Professional Qualifications
Some Food for Thought

Moderator: Sebastião Feyo de Azevedo, Emeritus Professor, University of Porto
Lisbon Civil Engineering Summit
LNEC, 27 September 2019

Challenges for the debate
What Civil Engineering needs,
What Civil Engineers need and want?

- Adapt to social, scientific and technical development - (i) life today; (ii) Revolution 4.0; (iii) the new concepts for education....

- Ever more holistic education - fundamental knowledge, competences and skills

- Recognition of qualifications - requirement for mobility

- Career Development in a lifelong context
What we have

Different Sectoral Qualifications Frameworks
- EUR-ACE, ABET, CDIO...

Different “accords”
- Washington Accord, Sydney Accord, Dublin Accord

Different “registers”
- EMF International Register of Professional Engineers
- ETMF International Register of Engineering Technologists
- APEC Register of Professional Engineers

Academic Degree Structures in Engineering
I - Concerning levels of qualification

Two levels of qualifications associated to those levels approved in the Directive of Professional Recognition and recognized in the EQF-EHEA and the EQF-LLL

- 1st Cycle, Level 6 EQF-LLL, Art. 11, d) European Directive: (3-4)U
  ✓ First Cycle Degrees are the basis for achieving the qualification of Technical (or Associate) Engineers, whatever the European designation

  ✓ Second Cycle Degrees are the basis for achieving the qualification of Engineers, or equivalent European designation
Academic Degree Structures in Engineering
II - Concerning Profiles

Two main profiles in Engineering

- More Theoretically oriented
  - Programmes with a stronger emphasis on basic and engineering sciences in the first years
  - Generally linked to Second Cycle degrees

- More Applications oriented
  - Designed to qualify after First Cycle, independently of pursuit of studies through Second Cycles, be it directly or through bridging programmes

Academic Degree Structures in Engineering
III - Prevailing concepts in the design of the Degree System

- More flexible paths - MORE differentiation (competences) offered
  - Either more research oriented, or more innovation oriented, or with a higher entrepreneurial spirit, etc....
  - Bringing in the concept of “Communication Pipes” between different profiles of education - Bridging programs

- More attractive offer in order to bring into the system students with different backgrounds and interests

- Promotion of a true offer for lifelong learning through
  - Complementary modules of (advanced) specialization courses
  - Implementing the concept of ‘accumulated credits’ for recognition of studies
Academic Degree Structures in Engineering
Routes for the different qualification levels

Qualification Level
- 2nd Cycle - Level 7 EQF Directive Art. 11 e)
- 1st Cycle - Level 6 EQF Directive Art. 11 d)

Professional Designation
- Engineer

- ? Technical Engineer ?

Route T
- 2nd cycle degree in Engineering + Training
- 1st cycle degree in engineering science (not leading to professional recognition)
- 1st cycle in Engineering + Training

Route A

Academic Degrees in Engineering
V - Understanding fundamental differences between levels of qualifications

- Programme Outcomes must be evaluated in relation with the level of intervention in the Engineering Activity
  - Social responsibility (namely, signing projects)
  - Capacity to tackle large, complex problems
  - Capacity to adapt to new jobs of high complexity and responsibility
  - Capacity for effective activity in the production line
  - …..

- For the different subsets of Programme Outcomes, and for the First and Second Cycle Degrees in Engineering, the differences in outcomes are mostly related with
  - scope, depth and breadth

- For the Master degree, developing the right ATTITUDE to use knowledge or skills in a given situation is a major outcome
Academic Degree Structures in Engineering
VI - Is there a trend?

In www.ieee.org/theinstitute


We can read

“....In the United States the National Academy of Engineering and the American Society of Civil Engineers have advocated that the Master of Science be declared the first professional degree in Engineering”.

AN OLD MAJOR QUESTION (I)

# AN OLD MAJOR QUESTION (II)

M. Kam & A. Peskin, "What Should be the First Professional Degree in Engineering?, IEEE, p.10-11, September 2007

<table>
<thead>
<tr>
<th>Question</th>
<th>Current Practice</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>What should be the minimum requirement?</td>
<td>A Bachelor of Science in engineering (or equivalent)</td>
<td>A Master of Science in engineering or a Doctor of Science in engineering plus 36 additional semester credits</td>
</tr>
<tr>
<td>What additional training would be required?</td>
<td>None</td>
<td>Master of Eng. or Ph.D. or equivalent credit with emphasis on professional education</td>
</tr>
<tr>
<td>What changes in engineering education would be needed?</td>
<td>None</td>
<td>New accreditation procedures for graduate programs, new requirements for new graduate curriculum, changes in licensing procedures and laws</td>
</tr>
<tr>
<td>Who supports each position?</td>
<td>IEEE in the USA,</td>
<td>Several engineering associations including the American Society of Civil Engineers in the United States, the Royal Academy of Engineering in the United Kingdom, and the Council of Europe for Engineering and Surveying in Europe</td>
</tr>
</tbody>
</table>

Educators of Engineering and the American Society of Civil Engineers have advocated that the Master of Science be declared the first professional degree in engineering. The U.S. National Council of Examiners for Engineering and Surveying recently discussed changes to its Model Law requiring a Bachelor of Science degree plus 36 semester credits as a prerequisite for candidacy for licensure.