Common Systems for Quality Assurance and Learning Outcomes Assessment

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Closing Ceremony of the International Colloquium
Towards Global Recognition in Engineering Education and Profession

IFEES & RAEE - Russian Association for Engineering Education
22 May 2009, St. Petersburg, Russia

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Common Grounds for Quality Assurance
Assessment of Learning Outcomes-

To say what I am going to say...

① The common need for reform and change
  ① New paradigms to meet social, cultural, scientific and technological development

② Common Grounds for Quality Assurance
  ② Sectoral and Subject Specific Frameworks
  ② Learning Outcomes Assessment

③ Recognition of Qualifications
  ③ Differences in Academic degree structures
  ③ Signals of International Efforts for Convergence

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Common Grounds for Quality Assurance
Assessment of Learning Outcomes-

Need for Common Grounds in a World of "Coopetition"
I - Driving forces for changes

- Last quarter of the 20th Century - Intense search of new routes for Europe and for the role of Europe in the World, driven by
  - ✓ Progress observed in Science and Technology, namely
    - in digital systems and communications
    - in health and life sciences
  - ✓ Political changes that took place in Europe
  - ✓ Expectations and demands of Society
    - Education for All
    - Quality requirements and increased competitiveness
    - A Society of "Comfort"

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Need for Common Grounds in a World of "Coopetition"
II - Life Today

- Economy and market forces - driving force of Today's Societies
- The computer and communications era - dramatic changes of the concepts of time and space - globalisation
- The increase of Expectation of Life - Social sustainability
- Sharp increase in standards and competition - Worldwide and within the European Space
- Significant change in the concepts of individual career management, mainly for Young People
- Job market and opportunities - wider than ever

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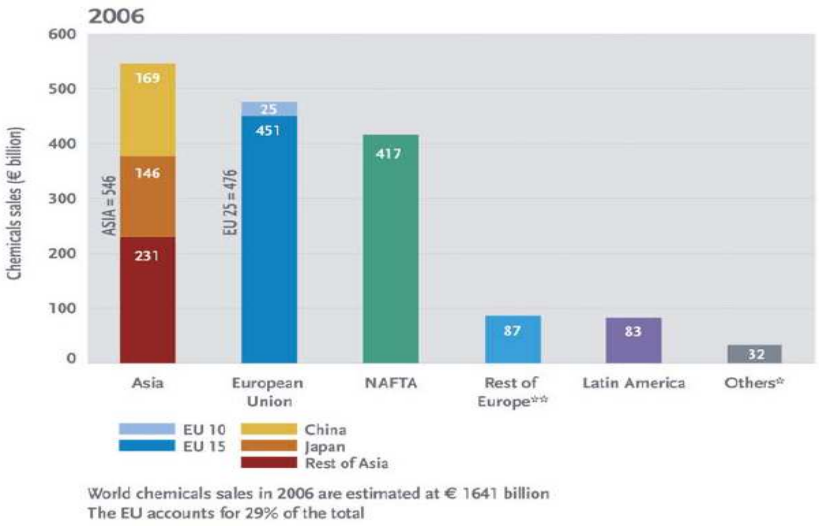
Just an Example of World Competition
Geographic breakdown of world chemicals sales, CEFIC F&F2006



World chemicals sales in 2006 are estimated at € 1641 billion
The EU accounts for 29% of the total

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Global World
A new Paradigm of Coexistence - COOPETITION

- Need for Mobility
- Need for Lifelong Learning
- A NEW PARADIGM of COOPERATION AND COMPETITION
- RECOGNITION OF QUALIFICATIONS – A COMMON NEED

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Assessment of Learning Outcomes-

The Future?..... Setting the Stage for Higher Education
The OECD and the Future of Higher Education Institutions

FOREWORD

"The University is no longer a quiet place to teach and do scholarly work at a measured pace and contemplate the universe as in centuries past.

It is a big, complex, demanding, competitive business, requiring large-scale ongoing investment"[1]

ON THE EDGE: SECURING A SUSTAINABLE FUTURE FOR HIGHER EDUCATION,
Report of the OECD/IMHE-HEFCE Project on Financial Management and Governance of Higher Education Institutions (Education Working Paper No. 7), 2007

[1] Malcolm Skilbeck (2001), *The University Challenged . A Review of International Trends and Issues with Particular Reference to Ireland, The Higher Education Authority, Dublin.*

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The Future?..... Setting the Stage….
The Bologna Process in the Global Context

☞ **The Bologna 2020 Ghent Conference, 19-20 May, 2008**

Professor Marek Kwiek, Rapporteur
Center for Public Policy, Poznan University, Poland

- ✓ **The Bologna Process should not be viewed in isolation from global processes - it is an example of a response to global integration, massification of HE and the accompanying financial resource challenge.**
- ✓ **Also it should not be viewed in isolation from European societies and economies.**
- ✓ **Tough times are coming - but change is always tough!**
- ✓ **Things are going to change fundamentally.**

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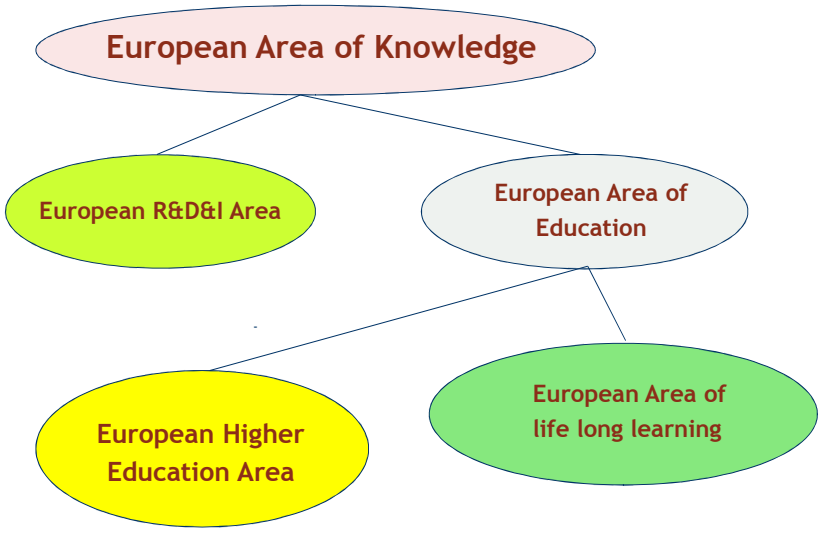
The Bologna Process
Building the European Area of Knowledge… till 2010 !!!....



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The Core of the Bologna Reforms
Keywords characterizing Structural Issues

☞ MOBILITY, COOPERATION, TRUST, ACCREDITATION

- ✓ MOBILITY AND COOPERATION require professional recognition
- ✓ Professional recognition requires TRUST
- ✓ TRUST requires transparency and readability of structures and professional qualifications

☞ All is achieved through:

- ✓ COMPARABLE QUALIFICATIONS FRAMEWORKS

And

- ✓ RECOGNISED QUALITY ASSURANCE PROCEDURES

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Qualifications Frameworks
The different layers - Who does what...

☞ High level descriptors - Meta Frameworks

- ✓ Characterized at institutional level of governments and stakeholders
- ✓ They represent the 'legal crust'

☞ Complemented by Sectoral and Specific descriptors

- ✓ By area and specialty
- ✓ In close cooperation with higher education institutions and professional associations
- ✓ In transnational cooperation
- ✓ They represent Bologna in practice

☞ Complemented by Curriculum descriptors - core contents

- ✓ Typically developed in Education Working parties and Academic Consortiuns, at European Level, or within regulatory bodies at national level
- ✓ They are the basis for credibility of the whole system

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Qualifications Frameworks and the Directive for Recognition of Professional Qualifications

- Three major documents at High Level
  - ✓ The QF-EHEA -Qualifications Framework for the European Higher Education Area
    - Adopted in Bergen 2005, within the Bologna Process
  - ✓ The EQF-LLL - European Qualifications Framework for Lifelong Learning
    - Adopted bt the EC - approved on April 23, 2008 by the Parliament and the Council of the European Union
  - ✓ The Directive for Recognition of Professional Qualifications, approved by the European Parliament and by the Council on September 7, 2005
    - National laws should have been passed in all EC Countries till the end of 2007

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Qualifications Frameworks and the Directive
A striking coincidence or concerted action?

Bologna QF-EHEA CYCLES	European Union EQF-LLL LEVELS	EU-Directive of Professional Recognition Art. 11 - LEVELS
Third Cycles	Level 8	
Second Cycles	Level 7	Art 11° e)
First Cycles	Level 6	Art. 11° d)
Short Cycles Linked to or Within First Cycles	Level 5	Art. 11° c)

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Relevance of Sectoral and/or Curriculum Frameworks
Taken from the BFUG document - Bologna Beyond 2010
February, 2009

"Common reference points could also be developed for an entire sector , which might lead to the definition of sectoral descriptors and the establishment of sectoral qualifications frameworks…"

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Relevance of Sectoral and/or Curriculum Frameworks
Taken from the Leuven/Louvain-la-Neuve Communique
29 April 2009

"…

Curricular reform will thus be an ongoing process leading to high quality, flexible and more individually tailored education paths.

Academics, in close cooperation with student and employer representatives, **will continue to develop learning outcomes and international reference points for a growing number of subject areas**

…"

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Bringing Qualifications Frameworks into Practice
I - Sectoral or Subject Specific Frameworks

Initiatives that came to life along the years

- TUNING methodology
  - ✓ E4 proposals for Engineering
- TU3 proposals - Delft, Eindhoven e Twente
- EUR-ACE standards for professional quality assurance
- CDIO - Conceive-Design-Implement-Operate
- ABET standards for professional quality assurance
- European projects to identify core knowledge and competences at discipline level
- Initiatives leading to core curricula recommendations
  - ✓ European Working Parties on Education and joint initiatives at academic level

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Qualifications Frameworks and Quality Assurance -
What is equal, what is different
QFs, the Directive and the EUR-ACE System

Bologna QF-EHEA CYCLES	European Union EQF-LLL LEVELS	EUR-ACE	EU-Directive of Professional Recognition Art. 11 - LEVELS
Third Cycles	Level 8		
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Assessment of Learning Outcomes-

Academic Degree Structures and Quality Assurance 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, Art. 11, d): (3-4)U
  - ✓ First Cycle Degrees are the basis for achieving the qualification of Technical (or Associate) Engineers, whatever the European designation
- 2nd Cycle, Level 7, Art. 11, e): >= 4U
  - ✓ Second Cycle Degrees are the basis for achieving the qualification of Engineers, or equivalent European designation

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Assessment of Learning Outcomes-

Academic Degree Structures and Quality Assurance 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

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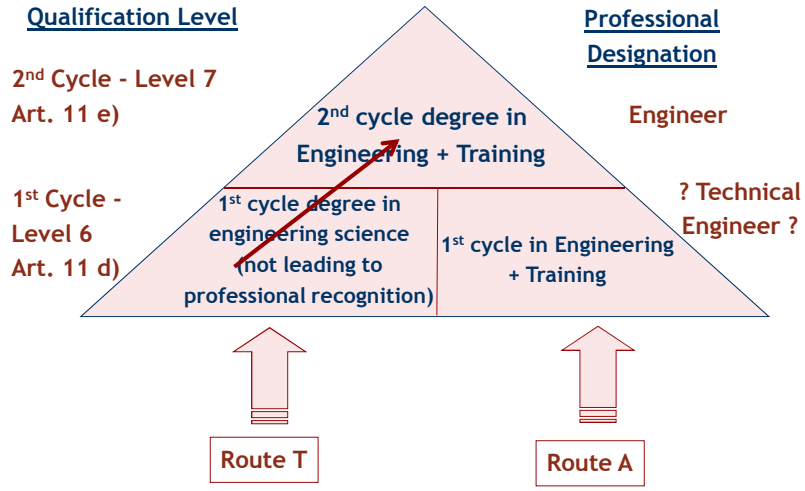
Academic Degree Structures and Quality Assurance in Engineering
III - Routes for the different qualification levels (I)



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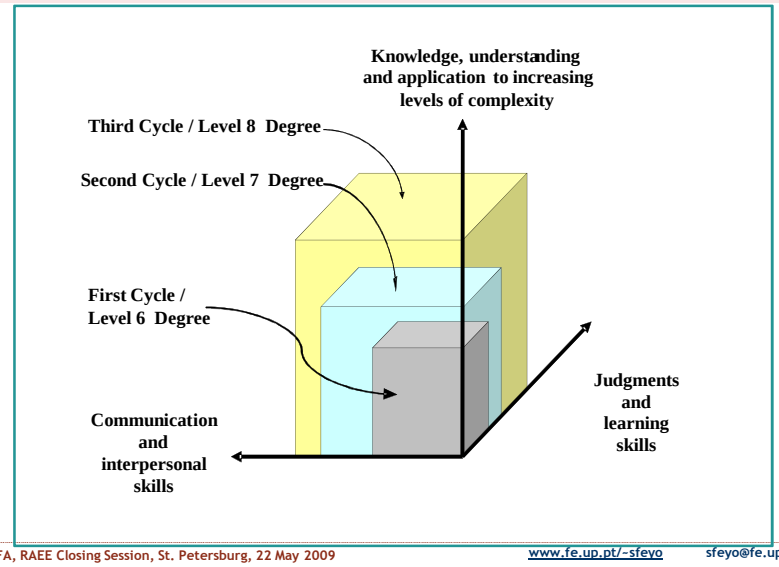

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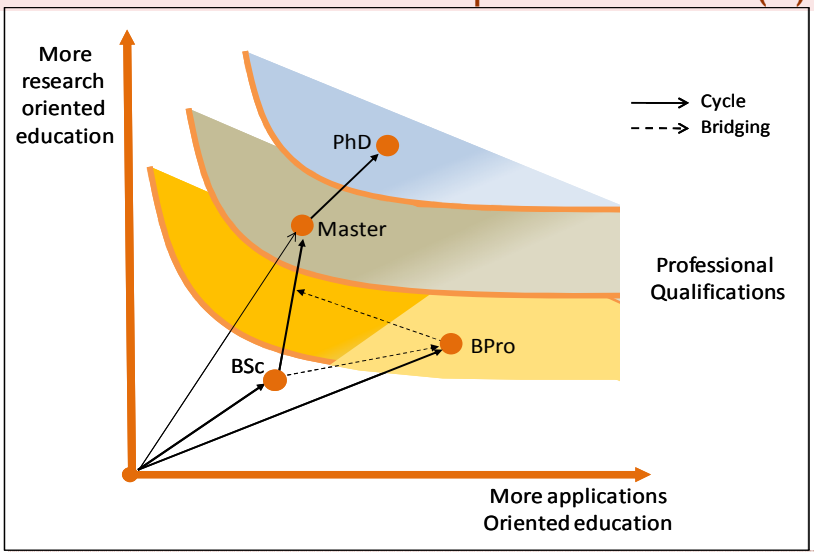

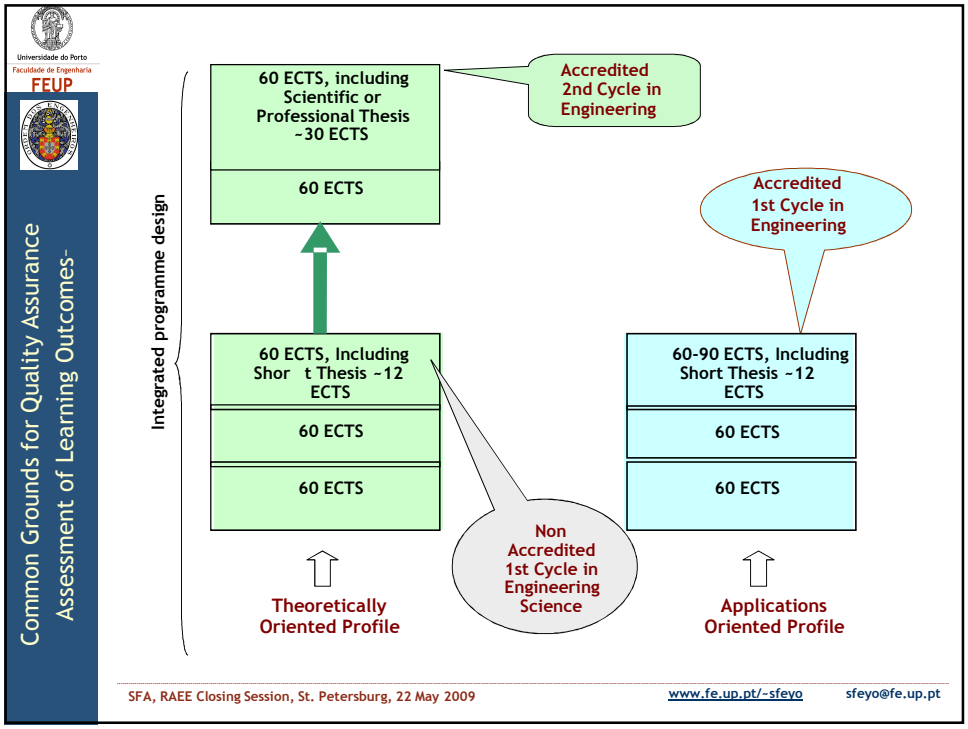
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Assessment of Learning Outcomes-
Integrated programme design
60 ECTS, including Scientific or Professional Thesis ~30 ECTS
60 ECTS
Accredited 2nd Cycle in Engineering
Accredited 1st Cycle in Engineering
60 ECTS, Including Shor t Thesis ~12 ECTS
60 ECTS
60 ECTS
60-90 ECTS, Including Short Thesis ~12 ECTS
60 ECTS
60 ECTS
Non Accredited 1st Cycle in Engineering Science
Theoretically Oriented Profile
Applications Oriented Profile
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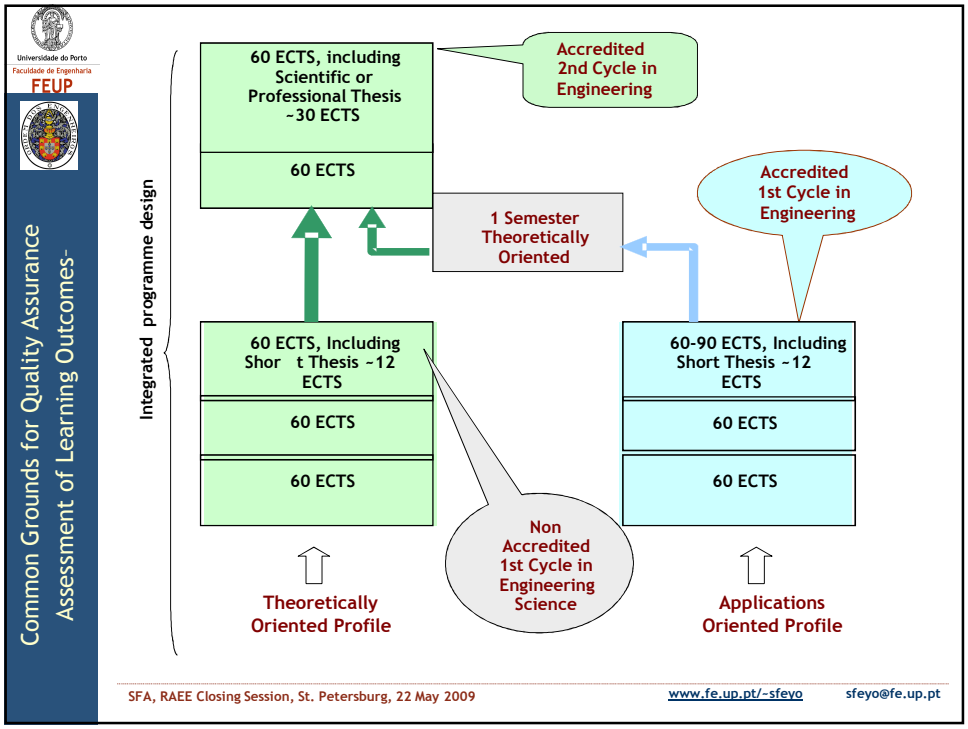
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Accredited 1st Cycle in Engineering
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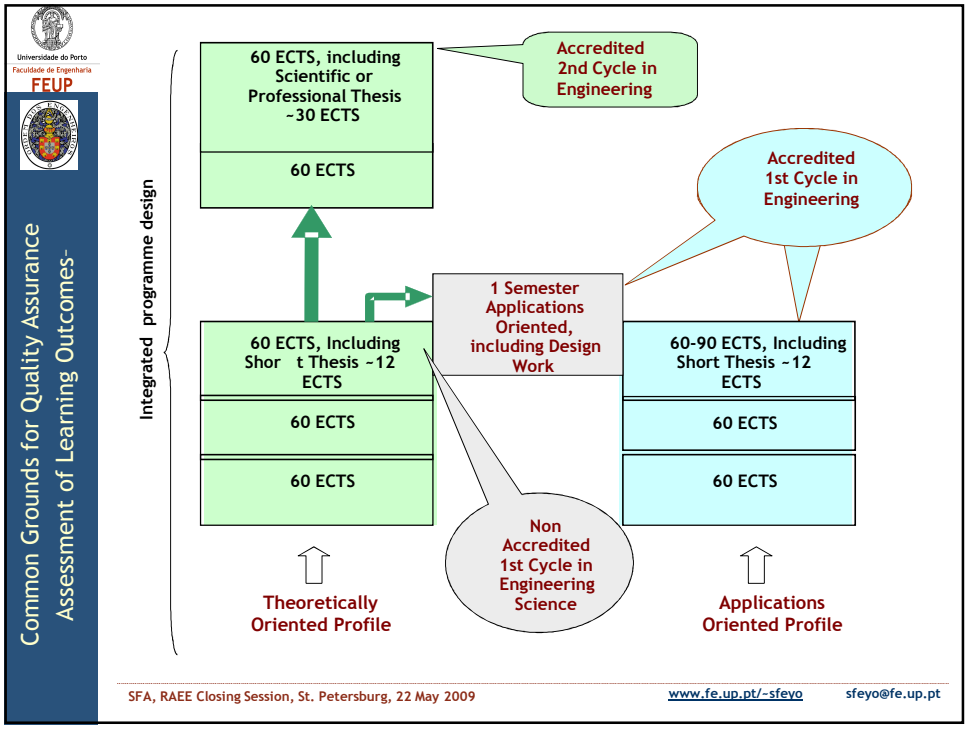
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Accredited 1st Cycle in Engineering
1 Semester Applications Oriented, including Design Work
60 ECTS, Including Shor t Thesis ~12 ECTS
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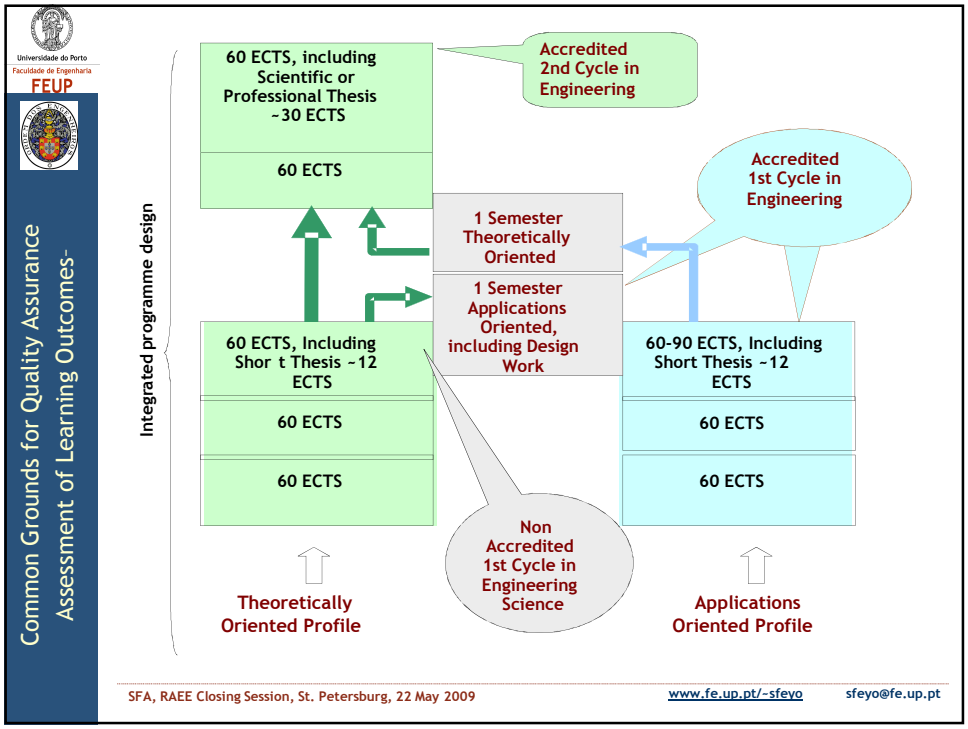
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Academic Degree Structures and Quality Assurance in Engineering
IV- Differences between levels of qualifications

- Programme Outcomes must be evaluated in relation with the level of intervention in the Engineering Activity
  - Social responsability (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

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Assessment of Learning Outcomes-

Academic Degree Structures and Quality Assurance in Engineering
V - Programme Outcomes for Accreditation

- Quality assurance procedures rely on accepted qualifications frameworks
- Programme outcomes for accreditation should always be related to potential professional recognition of engineering qualifications

↳ As such:

- There should be only one set of programme outcomes for accreditation of Second Cycle Degrees
  - ↳ (Whatever the profile and programme)
- There should be only one set of programme outcomes for accreditation of First Cycle Degrees

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Common Grounds for Quality Assurance
Assessment of Learning Outcomes-

Recognition of Qualifications – a Worldwide Issue
I - EUR-ACE vs. other existing global 'accords' [W-S-D] (I)

- ***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

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Recognition of Qualifications – a Worldwide Issue
I - EUR-ACE vs. other existing global 'accords' [W-S-D] (II)

- **Fundamental differentiation/barrier between**
  - "Professional Engineers" and
  - "Engineering Technologist"
- **Define all recognized (accredited) "Engineers' " degrees as "Bachelor".**
- **These features are not in the spirit of the EQF nor of EU Directive 2005/36**
- **Indeed discussion is currently in the air, and will have to be continued, concerning recognition of standards**

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Convergence - a Worldwide Issue
I - The Global Dimension... A Recent Report (I)

☞ **Clifford Adelman, "Bologna is a process, not a processed meat" Institute for Higher Education Policy (IHEP), USA, Inside Higher Ed audio conference , February 26, 2008:**

" Why do we need to pay attention:

- ✓ *ECTS (which actually started in 1989) as a major component of the Bologna Process, is a model of borderless transfer.*
- ✓ *The two-cycle degree structure offers clear steps in the completion of undergraduate study .*
- ✓ *Qualification frameworks are the clearest public statement of what we guarantee to students, the economy, and the society.*
- ✓ *The transparency of these components has already drawn imitative processes in Latin America (Tuning), the North Africans are moving to the 3+2 cycles, the Australians have introduced Diploma Supplements, and other former colonial countries in Africa and Asia will not be far behind."*

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"Prediction

- ✓ ***By 2030, what started as European will be global, providing transfer without borders.***
- ✓ ***The US will either join or be left behind.***
- ✓ ***It is a challenge unlike any other issued to our system of higher education, and we've been soundly asleep to date.***
- ✓ ***We had better get started---and in more positive ways than simply rejecting degree equivalencies! "***

Convergence – a Worldwide Issue
II – Changes may well occur elsewhere… (I)

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

EDUCATION

What Should Be the First Professional Degree in Engineering?

BY MOSHE KAM & ARNOLD PESKIN

We'd like your opinion. Should the first professional degree in engineering be at the Bachelor or Master level?

The IEEE is considering whether to follow the recommendations of several other professional bodies and declare that a Master of Science or Master of Engineering (rather than Bachelor-level degrees) should be an engineering's first professional degree in engineering is the customary degree needed for the practice of engineering. Practice is understood to be carried out in an industrial setting, and does not require much additional training.

However, it is widely accepted that in a field as large and diverse as engineering, some specialties require more training. For example, researchers and academ- gineering is the Bachelor of Science or Bachelor of Engineering. In the last decade, some educational programs that required more schooling or practice (and awarded a title such as Diplom-engineer) have reduced their requirements to conform to the B.Sc./B.Eng. "standard." Nevertheless, the increasing complexity of engineering tasks motivated educators to add new topics and subdisciplines to

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

EDUCATION

normally require two additional years of study and a dissertation.

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. 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 30 semester credits as a prerequisite for candidacy for licensure.

The tables presented here

The First Professional Degree in Engineering

Question	Current Practice	Proposed
What should be the minimum requirement?	A **Bachelor of Science** in engineering (or equivalent)	A **Master of Science** in engineering or a Bachelor of Science in engineering plus 30 additional semester credits
What additional training would be required?	None	Holders of a B.Sc. or B.Eng. would have to acquire additional educational credentials such as a M.Sc. or M.Eng.
What changes in engineering education would be needed?	None	New accreditation procedures for graduate programs; development of new graduate curricula; changes in licensure procedures and laws
Who supports each position?	Inside the IEEE, several sections, including the Alaska Section. In the United States, several representatives of state licensing boards that do not intend to adopt new guidelines.	Several engineering associations including the American Society of Civil Engineers. In the United States, the National Academy of Engineering and National Council of Examiners for Engineering and Surveying. In Europe, the developers of the Bologna Process.

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Convergence - a Worldwide Issue
II - Changes may well occur elsewhere… (III)

- In www.ieee.org/theinstitute

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

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" .

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Assessment of Learning Outcomes-

Recognition of Qualifications - a Worldwide Issue
III - OECD Initiative
AHELO - Assessment of HE Learning Outcomes

- **Potentially the largest, most comprehensive assessment of universities yet devised**
  - **The aim is to measure various types of Learning Outcomes and to examine a wide range of possible criteria to assess their influence in those outcomes**
- **10 Countries involved in the start-up, on May 2008**
  - Australia, Belgium (Flanders), Finland, Italy, Japan, Korea, Mexico, The Netherlands, Norway, Sweden
- **Composed of four strand of work**
  - **Assessment of generic skills**
  - **Assessment of discipline-specific skills in Engineering**
  - **Assessment of discipline-specific skills in Economics**
  - **Research-based value-added strand - assessing the "value-added" factors of Higher Education Institutions**

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Common Grounds for Quality Assurance
Assessment of Learning Outcomes-

Ladies and Gentlemen,
All that remains is…

To thank you for your attention to the Talk

And particularly,

To thank the Organizationn for providing this remarkable opportunity to exchange views in such most relevant matters for

Peace and Progress on Earth

Spasibo !!!