



# The Bologna Process in Portugal Where do we stand? Facts & Figures Some personal views on Engineering Education

Sebastião Feyo de Azevedo,  
Professor of Chemical Engineering  
Faculty of Engineering, University of Porto, Portugal  
National Delegate to the BFUG

[sfeyo@fe.up.pt](mailto:sfeyo@fe.up.pt)

<http://www.fe.up.pt/~sfeyo>

EQF-PRO Project, Dissemination Workshop

26 November, 2009  
Porto, Portugal

1



## To say what I am going to say...

*The Bologna Reforms in Portugal,  
November 2009*

- ① Reference for analysis - the Bologna Process today
- ② The Bologna Process in Portugal in short
- ③ A note about Qualifications Frameworks
- ④ Case Study - Engineering Education in Portugal

## From Bologna to Leuven/Louvain-La-Neuve... and beyond References for analysis

- ☞ **Characterizing the Process Today**
  - **Policy areas**
  - **Structural organization and issues**
  - **The Substance**

## From Bologna to Leuven/Louvain-La-Neuve... and beyond Policy Areas - Political objectives and concerns

- ✓ **Mobility**
- ✓ **Social dimension**
- ✓ **Employability**
- ✓ **Lifelong Learning**
- ✓ **Attractiveness or the Process in a global dimension**
  
- ✓ **Challenges posed by Global Competition - 'Borderless Higher Education Market'**
- ✓ **Need for International Cooperation - recognition**
- ✓ **The demographic challenge - new publics**
- ✓ **New leading roles and responsibilities**
- ✓ **Monitoring quality within diversity with multidimensional transparency tools**
- ✓ **Accessing diverse sources of funding**

## From Bologna to Leuven/Louvain-La-Neuve... and beyond The Structure - action lines and instruments for action

- ✓ A Degree Structure -
  - Based on recognised QUALIFICATIONS FRAMEWORKS
- ✓ A System to measure work and OUTCOMES
  - The ECTS credit and accumulation system
- ✓ A System to document qualifications
  - The DIPLOMA SUPPLEMENT
- ✓ A System to guarantee transparency
  - Building accepted QUALITY ASSURANCE procedures
- ✓ A System for recognition of qualifications
  - OVERCOMING DIFFICULTIES posed by the diversity of 'recognition cultures'

## From Bologna to Leuven/Louvain-La-Neuve... and beyond The Substance - the latecomer in the Bologna Process...

- ✓ Changes to a large extent still to occur
  - New contents... closer to more immediate Societal concerns
  - New programme structures, linked to a concept of lifelong Learning
  - New Methods - change from
    - ✓ Teacher-Centred to Student-Centred methodologies
    - ✓ Teaching based on Teacher Inputs to Learning Centred in well defined objectives - Learning Outcomes
    - ✓ Teaching Times to Student Workloads required to achieve desired Learning Outcomes

## The Core of the Bologna Reforms

### Keywords characterizing Structural and Political Objectives

- ☞ **MOBILITY, COOPERATION, TRUST, ACCREDITATION**
- ✓ **MOBILITY AND COOPERATION** require both academic and professional recognition
- ✓ Academic and Professional recognition require **TRUST**
- ✓ **TRUST** requires transparency and readability of structures and professional qualifications
- ☞ **All is achieved through:**
- ✓ **COMPARABLE QUALIFICATIONS FRAMEWORKS**
- And**
- ✓ **RECOGNISED QUALITY ASSURANCE PROCEDURES**

## The Core of the Bologna Reforms

### The Substance - The Latecomer or the Ugly Duck? Use of key terms in the Bologna Communiques

	Learning Outcomes	Student Centred...	Frameworks
Bologna, 1999	0	0	0
Prague, 2001	0	0	2
Berlin, 2003	1	0	6
Bergen, 2005	1	0	10
London, 2007	4	2	15
Leuven/Louvain-La-Neuve, 2009	4	3	8

## To say what I am going to say...

- ① Reference for analysis - the Bologna Process today
- ② **The Bologna Process in Portugal in short**
- ③ A note about Qualifications Frameworks
- ④ Case study - Engineering Education in Portugal

## The Bologna Process in Portugal - Figures & Facts

### Figures - Total of programmes approved within the new legal framework

	First Cycles		Integrated Masters	Second Cycles		Third Cycles	Sum Total
	Univ	Polyt	Univ	Univ	Polyt	Univ	
Public	510	566	91	1.269	316	498	3.250
Private	693		25	474		33	1.225
Military	22		21	0		0	43
Catholic University	97		10	198		47	352
<b>Sum Total</b>	<b>1.888</b>		<b>147</b>	<b>2.257</b>		<b>578</b>	<b>4.870</b>

## The Bologna Process in Portugal - Figures & Facts

### Facts in short

- ☞ We fully share **the European views concerning Policy Areas**
- ☞ **The legal structure is in place**, but in all the five issues identified we have a long way to go in bringing effectively the law into practice
  - Build or adopt in clear terms sectoral qualifications frameworks
  - Improve the understanding of the concept of ECTS
  - Generalize the issuing of the Diploma Supplement
  - Put in place QA procedures with consequences in the offer of higher Education
  - Put in place effective procedures for recognition of qualifications
- ☞ **The issues concerning the Substance**, identified above, are in **their first steps**

## To say what I am going to say...

- ① Reference for analysis - the Bologna Process today
- ② The Bologna Process in Portugal in short
- ③ **A note about Qualifications Frameworks**
- ④ Case-Study - Engineering Education in Portugal

## A major issue - 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 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 descriptors at branch level**
  - ✓ Typically developed in Education Working parties and Academic Consortia, at European Level, or within regulatory bodies at national level
  - ✓ They are the basis for credibility of the whole system

## Meta Qualifications Frameworks and the Directive for Recognition of Professional Qualifications

- ☞ **(Two plus One) major documents at High Level**
  - ✓ The QF-EHEA -Qualifications Framework for the European Higher Education Area - **An Agreement**
    - Adopted in Bergen 2005, within the Bologna Process
  - ✓ The EQF-LLL - European Qualifications Framework for Lifelong Learning - **A Recommendation**
    - Adopted by 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 - **A Law within the Union**
    - National laws should have been passed in all EC Countries till the end of 2007....

## A major Legal Document - the Directive for Recognition of Professional Qualifications (I)

- ☞ Article 11 - Five levels of qualification particularly relevant for professions that are out of the Annex for fully regulated professions
  - ✓ 2 levels requiring secondary education, general or vocational
  - ✓ 1 level, requiring short post-secondary education, not necessarily at higher education level, plus professional training
  - ✓ 2 levels of post-secondary education at higher education level, plus adequate professional training

## A major Legal Document - the Directive for Recognition of professional Qualifications (II)

- ☞ Art. 11, e) - higher level  
...completed a post-secondary course of at least four years' duration...at a university or establishment of higher education...and where appropriate completed professional training...
- ☞ Art. 11, d) - intermediate level  
...training at post-secondary level of at least three and not more than four years' duration...at a university or establishment of higher education...as well as the professional training that may be required...
- ☞ Art. 11, c) - lower level  
...training at post-secondary level other than that referred in d) and e) of a duration of at least one year...as well as the professional training which may be required in addition to that post-secondary course...



## Relevance of Sectoral and/or Curriculum Frameworks Taken from the Leuven/Louvain-la-Neuve Communiqué 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

...”

## Bringing Qualifications Frameworks into Practice Sectoral Frameworks

### What we have... In Engineering

- ☞ **TUNING Project** - a methodology designed to understand curricula and to make them comparable
  - ✓ E4 proposals for Engineering
- ☞ **TU3 proposals** - Delft, Eindhoven e Twente
- ☞ **CDIO** - Conceive-Design-Implement-Operate - MIT, Swedish U.
- ☞ **EUR-ACE standards** for professional quality assurance
- ☞ **ABET EC 2000 standards** for professional quality assurance
- ☞ **The TUNING-AHELO conceptual framework** of expected/desired Learning Outcomes in engineering
  - ✓ A major initiative from the OECD, 2009

## Bringing Qualifications Frameworks into Practice The EUR-ACE Project - The EUR-ACE Framework

- ☞ **European Project that aimed at establishing an European System for Qualification of Engineering Education programmes**
- ✓ **14 European Institutions, among them “Ordem dos Engenheiros - Engineers Portugal”**
- ✓ **FEANI, SEFI, CESAER, EUROCADRES, ENQHEEI, ASIIN, CTI, IEI, CoPI, UNIFI, OE, UAICR, RAEE, EC-UK**
- ☞ **First Phase for setting the standards, supported by the European Commission (DG EaC) within SOCRATES and TEMPUS programmes; Concluded in 2005**
- ☞ **Second Phase for implementation, supported by the European Commission (DG EaC) within SOCRATES and TEMPUS programmes; concluded in 2008**

## The EUR-ACE Framework III - Knowledge and Competence areas

- ☞ **Programme Outcomes that must be satisfied**
  - **6 areas of competences are defined**
    - ✓ Knowledge and Understanding
    - ✓ Engineering Analysis
    - ✓ Engineering Design
    - ✓ Investigations
    - ✓ Engineering Practice
    - ✓ Transferable (personal) Skills
  - **For each category, the EUR-ACE Framework Standards list the expected Programme Outcomes of First Cycle and Second Cycle Studies**

## 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		
Second Cycles	Level 7	Second Cycles	Art 11° e)
First Cycles	Level 6	First Cycles	Art. 11° d)
Short Cycles Linked to or Within First Cycles	Level 5		Art. 11° c)

## To say what I am going to say...

- ① Reference for analysis - the Bologna Process today
- ② The Bologna Process in Portugal in short
- ③ A note about Qualifications Frameworks
- ④ **Case-Study - Engineering Education in Portugal**

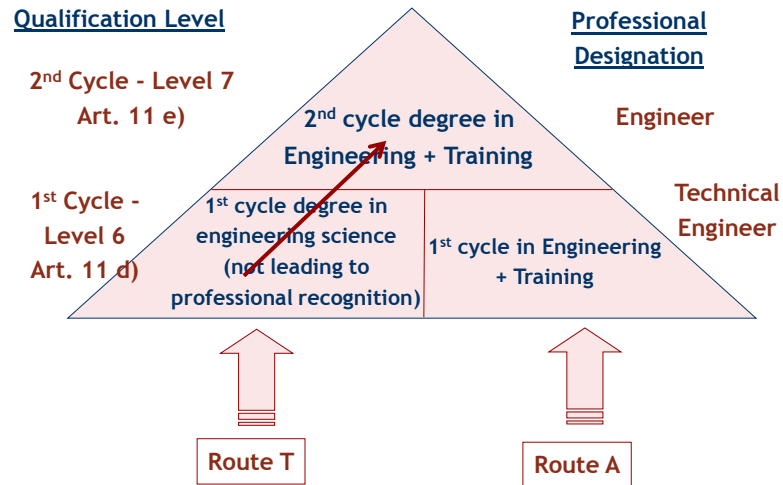
## Academic Degree Structures in Engineering Concerning levels of qualification

- ☞ **Two levels of qualifications associated to those levels approved in the Directive of Professional Recognition and recognized in the QF-EHEA and the EQF-LLL**
  - **1<sup>st</sup> Cycle, Level 6, Art. 11, d): 3U**
    - ✓ **First Cycle Degrees are the basis for achieving the qualification of Technical (Engineers, whatever the European designation)**
  - **2<sup>nd</sup> Cycle, Level 7, Art. 11, e): 2U**
    - ✓ **Second Cycle Degrees are the basis for achieving the qualification of Engineers, or equivalent European designation**

## Academic Degree Structures in Engineering 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 Routes for the different qualification levels



SFA, EQF PRO, Porto, 6 November 2009

www.fe.up.pt/~sfeyo

sfeyo@fe.up.pt

## Academic Degrees in Engineering Understanding fundamental differences between levels of qualifications for professional purposes

- ☞ 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 (TU3 Booklet)

SFA, EQF PRO, Porto, 6 November 2009

www.fe.up.pt/~sfeyo

sfeyo@fe.up.pt

## Offer of Engineering Programmes in Portugal, 2008-2009

Totals	Offer of M1, L5 e L3 -	315		
	Offer of M2 -	135		
	47	135	15	253
	M1 - Integrated	M2 - Masters	L5 - Licence	L3 - Licences
	Masters	Second Cycles	Before Bologna	First Cycles
U-Pub	47	100	5	64
Pol-Pub	0	20	0	144
ESPMP	0	0	5	0
U-Priv	0	6	5	25
Pol-Priv	0	0	0	15
UCP	0	9	0	5

## How to proceed?

### Academic Degree Structures in Engineering 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

