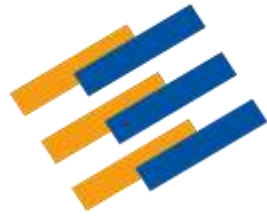


THE SEFI EUROPEAN CONVENTION FOR ENGINEERING DEANS 2024

Sheffield, 12-14 JUNE 2024



ENGINEERS EUROPE

Fédération Européenne d'Associations Nationales d'Ingénieurs
European Federation of National Engineering Associations
Föderation Europäischer Nationaler Ingenieurverbände

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ENGINEERS EUROPE



ERASMUS+ PROJECT - E4E PROJECT: CONSORTIUM

Industry & Profession



ORDEM
DOS
ENGENHEIROS



BE REHVA
Federation of European Heating,
Ventilation and Air Conditioning Associations



European Council
of Engineers Chambers

Accreditation



AGENCIA NACIONAL DE EVALUACIÓN
DE LA CALIDAD Y ACREDITACIÓN



Higher Education & Training



Association of European Civil
Engineering Faculties

E4E PROJECT : MAJOR OBJECTIVES



Co-funded by
the European Union

- **ERASMUS+ : ENGINEERS EUROPE with www.engineers4europe.eu**
- **Investigate the Shortage of Engineers in Europe and their perceived Shortage of Skills**
- **Bridge the gap between Academia and Industry : develop Micro-Credential Courses**
- **Set up a “*European Engineering Skills Council*” to develop a “*European Engineering Skills Strategy*”**

E4E PROJECT : OBJECTIVE 1 = PRIMARY AND SECONDARY RESEARCH

Three Electronic Surveys + Academic Research :

- **Examine how the challenges of tomorrow (twin-transition) will be tackled by future engineers : green and digital**
- **Consider the current Engineering Educational situation**
- **Amplify the Importance of Lifelong Learning (e.g. Micro Credentials)**
- **Suggest a Future-oriented Engineering Curriculum with the Skills Council**

E4E PROJECT : OBJECTIVE 2 = DEVELOP 4 MICRO CREDENTIALS



E4E : OBJECTIVE 3 = ESTABLISHMENT OF THE EUROPEAN ENGINEERING SKILLS COUNCIL TO DEVELOP A EUROPEAN ENGINEERING SKILLS STRATEGY



Engineer

(en-juh-neer) noun

Someone who does precision guesswork based on unreliable data provided by those of questionable knowledge



E4E SKILLS STRATEGY

ANTICIPATING SKILLS REQUIREMENTS FOR THE ENGINEERING PROFESSION



E4E

Engineers for Europe

1 September 2022 – 31 August 2025

Project Ref. Nr.: 101054872 — E4E — ERASMUS-EDU-2021-PI-ALL-INNO



I. FIRST FINDINGS – EDUCATION PROVIDERS

- **University departments** are based on historical developments and are not equipped to span all the knowledge required by today's challenges and systems and neither is it possible to fit such knowledge into a five-year programme.
- **Faculty must be at least one step ahead of their students**, which is a challenge because some grew up in an earlier, largely pre-digital generation. Faculty must manage to follow content, tools and pedagogical innovations which are happening faster than before while keeping their eyes on the quality of research and innovation. For that faculty needs the means to improve their skills and build new competences.
- **A Formal and Informal Curriculum** needs to be developed to better align with the needs of the job market = task for universities, technical schools and industry; businesses have a role to play in programs of re- & upskilling. Newly created jobs will arise in completely new occupations and existing occupations will undergo significant transformations in job content.

I. FIRST FINDINGS – EDUCATION PROVIDERS

- **Incorporation of sustainability principles in formal engineering education is paramount** to better prepare engineers for the 21st century. Changes in education curricula and CPD to bring SDGs into everyday practice + more practical experience (intern- & apprenticeships). Engineers must understand an increasingly complex world and therefore must **work in international and interdisciplinary environments** and acquire the competences to do so.
- Engineers are best served with **competency-based learning** and by an **assessment of their learning outcomes against UN SDGs** (knowledge, skills and wider competences or attitudes). Examples of consortia which also have a focus on engineering education as international hubs are **ENHANCE** (ETH Zürich) and **EuroTeQ** (TU München).

CONCLUSIONS : PART I

ACTIONABLE MEASURES FOR EDUCATION PROVIDERS

- A. Seek knowledge and **skill-updates from industry** and receive input on the future research that is needed.
- B. Seek and receive systematic **guest lecturers from industry** (i.e., guest teachers with an industry background) and seek cooperation from policy makers to support that.
- C. Ensure **harmonized basic core engineering knowledge** and promote a wider understanding of the learning outcomes to other stakeholders.
- D. Provide “**competence-based training**”, e.g., by providing shorter internships or short-term projects in collaboration with industry professionals where both entities need to report on quality.
- E. Engage in **structural interlinking initiatives between academic and industry staff** (exchanges of staff).
- F. Establish **Advisory Groups** at faculty (and program) level, include Alumni in these groups.

II. FIRST FINDINGS - PROFESSION

- **The future engineer** will continue to need **a strong scientific and technological background** in combination with basic knowledge of a broad range of disciplines beyond “hard sciences”, i.e. **soft skills**. These so called “**soft skills**” are in fact “professional skills” as they can be considered paramount for many professions : communication, time management, teamwork and collaboration, reliability, critical thinking, etc. It is **the level of proficiency** of those that requires attention (ref. JEE,18/12/2023).
- Engineers have a major role in **promoting sustainable practices. Strong positioning statement** about the profession (to improve the image) is required in public communication: making clear why engineering matters.
- **Entrepreneurship** is a key competence in improving European competitiveness + focus of R&D on development of a social and green economy. Professional Engineering Organizations can encourage this mindset and promote entrepreneurship through **interdisciplinary collaboration**.

CONCLUSIONS : PART II

ACTIONABLE MEASURES FOR PROFESSIONAL ORGANIZATIONS

- A. Provide more clarity on the existing number of **engineering titles** and what is behind them.
- B. Offer and seek **mentorship** for their individual members.
- C. Promote and **require proof of CPD after X-number of years of membership**, i.e. be concerned about their professional quality, e.g., certify their CVs).
- D. Take political influence regarding policy making : become more an “**authority**” for the profession.
- E. Ensure **industry representation** in their Executive Boards.
- F. Provide help and assistance regarding recognition of qualifications, portability of degrees, etc.

III. FIRST FINDINGS - INDUSTRY

- Increased emphasis on **Sustainability and Environmental** concerns + greater use of **Automation and AI** will be the most important changes over the next five years. **Renewable Energy and Green Infrastructure** are seen as major areas for innovation and development. Engineers must have a better understanding of **Sustainable Design and Circular Economy**.
- Engineering disciplines with future shortages are identified in **electrical/electronic-, ICT and agronomic engineering**.
- **Skills gaps** in the local labor markets are seen as a bigger barrier to business transformation, than a shortage of capital.

CONCLUSIONS : PART III

ACTIONABLE MEASURES FOR INDUSTRY

- A. Reward and **recognize relevant achievements** / extra skills of employees (innovation).
- B. Support and **help academic programs and research**: e.g. by donating equipment and machinery, sponsorship in master programs, etc.
- C. Provide **case studies, real-life challenges** in university projects / student organizations' activities.
- D. Motivate **up- and reskilling through funding the training** and providing the time needed / offer free training programs in cooperation with universities, professional skills.
- E. **Influence policy makers** (investments in engineering education / careers / recognition).

IV. FIRST FINDINGS – POLICY MAKERS

- **Mentorship and diversity/inclusion training** need to attract more talent from diverse and/or under-represented groups. Focus on **promotion and development of “diversity and inclusion policies”** and encouragement of experimental and problem-based learning opportunities to develop ethical decision-making skills.
- **Partnerships between industry and educational institutions** together with investments & increased funding in R&D in emerging technologies, are seen as effective tools to address digital, green, resilience and entrepreneurial skill shortages.

CONCLUSIONS IV : ACTIONABLE MEASURES FOR POLICY MAKERS

- A. Integrate and encourage **more engineers in policy making** (national or regional level) to promote an updated image of the profession.
- B. Provide **structural funding for engineering education**, increase scholarships and focus on secondary schools.
- C. Provide incentives for **enhanced academia-industry collaboration** and financially support CPD programs for SME's.
- D. Develop strategic planning e.g. by developing policies to promote a more balanced distribution of engineers between regions.
- E. Facilitate the understanding of the full range of engineers' qualifications (Technology Institutions - Polytechnics - Universities).