Let me start with the definition used by ENAEE & EUR-ACE:

**Accreditation of an [Engineering] Education Programme** is the result of a process to ensure suitability of programme as entry route to the [engineering] profession, by means of:

- Periodic assessment against accepted standards
- Peer review of written and oral information by trained and independent panels including academics and professionals
- Accreditation of programme, not of Department or University
- Accreditation of education, not of whole formation

Thus, the Quality of accredited degrees is guaranteed at all “levels”
But this definition may be controversial and give rise to misunderstandings: it must be qualified.

Then, how can we qualify the **Accreditation** given in accord to this definition?

**Academic accreditation**, because it regards “education” only?

NO, because it refers to the programme as entry route to the engineering profession

Then, “**professional accreditation**”?

NO, because it does not include all that is necessary to be professionally qualified.

I would therefore suggest to call it

**Pre-professional Accreditation**

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**Anyway, accreditation** of educational programmes as entry route to a profession (i.e. pre-professional accreditation) has been proved to be a powerful tool to improve at the same time academic quality and relevance for the job market.

*At present, accreditation of engineering programmes is widespread throughout the world, but historically Europe has been in the forefront, although different words have been and are used....*

Indeed, the word accreditation was not used in European specialized literature and documents until the late 1990s, when it came from American usage.
But even if different words were and are used, Europe has pioneered engineering accreditation...

In France the word used for formal accreditation is “habilitation”: it is the main task of the “Commission des Titres d’Ingénieur” (CTI), established by law since 1934 with representatives of academia, employers and social stakeholders.

In the UK a similar role has been played since the 19th Century by the Professional Institutions of the different engineering branches (disciplines): hence, in the UK accreditation was (and is) distinguished by branch. In 1981 the overarching Engineering Council (EngC) was established to coordinate and ensure quality and consistency among the Institutions.

Many more examples have been added to these two, and today accreditation of Engineering Education is in force in a great and increasing number of European countries, but its significance and procedures, and even the word by which it is denoted, vary greatly from one country to the other.

Note that recognition of professional qualifications within the European Union and consequent mobility of professionals is guaranteed since 1989 by “Directives” (= European laws): a new Directive on Recognition of Professional Qualifications was approved in September 2005 and is currently in force.

On the other hand, the “Bologna process” is establishing the 47-countries “European Higher Education Area” (EHEA), ensuring transparency, compatibility and quality of academic degrees, but is not concerned with “pre-professional accreditation”.
Because of all this, Europeans still encounter significant difficulties in recognition of academic and professional qualifications, hence in trans-national mobility as students and graduates.

The EUR-ACE adventure began with three European “Thematic Networks” (TNs) on engineering education, and their work on trans-national recognition of engineering education:

- **H3E “Higher Engineering Education for Europe”** (1996/99); Working Group 2 “Quality and Recognition in Engineering Education”
- **E4 “Enhancing Engineering Education in Europe”** (2000/04); Activity 2: Quality Assessment and Transparency for Enhanced Mobility and Trans-European Recognition

These TNs have been followed by a series of projects specifically devoted to the **European accreditation** of engineering programmes:

- **EUR-ACE (2004/06)**
- **EUR-ACE IMPLEMENTATION (2006/2008)**
- **PRO-EAST (2006/07)**
- **EUR-ACE SPREAD (2008-2010: current)**

In short, the basic motivation of these projects was the lack of a European accreditation system of engineering education accepted on the continental scale.
The EUR-ACE accreditation system was envisaged by the EU-supported EUR-ACE project (2004-06) to make up for the lack of a European accreditation system of engineering education accepted on the continental scale.

To implement the EUR-ACE system, the European Network for Accreditation of Engineering Education (ENAEE) www.enaee.eu was founded in February 2006 by 14 concerned Associations.

Two main outcomes of the EUR-ACE project:

a) a synthesis of existing national Standards:

**EUR-ACE Framework Standards for the Accreditation of Engineering Programmes**

b) a proposal for the Organization and Management of the **EUR-ACE Accreditation System**

The European Network for Accreditation of Engineering Education (ENAEE) has started in 2007 to implement the accreditation system envisaged by this proposal.
KEY POINTS agreed during the EUR-ACE project:

• NOT an European “Directive”
• NOT an European Accreditation Board
• A bottom-up agreement towards a decentralized accreditation system in which National (or Regional) Agencies would play a major role
• EUR-ACE-accredited programmes would satisfy a common set of Standards (EUR-ACE Framework Standards).
• The EUR-ACE accreditation would distinguish between FIRST CYCLE and SECOND CYCLE DEGREES, in accord with the European Qualification Frameworks.

The EUR-ACE Framework Standards, that were compiled as a “synthesis” between existing national Standards, specify the Programme Outcomes to be satisfied. They:

• Are valid for all branches of engineering and all profiles
• Distinguish between First and Second Cycle programmes, as defined in the European Qualification Frameworks
• Are applicable also to “integrated programmes”, i.e. programmes that lead directly to a Second Cycle degree
• Describe the abilities that the graduates must achieve but not how they should be taught
• Can accommodate national differences of educational and accreditation practice
The EUR-ACE® Standards distinguish between First cycle (FC) and Second Cycle (SC) degrees, and identify 21 programme outcomes for First Cycle degrees and 23 for Second Cycle degrees, grouped under six headings, namely:

- Knowledge and Understanding
- Engineering Analysis
- Engineering Design
- Investigations
- Engineering Practice
- Transferable (personal) Skills

For each heading the Outcomes of First Cycle and Second Cycle degrees are specified.

A short paragraph introduces the Programme Outcomes of each group:

Knowledge and Understanding

The underpinning knowledge and understanding of science, mathematics and engineering fundamentals are essential to satisfying the other programme outcomes.

Graduates should demonstrate their knowledge and understanding of their engineering specialisation, and also of the wider context of engineering.
Example of Programme Outcomes in the EUR-ACE Standards (2)

Knowledge and Understanding

First cycle
- Knowledge and understanding of the scientific and mathematical principles underlying their branch of engineering.
- A systematic understanding of the key aspects and concepts of their branch of engineering.
- Coherent knowledge of their branch of engineering including some at the forefront of the branch.
- Awareness of the wider multidisciplinary context of engineering.

Second cycle
- An in-depth knowledge and understanding of the principles of their branch of engineering;
- A critical awareness of the forefront of their branch.

The “Guidelines for Programme Assessment” specify that each programme must be consistent with legal national requirements and have in place:

- programme educational objectives and programme outcomes consistent with the mission of the Higher Education Institution, the needs of all stakeholders, and the EUR-ACE® Framework Standards;
- a curriculum which ensures achievement of the programme outcomes;
- academic and support staff, facilities, financial resources and cooperation agreements (with industry, research institutions etc.) adequate to accomplish the programme outcomes;
- appropriate forms of assessment which attest the achievement of the programme outcomes;
- a management system able to ensure the systematic achievement of the programme outcomes and the continual improvement of the programme.
Correspondingly, the EUR-ACE® Framework Standards require the assessment of a programme to consider at least the following items:

• 1. Needs, Objectives and Outcomes;
• 2. Educational Process;
• 3. Resources and Partnerships;
• 4. Assessment of the Educational Process;
• 5. Management System

and for each item specify the criteria to be assessed.

But, how does the EUR-ACE® accreditation system work?

• National (or Regional) Agencies accredit EE programmes;
• If the Agency satisfies appropriate Quality requirements, and the accredited programmes satisfy the EUR-ACE Framework Standards, the EUR-ACE® quality label can be “added” to the national accreditation, thus giving it an international value.
• The EUR-ACE® label distinguishes between FIRST CYCLE and SECOND CYCLE DEGREES, in accord with the European Qualification Frameworks.
• “Integrated (long) Programmes” can be awarded the SC label

The last points characterize the EUR-ACE system in accord with the “Bologna” approach, and allows to define it “European Accreditation ...”
Sample
EUR-ACE®
Label Certificate:
the relevant programme is
designated as a
FIRST [or SECOND] CYCLE
EUROPEAN-ACCREDITED
ENGINEERING programme;
the respective graduates
can call themselves either
EUR-ACE® Bachelor
or
EUR-ACE® Master

ENAEE, proprietor of the EUR-ACE® trademark, authorizes
National Agencies to award the EUR-ACE® (FC and/or SC) label.

Today (May 2010) seven “Agencies” are
authorized (EUR-ACE-accredited):

Since November 2006 (renewed December 2008):
• ASIIN (Accreditation Agency for Study Programs in Engineering,
  Informatics, Natural Sciences and Mathematics), Germany
• CTI (Commission des Titres d’Ingénieur), France
• Engineers Ireland
• RAEE (Russian Association for Engineering Education)
• Engineering Council, United Kingdom
• Ordem dos Engenheiros, Portugal
Since January 2009:
• MÜDEK (Association for Evaluation and Accreditation of Engineering
  Programs), Turkey
As of April 2010, 474 awarded EUR-ACE labels appear on the ENAEE website:

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* Several more labels have been awarded but not yet included in the database

To avoid misunderstandings, let me make clear that the EUR-ACE label has no “legal” value: however, it is fair to say that its significance and weight are rapidly increasing.

FEANI (European Federation of Natl. Engineers’ Association) includes automatically the EUR-ACE-accredited programmes in its INDEX of “recognized” engineering programmes.

FEANI has included the development of EUR-ACE in its Strategic Plan 2009-2012

The EUR-ACE label should be recognized as the basic academic qualification in the European Professional Engineering Card currently under study by a number of Engineers’ Associations.
The EUR-ACE® label is quoted in an official European Commission Report (September 2009) as an example of good practice in QA:

![Image of EUR-ACE label]

**Good practice**

The EUR-ACE label in engineering exists at the bachelor and master level. Standards were defined at European level, but are applied through national quality assurance agencies that are authorised to issue EUR-ACE “labels” together with their national accreditation. Several hundred labels have already been awarded, but they are still available from only seven national agencies.”

The EUR-ACE® label is quoted also in a EU publication issued for the “Bologna Anniversary Conference”, March 2010:

![Image of EUR-ACE label in engineering]

Page 8:

The Commission is supporting the development of a series of subject-specific European quality labels, which could/may lend their standards to existing agencies or become agencies in their own right. Examples include the EUR-ACE label in engineering and the Eurobachelor, Euromaster and Eurodoctorate labels in chemistry.
The EUR-ACE® label is quoted also in a EU publication issued for the “Bologna Anniversary Conference”, March 2010:

**EUR-ACE Implementation and the EUR-ACE Label**

This project has elaborated a European system of accreditation of engineering programmes at the first and second cycle level. Training of international accreditation experts and the award of the EUR-ACE labels are among the project outcomes.

The initial core of the EUR-ACE system includes seven countries [France, Germany, Ireland, Portugal, Russia, Turkey, UK] with very different educational and professional systems.

Consequently, a great variety can be noted also in the types of organizations participating in the EUR-ACE system:

- professional organizations (OE/PT, EngC, Engrs.Ireland),
- engineering education societies (RAEE),
- National accreditation body (CTI, MÜDEK)
- accreditation agency (ASIIN)

Although these seven countries are already a very significant sample of the 47 countries of the European Higher Education Area (EHEA), 4 within and 2 outside the EU, their number is very limited, and must increase !!!!
Several different ways will be/are being used to spread the EUR-ACE system beyond its initial core:

a) Any Agency accrediting Engineering programmes in the EHEA can apply to join the system. Also, a new National (or Regional) Engineering Agency can be established, possibly as a development of the alternatives below.

b) A “general” QA/Accreditation Agency can join the EUR-ACE system for what pertains to accreditation of engineering programmes, provided in this they satisfy the EUR-ACE Framework Standards. We are working towards this aim with the Romanian ARACIS, the Lithuanian SKVC, the Swiss OAQ. The “Netherlands and Flanders Accreditation Organization” NVAO has already applied to be authorized, and the procedure should be concluded in a few months.

c) Some of the present EUR-ACE Agencies (CTI, EngC, RAEE) already accredit programmes outside their own country: they have been authorized to award the EUR-ACE label also in such cases. EUR-ACE labels have been awarded to a few FC Swiss programmes; and this will allow to start spreading the system in French-speaking Belgium (CTI), in Kazakhstan (RAEE), etc.

But EUR-ACE has already started to “spread”:

- Turkey [MÜDEK] has been included in January 2009.

The current EUR-ACE SPREAD project (2008-2010) aims specifically at four more countries:

- Italy [Italian partner: CoPI]
- Lithuania [Lithuanian partner: SKVC]
- Romania [Romanian partner: ARACIS]
- Switzerland [partner: SUPSI, supported by an ad-hoc grant of the Swiss Government]

But other countries are not excluded from current efforts...

I have already quoted NETHERLANDS & FLANDERS, and can add POLAND, DENMARK, FINLAND...
Another EU-supported 3-year project, coordinated by the University of Florence has started in November 2009:

**EUGENE**

(EUropean and Global ENgineering Education)

with the objective of “improving the impact of European Engineering Education (EE) on competitiveness, innovation and socio-economic growth in a global context”

A whole “Activity Line” of EUGENE, lead by ENAEE, is aimed at “improving trans-national mobility of engineering students, graduates and professionals, also through contacts and synergies with the International Engineering Alliance and the Washington Accord”.

It is therefore expected that EUGENE will contribute to further strengthening and spreading of EUR-ACE.

The EUR-ACE Standards, like all modern ones, do not prescribe a “curriculum” but rather describe “outcomes” (“learning outcomes” or “programme outcomes”), i.e. the abilities that the graduates must achieve.

The Directorate for Education of the worldwide Organization for Economic Cooperation and Development (OECD) has launched a very ambitious initiative on the Assessment of Higher Education Learning Outcomes (AHELO)

The aim is “assessing Learning Outcomes on an international scale by creating measures that would be valid for all cultures and languages”.

A special focus is placed on Engineering and Economics.

ENAEE intends to be active, either directly or through individual “experts” and/or EUGENE, in all stages of this OECD initiative.
The outcomes of a pilot initiative within AHELO were finalized in May 2009:

**AHELO-Tuning**

**Conceptual Framework of Expected/Desired Learning Outcomes in Engineering**

and an analogous Framework for Economics.

The **Engineering Framework** is essentially a merging of the EUR-ACE Programme Outcomes for First Cycle Degrees and the ABET Criteria for accrediting engineering programs (and is compatible with other relevant Standards).

Summing up, ENAEE is creating a two-tier system of European-accredited engineering programmes.

Variants to accommodate specific national needs and/or additional qualifications (e.g. for specialized degrees or specific profiles) are not excluded.

Indeed, the EUR-ACE label is an “addition” to a national accreditation, and can be regarded as a quality guarantee of an accepted common basis to programmes providing an entry route to the engineering profession.

The experience of national accreditation bodies, old-established in several European countries, is fully exploited.

This approach and the essential distinction between FCD and SCD make the EUR-ACE system at the same time flexible and simple and should allow it to be spread world-wide.

Third Cycle (Doctoral) and Continuing Education are not (yet) considered.
On the global scale, different “accords” and “registers” exist and are grouped into the International Engineering Alliance (IEA):

- Washington Accord
- Sydney Accord
- Dublin Accord
- EMF International Register of Professional Engineers
- ETMF International Register of Engineering Technologists
- APEC Register of Professional Engineers

These accords/registers introduce a fundamental differentiation/barrier between “Professional Engineers” and “Engineering Technologist” while all recognized (accredited) Engineers’ degrees are defined “Bachelor”.

These features are not in EUR-ACE nor in the spirit of any “European” document (European Qualification Frameworks, EU Directive 2005/36 on recognition of Professional Qualifications,...)

The discussion concerning worldwide recognition of standards is currently very much open. ENAEE and IEA are tackling it together...

We feel a growing worldwide interest in the systematic EUR-ACE accreditation of engineering programmes as either

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<tr>
<th>FIRST CYCLE (Bachelor) Degree</th>
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<td>or</td>
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<tr>
<td>SECOND CYCLE (Master) Degree</td>
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Any Agency that accredits engineering programmes in any country throughout the world and is interested in this approach can apply and join the EUR-ACE system.

An ad-hoc Application Form is available on [www.enae.eu](http://www.enae.eu) [ENAEE documents].
In the meantime, Higher Education Institutions throughout Europe and the world that want the EUR-ACE FC or SC Label for one or more of their engineering programmes while no EUR-ACE Agency exist in their country, can apply through one of the EUR-ACE Agencies, following its procedure.

Alternatively, they can contact directly the ENAEE Secretariat, that will direct them to one of the Agency.

ENAEE intends to facilitate such initiatives, but is even more interested in a systematic spread of EUR-ACE within and outside the European Higher Education Area (“Bologna process”).

For up-to-date information on EUR-ACE system, EUR-ACE Standards, related documents & publications, instructions on applications, etc. visit

www.enaee.eu

or contact me

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