Evolution and trends of engineering education in France

Paris, 03-06-2010

1. Context: The EHEA and the Bologna Process
2. Engineering profession and education in France
3. CTI: missions and activities (focus on international missions)
4. Characteristics and evolution of the “Diplôme d’ingénieur”
5. Some current trends

Context: The EHEA and the Bologna Process

1999

The Bologna Declaration

- ***Ministers of education of 29 countries***
- **Aim:**

  To create a **European Higher Education Area (EHEA)** based on international cooperation and academic exchange that is attractive to European students and staff as well as to students and staff from other parts of the world.

The content of the reform:

1. **Easily readable and comparable degrees organised in a three-cycle structure (e.g. bachelor-master-doctorate)**
2. **Quality assurance in accordance with the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG).**
3. **Fair recognition of foreign degrees and other higher education qualifications in accordance with the Council of Europe/UNESCO Recognition Convention.**

2010

Official launching of the EHEA (47 countries)

After 10 years of bianual ministerial conferences and regulatory changes in all participating countries.

Context: The EHEA and the Bologna Process. Participating countries

- Albania
- Andorra
- Armenia
- Austria
- Azerbaijan
- Belgium
- Bosnia-Herzegovina
- Bulgaria
- Croatia
- Cyprus
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Georgia
- Germany
- Greece
- Holy See
- Hungary
- Iceland
- Ireland
- Italy
- Kazakhstan
- Latvia
- Liechtenstein
- Lithuania
- Luxembourg
- Malta
- Moldova
- Montenegro
- Netherlands
- Norway
- Poland
- Portugal
- Romania
- Russian Federation
- Serbia
- Slovak Republic
- Slovenia
- Spain
- Sweden
- Switzerland
- "the former Yugoslav Republic of Macedonia"
- Turkey
- Ukraine
- United Kingdom

Context: The EHEA and the Bologna Process. Engineering Education

- Common european framework for programme outcomes

- Academic and professional mobility

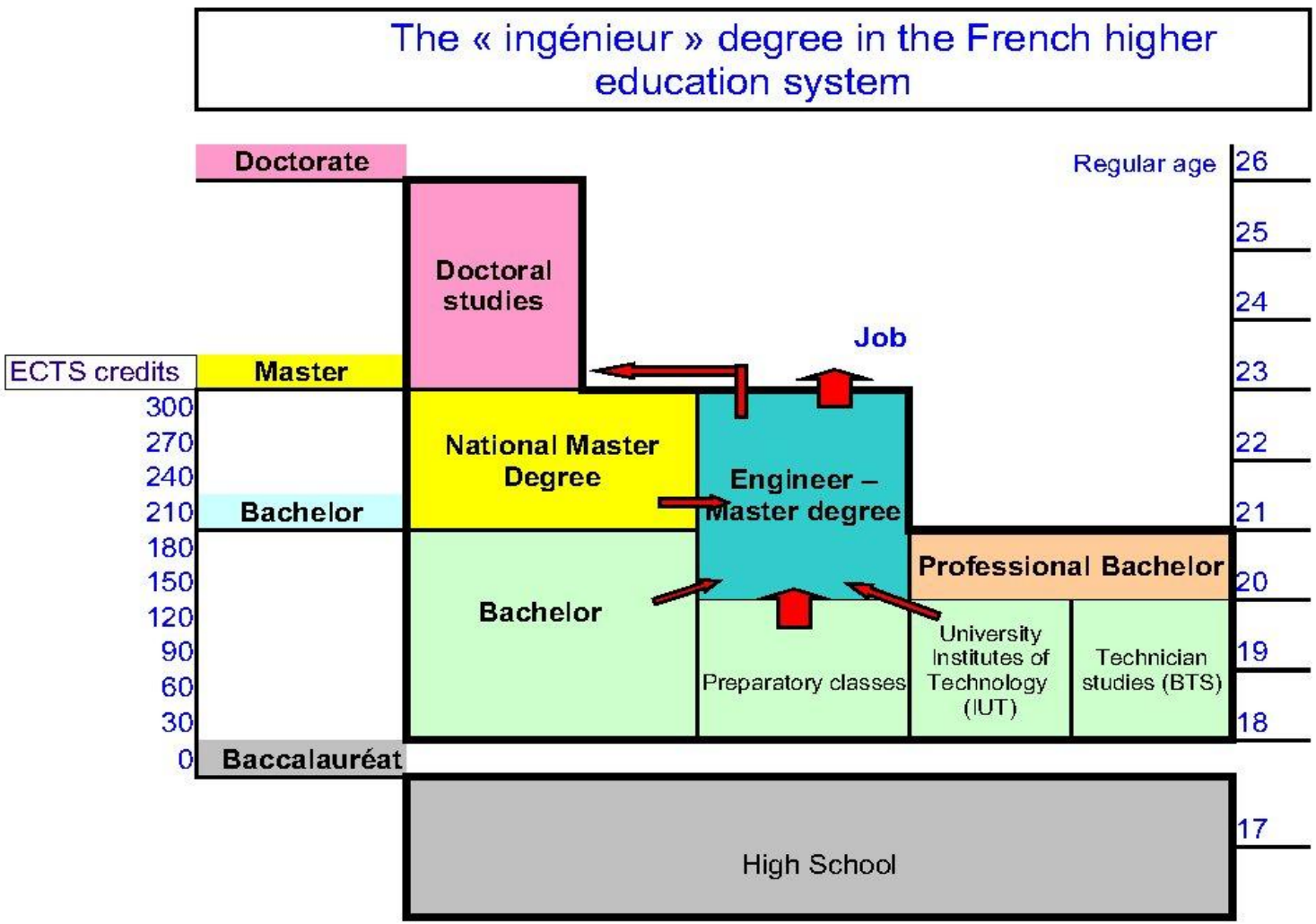
Very different regulations in different countries

- **France: Not regulated**
- **UK: partially regulated**
- **Spain, Italy: Very regulated, etc.**

Engineering degrees: entry acces to the engineering profession

Mutual recognition of decisions of accreditation

The French HE System and the Engineering Degree



Some facts on engineering and engineering education in France

- Engineering profession is not protected in France (not regulation; not an order of engineers)
- But, the “Titre d’ingénieur diplômé” is protected by law.
- All engineering programmes must be periodically assessed by CTI (generally, every 6 years)
- More than 200 accredited institutions in France
  - ✓ Engineering schools (grandes Écoles) and internal schools to universities
  - ✓ Public and private
- More than 30 000 graduates every year in France
- More than 600 000 graduates from accredited institutions
- Around 60% of engineers in France are “ingénieurs diplômés”.

Missions of CTI

(Commission des Titres d'Ingénieur) is an independent body established by the French law in 1934. It is in charge of the evaluation of all french engineering programmes. It contributes to the development of quality in engineering education, and to the promotion of the french engineering diploma and the french engineering profession in France and abroad.

Missions

Quality assurance and improvement of engineering education and protection of the french engineering diploma (5 year integrated degree;Master level)

International promotion and integration of french engineering programmes in the European Higher Education Area.

Functional structure

PLENARY ASSEMBLY

32 **members, mixed composition**

16 members from **academia**

16 members from i**ndustry**

→ MAIN DECISORY ORGAN

Functional structure

EXECUTIVE COMMITTEE

10 members

1 president
2 vicepresidents
7-8 other members CTI
(in charge of specific missions)

Institutional relations
Strategy and management
Planning of evaluation campaignes
Selection of experts

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MAIN DECISORY ORGAN

WG1
International

WG2
Quality

WG3
Engineering education

WG4
Procedures and rules

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WG3 Engineering education

WG4 Procedures and rules

Quality management International relations (1p)

ministère éducation nationale enseignement supérieur recherche

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

Administrative service (2 p)

Administration and secretariat (1 p)

Activities

1. Definition of standards and evaluation criteria for engineering education in France. Counselling and advice on all issues related to the engineering education and profession
2. National evaluation (all engineering programs- public and private)
3. International evaluation (upon demand)
4. Active collaboration with major higher education actors at an international level (quality agencies, knowledge networks, higher education institutions…)

International evaluation

- Upon demand of the foreign institutions
- Accreditation of programmes in Europe (Belgium, Switzerland, Bulgaria, …) and overseas (China, Viet Nam, Lebanon, Morocco, Burkina-Fasso,...)
- Accreditation missions in China:
  - École Centrale Pékin (Beihang University)- June 2010
- Motivations:
  - Foreign branch of French institutions
  - Institutions interested in delivering an engineering diploma recognized by the French government (national habilitation)
  - Institutions interested in being assessed and advised by an engineering specific quality agency
  - Institutions interested in the EUR-ACE label

International evaluation

Accreditation procedure

- Self-evaluation: the institution writes its self-evaluation report.
- On-site visit: an audit team visits the institution to assess its self-evaluation.
- Evaluation report (audit team).
- Final decision (CTI's plenary assembly). Possible decisions:
  - No accreditation
  - Full accreditation for 6 years with recommendations
  - Accreditation for 3 years or less when major problems detected

International Activities

Active collaboration with major higher education actors at an international level

ENQA
EUROPEAN ASSOCIATION FOR QUALITY ASSURANCE IN HIGHER EDUCATION

- Full member since 2005

eca european consortium for accreditation

- Founding Member 2005.
  Mutual Recognition Agreements (OAQ, NVAO)

EUR-ACE®
Accreditation of European Engineering Programmes

- Founding member 2000

(one of the 7 institutions that can deliver the EUR-ACE label)

International Activities

Active collaboration with major higher education actors at an international level

- Agreements with Canada (2006). Mutual recognition agreement of engineering professionals.
- Collaboration with the ENIC-NARIC networks (European Network of Information Centers and National Academic Recognition of Information Centers)

Characteristics and evolution of the french engineering diploma

Main characteristics

MASTER LEVEL, 300 ECTS (5 years),

- **A strong and broad basis in fundamental sciences in order to guarantee analytical competences and the capacity for adjusting in the long term the demanding evolutions of the engineering and management activities.**
- **The engineering sciences provide a guarantee of efficiency and quick adaptation to a professional activity (experience and flexibility to adapt to multiple professional environments and activities).**
- **Engineering education includes an innovation and research dimension.**
- **Business culture and economic, social, human, environmental ethics awareness. This could be achieved by means such us partnerships of the higher education institutions with the profession, involvement of professionals in training, internships in industry or entrepreneurship initiatives.**
- **Communication skills and international awareness, which could be achieved through international partnerships, intercultural experiences, evaluation and training of language skills, joint degree agreements.**

Evolution

- First engineering degrees created in the XVIIIth century in order to respond to societal and economic demands.
- Different stages:

1. Engineering schools created by the State (From mid 1600 to 1829)
2. Engineering schools created to answer the needs of the industrial revolution (1829-1960)
3. New trends (1960- current moment)

Evolution

1. Engineering schools created by the state (1600-1829)
   - Objective: To create technitians (specific) able to reason about their technics (analytic capacity)
   - Disciplines: naval engineering, civil engineering, mines, military, forestry engineering.

2. Engineering schools created to answer to the needs of the industrial revolution(1829- 1960)
   - Objective: To answer to the needs of the industrial revolution.

     Engineer is in charge of **applying** the scientific advances to practices (he must have a wide scientific base);

     Big and complex civil projects and factories: need to be **managed** by professionals with technical knowledge.

     → **Generalistic professional**
   - Disciplines: Industrial engineering, mechanics, physics, electricity and electronics, chemistry,

Evolution

3. Contemporary age(1960- current moment)
   - Objective: To respond to the needs of an increasingly complex, dynamic and globalised society.

→ **Generalistic professional, able to adapt and innovate**

   - Disciplines: biological sciences, nano sciences, telecommunications and information systems, engineering management.

Some current trends

- Integration in the European Higher Education Area .
  - ECTS, Bachelor-Master system
  - Compatibility and specificity
- New methodologies and approaches
  - Approach competences
  - Apprenticeship
  - Long life learning and continuous education,
- Quality management and accreditation
  - National and international (EUR ACE, ABET)

Some current trends

Thank you

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