



Erasmus+

KA2: Cooperation for innovation and the exchange of good practices - Knowledge Alliances

Application Form

Call: EAC/A02/2019

Deadline: 26.02.2020 (17:00 CET, Brussels time)

Knowledge Alliances

E4E

DETAILED PROJECT DESCRIPTION

(To be attached to the eForm)

EN Version 2020

PART 0. Project summary and involvement in previous relevant projects

0.1. Please provide a short summary of the main features and outputs of your project (Recommended limit 2000 characters) - Please bear in mind that your short summary may be published on EC or/and EACEA websites and dissemination tools.

Objective

Engineers for Europe (E4E) embraces **new trends in engineering education and boost industry innovation** by co-creating, testing and rolling out **five new tools in six pilot countries**: France, Germany, Ireland, Italy, Poland and Portugal.

Perspective

E4E is a pan-European alliance bringing together engineering schools, companies and associations in a shared vision for **2030** to benefit students, lifelong learners, educators, employers, policymakers and society at large. E4E will disseminate project results through its growing network of academic and industrial partners, most notably the **European University (Tech) Alliances** and **European Employers Associations in Engineering (Part III, Section III.2)**.

Actions

Within in the **five main outputs** E4E will:

- **Monitor** the engineering profession in Europe
- List the industry's core competences in a '**Compass**'
- **Register** micro-credentials in engineering fields
- Validate engineering competence with a certification **badge**

- **Match** engineering expertise supply and demand

E4E Monitor

E4E's **three annual studies** (2021, 2022, 2023) will monitor Europe's engineering profession (starting with the six pilot countries), analyse the needs and inform decision-makers in academia, industry and the public sector. Studies cover:

- *Do We Know Our Engineers?*
- *Engineering Education in Practice*
- *What Engineers Want*

E4E Competences Compass

The E4E Competences Compass will provide learners, educators and decision-makers in academia, industry and the public sector with insights into the current, emerging and future skills needed in engineering.

E4E Micro-credentials Register

The Register, which will draw on work already done by ENIC-NARIC centres (European Network of Information Centres in the European Region – National Academic Recognition Information Centres in the European Union) and the European MOOC Consortium, will list thousands of online and blended courses that have been positively assessed by E4E partners. The Register will serve students, graduates and successful professionals.

E4E Competence Badge

The Badge will validate an individual's engineering skills, indicating learning outcomes linked to the eight European Qualifications Framework (EQF) levels. Badges will be kept in EuroPass compatible wallets and count towards individual learning accounts.

E4E Matching App

The Matching App connects learners, jobseekers, qualified professionals and project partners in engineering education, innovation and the labour market with temporary and permanent positions, funding opportunities, traineeships, coaching and mentorships.

PART I. Project relevance

I.1. Why has the consortium decided to undertake this project?

I.1.1 Please outline the purpose behind your project, clearly analysing the specific needs or problems/challenges, which the project intends to address. (Recommended limit 3000 characters)

Project purpose

The purpose behind our project is to help bridge the information gap between engineering education and engineering practice in a lifelong learning and career perspective. The lack of information hampers decisions taken by learners, educators, employers, professionals and policy-makers.

The E4E Knowledge Alliance addresses five specific needs (problems/challenges):

- Lack of data on engineering professions in Europe
- Lack of clarity on the type of engineering skills required
- Lack of status of short courses or micro-credentials
- Lack of recognition for individuals acquiring engineering competences
- Demand for engineering expertise not being met

Lack of data on engineering professions in Europe

Current data sets are incomplete and incomparable on important aspects of training, career, labour conditions and aspirations of engineers. Data collected in one country are not collected in another. Analyses vary substantially. Data lacks hamper decision-making in education, industry and public policy.

This will be addressed by the E4E Monitor.

Lack of clarity on the type of engineering skills required

Numerous sets of desired engineering skills are circulating (ESCO, TUNING, UNESCO etc.). The multitude of information is enriching but can also confuse end-users and decision-makers.

This will be addressed by the E4E Competences Compass.

Lack of status of short courses or micro-credentials

Learning increasingly takes place through nano (1 month or less), micro (3-6 months) or short-cycle courses

(20-60 months). Real or presumed quality issues, however, create uncertainty for learners, educators and employers. Such issues form a barrier to recognition and wider uptake of such short learning experiences. Fortunately, a European standard for micro-credentials is currently under discussion in European Union and Bologna circles.

This will be addressed by the E4E Micro-credentials Register.

Lack of recognition for individuals acquiring engineering competences

Individuals acquire competence on a continuing basis throughout life, including voluntary, leisure and work experiences, as it is acknowledged in France, for example, with the long established mechanism of *Validation des Acquis de l'Expérience* (VAE) where individuals can obtain recognition (up to full degrees) for the things they have learned outside academia. Most of this learning is not acknowledged and often does not formally contribute to study or career advancement. E4E will explore similar approaches for smaller units of engineering competences.

This will be address by the E4E Competence Badge.

Demand for engineering expertise not being met

Engineering expertise is spread unevenly and not always available when it is most needed because of geographical location, migration, specialisation, aging, skills gaps or overly rigid labour markets.

This will be addressed by the Matching App.

1.1.2 Please explain how the project proposal fits into the objectives of the participating organisations and European policies in the fields of education and training. (Recommended limit 3000 characters)

Fit with the objectives of the participating organisations

Academic Partners: Five universities and AECEF

The E4E Knowledge Alliance comprises the following four universities: Katholieke Universiteit (KU Leuven), Technological University Dublin (TU Dublin), Faculty of Engineering of the University of Porto (FEUP), the Bureau of International Relations at the School of Engineering Design at the Polytechnic University of Valencia (ETSID-UPV) and the Technische Hochschule Georg Agricola (THGA) and the Association of European Civil Engineering Faculties (AECEF). E4E supports its academic partners in their objective to better connect teaching and learning to the needs of the labour market and the realities of professional life. Notably, but not exclusively through the:

- **E4E Monitor** studies containing the most recent data on engineering professionals (status, working conditions, aspirations); new trends in engineering education in other countries (benchmarking); and ways to innovate engineering careers (Editions 2021-2023).

- **E4E Competences Compass** providing constantly updated insight into the most sought-after competences, which higher education institutions and the organisation of Continuous Professional Development (CPD) can access for teaching current and future learners.

Associations of Engineers (BEST, ECEC and FEANI-6)

E4E helps associations such as the Board of European Students of Technology (BEST), the European Council of Engineers Chambers (ECEC) and FEANI-6 (six pilot countries that are national members of FEANI), in their objective to better understand and serve their respective constituencies. Notably, but not exclusively through the:

- **E4E Monitor Study 3: *What Engineers Want*** providing a detailed analysis of data availability and data needs on engineering career innovation in six pilot countries. (Editions 2021-2023)
- **E4E Micro-credentials Register** providing a potential 3.5 million (pilot countries only) engineers with easily accessible trustworthy assessments of thousands of online and blended courses, reviewed by our partners and peers from among the association's extended membership (e.g. Engineers Europe Advisory Group (EEAG)).
- **E4E Competence Badge** validating engineering competences of individuals, independent of the status and mode of learning.

Industrial partners (REHVA, ASD-Europe)

E4E helps industrial partners such as the Federation of European Heating, Ventilation and Air Conditioning Associations (REHVA) and AeroSpace and Defence Industries Association of Europe (ASD-Europe) in their objective to attract and retain highly skilled professionals. Notably, but not exclusively through the:

- **E4E Micro-credentials Register** that will help their current and future employees to find courses that will keep them up to speed with the latest knowledge and competences required in industry.
- **E4E Competence Badge** that will validate engineering competences of their current and future employees acquired on courses (e.g. micro-credentials), through self-study or on the job.
- **E4E Matching App** connects learners, jobseekers, qualified professionals and project partners in engineering education, innovation and the labour market with temporary and permanent positions, funding opportunities, traineeships, coaching and mentorships.

Fit with the objectives of European policies

E4E supports the European policy objective of '*improving the inclusive, lifelong-learning based and innovation-driven nature of their education and training systems*' (third and all-embracing objective of the **European Education Area**).

E4E is doing so by co-creating, testing and rolling out the **five new tools** described above. These tools will inform decision making by individuals, education providers, professional associations and employers. They

will boost innovation in the industry as they **accelerate** the transmission of knowledge and help to **upgrade and upscale** provision and validation. The project will reach decision-makers, educators, learners, employers and professionals on an unprecedented scale.

I.1.3 Please explain how the expected results, outputs and outcomes will meet the identified needs. (Recommended limit 1500 characters)

Identified need: Lack of data on engineering professions in Europe

Output & expected result

The **three annual E4E Monitor studies** published in **2021, 2022, 2023** will help to fill the knowledge gap concerning engineering professionals in six pilot countries.

Identified need: Lack of clarity on the type of engineering skills required

Output & expected result

The **E4E Competences Compass** will check, analyse and categorise existing skills against the views of practitioners in education and industry, who are well represented among the E4E membership in the six pilot countries.

Identified need: Lack of status of short courses or micro-credentials

Output & expected result

The **E4E Micro-credential Register** will provide a practical assurance in terms of quality and relevance of courses by creating a list of thousands of online and blended courses, which have been positively assessed by volunteers from among the extensive E4E member organisations.

Identified need: Lack of recognition for individuals acquiring engineering competences

Output & expected result

E4E will study the global trend for badges and explore the scope for a Europe wide standard badging system for engineering competences. **The E4E Competence Badge** will draw on the experience of the international community of engineering educators and practitioners that constitute the E4E membership, starting in the six pilot countries and it is hoped eventually would become the go-to tool to assess engineering competence in Europe.

Identified need: Demand for engineering expertise not being met

Output and expected result

E4E intends to mitigate these mismatches and encourage collaboration at all levels within and across education, innovation and the labour market by exploring and testing the **E4E Matching App** in the six pilot

countries.

I.2. Analysis of the subject area (current state of the art) and innovative character

Please explain how the needs analysis has been carried out. Please indicate what the project is offering that is new and different. Please also indicate what the main innovative elements of the method(s), result(s), approach(es), etc. are. (Recommended limit 3000 characters)

Needs analysis

The E4E Consortium of 11 partners is finalising **three needs analysis studies** for Spring 2020 (to be updated in 2021, 2022 and 2023) that help to underpin the current proposal:

- E4E Monitor Study 1: ***Do we know our engineers?*** Detailed data needs analysis on the status of engineering professionals in the six pilot countries.
- E4E Monitor Study 2: ***Engineering Education in Practice***. Detailed data needs analysis on the correlations between engineering education and engineering practice in the six pilot countries.
- E4E Monitor Study 3: ***What Engineers Want***. Detailed data needs analysis as concerns engineering career innovation in six pilot countries.

Our own needs analysis draws on the research and findings of our project partners and other sources that also point to the knowledge gap in the engineering sector.

The European Society for Engineering Education (SEFI) recently published the report entitled “*Professional Roles and Employability of Future Engineers*,” (September 2017) in which they highlighted a “need to develop a framework of professional roles for future engineers”.

A number of studies have been carried out by BusinessEurope; one such example being the report “*Reducing labour shortages by improving skills matching*” Employers Statement, (September 2019). The report specifically points to the need to “Strengthen cooperation among business, schools, vocational schools, professional colleges and universities.

Work on the three studies began in summer 2019. Three editing teams were formed consisting of representatives from E4E partners. Work consisted of desk research; organising two expert hearings in September and December 2019; analysis of the findings; and drafting and editing.

The final versions of the three studies will be published in April 2020, as part of the **E4E Monitor** launch. Updates of all three studies will be published in 2021, 2022 and 2023.

New and different is the fact that the E4E Knowledge Alliance project is offering to **build and update five new tools** drawing on the expertise of the wide network of E4E membership organisations in education, industry and the engineering professions.

Main innovative elements

E4E Monitor

No comparable monitoring system capturing the engineering profession with the breadth and depth of the E4E Monitor currently exists. The E4E Monitor and the resulting studies will draw on online surveys that will remain open, allowing for a **constant update of results**. Their relevance and effectiveness will be checked engineering professionals and in focus groups per country.

E4E Competences Compass

The E4E Competences Compass will **provide a reality check** with constant updates and codification of existing skills, regular reviews by practitioners in education and industry, and strong representation among the E4E membership in the six pilot countries.

E4E Micro-credentials Register

No comparable register provides such a **trusted assessment** of micro-credentials as foreseen by the E4E Knowledge Alliance, which draws on a wide range of professional volunteers from among its members. E4E partners will indicate which learning outcomes the engineers have acquired through the micro-credentials at what level of the EQF.

E4E Competence Badge

No comparable badging system currently exists that acknowledges engineering competences with the trustworthiness, scale and precision (learning outcomes, EQF) that E4E can offer.

E4E Matching App

No comparable device is currently available in Europe that brings together offers and requests for engineering expertise with the sectoral diversity and scale that E4E can offer.

I.3. Aims and objectives

I.3.1 Please define the specific aims and objectives of the project and how these will address the problems and challenges identified in sections I.1 and I.2. Also indicate how the project will contribute to achieve the objectives of the Knowledge Alliances action. (Recommended limit 3000 characters)

The specific aims and objectives of the project will address the problems and challenges in the engineering industry as highlighted by our needs analysis (see sections I.1 and I.2). Aims and objectives have been divided into Work Packages (WP) as listed below in accordance with the European Commission Guidelines for Applicants.

For the full list of all **nine** WPs together with the **19** Tasks (see in Part VII).

WP1(Preparation) and WP3 (Data Policy and Data Analysis) will kick-start the three substantial WPs (WP4 (E4E Monitor), WP5 (E4E Education) and WP6 (E4E Careers).

The specific objectives of WP1 and WP3 are to define a data policy, prepare online surveys and update the three baseline' needs analyses that preceded the Knowledge Alliance proposal.

Problem/challenge: Lack of data on engineering professions in Europe

This will be dealt with by WP4 (E4E Monitor).

The overall aim of WP4 is to ensure a steady flow of reliable data on engineering education and careers in Europe as a basis for analysis by policy makers, businesses and higher education professionals.

The specific objectives of WP4 are to design and roll out surveys and produce studies on the engineering profession to bridge the current knowledge gap in the industry.

New tool: E4E Monitor.

Problem/challenge: Lack of clarity on which type of engineering skills are needed

Problem/challenge: Lack of status of short courses or micro-credentials

These will be dealt with by WP5 (E4E Education).

The specific aim of WP5 is to highlight new trends in engineering practice to ensure learners acquire or update their skills in line with current and future changes in the industry.

The specific objective of WP5 is to build tools to provide information about up-to-date practices in engineering education in terms of content and delivery in line with the needs of the industry.

New tool: E4E Competences Compass

Problem/challenge: Lack of recognition for individuals acquiring engineering competences
Problem/challenge: Demand for engineering expertise not being met

These will be dealt with by WP6 (E4E Careers).

The specific aim of WP6 is to open up and transform engineering careers in Europe in order to boost innovation and productivity.

The specific objective of WP6 is to test and launch tools that acknowledge engineering competences and build professional partnerships.

New tools: E4E Competence Badge and E4E Matching App

The E4E project contributes to the objectives of the Knowledge Alliance by **bridging the information gap** between engineering education and industry, leading to **better lifelong learning** and **longer career perspectives**. This will be achieved through the development of **five new E4E tools** that will:

- **Monitor** the engineering profession in Europe
- List the industry's core competences in a '**Compass**'
- **Register** micro-credentials in engineering fields
- Validate engineering competence with a certification **badge**
- **Match** engineering expertise supply and demand

The steady flow of information provided through these new tools will make it possible for educators and practitioners to take **informed decisions** when addressing the objectives of the Knowledge Alliances actions:

- Develop new, innovative and multidisciplinary approaches to teaching and learning.
- Stimulate entrepreneurship and entrepreneurial skills of higher education teaching staff and company staff.
- Facilitate the exchange, flow and co-creation of knowledge.
- Tackle future skills mismatches and promote excellence in skills development.
- Build inclusive and connected higher education systems.
- Ensure higher education institutions contribute to innovation.
- Support effective and efficient higher education systems.

I.3.2 Please explain the contribution of higher education institutions to the project and how they will benefit from the project in the short and long term. (Recommended limit 1500 characters)

Contribution

Higher education institutions will contribute to the project by sharing their academic knowledge, experience and insights necessary to develop the five new E4E tools. The E4E project is very much knowledge and data driven, including through the use of artificial intelligence, and will therefore draw heavily on the input of its academic partners.

E4E's academic partners will lead WP3 (E4E Data Policy and Data Analysis), WP5 (E4E Education), WP6 (E4E Careers), WP7 (E4E Quality) and WP8 (E4E Evaluation). They will co-lead WP1 (E4E Preparation), WP4 (E4E Monitor) and WP9 (E4E Dissemination & Exploitation). Academic partners will chair 10 of the 19 Task Forces. (see Section VII.)

Benefits

In the short term, higher education institutions will benefit from acquiring access to new data sources that will help them make more informed decisions on curricula design and subjects to teach.

In the long term, higher education institutions will use the project results to transform themselves into **open learning centres** attracting new categories of learners, notably working adults, offering (stackable) micro-credentials and acknowledging competences acquired inside and outside academia.

I.3.3 Please explain the contribution of enterprises to the project and how they will benefit from the project in the short and long term. Please refer to the nature/ field of their economic activity. (Recommended limit 1500 characters)

Contribution

Enterprises and professional associations (both from the world of work) will contribute to the project by sharing their practical knowledge, experience and insights necessary to develop the five new E4E tools. The E4E project is very much based on the needs of the engineering industry and will therefore draw heavily on the input of enterprises and professional partners.

Associations such as BEST, ECEC, FEANI-6 and REHVA will notably contribute to the data collection for the E4E Monitor (WP4) through the permanent online surveys that will be organised among their respective memberships. Enterprises and professional partners will provide a **reality check** for all outputs of the project. They will co-lead WPs 5, 6 and 8.

Benefits

In the short term, enterprises and professional associations will benefit from acquiring access to new data sources that will help them to make more informed decisions on staff development, staff training and recruitment in general.

In the long term, enterprises and professional associations will use the project results to transform themselves into **open working spaces** attracting new categories of workers, notably learning adults, offering work-based learning and acknowledging competences acquired inside and outside academia.

I.4. European added value

Please describe the benefits of, and need for, European cooperation. Please also describe why the results cannot be achieved through cooperation at national, regional or local level. (Recommended limit 3000 characters)

European cooperation: the benefits

European cooperation in this project is not only necessary but highly beneficial because **new engineering competences are shaped and transformed internationally**. Such changes are the result of research and innovation carried out in cooperation with universities, higher education institutes and companies globally. New technological knowledge (e.g. on artificial intelligence) and new intercultural competences (e.g. for working in and with international teams, also in smaller, export-oriented enterprises) are acquired through collaboration and pan-European knowledge alliances. E4E will tap into this and build a strong network for collaboration.

Engineering students and professionals are more internationally mobile than other professionals. Europe's position in the world is further strengthened when our engineers are at the forefront of global knowledge and have learnt to operate in an intercultural environment.

The E4E Knowledge Alliance project is built on these insights. Work Package Teams, comprising the Lead, Co-Lead and Task Forces, are a diverse mix of nationalities and engineering sectors. A variety of partners, stakeholders, experts and surveyed individuals from across Europe provide input to enrich the project results.

The confrontation of ideas and approaches encourages debate, provides comparisons, deepens understanding and can enhance the quality and relevance of the project. It could also lead to new approaches and solutions for reaching, for example, the end users of the new tools that will be developed in the coming three years. This in turn could lead to a survey tool or an App interface being more tailored to a particular audience, which could further improve results.

The envisaged results of the E4E Knowledge Alliance project can only be achieved through cooperation at a European level as the project depends to a large extent on input from partners based throughout Europe.

National, regional or local cooperation would narrow the scope of the project, restrict its usefulness as an intended pan-European project and prevent it from being rolled out in other EU countries. This point is better illustrated by looking at the five new E4E tools being proposed:

E4E Monitor

The E4E Monitor will be certainly be more useful locally, regionally and nationally when it can draw on Europe-wide cooperation. Steadily improved methodology will enhance results; while a comparison of content will sharpen the insights it delivers, particularly regarding labour conditions or work-life balance.

E4E Competences Compass

The Competences Compass will cover the Europe-wide trends in engineering education and industry, which in turn will influence local, regional and national requirements for skills. This could also lead to education institutions at these levels adapting their courses to ensure their students are better prepared to take up engineering opportunities not only nationally but also internationally.

E4E Micro-credentials Register

The Register will list micro-credentials across all engineering fields and providers both Europe-wide and globally thus providing a service to all engineering professionals, companies and higher education institutions wherever they are located.

E4E Competence Badge

The pan-European status of acknowledgement expressed through the E4E Badge will have an extra added value for individuals, employers and higher education institutions that could not be delivered by local, regional or national labels.

E4E Matching App

The Europe-wide coverage of the Matching App will supplement its local, regional or national matching capacity on an unprecedented scale. Collating engineering job offers and requests from throughout Europe and displaying them in one App will be highly beneficial for all engineers.