



Institution of Engineers, Portugal Overview and Its Accreditation System

Sebastião Feyo de Azevedo
National Vice-President
sfeyo@ordemdosengenheiros.pt
<http://www.ordemengenheiros.pt>

Seminar 'Improving the Quality of Engineering Education
USEA - Union of Scientific and Engineering Associations
Lisbon, Portugal, 26 May 2007



To say what I am going to say...

Institution of Engineers, Portugal
Overview

- ① Engineering Education and the Engineering Profession
- ② The Institution of Engineers -
Legal framework; Organisation; Co-operation; Membership...
- ③ The Accreditation Process Today
Formal objectives and practical implications; Conceptual model; Procedures; Figures...
- ④ Preparing the future
New model for education, new accreditation procedures
- ⑤ The future - tools for mobility and transnational co-operation



Engineering Education and the Engineering Profession I - Academic Titles - transitional period 2006-2008

☞ Academic titles of the past still awarded (till 2006-2007) by Portuguese Institutions of Higher Education :

- ✓ *Bacharel* a 3 years course
- ✓ *Licenciado* a 5 years course
- ✓ *Mestre* 2 further years of study, after *Licenciado*, including a course and research
- ✓ *Doutor* 3 to 4 further years of research, after *Licenciado* or *Mestre*

☞ Academic Titles after the reform, 2006/2007:

- ✓ *Licenciado* 6 to 8 semesters of work (full-time equivalent)
- ✓ *Mestre* after further 3 to 4 semesters or through an integrated programme
- ✓ *Doutor* after a minimum of 3 years of course and research work



Engineering Education and the Engineering Profession II - The Offer of Engineering Education in Portugal in 2006

☞ 297 Engineering Courses under 126 Designations

☞ 64 Schools of Engineering in 44 Institutions of Higher Education

- ✓ 30 institutions of the public subsystem
 - 13 Universities with their 18 University Schools
 - 17 Polytechnic Institutes with their 29 Polytechnic Schools
- ✓ 14 Institutions of the Private and Concordatary subsystem
 - 7 Universities with their 7 University Schools
 - 7 Higher Education Institutions with 10 Polytechnic Schools

☞ Out of the 297 courses

- ✓ 97 courses are currently accredited by the Institution of Engineers, corresponding to 56 different designations



Engineering Education and the Engineering Profession III - Professional Titles and Professional Regulation

- ☞ Professional Titles are legally protected in Portugal:
 - ✓ The professional title of *Engenheiro* (Engineer) is awarded by the Institution of Engineers. All *licenciados* may apply for the professional title of Engineer.
 - ✓ The professional title of “Engenheiro Técnico” (Technical Engineer) is awarded to any *bacharel* by ANET (Associação Nacional dos Engenheiros Técnicos - National Association of Technical Engineers)

- ☞ The Engineering Profession is partially regulated in Portugal
 - ✓ Some acts, namely in Civil Engineering, but also in areas of Electrical and Mechanical Engineering, can only be performed by members of Institution of Engineers



Institution of Engineers I - Legal Framework and Mission Statement (I)

- ☞ Institution of Engineers is the public association that represents the holders of a *Licenciado* diploma that work as *Engenheiros* (Engineers).

- ☞ The main purpose of the Institution of Engineers is to contribute to the development of the Portuguese Engineering by working with other partners for the improvement of legal frameworks and of the scientific, professional and social level of its members, and by accomplishing codes of professional ethics.



Institution of Engineers

I - Legal Framework and Mission Statement (II)

☞ Some competencies:

- ✓ To award the professional title of Engineer and to protect it against abuse
- ✓ To regulate the professional practice and also to protect the professional practice by legal means
- ✓ To improve Engineers' professional qualification and to ensure the accomplishment of the professional code of ethics
- ✓ To support and cooperate on the development of Engineering education in order to guarantee a high standard of the Engineering profession
- ✓ To promote exchanges with the national and foreign comparable organizations in order to develop any cultural and professional links involving the Engineers in the world.



Institution of Engineers

I - Legal Framework and Mission Statement (III)

- ☞ Institution of Engineers (OE) was created in November 24, 1936 and is ruled by the Portuguese law, decree n. 119/92 of the 30th June, which contains all its legal competencies.
- ☞ Institution of Engineers is independent from the State and has administrative, financial, scientific, disciplinary and regulatory autonomy.
- ☞ Institution of Engineers is the single largest Portuguese professional association - approx. 40.000 members



Institution of Engineers II - Internal organisation (I)

- ☞ Territorial, covering all the Country with
 - ✓ 3 Regions with Delegations
 - ✓ and 2 Sections (Madeira and Azores)
- ☞ Colleges - 12 Specialties, covering all the engineering areas
- ☞ Governance by a National Board of Directors
 - ✓ President (Bastonário) and 2 Vice-Presidents nationally elected
 - ✓ 6 other members, representing the Regions, elected in each Region
- ☞ Governance supported by two major Councils
 - ✓ Admissions and Qualification Council that regulates the admission and qualification of members
 - ✓ Colleges Co-ordinating Council



Institution of Engineers II - Internal organisation (II)

- ☞ Internal organisation in Colleges - 12 Specialties
 - ✓ Civil Engineering
 - ✓ Electrical Engineering
 - ✓ Mechanical Engineering
 - ✓ Mining Engineering
 - ✓ Chemical Engineering
 - ✓ Naval Engineering
 - ✓ Geographic Engineering
 - ✓ Forest Engineering
 - ✓ Metallurgical Engineering
 - ✓ Agricultural Engineering
 - ✓ Informatics Engineering
- ☞ Each College has its own National Board and Regional Co-ordination Board



Institution of Engineers II - Internal organisation (III)

- ☞ Specializations (different from Specialties) - more horizontal, or sub-areas within major areas

Energy	Textile Engineering
Food Engineering	Construction Management
Industrial Engineering	Territorial Planning
Geotechnics	Structures
Acoustic Engineering	Transportations
Air Conditioning Engineering	Hydraulics
Sanitary Engineering	Industrial Maintenance
Geographic Information Systems	Automation and Control
Aeronautics	
Safety Engineering	
Telecommunications	



Institution of Engineers II - Internal organisation (IV)

- ☞ Staff
 - ✓ Headquarters
 - 16 strong, of which 8 with University Degree
 - Department of Admissions and Qualification
 - 4 members of staff - with University degree
 - ✓ North Region
 - 16
 - ✓ Center Region
 - 7
 - ✓ South Region
 - 18
 - ✓ Sections (Madeira and Azores)
 - 4



Institution of Engineers

III - Institutional Co-operation and Agreements (I)

OE is associated with a significant number of organizations representing engineering:

CLAIU - Comité de Liaison des Associations d'Ingénieurs de l'Union Européenne;
FEANI - Fédération Européenne des Associations Nationales d'Ingénieurs;
EUCEET - European Civil Engineering Education and Training;
ECCE - European Council of Civil Engineers;
EUREL - Convention of National Societies of Electrical Engineers of Europe;
FEIBEM - Federação Ibero-Americana de Engenheiros Mecânicos;

CEDIA - Confederation Européenne d'Ingénieurs Agronomes;
EFCE - European Federation of Chemical Engineers;
CEMT - Confederation of European Maritime Technologies;
ECG - European Commission of Glass;
FIG - Federation of Surveyors;
REHVA - Federation of European Heating and Air Conditioning Associations;
CFPA - Confederation of Fire Protection Associations;
CEAS - Confederation European Aerospace Societies.



Institution of Engineers

III - Institutional Co-operation and Agreements (II)

☞ OE has (or has had) also several partnerships or memorandums of understanding with other European and American Engineering Association (EC-UK, ASIIN, CTI, CoPi, SEFI, IEI, RAEE, EUROCADRES, UNIFI, ABET...).

☞ OE further has a close relationship with similar Associations of the CPLP (Portuguese Speaking Community):

- ✓ CONFEA - Brazil
- ✓ Institution of Engineers of Angola
- ✓ Institution of Engineers of Mozambique
- ✓ Institution of Engineers of Cabo Verde



Institution of Engineers

IV - Membership - Conditions of admission (I)

☞ For holders of a Diploma of *Licenciado in Engineering* by a Portuguese Institution:

To obtain the professional title of *Engenheiro*, the Institution of Engineers requires the fulfillment of the following further conditions:

- ✓ To have been approved in an admission exam organized and run by Order of Engineer
- ✓ To have gone through an approved period of training and to have attended an Ethics and Professional Conduct course also run by OE



Institution of Engineers

IV - Membership - Conditions of admission (II)

☞ For candidates holding a diploma from other countries:

- ✓ Candidates holding a diploma from a country of the European Union will have their request analyzed according to legislation approved in the Directives for Professional Recognition and its related translation to Portuguese legislation.
- ✓ Candidates holding a diploma from third countries will have to seek equivalence from a Portuguese University.



Institution of Engineers

IV - Membership - Numbers in December 31, 2006

☞ About 34000 members in the 12 Specialties

✓ Civil Engineering (C)	42,6%
✓ Electrical Engineering (E)	21,0%
✓ Mechanical Engineering (M)	13,7%
✓ Agricultural Engineering	7,7%
✓ Chemical Engineering (H)	7,3%
✓ Mining Engineering (N)	2,1%
✓ Forest Engineering (F)	1,3%
✓ Informatics Engineering	0,9%
✓ Geographic Engineering (G)	0,9%
✓ Metallurgical Engineering (T)	0,8%
✓ Naval Engineering (N)	0,3%

☞ About 6000 registered trainees



The Accreditation Process Today

I - Formal Objectives, Practical Consequences

☞ Formal

- ✓ The accreditation process aims at exempting candidates from the admission exam
- ✓ A Candidate holding a diploma from an accredited course **IS EXEMPTED** from the admission exam

☞ Practical consequences

- ✓ Far wider consequences
- ✓ Accreditation is an exercise that leads to significant organisational improvements
- ✓ Accreditation is perceived by the Society as a stamp of quality of a course offered by an institution



The Accreditation Process Today II - Conceptual Model

- ☞ **Main reference terms**
 - School Administration
 - Teaching staff
 - Curricular content
 - School enrolment and assessment of students
 - Course structure
 - R&D quality
 - Facilities and resources
 - Administrative procedures
 - Institutional culture
- ☞ **Inspired on ABET and EC-UK criteria of the nineties...**
- ☞ **It is clear that it is Engineering Degree Programs and not Institutions that are accredited**



The Accreditation Process Today III - Procedure

- ☞ **National Admission and Qualification Council runs the accreditation process**
 - 24 members (2 per College) chaired by a Vice-President
- ✓ **Accreditation Committee of 4-5 members**
- ✓ **Analysis of dossier previously submitted**
- ✓ **1-Day Visit**
- ✓ **Reporting**
- ✓ **Proposal of decision**
- ☞ **All steps are regulated in the general procedure approved by the OE's National Board**



The Accreditation Process Today

IV - Decision

☞ The decision may take the following forms:

- a) **Full 6-year accreditation**, subject to revaluation at the end of this period, expecting that recommendations listed in the report will be addressed
- b) **Limited 3-year accreditation**, the report stating the aspects to be corrected within the indicated period and to be assessed in a new accreditation process
- c) **Non-accreditation decision**, the report stating the aspects that led to this decision



The Accreditation Process Today

V - Accreditations carried out since 1994 (I)

Source: QUALIFICATIONS OFFICE, INSTITUTION OF ENGINEERS, MAY 21, 2007

Colleges	Applicant courses	Scheduled visits	Completed visits	Accredited courses	Non/ accred courses	Not completed
Agricultural	29	27	27	27	1	0
Environment	13	12	12	10	2	3
Civil	33	32	32	24	8	1
Electrical	37	34	34	28	5	2
Geographic	6	6	6	6	0	0
Informatics	20	16	16	15	3	1
Mechanical	42	37	37	33	6	3
Metallurgical	15	14	14	14	0	1
Mining	19	19	19	17	2	0
Naval	2	2	2	2	0	0
Chemical	22	20	20	20	1	1
Forest	5	5	5	5	0	0
Other	18	17	17	11	6	2
Total	261	241	241	212	34	14



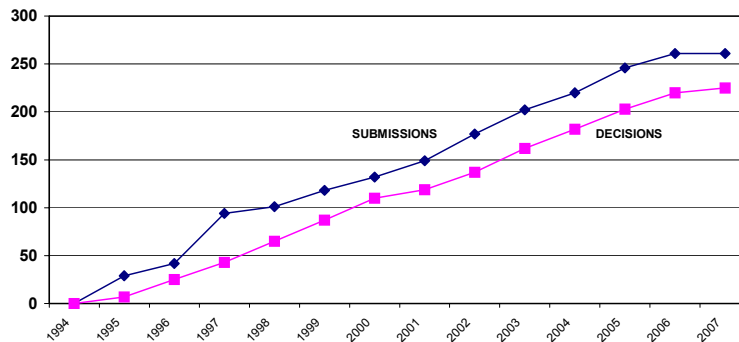
The Accreditation Process Today - April 2007 V - Accreditations carried out since 1994 (II)

Applications -	261
Accredited -	192
Non-Accredited -	33
In progress -	36



The Accreditation Process Today V - Accreditations carried out since 1994 (III)

ACCREDITATION OF ENGINEERING COURSES
(number of submitted courses and issued decisions)





Engineering Education and Transnational Co-operation What comes next?

- ☞ OE is fully committed to
 - ✓ Adapting to the **NEW DEGREE STRUCTURE**
 - ✓ **Quality Assurance**

- ☞ Articulation with the
National Accreditation System...

- ☞ Aiming at fulfilling our Statutory Obligation within this new paradigm of international and in particular European co-operation, of

Supporting and co-operating on the development of Engineering education in order to guarantee the highest standard for the Engineering profession



KEYWORDS

MOBILITY, CO-OPERATION, TRUST AND ACCREDITATION

- ☞ ‘We should not treat as equal what is different’
 - ✓ **MOBILITY** requires **TRUST**
 - ✓ **TRUST** requires **transparent and readable structures and professional qualifications**
 - ✓ **Transparency and Readability** mean **understanding and making the differences visible** -
 - **both in quality levels and profiles**
 - ✓ **Such requires Quality Assurance Standards and Procedures - accreditation through recognised Agencies**

- ☞ **Any initiative to be successful must have these keywords in mind**



Qualifications Framework

and the Directive for Professional Recognition

I - Qualification linked to Short Cycles - Art. 11, c) of Directive

- ☞ **Level of Qualification: Art. 11, c)**
 - **1 year of post-secondary course work + Professional Training $\geq Z$, with $Z=1$**
- ☞ **At least for the time being, in most countries, not leading to a recognised competence group of Engineering, though they are vital for the 'Engineering Act'...**
- ☞ **Let's identify them as Technicians**



Qualifications Framework

and the Directive for Professional Recognition

II - Two main levels of qualification - Art. 11, d) and e) of Directive

- ☞ **LEVEL 1 - Art. 11, d): (3-4)U + Professional Training $\geq Y$, with $Y=?$**
 - **First Cycle Degrees are the basis for achieving the qualification of Associate Engineer, or equivalent European designation**
- ☞ **LEVEL 2 - Art. 11, e): $\geq 4U$ + Professional Training $\geq X$, with $X=?$**
 - **Second Cycle Degrees are the basis for achieving the qualification of Engineer, or equivalent European designation**



Qualifications Framework

and the Directive for Professional Recognition

III - Two Profiles

- ☞ Two main engineering profiles
 - **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



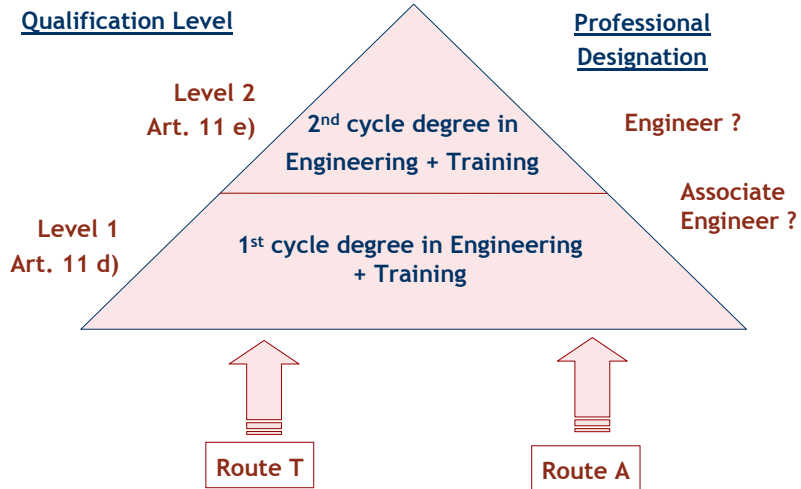
Academic Degrees and Recognition of Professional Qualifications

I - Offer of Programmes (I)

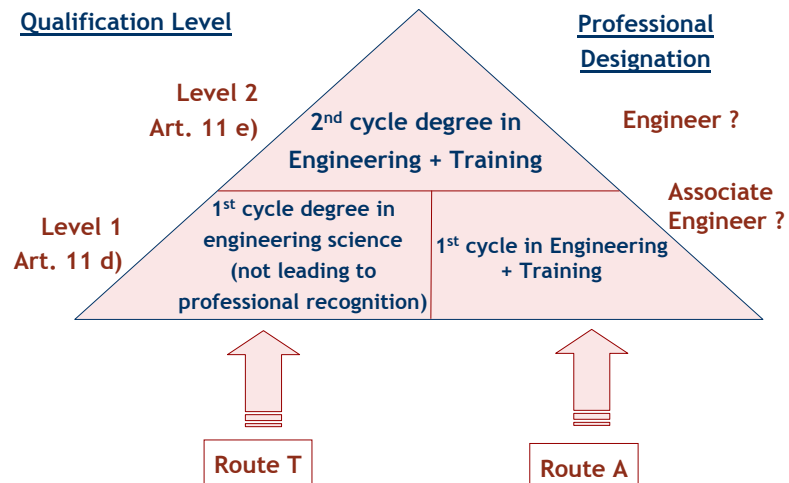
- ☞ Two-Tier and Binary System
- ☞ What in all is most relevant, and not so much spoken ☞
 - Increase the attractiveness of the offer in order to bring into the system students with different backgrounds and interests
 - Providing bridging programs
 - Implementing the concept of 'accumulated credits'
 - Creating a true offer for lifelong learning through complementary modules of (advanced) specializations courses



Academic Degrees and Recognition of Professional Qualifications II - Routes for the different qualification levels (I)



Academic Degrees and Recognition of Professional Qualifications II - Routes for the different qualification levels (III)





Academic Degrees and Recognition of Professional Qualifications III - Programme Outcomes for Accreditation (I)

- ☞ 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



Academic Degrees and Recognition of Professional Qualifications III - Programme Outcomes for Accreditation (II)

- ☞ Programme Outcomes must be evaluated in relation with the level of intervention in the Engineering Act
 - 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, the differences in requirements are mostly related with
 - **scope, depth and breath**



Academic Degrees and Recognition of Professional Qualifications III - Programme Outcomes for Accreditation (III)

- ☞ Programme Outcomes for Accreditation of Second Cycle Degrees
 - ✓ Whatever the programme and profile, be it an 'Integrated Programme' (?) or First-Second Cycle Degree, we must evaluate Integrated Outcomes
 - ✓ We are not going to accredit the part corresponding to '120 ECTS'...
- ☞ Programme Outcomes for First Cycle Degrees
 - ✓ In Integrated or 'more theoretically oriented profiles' the 'First Cycle within these programmes' may not meet the requirements for accreditation
 - ✓ First Cycle Degrees for 'more applications oriented programmes' must aim at satisfying such requirements



Academic Degrees and Recognition of Professional Qualifications IV - The EUR-ACE Project (I)

- ☞ European Project of significant relevance, that aimed at establishing an European System for Accreditation of Engineering Education programmes
 - ✓ 14 European Institutions, among them the Portuguese Institution of Engineers, Portugal
 - FEANI, SEFI, CESAER, EUROCADRES, ENQHEEI, ASIIN, CTI, IEI, CoPI, UNIFI, OE, UAICR, RAEE, EC-UK
- ☞ The EUR-ACE Project was concluded in 2005 and has established:
 - ✓ Standards for Second Cycle degrees, viewed in an integrated perspective
 - ✓ Standards for First Cycles



Academic Degrees and Recognition of Professional Qualifications IV - The EUR-ACE Project (II)

- ☞ The EUR-ACE project has led to the creation in February 2006 of an European Association
- ✓ The ENAEE - European Network for Accreditation of Engineering Education
- ☞ The ENAEE is responsible for maintaining and awarding the EUR-ACE label
- ☞ 6 European Agencies are currently accredited for awarding the EUR-ACE Label
- ✓ Institution of Engineers, Portugal is one such Agency and is now preparing its accreditations



The Accreditation process - preparing the future I - New Approach and Methodological Guidelines (I)

- ☞ **New Accreditation System in final testing phase**
 - ✓ 3 pilot projects running
 - ✓ In agreement with EUR-ACE Guidelines
- ☞ **New fresh approach**
 - ✓ By requisites (16 criteria)
 - ✓ Focused to the professional practice
 - ✓ Evaluation on the basis of evidence
 - ✓ Emphasis on quality improvement
 - ✓ Follow-up of the quality plan of programmes
 - ✓ Obeying EUR-ACE standards and procedures
 - ✓ Seeking accreditation of OE by ENAEE



The Accreditation process - preparing the future I - New Approach and Methodological Guidelines (II)

☞ The 16 Requisites

REQUISITE 1 - LEGITIMACY OF THE COURSE OPERATION	REQUISITE 9 - STANDARD OF TEACHING
REQUISITE 2 - ORGANISATION OF THE APPLICATION PROCESS	REQUISITE 10 - INVOLVEMENT OF THE TEACHERS IN THE RUNNING OF THE COURSE
REQUISITE 3 - STRATEGY OF THE HIGHER EDUCATIONAL INSTITUTION WITH REGARD TO THE COURSE UNDER CONSIDERATION	REQUISITE 11 - ADMISSION, MONITORING AND EVALUATION OF THE STUDENTS
REQUISITE 4 - COURSE DEVELOPMENT	REQUISITE 12 - EVALUATION OF THE COURSE BY STUDENTS, RECENT GRADUATES AND EMPLOYERS
REQUISITE 5 - COOPERATION WITH OTHER INSTITUTIONS	REQUISITE 13 - SUITABILITY OF PREMISES
REQUISITE 6 - RANGE OF THE COURSE AND SPECIFIC SKILLS	REQUISITE 14 - PEDAGOGIC FACILITIES
REQUISITE 7 - CURRICULUM STRUCTURE AND PEDAGOGIC PROGRAMME	REQUISITE 15 - COURSE MONITORING
REQUISITE 8 - DESCRIPTION OF THE THEMES TAUGHT AND ACADEMIC ACTIVITIES	REQUISITE 16 - EFFECTS OF OTHER EVALUATIONS AND THE QUALITY ASSURANCE PLAN



The ENGCARD I - Useful tool for improving mobility, only if...

- ☞ FEANI's and EUROCADRES Proposal
- ☞ A committed professional qualifications passport
- ☞ The proposed Engineering Professional Card may be very useful for **MOBILITY** in as much as it is linked to concise and transparent information.
- ☞ Its first design needs improvement...



The ENGCARD

II - Proposal for improvement of its contents (I)

- ☞ Ensuring recognition of qualifications is the basis for
 - ✓ Enhancing mobility and....., through that, gaining in credibility
- ☞ The current general design of ENGCARD looks positive in summarizing information
- ☞ ENGCARD should however lead to more detailed information with reference to qualifications framework and quality assurance
 - ✓ Level of qualification, including learning outcomes and related workload
 - ✓ Profile
 - Training in practical and applications engineering
 - Training in conceptual engineering
 - ✓ Accreditation labels received
 - ✓ Specialization areas
 - ✓ Etc.....



The ENGCARD

II - Proposal for improvement of its contents (II)

- ☞ A possible improvement should be to include information directing the interested User to a database
- ☞ A code field could be inserted in ENGCARD for each line of the engineering degrees awarded to the card holder, for identification of the degree programme through a code with appropriate structure (a 5-digit code seems to me would be enough and appropriate)
- ☞ FEANI should create and maintain a database of academic courses and degrees, identified by these codes, to be accessed with a password through the Internet,
 - ✓ where these courses/degrees would be concisely characterised (in profile, outcomes, ECTS dimension, basic contents, type of accreditation awarded, etc.).



Institution of Engineers, Portugal In All...

☞ OE is fully committed to the future

- ✓ Fulfilling our Statutory Obligation
- ✓ Within the new paradigm of international and in particular European co-operation
- ✓ Adapting and totally committed to the Criteria of Quality Assurance and to the Guarantee of the highest standard for the Engineering profession



Routes for the Future

☞ Europe will progress through transnational co-operation and mobility

☞ Transnational co-operation and professional mobility require TRUST

☞ The mechanisms to build and consolidate such TRUST are indeed slowly, but steadily, being implemented in our professions - **THE ENGCARD IS ONE SUCH EXAMPLE**

☞ Within the diversity of our cultures and traditions, and with the corresponding healthy difficulties, the common future of Europeans is being built...