



HOME COMMITTEES SUBMISSION REGISTRATION PROGRAM MORE... [PTI]

Engineering education 2030

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United Nations Educational, Scientific and Cultural Organization
Aalborg University
Aalborg Centre for Problem Based Learning in Engineering Science and Sustainability under the auspices of UNESCO

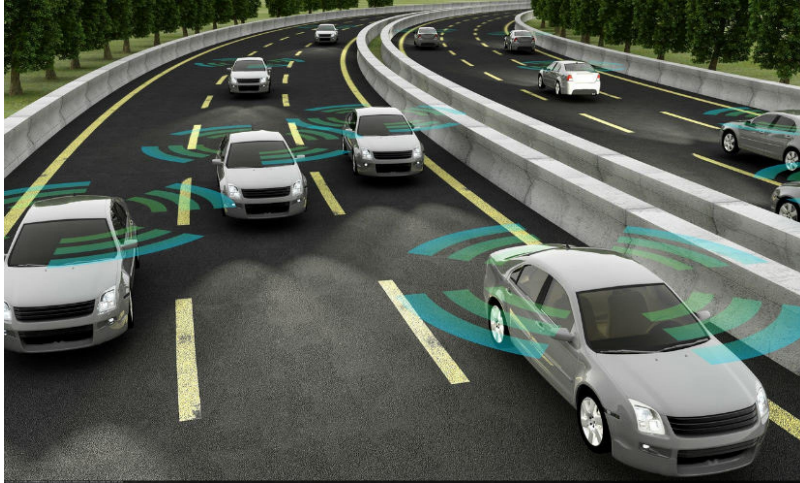


Anette Kolmos

Challenges for engineering education – Better and more

- **Better engineers**
 - Outdated knowledge?
 - Industry 4.0 and industrial revolution
 - Sustainable Development Goals (SDG)
- **More engineers** and higher level of technology competences in the population
- **Response from engineering education** - Slow change – at a course level and not at system level - but we see emerging models 😊
- **Life long learning or disrupted universities?**

Do we prepare our students?



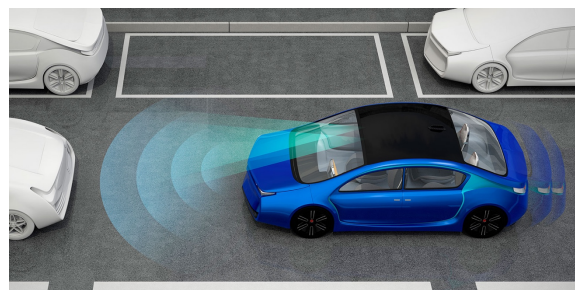
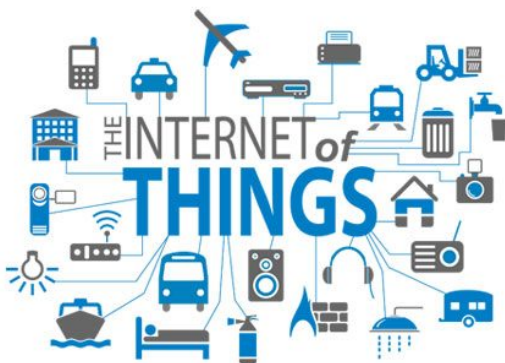
Todays' problems
 Known solution
 Intelligent traffic regulation

Todays' problems
New solution
Virtual traffic regulation

Tomorrows' problems
Tomorrows solution
Autonomous cars and
adaptive cruise control

Internet of things - Big data – cloud computing

Digitalisation and computerisation are fundamental premises integrated in all activities – and digital skill are vital



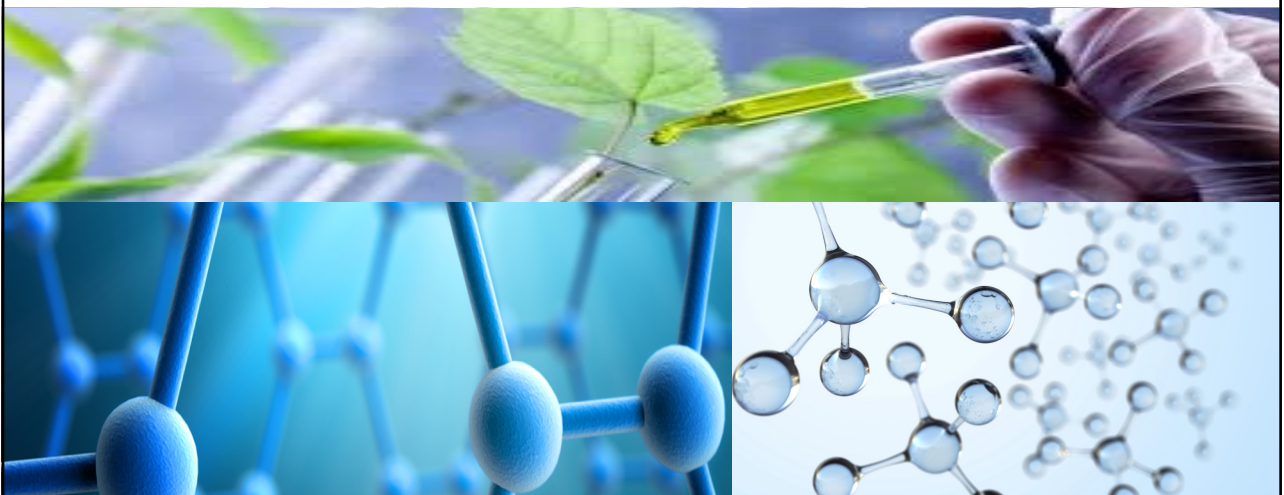
Arteficial intelligence – robotics

System thinking versus details

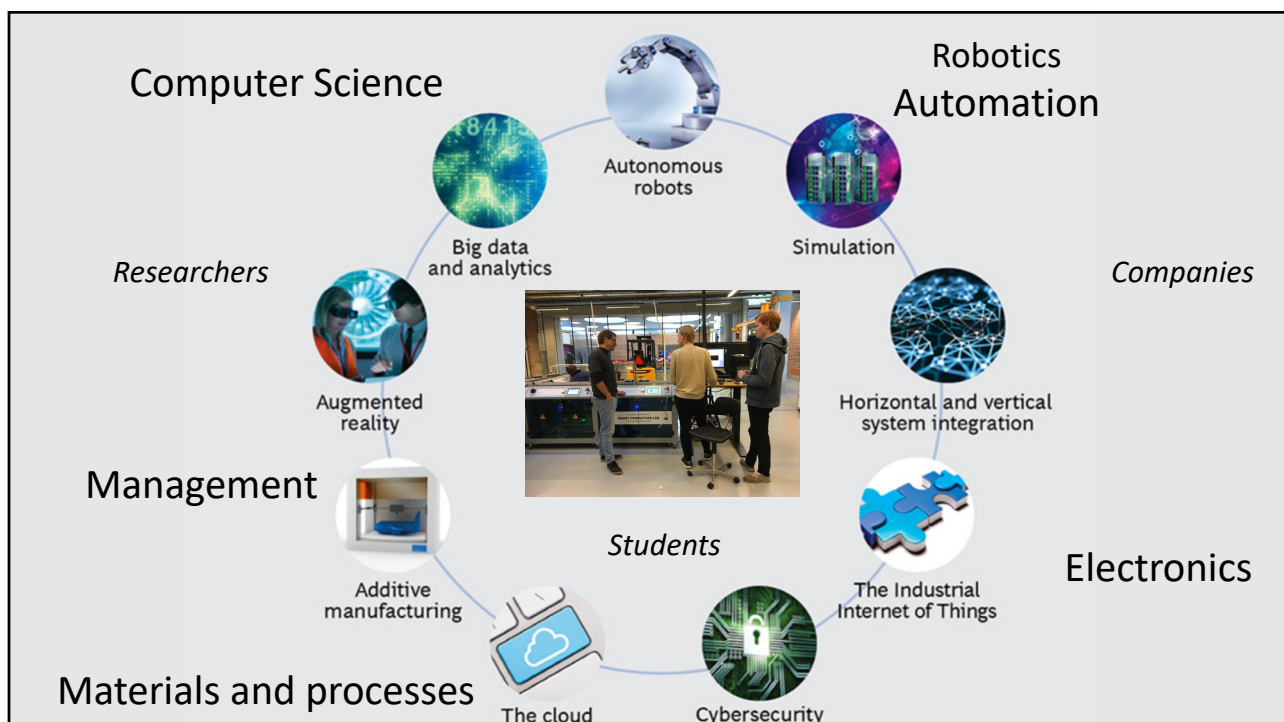
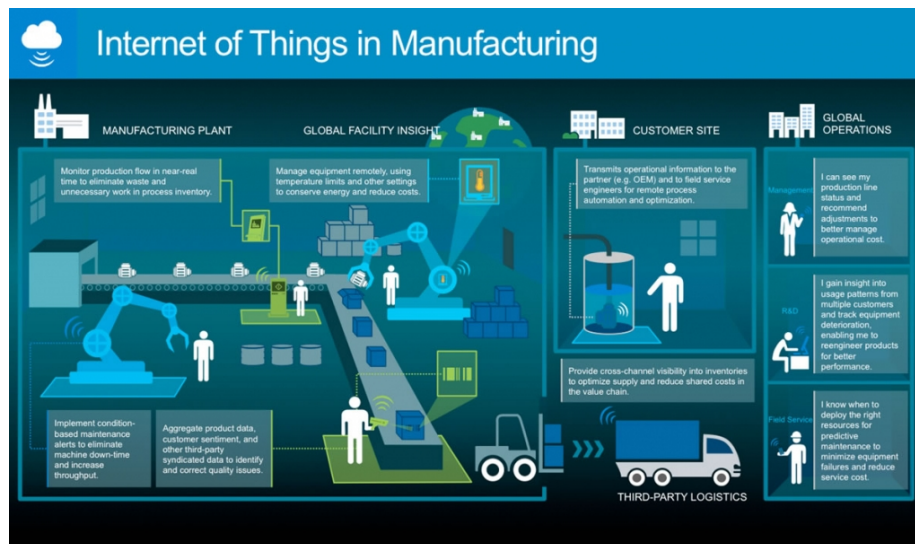
Higher degree of collaboration and contextual understanding



New materials – digital nano and bio technology -
establishment of new programs/subjects



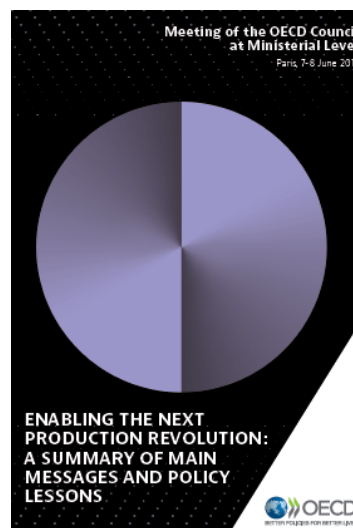
Industry 4.0 is about smart manufacturing



OECD – C-min-17

Education and skills systems will need constant attention § 61 and 62

- Challenges for the adequacy of **skills and training systems**. Effective systems for life-long learning and firm-level training are essential ... retraining can be accessed when needed.
- **Digital skills**, and skills which complement machines, are vital.
- **Generic skills** – such as literacy, numeracy and problem-solving – throughout the population, in part because generic skills provide a basis for learning fast-changing specific skills.
- **Achieving inter-disciplinarity** is not a new challenge. But more needs to be known about the practices adopted across research institutions, teams and departments - private and public – which enable inter-disciplinary education and research.



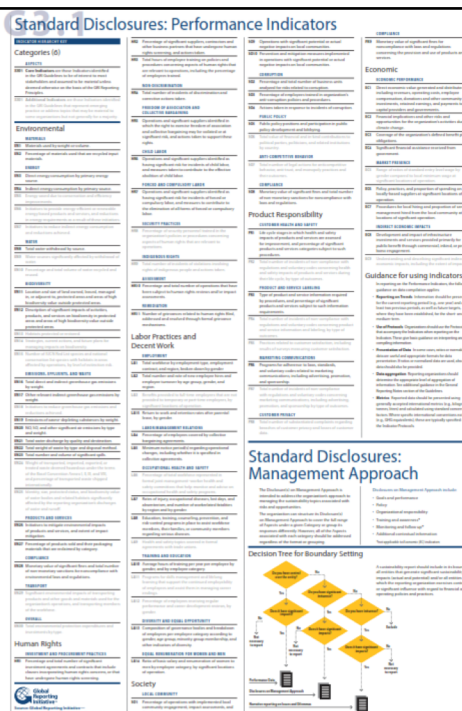
<http://www.un.org/sustainabledevelopment/sustainable-development-goals/>



<http://www.globalgoals.org/>

Global Reporting Initiative

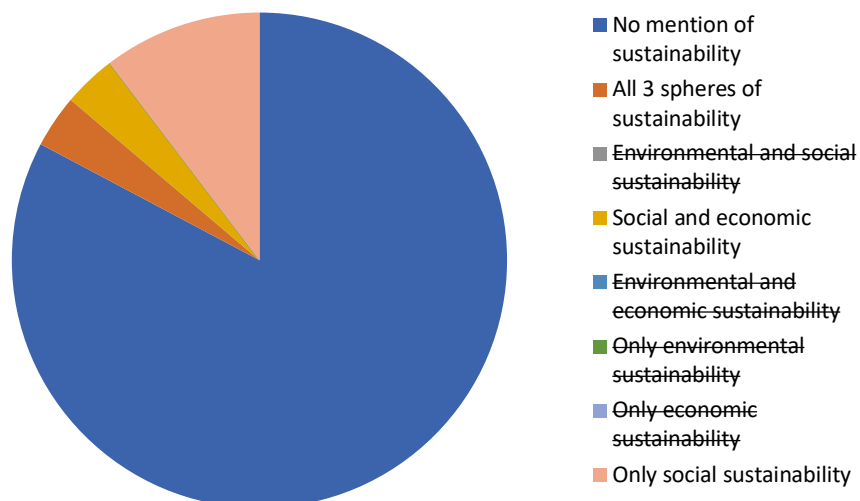
- Global Reporting Initiative: Sustainability Reporting Guidelines G3.1 – Reference Sheet
- <https://www.globalreporting.org/reporting/latest-guidelines/g3-1-guidelines/Pages/default.aspx>



Document analysis – key words

[illegible]

School of Information and Communication Technology (1/2)
29 Programmes



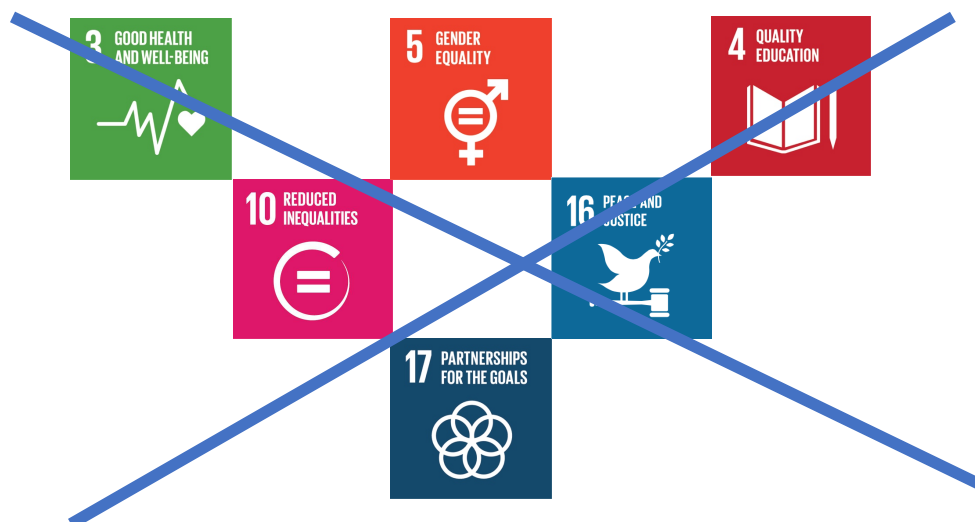
ESD – environment in engineering



ESD – economy in engineering – general picture



ESD – social in engineering – general picture

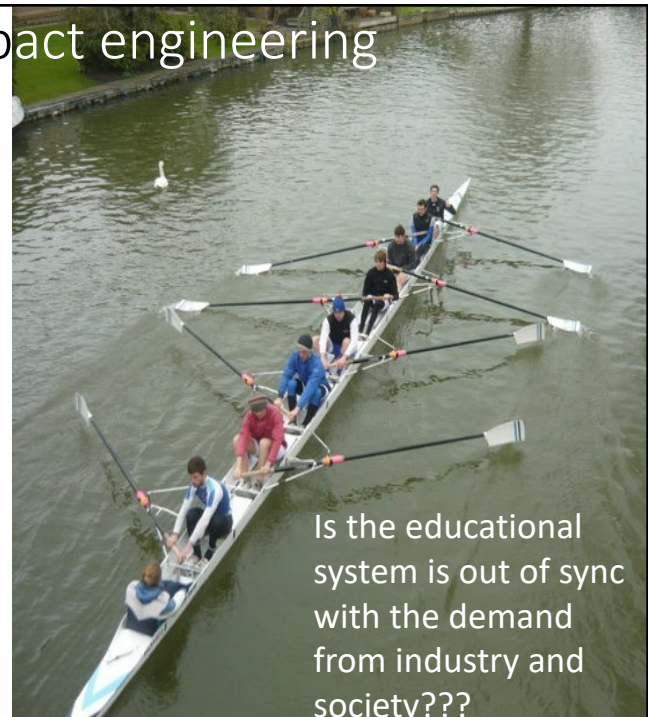


More has also to do with better...

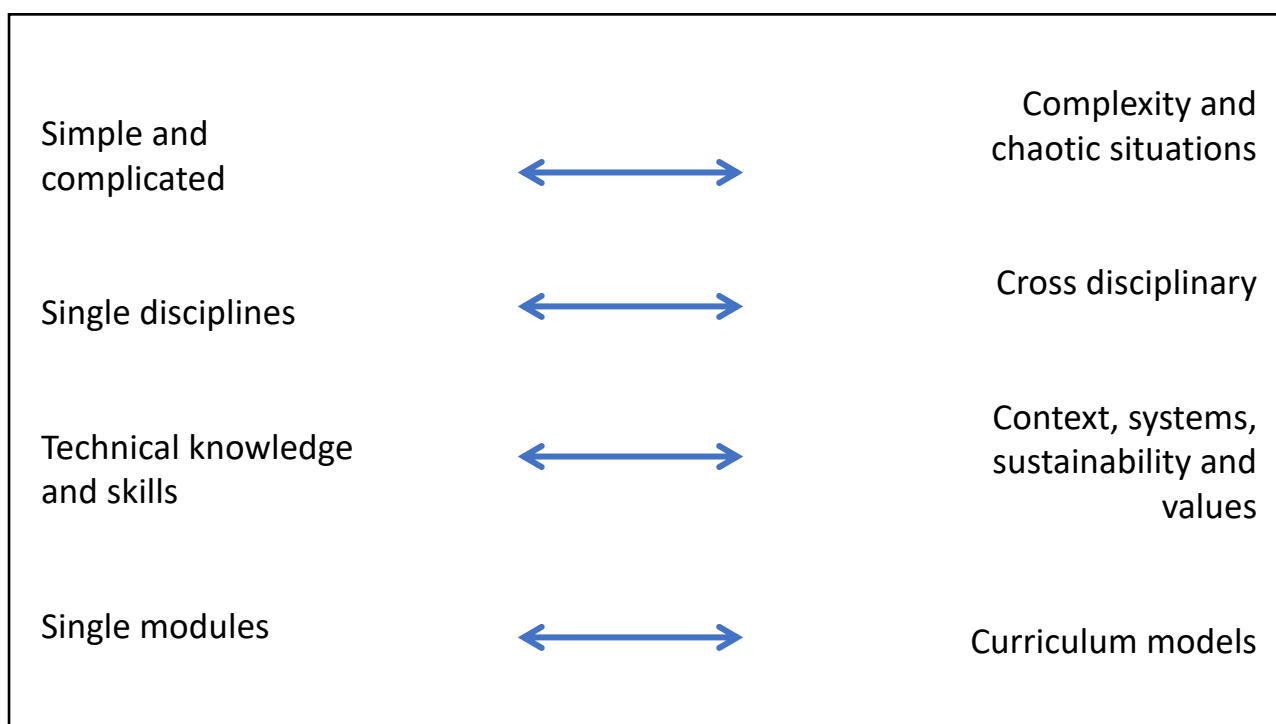
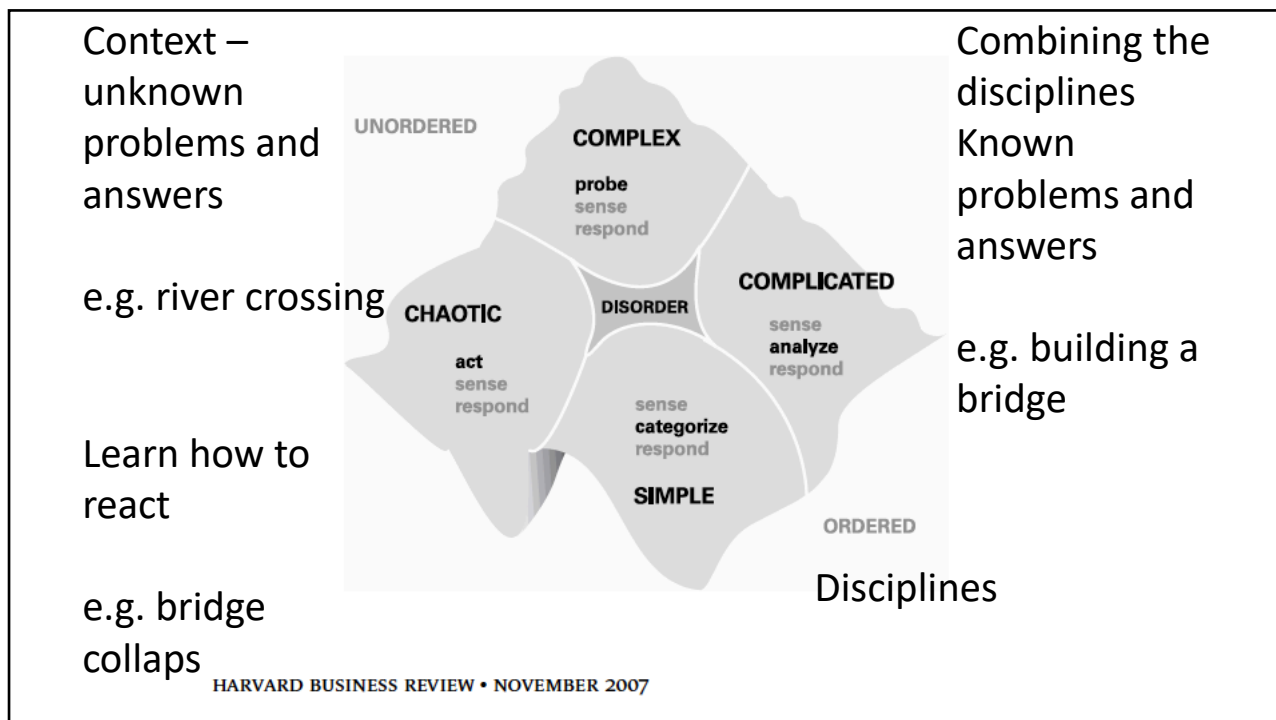
- Digitalisation influence at all levels – both engineers developing but indeed the employees in the production line – and the everyday life.
 - Digital literacy is at a beginning... it is not only about programming in school this is integrated into all subjects.
- STEM – and the E
 - Engineering can connect the other S subjects and motivate
 - The E is also connected to context – and context motivates
 - We need strategies for how to educate the teachers

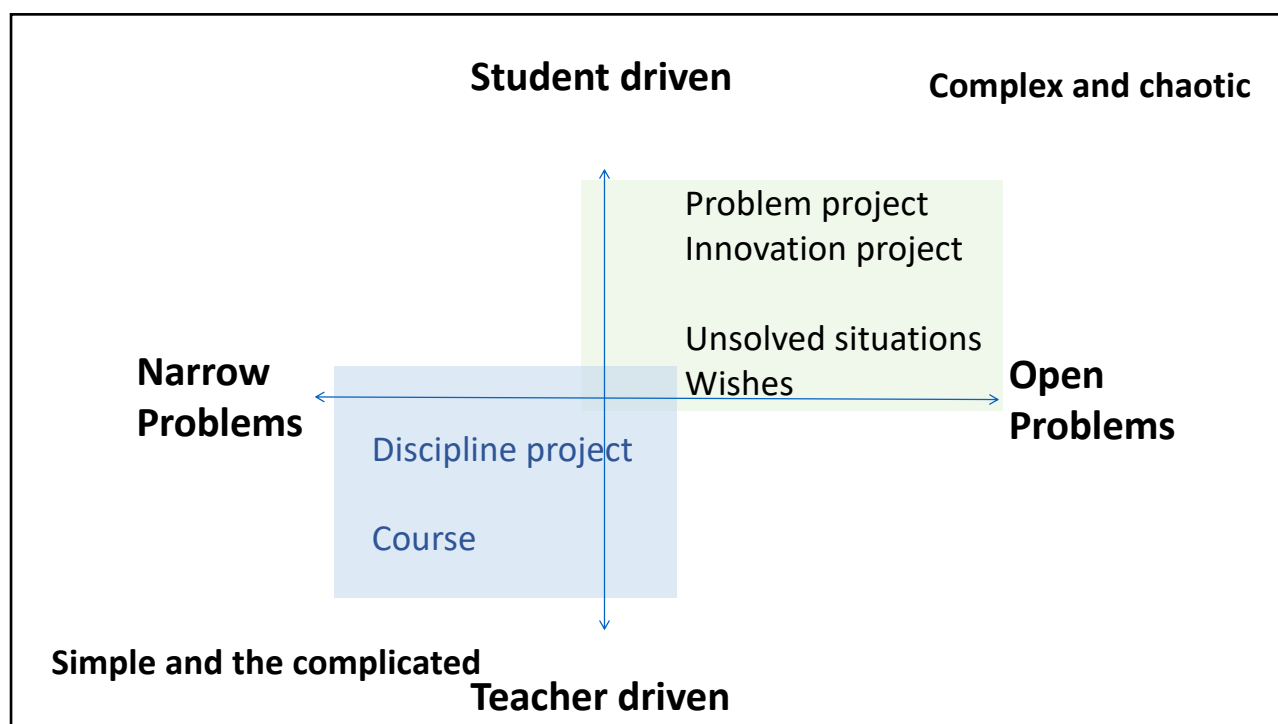
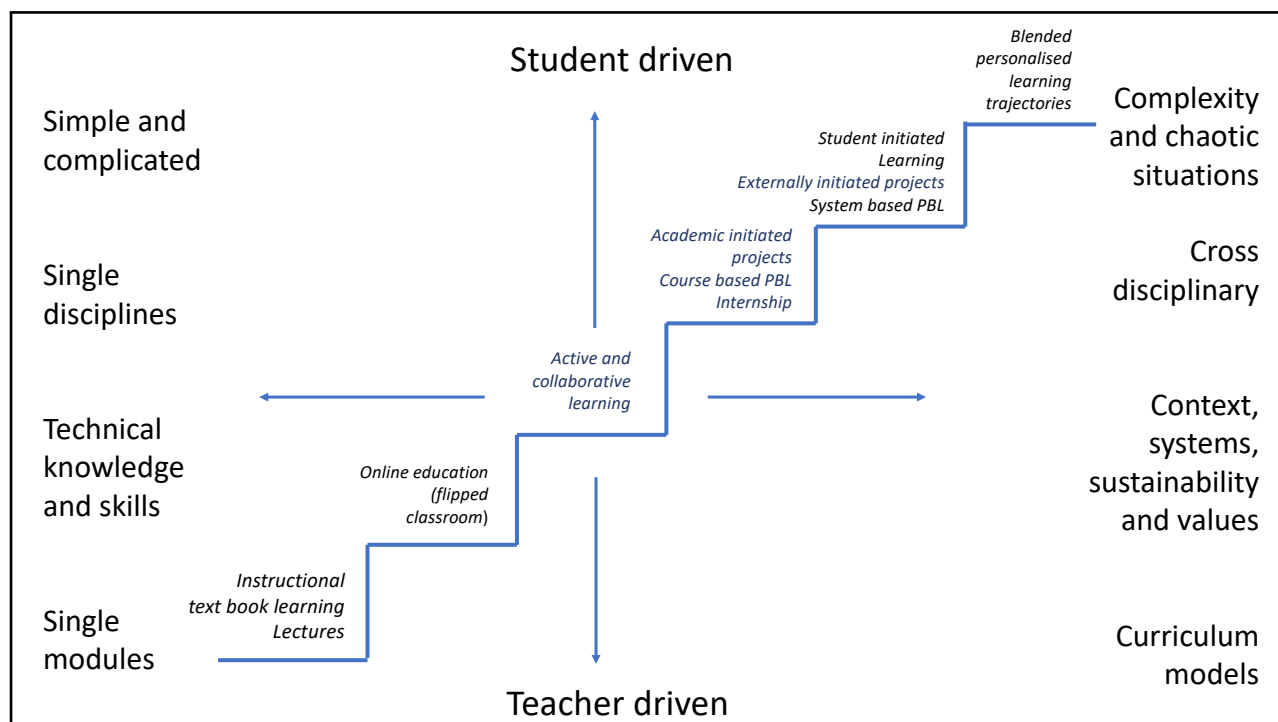
How will these trends impact engineering education in the future?

- Increasing the qualification level?
- **More** collaboration with industry
- **More** engineers
- **More systems thinking**
- **More specialisation/generalisation**
- **More** interdisciplinarity
- **More** digital competences
- **More** sustainability and ethics
- **More** life learning approaches
- **More** deep learning and transfer



Is the educational system is out of sync with the demand from industry and society???





Leading engineering programs

<https://jwel.mit.edu/news/mit-releases-global-engineering-education-report>

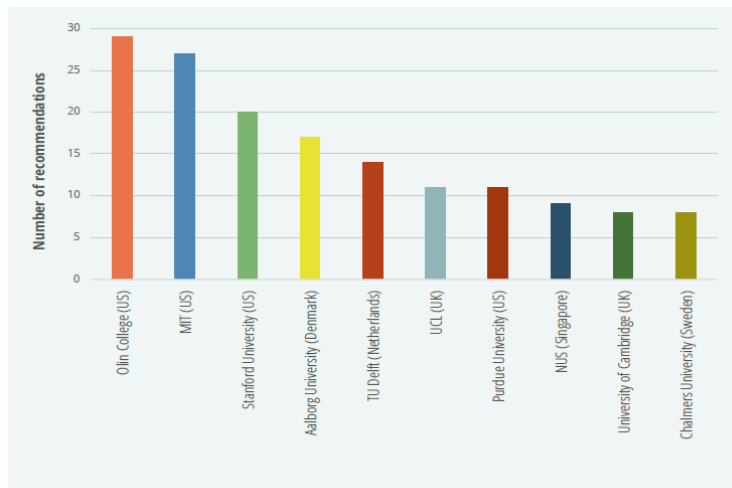
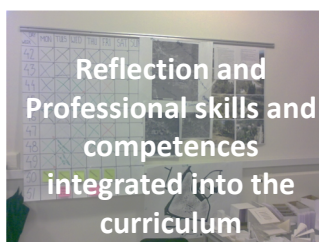


Figure 3. The 10 institutions most frequently identified as 'current leaders' in engineering education



Response from in engineering education



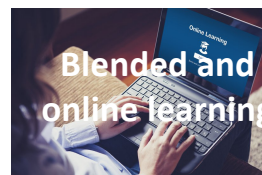
Emergence in engineering education



Active learning



Disciplines



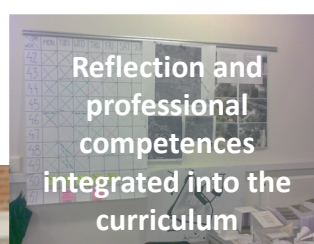
Blended and
online learning

The most common pattern

Emergence in engineering education



Active learning



Reflection and
professional
competences
integrated into the
curriculum



Engineering
Education
Disciplines

Emerging models
MIT reform
UCL
New universities

Coherent structure

Emergence in engineering education



Active learning –
especially problem-
based projects



Open and online
learning



Disciplines

Charles Sturt University

18 months at a university – doing
projects and online courses

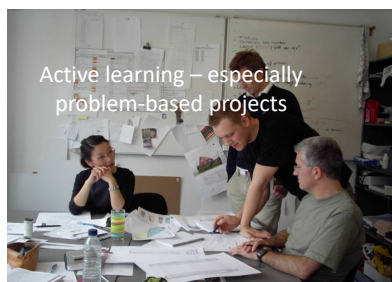
four year-long placements in industry
+ studying theory online



Internships in
companies
3DS JOB DATING
FOR STUDENTS - BEST OF

New programs:
e.g. Swinburne

Emergence in engineering education

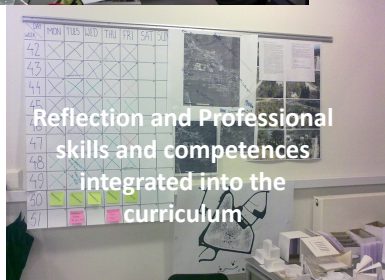


Active learning – especially
problem-based projects



DS JOB DATING

Disciplines

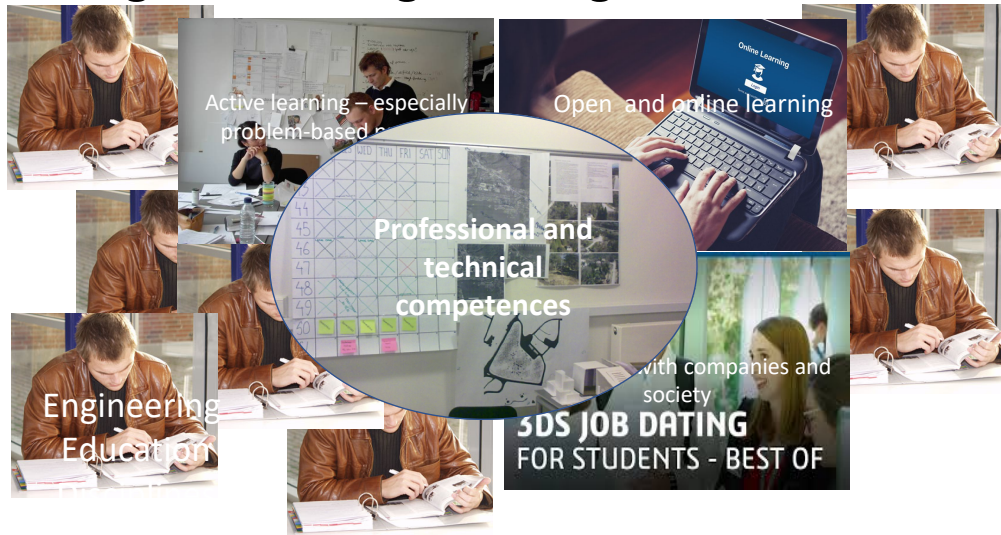


Reflection and Professional
skills and competences
integrated into the
curriculum



Iron Range, Minnesota

Emergence in engineering education



super specialisation with generic competences

generic competences with specialist knowledge

Will universities be disrupted?

- Serious concern for continuing education – which universities have not really taken on board - lifelong learning and personal learning trajectories
- Serious concern that private providers will offer e-learning platforms – so engineering education in the future might be a negotiation between universities and private providers.



7th IRSPBL 2018



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ICEE
International Centre for
Engineering Education
under the auspices of UNESCO



Innovation, PBL and Competences

October 19-21, 2018

See you in Tsinghua University, Beijing!

Symposium Name : 7th IRSPBL 2018;
Theme : Innovation, PBL and Competences;
Date : October 19-21 2018 ;
Venue : Tsinghua University, Beijing China
Organizers : UCPBL ICEE

Details:

Conference theme: Innovation, PBL and competences in Engineering Education

Sustainability problems, industry 4.0, or the next industrial revolution, are examples of a paradigm shift in engineering where engineers need new types of knowledge and competences to address the professional challenges. Problem Based, Project Organized Learning (PBL) is an innovative learning approach where authentic and real problems are used as point of departure for learning and enhances not only engineering fundamental knowledge but also problem solving skills, teamwork, communication, critical thinking, and communication. PBL has been shown to enhance graduate attributes and professional competences in terms of initiative, innovation and employability, and has been adopted in leading universities around the world.

With this in mind, the 7th International Research Symposium on PBL (IRSPBL 2018) theme is "Innovation, PBL and competences in Engineering Education". The International Centre for Engineering Education, Tsinghua University (China) hosts and organizes the symposium together with Aalborg Centre for PBL in Engineering Science and Sustainability, Aalborg University (Denmark), both leaders in their fields and Centres established under the auspices of UNESCO. The symposium aims to contribute to build an international community of educators, practitioners and researchers working with PBL. To fulfil this aim, the symposium committees welcomes contributions on a range of related topics:

- E-learning,
- Sustainability and interdisciplinarity,
- Cross-disciplinary PBL,
- Generating innovative and interdisciplinary knowledge and practices,
- PBL and entrepreneurship,
- Students' learning process,
- Evaluating practice – models and approaches,
- Curriculum design,
- Assessment methods,
- Management of change,
- Teacher roles in PBL,
- Learning technologies for PBL and Virtual PBL,
- PBL with large student groups,
- PBL for continuing professional development
- Industry- university collaboration in PBL
- Challenges of implementing PBL, in a global and local context – a cross cultural perspective

The conference organisers welcome contributions of interest in attending the conference. Please pay close attention to the following important dates:

See you at Tsinghua University, Beijing

New online introductory course

<https://ucpbl.moodle.aau.dk/>

4. Change to PBL

Evaluation

My courses


ADMINISTRATION

Course administration

- Turn editing on
- Edit settings
- Course completion
- Users
- Filters
- Reports
- Grades
- Gradebook setup
- Badges
- Backup
- Restore
- Import
- Reset
- Question bank
- Competencies

Switch role to...

1. Introduction to the course




In this session, you find a presentation of the course and the course providers as well as a discussion of some of the common myths of PBL.


Introduction to the course

Reflections on session 1

2. History, theories, and principles of PBL




This session takes you back to the start of problem based learning by presenting the history of PBL. It also presents the learning theories supporting PBL, historically and currently, as well as the learning principles common to many PBL models.




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Thank you very much

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