Revised draft proposal - Common Training Principles for Civil Engineers - based on results of stakeholder workshop on 30 June 2016

1. *Minimum Requirements of a Common Training Framework for Civil Engineers (= for automatic recognition of Civil Engineers)*

Level 1: European Chartered Civil Engineer Master level

- Academic education: Master degree (EQF Level 7) in the field of Civil Engineering
- 300 ECTS with a minimum of 70% technical ECTS (mathematics, natural science, technology, informatics)
- 2 years of post-graduate professional experience or professional examination (in the home country)
- For applicants from member states in which the profession is regulated: Certification of fulfilment of the requirements for authorization/ licence to provide services in the field of Civil Engineering; for applicants from member states in which the profession is not regulated: Confirmation from the competent authority (see 2.) that the applicant has the right to provide services on the field of Civil Engineering in the home country

Level 2: European Chartered Civil Engineer Bachelor level

- Academic education: Bachelor degree (EQF Level 6) in the field of Civil Engineering
- Minimum 180 ECTS with a minimum of 70% technical ECTS (mathematics, natural science, technology, informatics)
- 2 years of post-graduate professional experience or professional examination (in the home country)
- For applicants from member states in which the profession is regulated: Certification of fulfilment of the requirements for authorization/ licence to provide services in the field of Civil Engineering; for applicants from member states in which the profession is not regulated: Confirmation from the competent authority (see 2.) that the applicant has the right in his to provide services on the field of Civil Engineering in the home country.

2. *Responsibilities in regard to the verification of fulfilment of the minimum requirements of a CTF for Civil Engineers by the applicant*

A competent authority in the home member country establishes a certificate (to be further defined) stating that **the applicant fulfils the requirements of the Common Training Framework for European Civil Engineer MSc or European Civil Engineer BSc** and that the applicant is **not subject of an occupational ban or disciplinary procedure** in the home country.

For this assessment – which is the responsibility of the home member country - the **EUR-ACE® Framework Standards and Guidelines (EAFSG) by the European Network for accreditation of Engineering Education (see Annex 1)** are regarded as common orientation basis for the general programme output requirements of engineering education programmes.

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The Project Expert Team believes that the assessment for the CTF certificate can also be done in non-regulated countries (e.g. by national coordinators, authorised professional organisations etc.) without causing considerable additional administrative costs/efforts.

3. Procedure in case of special regional requirements in the host country

Special regional demands (e.g. seismic engineering) **can be listed by** participating countries. In these cases applicants either have to prove – by presenting curriculum / CPD certificate - that this aspect has been sufficiently covered by his/her academic education / by former CPD measures or he/she has to attend a CPD measure within a certain time period. If a CPD requirement is listed, an adequate CPD measure has to be available. It has to be reasonable in regard to necessity, and costs.

Until the fulfilment in regard to the listed special demand is recognized by the host country, the applicant will receive automatic recognition for all fields of Civil Engineering **except** the one for which the special demand is listed.

4. Scope of authorization of European Civil Engineer Master level / European Civil Engineer Bachelor level in the host member country

The European Civil Engineer Master level / European Civil Engineer Bachelor level are authorized to provide the same services as the Civil Engineers of the same level in the host country.

This means that in a country where the Bachelor level is sufficient for full authorization both the European Civil Engineers Master level and the European Civil Engineers Bachelor level will have full authorization.

In a country where the Master level is required for full authorization as Civil Engineer only the European Civil Engineers Master level can get full authorization automatically. If other professions / professional forms / professional forms with limited authorizations are existing for Civil Engineers Bachelor level in this country the European Civil Engineers Bachelor level are automatically authorized for these professions / professional forms.

European Civil Engineers Bachelor level also have the possibility **not** to apply for recognition based on the Common Training Framework for Engineers but based on the general system of recognition according to the Professional Qualifications Directive (= individual assessment of equivalence by the host country / compensation measures if necessary) in order to get full authorization as Civil Engineer in the host country.

Recognition based on the general system according to the Professional Qualifications Directive (= individual assessment of equivalence by the host country / compensation measures if necessary) will of course still be possible for all professionals that do not fulfil the requirements of the Common Training Framework for Civil Engineers.

5. Considerations of the Project Expert Team

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First draft proposal (old):

Based on the findings of the survey on Common Training Principles the Project Expert Team has produced a first preliminary draft to be presented at the stakeholder workshop on 30 June 2016 **(see Annex 2).**

The preference of a CTF – instead of a CTT - approach was already clear from the survey results as the authorities as well as the engineering organisations have expressed this with a high majority. Also the Project Expert Team stressed that this approach provides the possibility of an agreement on a very basic level without the necessity of going into curricula details, is a low cost approach and can be implemented fast and easily. In contrast do this, the Common Training Test approach would require an in-depth comparison of curricula and the authorization of institutions to hold the tests. It would lead to lengthy procedures with high administrative costs and coordination efforts and without the certainty that an agreement will ever be reached.

For the Project Expert Team it soon became clear that not only the CTT approach but all solutions based on the comparison of curricula details are problematic. There are so many different engineering courses and programmes existing that the work of comparing them in detail would be an enormous effort. Additionally it would be very unrealistic to find a common understanding soon

For the Project Expert Team it also was important to find an approach that is **not** based on an individual assessment of qualification by the host country as such an approach would provide almost no added value to the general system of professional recognition currently in force for engineers.

As the survey showed that a majority of regulated countries have different levels of the professions the Project Expert Team decided to present an approach with different levels. This was also a way of covering more of the national requirements that – as the survey once again confirmed – differ considerably in different countries / for different professional levels.

The content of the requirements of the first draft proposal derived from some basic common results of the survey:

- A majority of three quarters requires the EQF levels 6 or 7 as academic education requirements for access to the profession;
- a majority requires 4 or 5 years of academic education, one quarter 3 years;
- a majority requires professional experience for access to the profession/use of the professional title or alternatively/additionally a professional examination

The first proposal was based on these clear communalities. With the level approach it was possible to get a solution that is largely in compliance with the national requirements in a high number of countries without scarifying high level requirements.

<u>Second draft proposal (current status):</u>

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The project team has now taken into consideration all comments and points of criticism that were discussed / brought up by the participants of the stakeholder workshop on 30 June 2016.

Main topics of discussion / criticism:

- **Level system:** The three level system was seen critically by many participants. There was strong opposition against including the level" technician". By some participants the suggested names of Senior/Junior Engineers were regarded as inadequate. It was suggested to orient the levels towards the Bologna levels. By some participants the level system as such was seen as inadequate.
- **Academic education requirement:** The approach based mainly on academic education was seen critically by some participants. . A majority of the participants expressed the priority of an academic education requirement...
- Some asked for a more output-orientated approach, some wanted individual assessment of applicants by the host country. The question if it should be possible to compensate academic education requirements was regarded and discussed very controversial by the participants.
- **The requirements within the levels:** Many participants pointed out that 300 ECTS in 4 years for Senior Engineers will have to be changed as this is not possible to achieve (300 in 5 years or 240 in 4 years). The use of (technical) ECTS was queried. A list of authorizations for the different levels was demanded. Some participants expressed the wish to implement additional requirements (e.g. special regional requirements) that would demand individual assessment of the host country.
- **Other topics / questions:** The wish for a malpractice check was expressed by a participant. Questions were raised in regard to the definition of Technical ECTS and in regard to practical procedures of recognition. The opinions were expressed that the proposal in this form can't be transferred to other professions / that for other professions at least details of the proposals would have to be changed. A participant raised the question what happens if the majority of countries does not agree on the proposed CTP approach. Some participants expressed that the current general system of recognition is preferable to automatic recognition as it does not lower the requirements in high level countries and allows for individual assessment of the host country.

The Project Expert team has decided to present – as a first step – **a proposal for a Common Training Framework for Civil Engineers only**. Within the team there is a strong believe that the principal system of this proposal is easily transferable to other engineering professions even if it might require some individual amendments per profession. In order to make a common understanding more easy and based on the fact that the interest in CTP for Civil Engineers was considerably higher than for other engineering professions it nevertheless decided to propose a draft for Civil Engineers only.

As it was a clear result of the workshop that the approach of a **Common Training Framework is indeed the preferred approach by the stakeholders** there was no further discussion on the possibility of a Common Training Test.

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The Project Expert Team has decided **to stay with the level system** in principle as a majority of participants agreed with it and as it is the one solution that is largely in compliance with the national requirements in many countries and considers the fact that a level system is in existence in a majority of the countries. But based on the discussion results **the level of "technician" has been deleted and the approach was more streamlined with the Bologna System: According to some of the suggestions in the workshop the names of the levels were changed into "European Civil Engineer Master level" and "European Civil Engineer Bachelor level".**

Defining a **list of authorizations for the different levels** was demanded by some workshop participants, but after some consideration the Project Expert Team came to the decision that **due to the fact that the scope of authorization differs so very much on national level such a universally applicable list can't be established**. According to the general principle of the Professional Qualifications Directive the European Civil Engineer Master level / European Civil Engineer Bachelor level should be authorized to provide the same services as the Civil Engineers of the same level in the host country.

The Project Expert team has very intensively discussed the wish for a more output-oriented approach that was expressed by some participants whereas at the same time a minimum level of academic requirements was strongly supported by others. It finally came to the decision that **a fully output-oriented approach with individual assessment of the host country is not acceptable for a Common Training Framework. It would not lead to automatic recognition – which is the aim of the CTF – and thus would bring more or less no added value compared to the system of general recognition currently in force**.

Nevertheless, the Project Expert Team understood the wish for defining the requirements not only in regard to input (degree of academic education) but also in regard to output. **With the EUR-ACE Framework Standards and Guidelines (EAFSG)established by the European Network for accreditation of Engineering Education (see Annex 1) a definition of required programme outcomes is already available and in use in many countries. Therefore, the Project Expert Team has decided to suggest the EAFSG as a guideline in regard to the assessment of the question if an applicant fulfills all necessary requirements of the Common Training Framework for Civil Engineers** by the home country.

The Project Expert Team is of the opinion that by fulfilling an academic engineering education according to these standards plus the fulfilment of 2 years of professional practice (or professional examination in the home country after the degree) an applicant should be regarded as acceptable for automatic recognition.

It also stresses again that – based on the principle of mutual trust - the responsibility of the assessment should be in the responsibility of the home country.

If countries see the need for further requirements based on special regional demands (e.g. seismic engineering) this can't be a prerequisite for automatic recognition based on the Common Training

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Framework for Civil Engineers. Nevertheless the countries could be given the possibility to list such special regional demands and require that the applicant either shows – by presenting curriculum / CPD certificate - that this aspect is already covered by his/her academic education / by former CPD measures or that he/she attends a CPD measure within a certain time period. If a CPD requirement is listed, an adequate CPD measure has to be available. It has to be reasonable in regard to necessity, and costs. Until the fulfilment in regard to the listed special demand is recognized by the host country, the applicant will receive automatic recognition for all fields of Civil Engineering except the one for which the special demand is listed.

The possibility of compensation of a lack of academic education was intensively discussed in the workshop and also within the Project Expert Team. **It came to the decision that the general recognition system currently in force already provides sufficient possibility for compensation based on an individual assessment by the host country:**

This means that in a country where the MSc level is required for full authorization as Civil Engineer only the European Civil Engineers MSc can get full authorization automatically. But European Civil Engineers BSc would also have the possibility not to apply for recognition based on the Common Training Framework for Engineers but based on the general system of recognition according to the Professional Qualifications Directive (= individual assessment of equivalence by the host country / compensation measures if necessary) in order to get full authorization as Civil Engineer in the host country. Recognition based on the general system according to the Professional Qualifications Directive (= individual assessment of equivalence by the host country / compensation measures if necessary) should also still be possible for all professionals that do not fulfil the requirements of the Common Training Framework for Civil Engineers.

In regard to the requirements within the levels the Project Expert Team has decided to stay with the definition by ECTS – in addition to the requirement of an academic degree - as they are very widely used already and to delete the requirement of a certain number of academic years. A very basic definition of technical ECTS was included in the requirement. A more detailed definition did not seem necessary to the Project Expert Team and could lead to unnecessary restrictions.

The Project Expert Team has taken up the idea of a malpractice check in the way that the CTF certificate (to be further defined) from the home country has to stake also that the applicant is **not subject of an occupational ban or disciplinary procedure** in the home country.

In order to prevent circumvention of national requirements **the prerequisite of fulfilment of the requirements for authorization/ licence to provide services in the field of Civil Engineering in the home country was added** (similar to the existing automatic recognition system for architects).

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ANNEX 2 to the CTP Proposal

Excerpt EUR-ACE® Framework Standards and Guidelines (EAFSG)

European Network for accreditation of Engineering Education:

http://www.enaee.eu

2.3.1 Programme Outcomes for Bachelor Degree Programmes

Knowledge and Understanding
The learning process should enable **Bachelor Degree graduates to demonstrate**:
 knowledge and understanding of the mathematics and other basic sciences underlying their engineering specialisation, at a level necessary to achieve the other programme outcomes;
 knowledge and understanding of engineering disciplines underlying their specialisation, at a level necessary to achieve the other programme outcomes, including some awareness at their forefront;
 awareness of the wider multidisciplinary context of engineering.

Engineering Analysis
The learning process should enable **Bachelor Degree graduates to demonstrate**:
 ability to analyse complex engineering products, processes and systems in their field of study; to select and apply relevant methods from established analytical, computational and experimental methods; to correctly interpret the outcomes of such analyses;
 ability to identify, formulate and solve engineering problems in their field of study; to select and apply relevant methods from established analytical, computational and experimental methods; to recognise the importance of non-technical –societal, health and safety, environmental, economic and industrial - constraints.

Engineering Design
The learning process should enable **Bachelor Degree graduates to demonstrate**:
 ability to develop and design complex products (devices, artefacts, etc.), processes and systems in their field of study to meet established requirements, that can include an awareness of non-technical – societal, health and safety, environmental, economic and industrial– considerations; to select and apply relevant design methodologies;
 ability to design using some awareness of the forefront of their engineering specialisation.

Investigations
The learning process should enable **Bachelor Degree graduates to demonstrate**:

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- ability to conduct searches of literature, to consult and to critically use scientific databases and other appropriate sources of information, to carry out simulation and analysis in order to pursue detailed investigations and research of technical issues in their field of study;
- ability to consult and apply codes of practice and safety regulations in their field of study;
- laboratory/workshop skills and ability to design and conduct experimental investigations, interpret data and draw conclusions in their field of study.

Engineering Practice

The learning process should enable **Bachelor Degree graduates to demonstrate**:

- understanding of applicable techniques and methods of analysis, design and investigation and of their limitations in their field of study;
- practical skills for solving complex problems, realising complex engineering designs and conducting investigations in their field of study;
- understanding of applicable materials, equipment and tools, engineering technologies and processes, and of their limitations in their field of study;
- ability to apply norms of engineering practice in their field of study;
- awareness of non-technical -societal, health and safety, environmental, economic and industrial - implications of engineering practice;
- awareness of economic, organisational and managerial issues (such as project management, risk and change management) in the industrial and business context.

Making Judgements

The learning process should enable **Bachelor Degree graduates to demonstrate**:

- ability to gather and interpret relevant data and handle complexity within their field of study, to inform judgements that include reflection on relevant social and ethical issues;
- ability to manage complex technical or professional activities or projects in their field of study, taking responsibility for decision making.

Communication and Team-working

The learning process should enable **Bachelor Degree graduates to demonstrate**:

- ability to communicate effectively information, ideas, problems and solutions with engineering community and society at large;
- ability to function effectively in a national and international context, as an individual and as a member of a team and to cooperate effectively with engineers and non-engineers.

Lifelong Learning

The learning process should enable **Bachelor Degree graduates to demonstrate**:

- ability to recognise the need for and to engage in independent life-long learning;
- ability to follow developments in science and technology.

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2.3.2 Programme Outcomes for Master Degree Programmes

Knowledge and Understanding
The learning process should enable **Master Degree graduates to demonstrate**:
 in-depth knowledge and understanding of mathematics and sciences underlying their engineering specialisation, at a level necessary to achieve the other programme outcomes;
 in-depth knowledge and understanding of engineering disciplines underlying their specialisation, at a level necessary to achieve the other programme outcomes;
 critical awareness of the forefront of their specialisation;
 critical awareness of the wider multidisciplinary context of engineering and of knowledge issues at the interface between different fields.

Engineering Analysis
The learning process should enable **Master Degree graduates to demonstrate**:

 ability to analyse new and complex engineering products, processes and systems within broader or multidisciplinary contexts; to select and apply the most appropriate and relevant methods from established analytical, computational and experimental methods or new and innovative methods; to critically interpret the outcomes of such analyses ;
 ability to conceptualise engineering products, processes and systems;
 ability to identify, formulate and solve unfamiliar complex engineering problems that are incompletely defined, have competing specifications, may involve considerations from outside their field of study and non-technical – societal, health and safety, environmental, economic and industrial – constraints; to select and apply the most appropriate and relevant methods from established analytical, computational and experimental methods or new and innovative methods in problem solving;
 ability to identify, formulate and solve complex problems in new and emerging areas of their specialisation.

Engineering Design
The learning process should enable **Master Degree graduates to demonstrate**:
 ability to develop, to design new and complex products (devices, artefacts, etc.), processes and systems, with specifications incompletely defined and/or competing, that require integration of knowledge from different fields and non-technical - societal, health and safety, environmental, economic and industrial commercial – constraints; to select and apply the most appropriate and relevant design methodologies or to use creativity to develop new and original design methodologies.
 ability to design using knowledge and understanding at the forefront of their engineering specialisation.

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Investigations
The learning process should enable **Master Degree graduates to demonstrate**:
 ability to identify, locate and obtain required data;
 ability to conduct searches of literature, to consult and critically use databases and other sources of information, to carry out simulation in order to pursue detailed investigations and research of complex technical issues;
 ability to consult and apply codes of practice and safety regulations;
 advanced laboratory/workshop skills and ability to design and conduct experimental investigations, critically evaluate data and draw conclusions;
 ability to investigate the application of new and emerging technologies at the forefront of their engineering specialisation.

Engineering Practice
The learning process should enable **Master Degree graduates to demonstrate**:
 comprehensive understanding of applicable techniques and methods of analysis, design and investigation and of their limitations;
 practical skills, including the use of computer tools, for solving complex problems, realising complex engineering design, designing and conducting complex investigations;
 comprehensive understanding of applicable materials, equipment and tools, engineering technologies and processes, and of their limitations;
 ability to apply norms of engineering practice;
 knowledge and understanding of the non-technical – societal, health and safety, environmental, economic and industrial - implications of engineering practice;
 critical awareness of economic, organisational and managerial issues (such as project management, risk and change management)

Making Judgements
The learning process should enable **Master Degree graduates to demonstrate**:
 ability to integrate knowledge and handle complexity, to formulate judgements with incomplete or limited information, that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgement;
 ability to manage complex technical or professional activities or projects that can require new strategic approaches, taking responsibility for decision making.

Communication and Team-working
The learning process should enable **Master Degree graduates to demonstrate**:
 ability to use diverse methods to communicate clearly and unambiguously their conclusions, and the knowledge and rationale underpinning these, to specialist and non-specialist audiences in national and international contexts;

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 ability to function effectively in national and international contexts, as a member or leader of a team, that may be composed of different disciplines and levels, and that may use virtual communication tools.

Lifelong Learning

The learning process should enable **Master Degree graduates to demonstrate**:

 ability to engage in independent life-long learning;

 ability to undertake further study autonomously.

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ANNEX 2 to the CTP Proposal
First draft CTP for Engineers proposal presented and discussed at the stakeholder workshop on 30 June 2016 (old):

European Senior (Civil and Environmental) Engineer

4 years of academic education (EQF Level 7)
in the field of Civil and Environmental Engineering
300 ECTS (minimum 70% technical ECTS)
2 years of post-graduate professional experience or professional examination (in the home country)

European Junior (Civil and Environmental) Engineer

3 years of academic education (EQF Level 6) in the field of Civil and Environmental Engineering
Minimum 180 ECTS (minimum 70% technical ECTS-within defined basic set of subjects) or 240 (minimum 70% technical ECTS)
2 years of post-graduate professional experience or professional examination (in the home country)

European (Civil and Environmental) Technician

Technical education in the field of construction and environmental technologies
(EQF Level 5)

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