

# WORKSHOP

## Engineering Education 2030

*Commonality versus Diversification in Learning Outcomes*

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**Inventing Tomorrow's  
Engineering Education**  
25 & 26 January 2016 in Delft

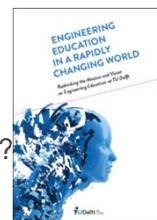
## Workshop Engineering Education 2030

- 15 min. Introduction

*Different perspectives on the future professional needs.*

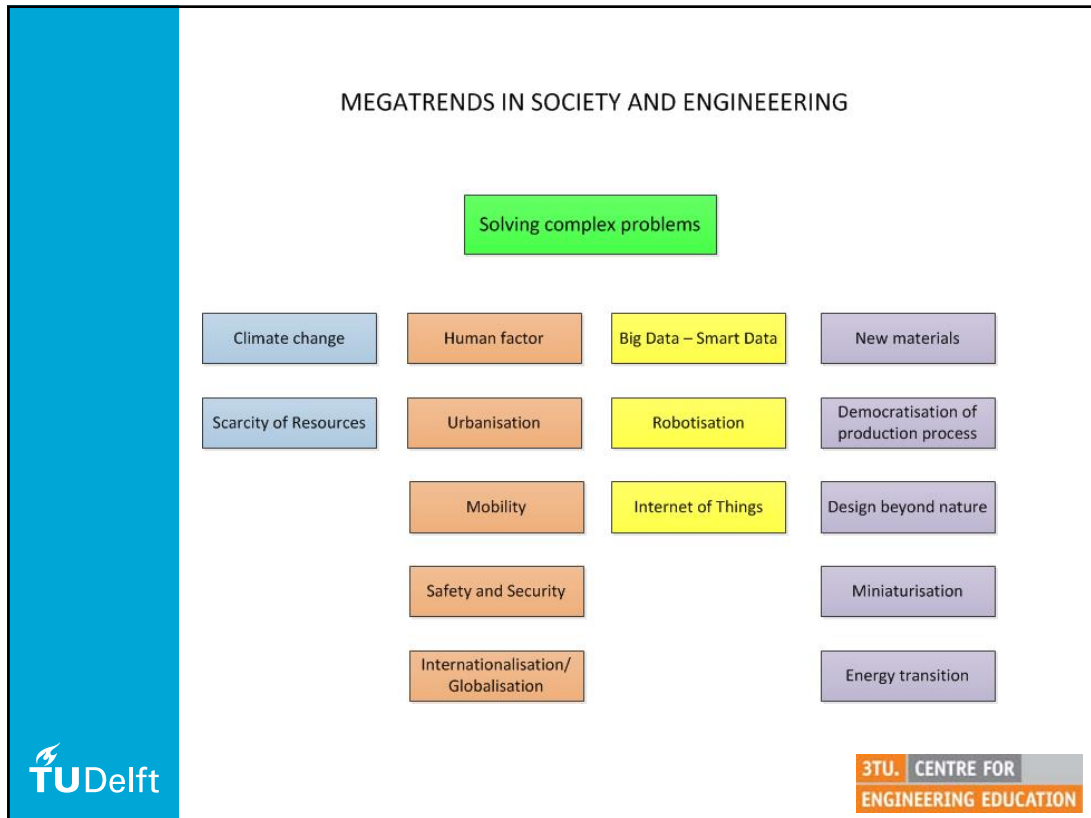
- 40 min. Action: What graduates do we want to educate?

*Diversified versus Common learning outcomes*



- 20 min. Plenary feedback
- 5 min. Delft Think Tank scenarios for contemplation





## The New World of Work

“The Conceptual Age; The Second Machine Age; The Flat World”  
- ASML, Philips, GE, Boeing, Pratt & Whitney, Rolls Royce -

- *“There has never been a better time to be an engineer with special skills and the right education, because these people can use technology to create and capture value”.*
- *“There has never been a worse time to be an engineer with only “ordinary” skills and abilities to offer. **Employability competition is worldwide.** Engineering students all over the globe and computers, virtual assistants and other thinking machines are acquiring these skills and abilities at an extraordinary rate”.*

*[Sources: Erik Brynjolfsson and Andrew McAfee (2014) and Thomas Friedman (2007)]*

TU Delft

3TU. CENTRE FOR  
ENGINEERING EDUCATION

# University World News

ISSUE 00229

THE GLOBAL WINDOW ON HIGHER EDUCATION

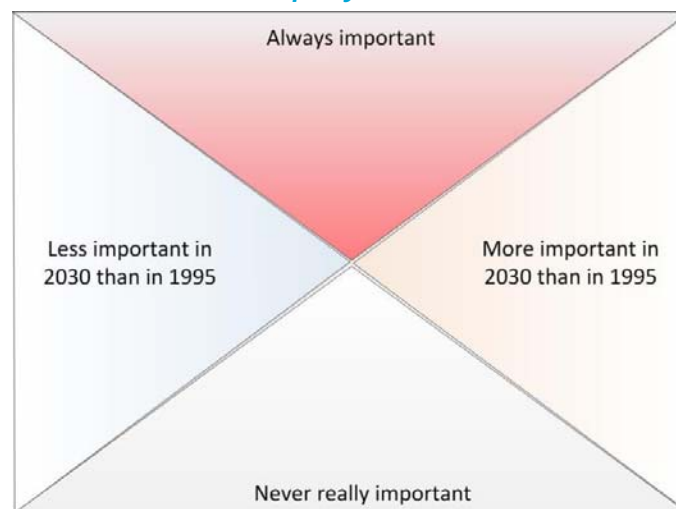


7 Nov 2015

- The top five critical factors employers consider when they select candidates to interview are:
- Proven ability to perform (92%)
- Strong oral communication skills (89%)
- Strong technical and-or quantitative skills (84%)
- History of increased job responsibility (62%)
- Strong writing skills (56%).

## Shifting importance knowledge and skills

*What attributes do employers want most in 2030?*





## Shifting engineering attributes

*Outcomes of CDIO Workshop Belfast Nov 2015*

Less important in future	More important in future
Deep expert knowledge	Interdisciplinary thinking
Convergent thinking	Creative thinking.
Design and manufacturing	Non-engineering disciplines
<i>Digital literacy...</i>	Systems view
<i>Programming...</i>	Self-reflection
	Lifelong learning
	Ethical responsibility
	Adaptive capacity
	International experience, mobility

## Shifting engineering attributes

*Outcomes of CDIO Workshop Belfast Nov 2015*

Always important	Don't know
Common sense	Entrepreneurship
Critical thinking	Business acumen
Risk taking	Digital literacy
Teamwork	Environmental literacy
Complex problem solving	Systems engineering
Project management	
	Never important
	Career development

## Shifting engineering attributes

*Engineering Education in a Rapidly Changing World*



Current academic profile	Shifting towards more:
Mono-disciplinary thinking	Multi- and interdisciplinary thinking
Reductionism	Integration
Convergent thinking	Creativity
Independence	Collaboration
Techno-scientific base	Socio-economic context
Understanding certainty	Handling ambiguity and failure
Rounded expert	Employability, lifelong learning
Rational problem solving	Complex problem solving

## “The 10 skills you need to thrive in the 4<sup>th</sup> Industrial Revolution” 20 Jan 2016

WORLD  
ECONOMIC  
FORUM  
COMMITTED TO

### in 2020

1. Complex Problem Solving
2. Critical Thinking
3. Creativity
4. People Management
5. Coordinating with Others
6. Emotional Intelligence
7. Judgment and Decision Making
8. Service Orientation
9. Negotiation
10. Cognitive Flexibility

### in 2015

1. Complex Problem Solving
2. Coordinating with Others
3. People Management
4. Critical Thinking
5. Negotiation
6. Quality Control
7. Service Orientation
8. Judgment and Decision Making
9. Active Listening
10. Creativity



Source: Future of Jobs Report, World Economic Forum

## Today's Vanderlande keynote 25 Jan 2016: Our needs for today and tomorrow

**VANDERLANDE**

### Concluding: Our needs

- ✓ Technical knowledge and analytic skills
- ✓ Engineering methods and problem solving skills
- ✗ Management and business science
- ✗ Sales and commercial skills (listing, negotiation, etc.)
- ✗ Leadership skills (convincing, inspiring, motivating, etc.)
- ✗ Intercultural skills (empathy, behaviour flexibility, etc.)
- ✗ Management skills (organising, effectiveness, etc.)
- ✗ Interpersonal skills ((non-verbal) communication, etc.)
- ✗ Entrepreneurial (business and financial smartness)
- ✗ .....

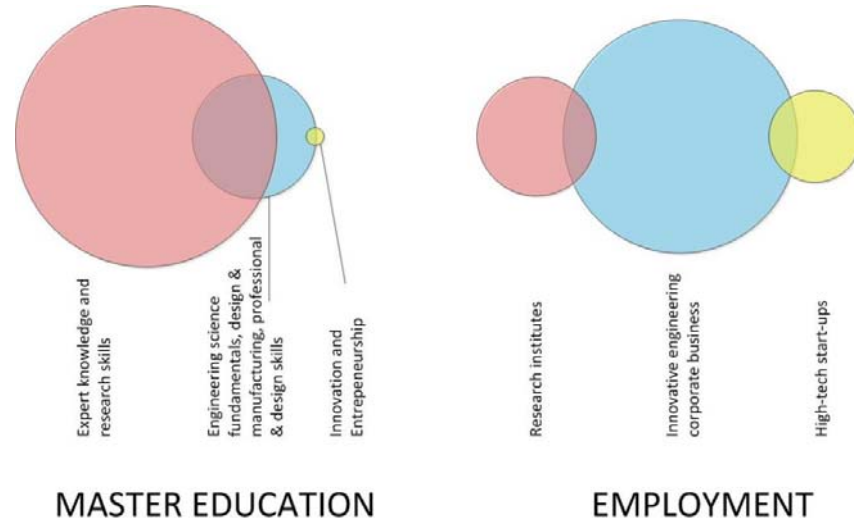


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MOVING YOUR BUSINESS FORWARD

# What graduates do we want to educate?

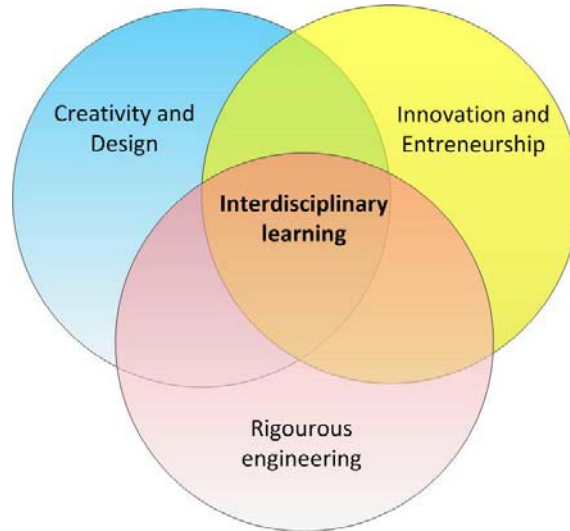
## Typical MSc content versus job market



How to integrate the  
explosion in expert knowledge  
and  
increasing job market needs  
of professional capabilities....  
in already fully packed curricula?

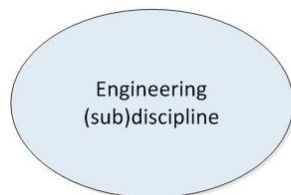


## The scene for innovative engineering curricula

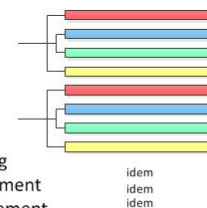


"The Delft Engineering Language"

- Maths & science
- Digital literacy
- Design skills
- Academic communication
- Ethics
- Interdisciplinary teamwork



- Mechanical Engineering
- Aerospace Engineering
- Electrical Engineering
- Civil Engineering
- Applied Physics
- Industrial Design Engineering
- Architecture & Built Environment
- Technology Policy & Management



Career-, profession-, role-, function-oriented profile, matching future needs

## Integrating (future) job market needs

Workshop assignment:

1. Discover 5 “Professional Crossover” profiles you would consider most promising in your university, anticipating the unknown future world in 2030
2. What are its most important competences?