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## Interaction industry-university for (lifelong) learning: some lessons learned



WORKSHOP: UNIVERSITY LEADERSHIP IN THE TRANSITION TOWARDS INDUSTRY 4.0


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## Interaction industry-university for (lifelong) learning: some lessons learned




WORKSHOP: UNIVERSITY LEADERSHIP IN THE TRANSITION TOWARDS INDUSTRY 4.0

- Introduction
- Mutual expectations
- Case study: INCASE project
- Case study: curriculum reform FET
- Case study: techtransfer office LRD
- Discussion

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Boosting the role of HEIs in the industrial transformation towards the Industry 4.0 paradigm in Georgia and Ukraine  
609939-EPP-1-2019-1-BE-EPPKA2-CBHE-JP

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## Interaction industry-university for (lifelong) learning: some lessons learned

- Personal viewpoint, based on experience ... and intended for discussion!
- **“Industry”**, not “Industry 4.0”
  - A matter of “topics”?
  - Or also “open innovation”, “co-creation”, “design thinking”, etc.?
- **“Learning” and “lifelong learning”**
  - Learning: student education => new curriculum development
  - Lifelong learning: for practicing engineers from industry



Timeframe I4.0 ... who'll do it ?

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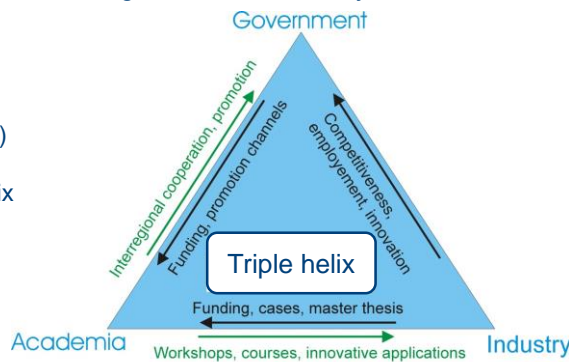
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## Interaction industry-university for (lifelong) learning: some lessons learned

- **“Interaction”** ?
  - It's government policy !
  - Remember typical funding criteria for research project applications
  - “Triple helix” of government, industry and academia

Quadruple (public) and Quintuple (environment) helix



Source: “Industry and engineering education interacting in an interregional project – a Flanders’ perspective”, SEFI 2014, Sep. 15-19, Birmingham (UK). Jos Knockaert, Geert De Lepeleer, Tony Stevens, Philippe Saey.

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## Interaction industry-university for (lifelong) learning: some lessons learned



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## Mutual expectations ... of industry and university

- **What does the university expect to gain?**
  - In Belgium, universities have a triple mission:
    - Education
    - Research
    - Services to society
  - What we do with and for industry, related to applied research and to transfer of knowledge via courses for industry ...
    - Should contribute to our goals => courses at high level, contributing to the courses/labs that we teach to our own students
      - Mandatory component of e.g. TETRA or CORNET projects
    - Should if possible lead to a publication derived from that work (it is however not the main focus of "services to society" ...)
    - Should if possible inspire for and facilitate access to research projects
      - E.g. Vlaio often requires for cofinancing *from industry* (e.g. 92,5 % funding)
      - E.g. IOF ("Industriële Onderzoeksfonds"), "Baekeland mandaten", EU projects are demanding industry as stakeholder ("demand driven" research, cofinancing, ...) (we are in engineering, not in astronomy!)
      - Focus on SMEs (...)
  - And ... well educated (engineering) students, that had contacts with industry (also refer to Germany, France ... for engineering students that spend a semester in industry)

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## Mutual expectations ... of industry and university

- **What does the industry expect to obtain from universities?**
  - A yearly supply of fresh well educated (engineering) students, that had contacts with industry
  - Support and cooperation for research – fundamental and applied
  - Opportunities for lifelong learning for their (engineering) staff: from short low level to long high-end courses ... at a very low price
    - In Belgium: covenant (voluntary agreement) between universities and professional organizations of companies ... work at market price
    - Sometimes a diploma or certificate if a course is followed ... but most of the time not at all (to suppress mobility of employees)
    - No exam at the end (at least for engineers), after all they volunteered to take the course

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## Mutual expectations ... of industry and university

- **Lessons learned for lifelong learning courses**
  - Provide courses aimed at engineering level
    - The other levels do not contribute (directly) to our educational task, nor link (easily) with the research task
    - You enter the commercial market if you aim at other (lower) levels (for high level, the investment is very large: opportunity)
  - Be attractive ... search: 1) fast changing 2) industrially relevant topics
  - Cooperate with professional organizations, national and international
  - Link to MSc and PhD thesis topics and MSc student projects, to make your MSc engineering education industrially relevant
  - Link to government & EU priorities to obtain external funding: “Digital Agenda”, “Green Deal”, manufacturing industries and ... Industry 4.0 !
  - And ... keep your specialization and profile!

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## Case study: INCASE project

- **INCASE: *towards Industry 4.0 via Networked Control Applications and Sustainable Engineering***

- Common challenge of the 2 Seas region:
  - Close the gap between the region and leading countries in converting manufacturing industry towards I4.0



- Project main objective:
  - Prepare the industry (manufacturing & automation industry) for the future "Industry 4.0" (I4.0) and "Industrial Internet of Things" (IIoT)

4.6 M€, 60% ERDF funding

3+ years (01/09/2016 – 31/12/2019)

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## Case study: INCASE project

- **INCASE: towards Industry 4.0 via Networked Control Applications and Sustainable Engineering**



- Prepare the industry (manufacturing & automation industry) for the future “Industry 4.0” (I4.0) and “Industrial Internet of Things” (IIoT) => **technology transfer**
  - By developing pilots and do applied research on key enabling automation technologies => WP1
  - By designing and developing sustainable engineering technologies and demonstrators => WP2
  - By providing “demonstration actions” to engineers in the automation and manufacturing industries => WP3

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## Case study: INCASE project

- **INCASE: towards Industry 4.0 via Networked Control Applications and Sustainable Engineering**



- Results of the “technology push”:
  - Step 1: Development of demonstrators and pilots
  - Step 2: Development of demonstration tools
  - Step 3: Demonstration actions => *list*
  - Step 4: Impact measurement
    - Long courses (4 day)
    - Workshop (1/2 to 1 day)
    - Lectures (organized and invited, > 30 min)



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## Case study: INCASE project



- **INCASE: towards Industry 4.0 via Networked Control Applications and Sustainable Engineering**
  - “Technology push” – audience reached with impact measurement:

	Unique companies (target)	Unique people
O1. PROFICloud	192 (125)	378
O2. Load/error generator	107 (75)	311
O3. PLC and EMC	154 (75)	293
O4. Networked Control	181 (100)	405
O5. Integrated Design	182 (75)	347
O6. PROFIEnergy	174 (100)	313
O7. PLC in smart grids	88 (50)	133
O8. Smart homes	67 (50)	89
O9. Energy monitoring	29 (25)	36

Σ = 2305 people  
886 unique people

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## Case study: Curriculum reform FET

- **KU Leuven – A global university**
  - Global university



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## Case study: Curriculum reform FET

- **Faculty of Engineering Technology**
  - SET Group – 5 faculties – 14 research departments

### Science, Engineering & Technology Group

Faculties	Research departments
Science	» Architecture
Engineering Science	» Biology
Bioscience Engineering	» Biosystems
Engineering Technology	» Chemical Engineering
Architecture	» Chemistry
	» Civil Engineering
	» Computer Science
	» Earth and Environmental Sciences
	» Electrical Engineering (ESAT)
	» Mathematics
	» Mechanical Engineering
	» Materials Engineering
	» Microbial and Molecular Systems
	» Physics and Astronomy

Arenberg Doctoral School

**5 faculties – 14 departments**

Source: Siemens\_Industry\_Academy\_Kick\_Off\_21\_11\_2019.pdf

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## Case study: Curriculum reform FET

- **Faculty of Engineering Technology**
  - Focus on “design”, “research/discover”, “problem solving”, push the boundaries of technology

### FET UP CLOSE

3rd largest faculty of KU Leuven

Intensive cooperation with industry

160 academic partners worldwide

Interdisciplinary research in 38 research groups

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6,177 students

671 international students, over 41 countries

3 bachelor's programmes (1 in English)

17 master's programmes (7 in English)

2 advanced master's programmes (2 in English)

7 locations throughout Belgium

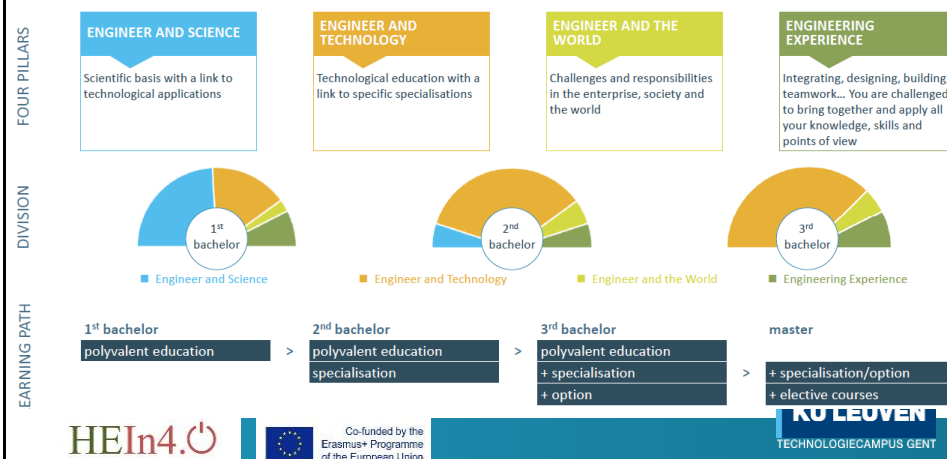


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## Case study: Curriculum reform FET

- **Ongoing curriculum reform**
    - Engineer and ...
- Science – Technology – the World – Engineering experiences

### Structure of the programme



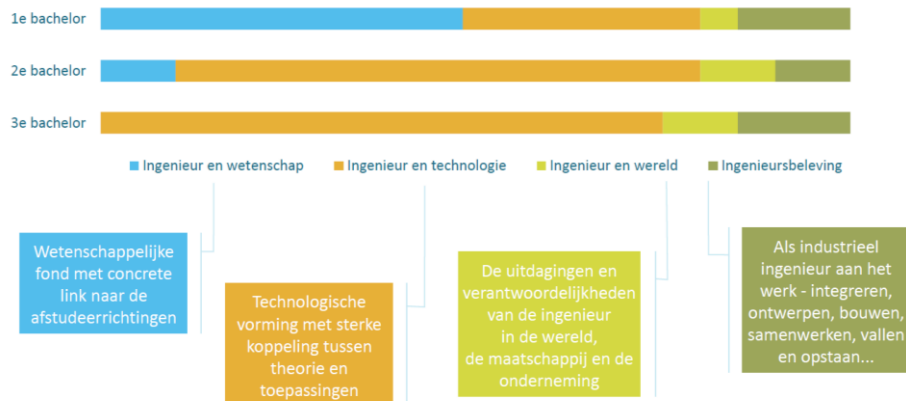
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## Case study: Curriculum reform FET

- **Ongoing curriculum reform**

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Science – Technology – the World – Engineering experiences



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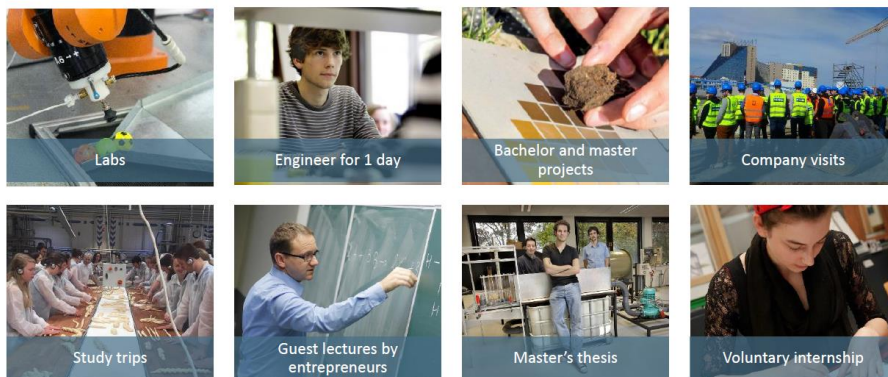
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## Case study: Curriculum reform FET

- **Ongoing curriculum reform**

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Science – Technology – the World – **Engineering experiences**



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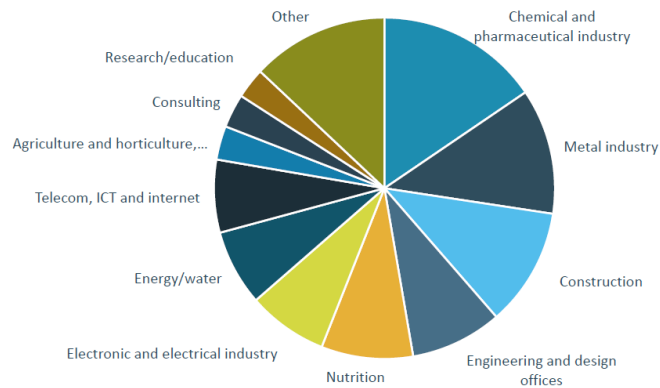
## Case study: Curriculum reform FET

- **Ongoing curriculum reform**

- Engineer and ...

Science – Technology – the World – **Engineering experiences**

Career perspectives: employment sectors



Source: ie-net startbaanenquête 2019 report  
of the European Union



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## Case study: techtransfer office LRD

- **KU Leuven – A global university**
  - Global **research** university

KU Leuven maintains a pioneering role in collaborative networks of research universities such as LERU and The Coimbra Group, making significant contributions to the advancement of academic knowledge and providing leadership and expertise to the debate on scientific policy at the European level.

**AN INTERNATIONAL PIONEER**

#1

in the European Commission's Marie Skłodowska-Curie Actions programme (HEI only)

#5

in the European Commission's Horizon 2020 programme (HEI only)

#17

in the ERC grants programme (HEI only)

The university has a long tradition of securing funding from competitive research funds, including the prestigious ERC Grants awarded by the European Research Council.

**VALUABLE CONTRIBUTIONS TO SOCIETY**

7,637

researchers & professors

6,236

PhD researchers

€ 522 million

in research expenditures

KU Leuven's approach to clinical research is built on exemplary collaboration between KU Leuven researchers and doctors from University Hospitals Leuven.

Our discoveries address real-world problems, truly changing people's lives for the better.

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## Case study: techtransfer office LRD

- **KU Leuven – A global university**
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### Europe's most innovative university

- Reuters ranks KU Leuven as Europe's most innovative university in its top 100 of innovative European universities (in 2016, 2017 and 2018).
- The Reuters study is based on
  - Number of publications
  - Patent applications (number, granted patents, global coverage, ...)
  - Number of citations of patents and publications (in patents and publications)
  - Number of industrial collaborations
  - ...

Reuters top 10: Europe's most innovative universities

1. KU Leuven
2. Imperial College London
3. University of Cambridge
4. École Polytechnique Fédérale de Lausanne
5. University of Erlangen Nuremberg
6. Technical University of Munich
7. University of Manchester
8. University of Munich
9. Technical University of Denmark
10. Swiss Federal Institute of Technology Zurich

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## Case study: techtransfer office LRD

- **Leuven Research & Development**

- Global **research** university ... and “services to society”
- One of the first technology transfer offices in Europe
- Central staff is about 100 FTE

### Mission of LRD !

“Promoting and supporting knowledge and technology transfer between university and society”



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