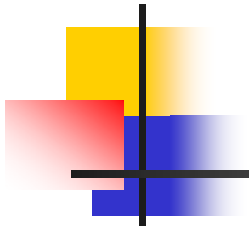
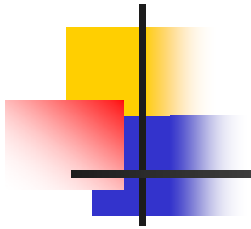


Engineering Academy of the Czech Republic

Selected topics on Engineering Education today and in future

The present international workshop is organized by EACR within the scope of the Euro-CASE platform Engineering Education



The Platform was established in 2009 under the leadership of Prof. Kopp from Acatech

In 2003-2011 the outputs of the Platfrom were 3 reports:

Final Report : Bologna Process

Final Report : Ranking in Engineering Sciences

Report : Inspiring the Young Generation

The reports were discussed at the session of the Euro-CASE Board of Directors and presented to representatives of member academies for application on their national level.

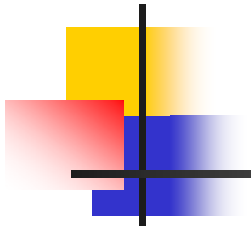
Engineering education was also dealt with at the annual Euro-CASE conference in Stockholm (2011) and CAETS in Budapest (2013)

Engineering Education and its impacts on the development of the society are at present a highly topical issue. It is dealt with in developed countries on various levels. However the achieved results, in a number of cases, differ.

The Euro-CASE Executive Committee approved further activity of the Platform and authorized EACR with its chairmanship. In 2013 and 2014 there were 2 sessions of the Platform Core Group in Prague and it was decided that the Platform should deal with two main topics:

- **Present state and future of engineering education**
- **How to increase the interest of the young generation and parents in engineering education (in relation with an older report)**

The national workshop with participation of rectors of all technical universities specified in detail issues which must be dealt with



- Specification of a vision how should engineering education develop in 10 years from now and what will be its role in the society
- Interest of young people in engineering education (not to be compared with the global interest in science, technology, engineering and mathematics – STEM)
- Contents , structure and comparison of individual fields of study, their flexibility and explicitness and related student and teacher mobility – effort to deal with a part of this issue is exerted by ENAEE (European Network for Accreditation of Engineering Education)
- Creation of a coherent educational system on all levels ranging from kindergartens up to universities.

Main selected issues (cont.)

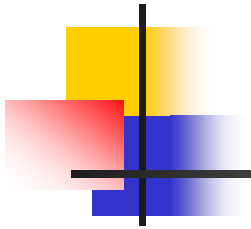
- Close relations of engineering education with industry
- Support of engineering education from the government from the aspect of assurance of competitiveness and requirements from industry (exploitation of EFQM – European Foundation of Quality Management)
- Potential cooperation on an international level

Participants of the Czech Round-Table Meeting arrived at a numebr of conclusions:

- The present system of funding Czech universities is based on the number of students.
- Funding of public technical universities must be increased in relation with the demand for highly qualified engineers and not the number of graduates
- Close relations of engineering education with industry
- Contact persons should be appointed for cooperation with industry. Student-university-industry contracts supported. A functional dialogue between Academia and industry should be established – a regular Discussion Forum of leading industrialists (leading managers from industry) and representatives from universities "Communitation – Dialogue project" (Jointly with Centres of Excellence).

Increasing interest in engineering education in the Czech Republic

- Support of advanced projects and activities of several technical universities in the Czech Republic aimed at educating children in technical disciplines – technically orientated kinder gardens, children universities, promoting and awarding technically orientated children projects.
- Support of technical education at primary schools, after-school hobby centers. In this respect to increase the number of qualified teachers teaching technical disciplines and to modernize curricula at teacher education colleges
- Involvement of families (mainly mothers) in the process of choosing children education and selection of their future profession



- I am convinced that this workshop will give answers to a number of issues from an international viewpoint.
- Sessions of national and international ograinzations, e.g. UNESCO, present further incentives on the transformation of engineering education. Let us now mention some of them

The role of engineers in society

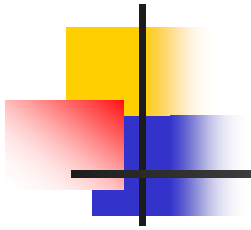
The technological aspect of dealing with problems is a necessary condition for the further innovative development of our society. Topical, effective and sustainable solutions depend above all on the quality of engineers. Their societal status increases rapidly. In spite of this some issues have to be considered. Why does the number of engineers decrease and who is responsible for this. What should be included in the curricula, what is the reaction of universities to necessary transformations, how will they be implemented and who will undertake them.

Structure of study programmes

- Engineering education must correspond with the requirements for this profession in the rapidly developing world and must combine engineering sciences and experience with application of advanced technologies. Education must be project-orientated and must have a comprehensive character. Basic curricula at the beginning of study need not be changed, students, however, must be attracted and motivated and led to be capable to analyze issues creatively, towards teamwork, to learn to communicate and to be responsible for maintaining ethical, environmental and also business attitudes.
- The educational system must also be orientated more on soft skills.

Study must be student-orientated and must support his interest

Study must be based on collective cooperation and emphasis laid on information and communication technologies. Knowledge must be exploited of teachers, older students, doctoral study students, engineers from industry and retired experts. Every student should have his/her own career plan. Technical information should be drawn from the internet, information technologies used for communication between students and professors, for presentation, assessment, calculations and concepts. Face-to-face contact, however, is still important.



Study must have a multidisciplinary character

Mathematical, scientific and engineering principles must be supported and exploited in investigating real engineering projects. Multidisciplinarity helps students in selecting their splecialization in later periods of their study and can appropriately support their interest in study.

Newly prepared programmes must be implemented in close cooperation with key stakeholders

Real interconnection is necessary between universities and the sphere of implementation, even on a regional level including funding. E.g.CTU in Prague is establishing an intelligent web. application. Transformations must start in the understanding of industry and fields of technology on the level of the whole society.

The role of universities

- Universities must basically serve for education, science and research and numerous activities orientated outside the university
- Included can be lifelong education, commercialization of science and research, information and consultancy services and participation in public life. Attention must be paid to all of these areas, however , nobody, except universities, will deal with the issue of education, its content and quality. They are fully responsible for curricula, the process of teaching and shaping students, assessment of graduates.
- Cooperation on a national and international level is necessary with professional engineering organizations , e.g. the Engineering academy of the Czech Republic. This is why these topics are now dealt with.

What can be done to support the development of engineering education

- Universities must be flexible in performing necessary transformations
- Support provided from the government and industry
- High-quality accreditation
- Reform of legislation
- Enhance the role of employers in preparing and executing curricula
- Support of interdisciplinary
- Support of entrepreneurship
- Interconnection of educational and scientific/research both in content and funding

I hope the present workshop will be beneficial to all participants and to Euro-CASE.

Thank you for your kind attention