PRESENTATION OF SEFI

- It is the largest network of higher engineering institutions and of individuals involved in engineering education in Europe
- It has the mission to contribute to the development and the improvement of the engineering education in Europe
- SEFI wishes to contribute to the development and improvement of EE in Europe as well as to the improvement of the position of both EE in society and of the engineering professionals
The CDWG aims at providing a forum for people interested in the development of EE curricula in Europe.

The CDWG consists of people highly involved in all aspects of modern engineering education. Through sharing our experiences we all gain in insight and knowledge.

CDWG Members: Employers, Engineering students, Managers of HEI, Teachers
Two ways of designing educational curricula

✓ Input oriented
✓ Output/ learning oriented
Industry's recommendation for content in an Engineering Program

Depth of Qualification

- Thesis (Project) ~25%
- Application Base & Problem Solving Methodology ~25%
- Personal Skills ~15%
- Scientific Base ~30%
- Technology Base ~30%

Width of Qualification

- Industry Placement
TEACHING STYLES

Transfer
The teacher is the expert who transfers knowledge to the students

Guidance
The teacher guides the students towards a predefined goal

Shaping
The teachers shapes the students using an example or a mold

Growth
The teachers facilitates the student's independent development

✓ Source: de Graaff.
THE EDUCATIONAL ENVIRONMENT

- Self study
- Content oriented
- Exercises/tutorials
- Practical exercises
- Lectures
- Teacher controlled
- Student controlled
- POPBL
- Problem Based Learning
- Project-oriented Learning
- Learning by doing
- Cases

✓ Source: de Graaff
THE ROLES OF TEACHERS

The teacher as:
- Expert
- Designer
- Evaluator

- Explaining, answering questions and sharing his enthusiasm with the students
- Defines learning goals, chooses methods to stimulate the learning process
- Assess learning results, evaluates the effectiveness of the education

✓ Source: de Graaff
<table>
<thead>
<tr>
<th>Outcomes of education</th>
<th>Process of education</th>
<th>Stakeholders of education</th>
<th>Organisation for education (academic social world)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ultimate purpose</strong></td>
<td>International/national level</td>
<td>Society - incl taxpayers</td>
<td>Context (society, profession)</td>
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<tr>
<td>Sustainable society (social, economical and ecological)</td>
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<tr>
<td><strong>Values</strong></td>
<td>Institutional level</td>
<td>Students and family</td>
<td>System structures - rules, managing structures</td>
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<tr>
<td>Critical thinking, diversity, creativity, innovation, intellectual rigour, ethics</td>
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</tr>
<tr>
<td><strong>Engineering competences</strong></td>
<td>Curriculum (program) level</td>
<td>Working life - industry, professional bodies, practicing engineers, graduates</td>
<td>Praxis within the organization (what people do)</td>
</tr>
<tr>
<td>Integration and application of knowledge. Enabling skills (incl teamwork, communication)</td>
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<tr>
<td><strong>Technical knowledge</strong></td>
<td>Course (module) level</td>
<td>Higher education/university</td>
<td>Culture (what people say and think)</td>
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<tr>
<td>Conceptual understanding of content</td>
<td></td>
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<tr>
<td><strong>Learning activity</strong></td>
<td>School</td>
<td>Identity (who people are or see themselves)</td>
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</tbody>
</table>
TECHNOLOGICAL INNOVATION
INNOVATION

✓ Methods
✓ Contents

EVALUATION AND ASSESSMENT

✓ Of new methods
✓ Of curricula
✓ Of students
WHY TO INNOVATE?

As an answer to new requirements.

• Technical
• Economical
• Social
• Environmental
THE CYCLE OF EDUCATIONAL INNOVATION

The Innovation Cycle of Educational Practice and Research

- Educational Practice
  - identifies and motivates
  - which help improve
- Questions
  - Insights
  - which lead to
- Research
  - that results in

Adapted from Booth, Colomb, and Williams, 2008

Source: ASEE: Creating a Culture... (2009)
The European Reference Framework sets out the following competences:

- Communication in the mother tongue
- Communication in foreign languages
- Mathematical competence and basic competences in science and technology
- Digital competence
- Learning to learn
- Social and civic competences
- Sense of initiative and entrepreneurship
- Cultural awareness and expression
INNOVATIVE CURRICULA

- Use of new teaching/learning methods and technologies
- Flexible enough to address different students needs and learning demands
- Orientated towards life-long learning
- Holistic approach of curriculum development
- Development of competences
- Integrating industrial practice
INNOVATIVE METHODS IN ENGINEERING EDUCATION

- Active Learning
- Problem Based Learning
- Project Oriented learning
- Research Oriented Learning
- Work Integrated Learning
THANKS FOR YOUR ATTENTION