technical regulations, codes or norms*
- *technical visit/assignment*
- *participation in job-related conference, congress or convention*
- *preparation and presentation of technical paper*
- *preparation and publication in a profession-related publication*
- *manufacturing, production, construction*
- *technical quality control, inspection or evaluation*
- *coordination and management*

The system for documenting and validating the technical learning activities will be described and explained in detail in section 2.2.

#### d.) Documentation and validation of learning activities (e-portfolio)

The project team also developed a list of information that every applicant has to add for each single learning activity. This is not only the first step of the validation process; it is also part of the self-reflection of the applicants on their own achievements.

- *Starting date and conclusion date of the activity*
- *Designation of the activity*
- *Basic category of the activity (non-technical/technical)*
- *Short summary of the activity (max. 200 characters)*
- *Duration of activity (in hours)*
- *CPD points (according to FEANI CPD policy)*
- *Type of activity (field of competence)*

In addition to this information, the applicant has to add some kind of evidence of the learning activity in order to receive validation. This maybe a certificate, if the learning activity has taken place in a formalized way. However, this evidence may also be of a different kind, e.g. an electronic certificate generated from a self-learning program, a list of participants, a fair ticket, etc.

#### e.) Self-evaluation

Another important part of the documentation and validation of learning activities is the self-evaluation scheme. This offers the applicant the opportunity to add information on the level of competence they have achieved in the field of competence the activity is a part of.

This is a very important part, as a single learning activity in itself will only offer limited information on the applicant's knowledge, skills, and competences; by adding a self-evaluation the applicant has the opportunity to give to the reader (e.g. an HR manager) the bigger picture, thus providing vital information on the competence profile as a whole.

The self-evaluation scheme offers several options. The functionality of the self-evaluation scheme will be explained in detail in section 2.2.

## 2.2 The process of documentation and validation of learning activities<sup>60</sup>

The record of the non-formal and informal learning activities and outcomes in this concept is realized in the form of an online e-portfolio. In order to come up with this e-portfolio, a process of identification, documentation, self-evaluation, and finally validation is necessary.

The following chapter describes in detail the application process of the engineering card with a special focus on the section for documentation and validation of non-formal and informal learning activities.

The application process consists of the following steps:

1. Personal data
2. Engineering education (academic)
3. Professional experience (after conclusion of education)
4. Continuing professional development (only formal – old system)
5. Continuing professional development (formal/non-formal/informal – new system)
6. Payment method
7. Summary of application and acknowledgement
8. Confirmation of application and payment

### a.) Personal Data

The applicant has to enter their personal information for registration as an applicant. This data later forms the basis for the printing the card and the register excerpt. The e-mail address together with a password generated later in the process forms the login information needed by the card holder to update data on a regular basis.

The screenshot displays the '1. Persönliche Angaben' (Personal Data) step of an online application process. The interface is in German and includes a progress bar at the top with steps: 1. Persönliche Angaben (highlighted), 2. Studium, 3. Berufserfahrung, 4. formale Weiterbildung, 5. non-formale/informelle Weiterbildung, 6. Zahlungsart, 7. Angaben prüfen, and 8. Zahlung.

On the left side, there is a sidebar with the following information:

- A question mark icon and the text 'VORSCHAU DER EINZELNEN SCHRITTE'.
- The European Union flag and the text 'Kofinanziert durch das Programm Erasmus+ der Europäischen Union'.
- A disclaimer: 'Die Verantwortung für den Inhalt dieser Veröffentlichung trägt allein der Verfasser; die Kommission haftet nicht für die weitere Verwendung der darin enthaltenen Angaben.'
- A 'Hinweis' (Note) stating: 'Hinweis: Die Zahlung für das kostenpflichtige Prüfverfahren erfolgt an den VDI e.V. Der VDI e.V. handelt für die Träger der engineeriNG card.'
- The Creative Commons Attribution-NonDerivatives 4.0 International License logo and text: 'This work is licensed under a Creative Commons Attribution-NonDerivatives 4.0 International License'.

The main form area contains the following fields and sections:

- Angaben zur Person:**
  - Anrede\*:  Frau  Herr
  - Land\*: Deutschland (dropdown)
  - E-Mail\*: mustermann\_max@vdi.de
  - Wiederholung E-Mail\*: mustermann\_max@vdi.de
  - Nachname\*: Mustermann
  - Geburtsdatum\*: 01.01.1995 (TT.MM.JJJJ)
  - Geburtsort\*: Musterstadt
  - c/o: (empty)
  - Telefonnr. (tagsüber)\*: 01234 567890
  - Strasse/Hausnr.\*: Musterstraße 1
  - PLZ\*: 01234
  - Staatangehörigkeit\*: Deutsch (dropdown), Germany (checkbox), (optional - warum englisch?)
  - Ort\*: Musterstadt
- Passfoto hochladen\*** (max. 1 Datei): Includes a photo upload area with a 'Durchsuchen...' button and a 'Hochladen' button. Supported formats: (jpg, jpeg, gif, png, .bmp, max.4 MB).
- Unterschrift hochladen\*** (max. 1 Datei): Includes a signature upload area with a 'Durchsuchen...' button and a 'Hochladen' button. Supported formats: (jpg, jpeg, gif, png, max.4 MB).
- Verbandszugehörigkeit auswählen:** A dropdown menu showing 'Verein Deutscher Ingenieure e.V.' with a 'Preisübersicht (öffnet in neuem Fenster)' link below it.
- Nachweis Verbandszugehörigkeit hochladen\***: Includes a PDF upload area with a 'muster.pdf' file icon, a 'Durchsuchen...' button, and a 'Hochladen' button. Supported formats: (jpg, jpeg, gif, png, .bmp, .pdf, max.4 MB).

At the bottom right, there is a button labeled 'weiter zum nächsten Schritt'. At the bottom left, there are footnotes: '\* = Pflichtangabe' and '\*\* = je nach getroffener Auswahl gegebenenfalls Pflichtangabe'.

<sup>60</sup> This is how the process would look like, if an applicant would do their first application and enter information on education, professional experience, and further training. In reality, most applicants continually update information on professional experience and further training, as they are not a prerequisite for being granted the engineering card.

## b.) Engineering education

The applicant has to enter information on their engineering education. An applicant may enter more than one data package, e.g. the applicant has first finished a bachelor degree (A1), after that a master degree (A2), and finally a PhD (A3). Only engineering programs can be accepted under this section.

VORSCHAU DER EINZELNEN SCHRITTE

1. Persönliche Angaben 2. Studium 3. Berufserfahrung 4. formale Weiterbildung 5. non-formale/informelle Weiterbildung

6. Zahlungsart 7. Angaben prüfen 8. Zahlung

Angaben zum 1. Studium

Akademischer Grad\* Bachelor of Engineering (B.Eng.)

Freitextfeld nur benutzen, falls zuvor "Sonstige" ausgewählt

Abschlussdatum\* 20 Juli 2016

Studiengang\*\* Maschinenbau (optional - warum englisch?)

Hochschule\* Technische Universität Musterstadt

Abschlusszeugnis / Diploma-Supplement\*

muster.pdf

Durchsuchen... Hochladen

(.jpg, .jpeg, .pdf, .png, .gif, .pdf, max.4 MB)

weitere Studium hinzufügen oder weiter zum nächsten Schritt

\* = Pflichtangabe  
\*\* = je nach getroffener Auswahl gegebenenfalls Pflichtangabe

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## c.) Professional experience

VORSCHAU DER EINZELNEN SCHRITTE

1. Persönliche Angaben 2. Studium 3. Berufserfahrung 4. formale Weiterbildung 5. non-formale/informelle Weiterbildung

6. Zahlungsart 7. Angaben prüfen 8. Zahlung

Angaben zur 1. Berufserfahrung

falls Sie keine Berufserfahrung angeben möchten, können Sie diesen Abschnitt ohne Eingaben überspringen!

Zeitraum\* September 2016 heute

Bereich der beruflichen Tätigkeit\* freie Wirtschaft

Arbeitgeber\*\* Muster GmbH

Funktion\* Projektingenieur (optional - warum englisch?)

Tätigkeiten\*

400 Zeichen übrig

400 Zeichen übrig

Nachweisdokument\* (z.B. Arbeitsbescheinigung) (mehrere Dateien möglich)

muster.pdf

Durchsuchen... Hochladen

(.jpg, .jpeg, .pdf, .png, .gif, .pdf, max.4 MB)

weitere Berufserfahrung hinzufügen oder weiter zum nächsten Schritt

\* = Pflichtangabe  
\*\* = je nach getroffener Auswahl gegebenenfalls Pflichtangabe

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The applicant may enter information on the professional experience they have gathered after the conclusion of their first engineering education. This is not mandatory. Only professional experience for the period after the conclusion of the first engineering education can be accepted.

## d.) Continuing Professional Development –formal

Applicants may enter further education activities that are strictly formal in nature. The applicant has to choose a category for each activity and add a certificate. The three categories are a combination of content and type of the activity. They are:

C1 – non-technical or technical; only participation

C2 – technical with a mandatory test

C3 – technical with a mandatory test and a formal certificate; engineering education a prerequisite

Only further education activities for the period after the conclusion of the first engineering education can be accepted.

**VORSCHAU DER EINZELNEN SCHRITTE**

**Hinweis:**  
Die Zahlung für das kostenpflichtige Prüfverfahren erfolgt an den VDI e.V. Der VDI e.V. handelt für die Träger der engineerNG card.

**1. Persönliche Angaben** | **2. Studium** | **3. Berufserfahrung** | **4. formale Weiterbildung** | **5. non-formale/informelle Weiterbildung**

**5. Zahlungsart** | **6. Angaben prüfen** | **7. Zahlung**

Hier können Sie **formale** Weiterbildungen erfassen

**Angaben zur 1. Weiterbildung**  
falls Sie keine Weiterbildung angeben möchten, können Sie diesen Abschnitt ohne Eingaben überspringen!

Zeitraum\*  2016  2017

Weiterbildungs-Titel\*   (optional - warum englisch?)

Art der Weiterbildung\*

Anbieter\*

Nachweisdokument\* (mehrere Dateien möglich)  
    
(.jpg, .jpeg, .pdf, .png, .gif, .pdf, max. 4 MB)

oder

\* = Pflichtangabe  
\*\* = je nach getroffener Auswahl gegebenenfalls Pflichtangabe

### e.) Continuing Professional Development – non-formal/informal

In addition to the old system, the new engineering card database offers the opportunity to add learning activities that are non-formal or informal in nature.<sup>61</sup> This adds the possibility for applicants to provide via the register excerpt others (e.g. HR managers) with a complete picture of their own competence development after basic education.

As mentioned earlier in this document, the applicant may enter non-technical learning activities from

**VORSCHAU DER EINZELNEN SCHRITTE**

**1. Persönliche Angaben** | **2. Studium** | **3. Berufserfahrung** | **4. formale Weiterbildung** | **5. non-formale/informelle Weiterbildung**

**6. Zahlungsart** | **7. Angaben prüfen** | **8. Zahlung**

Hier können Sie **non-formale/informelle** Weiterbildungen erfassen

**Angaben zur 4. non-formalen/informellen Weiterbildung**  
falls Sie keine non-formale/informelle Weiterbildung angeben möchten, können Sie diesen Abschnitt ohne Eingaben überspringen!

Zeitraum\*  2015  2017

Bezeichnung\*   (optional - warum englisch?)

Grundstufen\*

Kurzbeschreibung\*

Dauer der Aktivität (in Stunden)

CPD Punkte lt. FEANI CPD Policy

Lernaktivitäten mit nicht-technischem Inhalt\*

Selbsteinstufung nach EU Referenzrahmen Sprachen\*  (Erklärung)

Nachweisdokument\* (mehrere Dateien möglich)  
    
(.jpg, .jpeg, .pdf, .png, .gif, .pdf, max. 4 MB)

Hier können Sie **non-formale/informelle** Weiterbildungen erfassen

**Angaben zur 2. non-formalen/informellen Weiterbildung**  
falls Sie keine non-formale/informelle Weiterbildung angeben möchten, können Sie diesen Abschnitt ohne Eingaben überspringen!

Zeitraum\*  2017  2017

Bezeichnung\*   (optional - warum englisch?)

Grundstufen\*

Kurzbeschreibung\*

Dauer der Aktivität (in Stunden)

CPD Punkte lt. FEANI CPD Policy

Lernaktivitäten mit technischem Inhalt\*

Selbsteinstufung in diesem Kompetenzfeld\*  (Erklärung)

Nachweisdokument\* (mehrere Dateien möglich)  
    
(.jpg, .jpeg, .pdf, .png, .gif, .pdf, max. 4 MB)

oder

\* = Pflichtangabe  
\*\* = je nach getroffener Auswahl gegebenenfalls Pflichtangabe

the following areas:

- foreign language competences
- digital competences
- social and civic competences
- entrepreneurial competences

The applicant may also, under the category “other”, add learning activities that do not fit into one of those categories. After choosing the field of competence, the applicant has to enter additional information on the learning activity as well as provide a document in order to allow for validation of the learning activity.

The final step for the applicant is to do a self-evaluation of their overall competences in the field of the learning activity.

<sup>61</sup> For the definition on “non-formal” and “informal” please see page 5 of this concept.

For **languages**, the self-evaluation is based on the European Reference Framework for languages (see figure).

<b>PROFICIENT USER</b>	C2	Can understand with ease virtually everything heard or read. Can summarise information from different spoken and written sources, reconstructing arguments and accounts in a coherent presentation. Can express him/herself spontaneously, very fluently and precisely, differentiating finer shades of meaning even in more complex situations.
	C1	Can understand a wide range of demanding, longer texts, and recognise implicit meaning. Can express him/herself fluently and spontaneously without much obvious searching for expressions. Can use language flexibly and effectively for social, academic and professional purposes. Can produce clear, well-structured, detailed text on complex subjects, showing controlled use of organisational patterns, connectors and cohesive devices.
<b>INDEPENDENT USER</b>	B2	Can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialisation. Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. Can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options.
	B1	Can understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc. Can deal with most situations likely to arise whilst travelling in an area where the language is spoken. Can produce simple connected text on topics which are familiar or of personal interest. Can describe experiences and events, dreams, hopes & ambitions and briefly give reasons and explanations for opinions and plans.
<b>BASIC USER</b>	A2	Can understand sentences and frequently used expressions related to areas of most immediate relevance (e.g. very basic personal and family information, shopping, local geography, employment). Can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters. Can describe in simple terms aspects of his/her background, immediate environment and matters in areas of immediate need.
	A1	Can understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type. Can introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has. Can interact in a simple way provided the other person talks slowly and clearly and is prepared to help.

<https://www.coe.int/en/web/common-european-framework-reference-languages/table-1-cefr-3.3-common-reference-levels-global-scale>

For **digital competences**, the self-evaluation is based on DIGCOMP, the European Reference Framework for Digital Competences. Here, the applicant first has to choose from one of five categories in which the activity may fall and then select a proficiency level based on the given descriptors.<sup>62</sup>

For learning activities that fall under the categories “**social and civic**”, “**entrepreneurial**” or “**others**” so far no reference framework is available. Therefore, the project team has decided to resort to the European Qualification Framework (EQF). It offers eight levels of proficiency.<sup>63</sup>

For the engineer, of course, continuing professional development in the technical field is of the utmost importance. However, does not necessarily take place in a formalised way, but may also be non-formal and informal in nature.

<sup>62</sup> <http://ftp.jrc.es/EURdoc/JRC83167.pdf>

<sup>63</sup> <https://ec.europa.eu/ploteus/content/descriptors-page>

The engineering card in its revised version offers the applicant the opportunity to add **technical learning activities** that are non-formal or informal in nature. Each learning activity has to be categorised by using the following scheme and evaluated by using the proficiency scale below:

- a) in-company training
- b) external training
- c) post graduate academic
- d) engineering research
- e) teaching or instructing
- f) service in professional engineering organization
- g) development of technical regulations, codes or norms
- h) technical visit/assignment
- i) participation in job-related conference, congress or convention
- j) preparation and presentation of technical paper
- k) preparation and publication in a profession-related publication
- l) manufacturing, production, construction
- m) technical quality control, inspection or evaluation
- n) coordination and management

Score	Proficiency Level	Description
N/A	<b>Not Applicable</b>	You are not required to apply or demonstrate this competency.
1	<b>Fundamental Awareness</b>	One has a common proficiency of basic techniques and concepts of the engineering competency. <ul style="list-style-type: none"> <li>Focus is on learning and knowledge of engineering.</li> </ul>
2	<b>Novice</b>	One has the level of competency gained in a classroom and/or laboratory scenarios or as a trainee on-the-job. One is expected to need help when performing this engineering competency. <ul style="list-style-type: none"> <li>Focus is on developing through on-the-job experience;</li> <li>One understands and can discuss terminology, concepts, principles, and issues related to this competency;</li> <li>One utilizes the full range of reference and resource materials in this competency.</li> </ul>
3	<b>Intermediate</b>	One is able to successfully complete tasks in this competency as requested. Help from an expert may be required from time to time, but one can usually perform this competency independently. <ul style="list-style-type: none"> <li>Focus is on applying and enhancing knowledge or skill or attitude;</li> <li>One has applied this competency to situations occasionally while needing minimal guidance to perform successfully;</li> <li>One understands and can discuss the application and implications of changes to processes, policies, and procedures in this area.</li> </ul>
4	<b>Advanced</b>	One can perform the actions associated with this competency without assistance. One is recognized as "a person to ask" when difficult questions arise regarding this competency. <ul style="list-style-type: none"> <li>Focus is on broad organizational/professional issues;</li> <li>One has consistently provided practical/relevant ideas and perspectives on process or practice improvements which may easily be implemented;</li> <li>One is capable of coaching others in the application of this competency by translating complex nuances relating to this competency into easy to understand terms;</li> <li>One participates in senior level discussions regarding this competency;</li> <li>One assists in the development of reference and resource materials in this competency.</li> </ul>
5	<b>Expert</b>	One is known as an expert in this area. One can provide guidance, troubleshoot and answer questions related to this area of expertise and the field where this competency is used. <ul style="list-style-type: none"> <li>Focus is strategic;</li> <li>One has demonstrated consistent excellence in applying this competency across multiple projects and/or organizations;</li> <li>One is considered the "go to" person in this area within related organizations;</li> <li>One creates new applications for and/or leads the development of reference and resource materials for this competency;</li> <li>One is able to diagram or to explain the relevant process elements and issues in relation to organizational issues and trends in sufficient detail during discussions and presentations, to foster a greater understanding among colleagues and constituents.</li> </ul>

#### f.) Payment method

After entering all information on education, professional experience, and further training, the applicant may choose the payment method. They three available options are: credit card, invoice/bank transfer, and voucher.

The screenshot shows a web interface for selecting a payment method. At the top, there are navigation tabs: 1. Persönliche Angaben, 2. Studium, 3. Berufserfahrung, 4. formale Weiterbildung, 5. non-formale/informelle Weiterbildung, 6. Zahlungsmittel, 7. Angaben prüfen, 8. Zahlung. The '6. Zahlungsmittel' tab is active. Below the tabs, there are three radio button options: 'Zahlung per Rechnung' (selected), 'Zahlung per Kreditkarte', and 'Einmaliger Gutschein'. To the right of these options, there is a text box for 'Gutscheincode'. Below the options, there is a 'weiter zum nächsten Schritt' button. At the bottom left, there is a Creative Commons Attribution-NonCommercial 4.0 International License logo.

## g.) Summary of application and acknowledgment

VORSCHAU DER EINZELNEN SCHRITTE

Kofinanziert durch das Programm Erasmus+ der Europäischen Union

Die Verantwortung für den Inhalt dieser Veröffentlichung trägt allein der Verfasser; die Kommission haftet nicht für die weitere Verwendung der darin enthaltenen Angaben.

Hinweis: Die Zahlung für das kostenpflichtige Prüfverfahren erfolgt an den VDI e.V. Der VDI e.V. handelt für die Träger der engineerING card.

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1. Persönliche Angaben 2. Studium 3. Berufserfahrung 4. formale Weiterbildung 5. non-formale/informelle Weiterbildung

6. Zahlungsart 7. Angaben prüfen 8. Zahlung

Angaben zur Person vom 25.10.2017

Daten korrigieren

Anrede Herr

Titel

Vorname Max

Nachname Mustermann

elo

Strasse/Hausnr. Musterstraße 1

PLZ 01234

Ort Musterstadt

Land Deutschland

E-Mail kiefer@vdi.de

Geburtsdatum 01.01.1995

Geburtsort Musterstadt

Telefonnr. (tagüber) 01234 567890

Staatsangehörigkeit Deutsch Germany

Passfoto

Unterschrift

Verbandszugehörigkeit Verein Deutscher Ingenieure e.V.

Verbandschweisedokument(e) vdi.de

Angaben zur Zahlung vom 25.10.2017

Daten korrigieren

Zahlweise  per Rechnung

Gesamtpreis

Preis für erstmaligen Kartenantrag: 94,99 - €

\*\*\*\*\*

Gesamtpreis: 94,99 - €

Wie sind Sie auf die engineerING card aufmerksam geworden?

oder Sonstiges:

Ich versichere, dass sämtliche Angaben in diesem Antrag richtig sind. Ich versichere weiter, dass die eingereichten Unterlagen richtig sind und insbesondere mit den Originalurkunden identisch sind.

Die [Ethischen Grundsätze](#) (PDF in neuem Fenster) des Ingenieursberufs erkenne ich an.

Ich nehme zur Kenntnis, dass mit der Beantragung der engineerING card Kosten für die Prüfung der Mindestvoraussetzungen verbunden sind. Diese Prüfkosten (s.o.) fallen unabhängig vom Ausgang des Prüfverfahrens an.

>> Daten senden und weiter zur Zahlung

In the final step, the applicant has the opportunity to check again all information entered and is asked to accept the terms and conditions.

## h.) Confirmation of application and payment

The final step confirms the payment and informs the applicant on the further steps concerning payment. The application is transferred into the database for formal evaluation by the engineering card office. The application process is complete.

VORSCHAU DER EINZELNEN SCHRITTE

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Notice: Undefined variable: arrDaten in /home/www/sites/194.245.72.80/site/professionalcard/gui/index.php on line 5703

Notice: Undefined index: in /home/www/sites/194.245.72.80/site/professionalcard/gui/index.php on line 5703

1. Persönliche Angaben 2. Studium 3. Berufserfahrung 4. formale Weiterbildung 5. non-formale/informelle Weiterbildung

6. Zahlungsart 7. Angaben prüfen 8. Zahlung

Karte erfolgreich beantragt

Vielen Dank. Wir haben Ihren Antrag erhalten und Ihnen zur Kontrolle eine E-Mail mit Ihren Angaben an Ihre E-Mailadresse "kiefer@vdi.de" gesendet.

Da Sie als Zahlweise "per Rechnung" gewählt haben, warten Sie mit der Bezahlung bitte, bis wir Ihnen eine Rechnung zugesendet haben. Nach Begleichung der Rechnung durch Überweisung und Geldeingang werden wir mit der Prüfung bzw. Bearbeitung beginnen.

Falls Sie noch Fragen haben, nehmen Sie bitte Kontakt mit uns auf unter VDI e.V., <http://www.engineering-card.de/index.php?id=2736>. Für Rückfragen stehen wir Ihnen gerne zur Verfügung.

Mit freundlichen Grüßen

Ihre Geschäftsstelle engineerING card

Verein Deutscher Ingenieure e.V.  
VDI-Platz 1  
40468 Düsseldorf  
Telefon: [+49 211 62 14 149](tel:+492116214149)  
E-Mail: [info@engineering-card.de](mailto:info@engineering-card.de)

### 3. Lessons learned – main challenges in the creation of a documentation and validation system

During the lifetime of this project, the project team had to deal with several challenges. The following is a short summary of the main obstacles. Additionally, the project team wants to make some suggestions on how to overcome those challenges.

#### a.) Documenting and referencing competences

When the project started, the project partners had the idea to create a system for the documentation and validation of technical and non-technical competences of engineers. During the first months of the project, after a phase of intensive desk research on existing documentation and validation systems and methods and careful considerations, the project team decided to reduce the scope of the project to the development of a system for the documentation and validation of non-formal and informal learning activities of engineers. This is a document-based approach, i.e. while the learning activity or the learning process as a whole (as it may consist of several activities) itself may be non-formal or informal in nature, the documentation and validation process is a formalized one.

The main reason, why a competence-based approach proved to be unrealistic, is the lack so far of a reference framework for engineering competences based on learning outcomes. A reference framework is important for several reasons:

1. it offers the applicant a matrix to do a self-evaluation as part of the documentation process,
2. provides the validator with a generally accepted classification and evaluation system and
3. creates transparency thus
4. increasing the credibility of the assessment.

There have been several approaches to create such a reference framework, e.g. EUR-ACE, Euro-records, etc. However, the heterogeneity of the engineering education in Europe and the complexity of engineering as a profession comprising many different fields of specialization have so far made it impossible to create such a framework.

In addition, there is no consensus, so far, on the European level concerning the competences an engineer must have in order to be able to work.

However, the system for documentation and validation of non-formal and informal learning activities of engineers as presented by this concept could be easily enhanced. It would then become a system to document and validate competences (the learning outcome) instead of the competence acquirement (the learning activity). Until a generally accepted reference framework is in place, however, the process will have to be limited to the creation of an e-portfolio with a documentation and document-based validation of non-technical as well as technical learning activities combined with a self-evaluation of the activity by the applicant.

## b.) Validating competences

The second challenge, the project team faced when working on the competence-based approach, was validation. While the validation of formal learning is quite easy, as in most cases, there is a formal certification involved, non-formal and informal learning do not necessarily lead to certification. In those cases, the validation of competences makes different approaches necessary that are quite complex, e.g. interviews, analysis of sample work, standardised tests, and other elaborate forms of validation. The chapter on the approach towards non-formal and informal learning in Austria shows, how elaborate mechanisms to document and validate learning outcomes/competences have to be and how resource-intensive their use is.

Here again, the prerequisite is a reference framework in order to reference an applicant's knowledge, skills, and competences against defined criteria, thus allowing a reliable statement concerning the level of proficiency of a person in the field of competence (see above). In order to be reliable, the testing has to be done by experts, so a comprehensive system to document and validate non-formal and informally acquired learning outcomes requires a joint effort of organisations/institutions from many different areas of expertise.

For the reasons given above, the project team decided to resort to a rather simple document-based validation, i.e. the applicant has to provide some type of document to validate the learning activity. This still offers the applicant to enter a wide variety of learning activities, as even informal learning, e.g. visiting a fair, doing online learning, being in charge of a project at work, in many cases produces some type of certification.

## 4. Glossary<sup>64</sup>

This glossary defines specific terms used in European education and training policy in general and in this project concept in specific. The terminology and definitions have been gathered from different sources. Some of them have been adapted for this specific context by the experts included in this project.

<b>Term</b>	<b>Definition</b>
CEDEFOP	The European Centre for the Development of Vocational Training (CEDEFOP) is one of the EU's decentralized agencies supporting development of European vocational education and training (VET) policies and contributes to their implementation.
Certificate	An official document that records achievements of an individual/organization following assessment against predefined criteria. It is issued by an awarding body.
Competence	Competence is the ability to use knowledge and skills to fulfill a given task or solve a given problem.
Continuing Professional Development (CPD)	Any action undertaken to improve professional performance by enhancing or increasing knowledge, skills, and competences in the field of a person's profession.
engineerING card	The engineering card is a professional card issued by several engineering organisations in Europe under the umbrella of FEANI, the European Federation of national engineering associations. It is a tool that was developed to increase transparency and facilitate mobility on the European labor market.
e-portfolio	An e-portfolio is an electronic collection of information on a single person, e.g. a collection of all further education activities of a person. The idea of the portfolio in this case is to allow for a comprehensive presentation of a person's competences.

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<sup>64</sup> The glossary is not comprehensive, but includes terms that are relevant in this concept. For more definitions, please refer to other sources, e.g. CEDEFOP (2008): Terminology of European education and training policy. A selection of 100 key terms. Luxembourg.

EUROPASS	Portfolio helping citizens to better communicate their skills and qualifications when applying for job or study in Europe. The Europass CV and the language passport are completed by citizens themselves; the other documents can be issued to citizens who achieve a mobility experience in another European country (europass mobility) or who complete a formal program of vocational education or training (certificate supplement) or of higher education (diploma supplement).
European credit transfer system (ECTS)	A systematic way of describing a higher education program by attaching credits to its components (modules, courses, placements, dissertation work, etc.). The main goal is an increase in transparency and mobility on the Higher Education market.
European Higher Education Area (EHEA)	The European Higher Education Area (EHEA) is the area defined by the Bologna-Declaration. It includes not only the European Union, but entire Europe-
European Qualification Framework (EQF)	The European Qualifications Framework acts as a translation device to make national qualifications more transparent and comparable across Europe. The EQF aims on relating different countries' national qualification systems to a common European reference framework.
European qualifications framework (EQF) for lifelong learning (LLL)	The EQF-LLL is a reference tool for describing and comparing qualification levels in qualifications systems developed at national, international or sectoral levels.
Evaluation	Procedure of systematic determination of a person's achievement or value in regard to predefined criteria
Formal learning activity	Learning organized and guided by a formal curriculum in an organized and structured environment. The learning is explicitly designated as a learning process leading to formal certification.
Higher Education Institution (HEI)	Higher Education Institutions offer post-secondary education or third level education. They are therefore part of the formal learning system.

Informal learning	Informal learning is not organized or structured in terms of objectives, time or learning support. Informal learning is in most cases unintentional from the learner's perspective.
Knowledge	Knowledge is the sum factual information a person possesses. Expert knowledge is knowledge in a specific area.
Learning outcomes / learning attainments	Statements of knowledge, skills and/or competences an individual has acquired and/or is able to demonstrate after completion of a learning process. Learning outcomes are often defined using descriptors.
Mobility	Ability of an individual to move and adapt to a new occupational or educational environment.
National Qualification Framework (NQF)	The National Qualification Framework is the result of implementation of the European Qualification Framework (EQF) on the national level. Each country references the different levels of the national education system to the levels of the EQF in order to create comparability between the various national systems.
Non-formal learning	Non-formal learning is learning embedded in planned activities not explicitly designated as learning (in terms of learning objectives, learning time or learning support). Non-formal learning is intentional from the learner's point of view.
Non-technical learning activities	Non-technical learning activities are non-technical in content. They are not directly linked to the engineering profession and may be interdisciplinary. Typical non-technical learning activities are language learning or project management.
Skill	Ability to apply knowledge to complete tasks and solve problems.
Technical learning activities	Technical learning activities are technical in content. They are directly relevant to the engineer as they are part of the expert knowledge of the engineer.
Validation	Act of confirming that the information given is correct by checking them against pre-defined criteria.

## 5. Literature

The literature used in this project is available [here](#) using the following login information:

Username: **vdi\projekt.erasmusplus**

Password: **PE\_10000**