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Empowering Tomorrow's Engineers:
Building Identity and Competence in Gen Z

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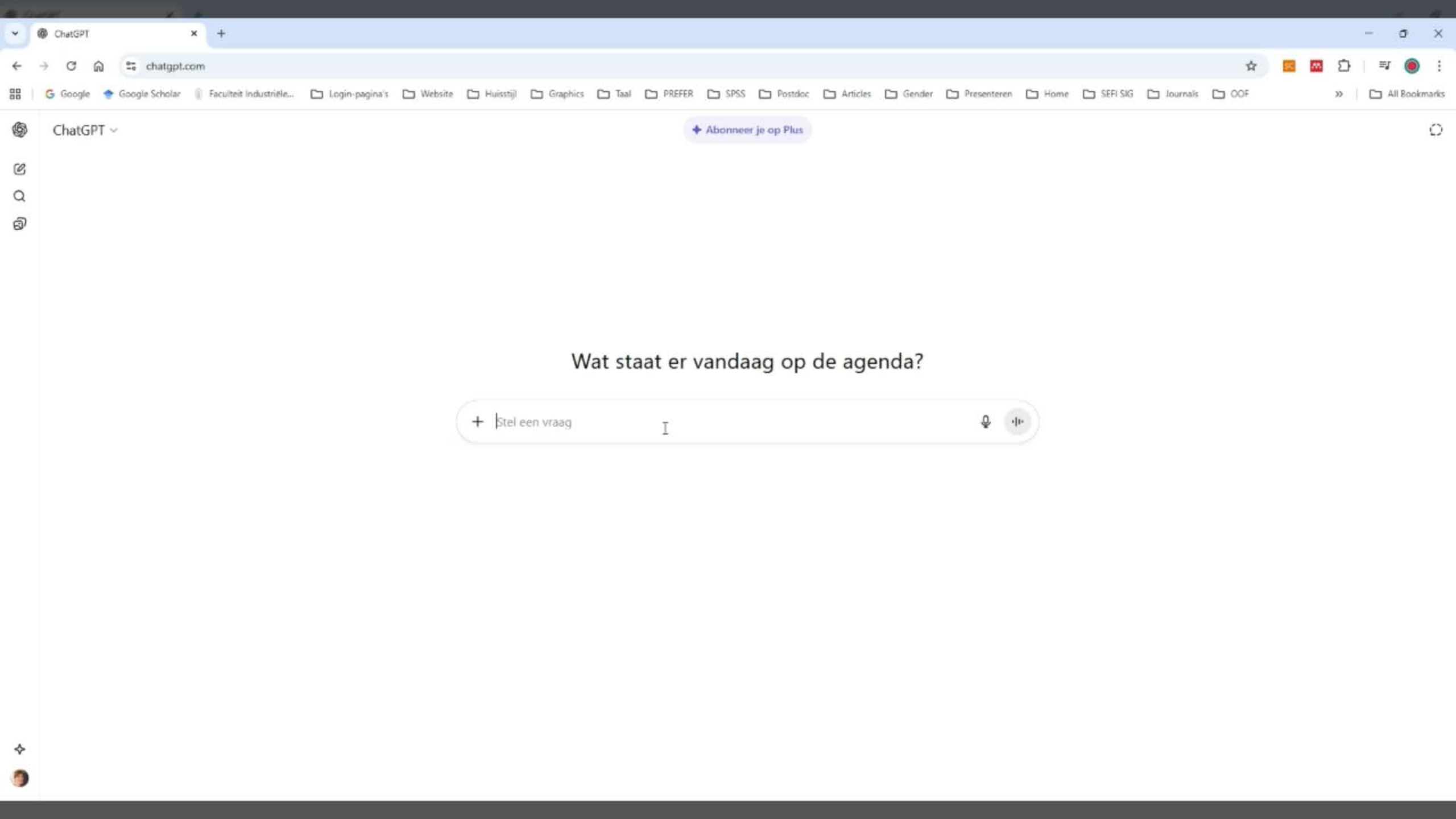
Let’s talk about…

- Who is Gen Z? (and why does it matter for engineering education?)
- Why engineering identity?
- How to enhance students’ engineering identity
- … and increase attractiveness and diversity in engineering

Who is Gen Z?
(and why does it matter for engineering education?)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Wat staat er vandaag op de agenda?
Stel een vraag

Gen Z

Who is Gen Z?

Digital natives

Socially aware

Purpose-driven

"Gen Z seeks education that goes beyond theory, addressing topics like sustainability, equity, and social impact."

Quote: https://www.goodcourse.co/post/teaching-gen-z-rethinking-education-for-a-new-generation

… and education

Who is Gen Z?

Digital natives

Socially aware

Purpose-driven

Why it matters for education?

Technology enhanced

Inclusive and flexible

Relevant to real-world challenges

Some context first...

KU LEUVEN

Inspiring the outstanding

- ✓ Founded in 1425
- ✓ Highly ranked
- ✓ Comprehensive

KU Leuven

HUMANITIES & SOCIAL SCIENCES

BIOMEDICAL SCIENCES

SCIENCE, ENGENEERING & TECHNOLOGY

5 Faculties
Science
Engineering Science
Bioscience Engineering
Engineering Technology
Architecture

Faculty of Engineering Technology

+6000 STUDENTS

+800 STAFF

ETHER | Engineering Technology Education Research

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Supporting education for (future) engineers

LESE

Leuven Engineering and Science Education Center

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Why engineering identity?

Engineering in Flanders (Belgium)

- **Graduated in 2023**
  (N=1006)

  65% are employed in a company (+5% contract)
  14% start a PhD
  7% continue studying
  2% start their own company

- **Main sectors**

  chemistry and pharmacy (13%)
  construction (12%)
  electronics and tech industry (12%)

- **Main functions**

  production/processes (15%)
  consultancy (15%)
  research and development (13%)

(ie-net 2023)

wake up call…

1 on 5

engineers change job before the age of 26.

(more than half of them within the first year)

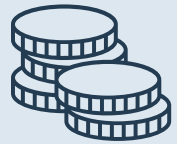
N=1930

#1

Job content (60%)

#2

Career opportunities (35%)



#3

Higher salary (29%)

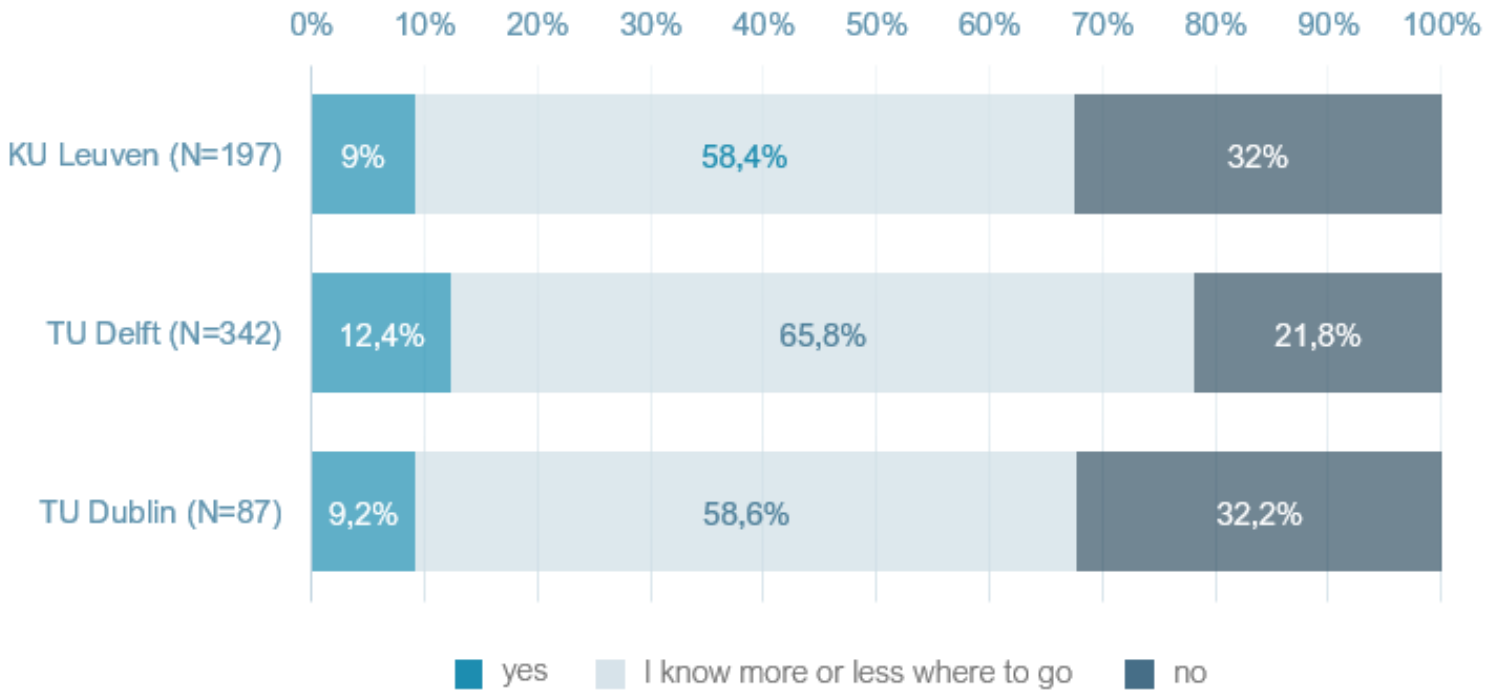
#4

Working in a larger company (16%)

KU Leuven, UAntwerpen, UGent, UHasselt & VUB (2016). *Report Engineer 2020*.

Students' perception of their future self

Do you have a clear picture of your professional future?



(Saunders-Smits et al. 2021)

During the **internship** in the final Bachelor year, I discovered that being a project leader is nothing like I expected. **I panicked**. Shit, did I choose the wrong education?

Toon,
graduated in civil engineering

As a student, I never found out what opportunities you have in engineering. The only image of an engineer I had was the **image of a technical engineer**: someone who designs or optimizes a machine. But that is only one of the many options**. I realised that only after I graduated.**

Evy,
graduated in electromechanical engineering

Students with a higher score in engineering identity-related measurement are more likely to persist in studying engineering and/or work as engineers after graduation.

(Cannaerts et al., in review; Choe & Borrego, 2020; Verdín, 2021)

How to enhances students’ engineering identity?

Engineering identity

Engineering identity = ways in which students describe themselves and are positioned by others in the role of being 'an engineer'

(Godwin & Kirn, 2020)

Interest	The enjoyment and fulfilment of studying/being an engineer(ing)
External recognition	The extent that people in their environment see the student as an engineer
Performance	Students' belief to perform well in engineering (programmes)

Engineering identity

Engineering identity = ways in which students describe themselves and are positioned by others in the role of being 'an engineer'

(Godwin & Kirn, 2020)

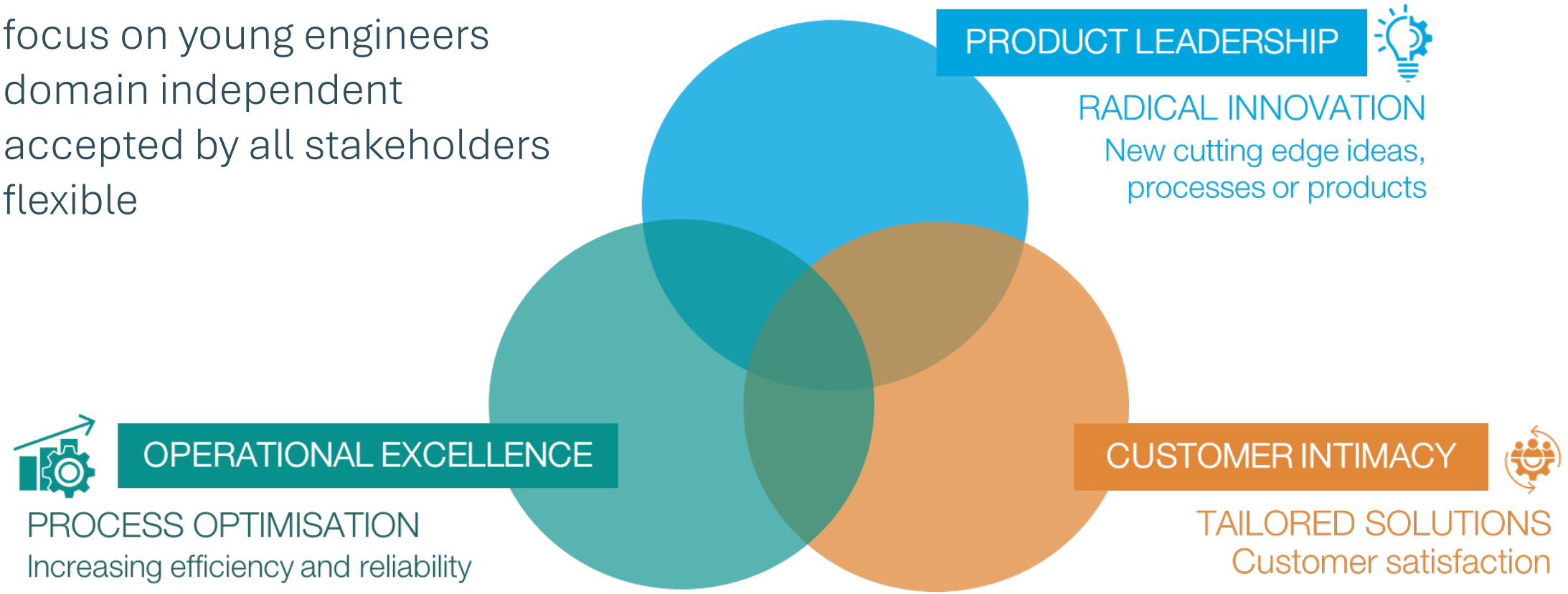
Professional role = an interpretation of an (engineering) position based on expectations of the environment (the work field in this case).

(Craps et al., 2020)

PREFER model

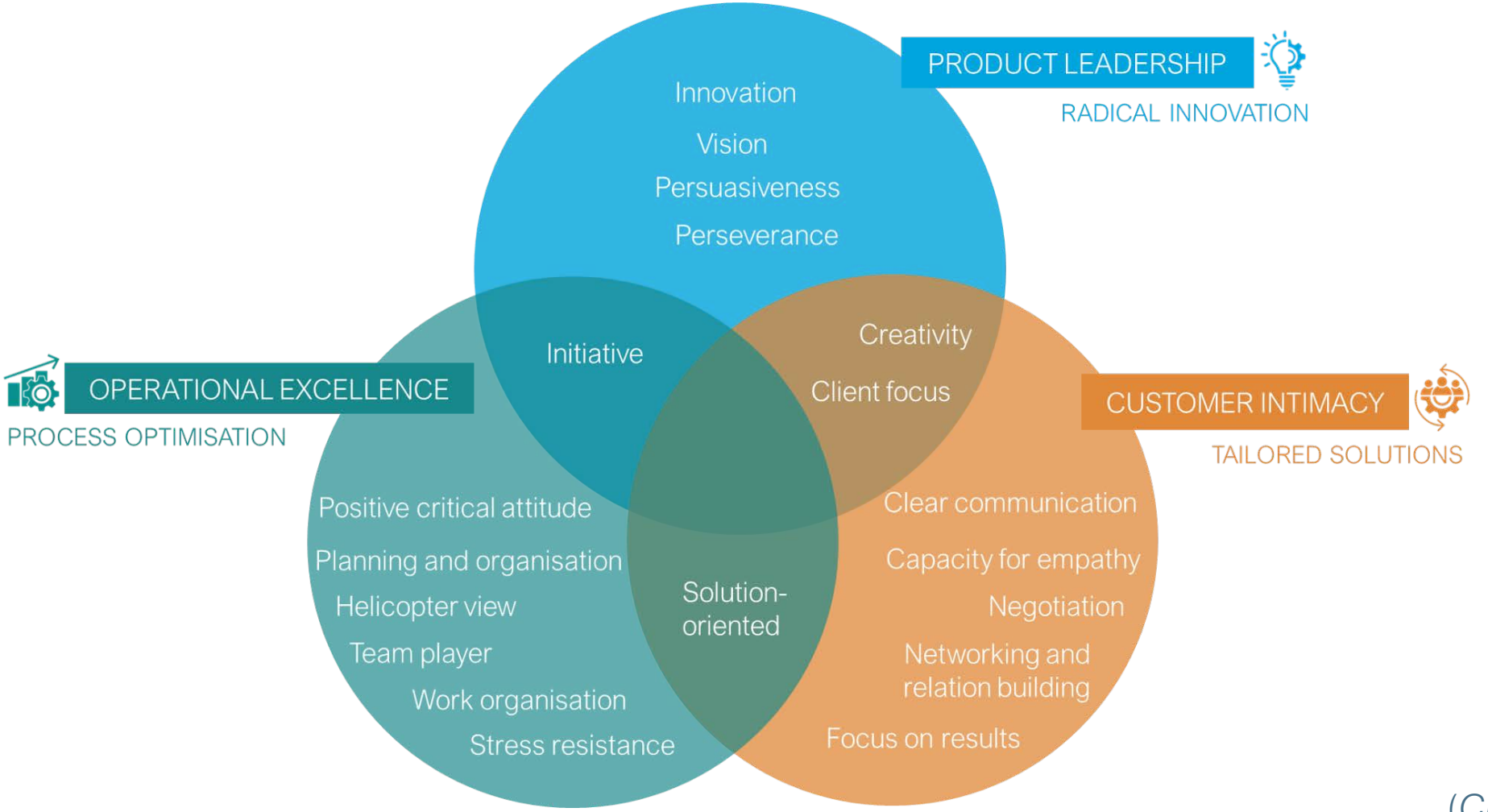
Constraints:

- focus on young engineers
- domain independent
- accepted by all stakeholders
- flexible



(*Craps et al., 2020*)

PREFER model



(*Craps et al., 2021*)

PREFER tests

What role(s) do I prefer?

Motivation

PREFER Explore

- 10 questions
- Rank most to least preferred option
- No wrong answers
- 5 minutes
- Feedback on **role preference**

Do my existing skills match my preferred role?

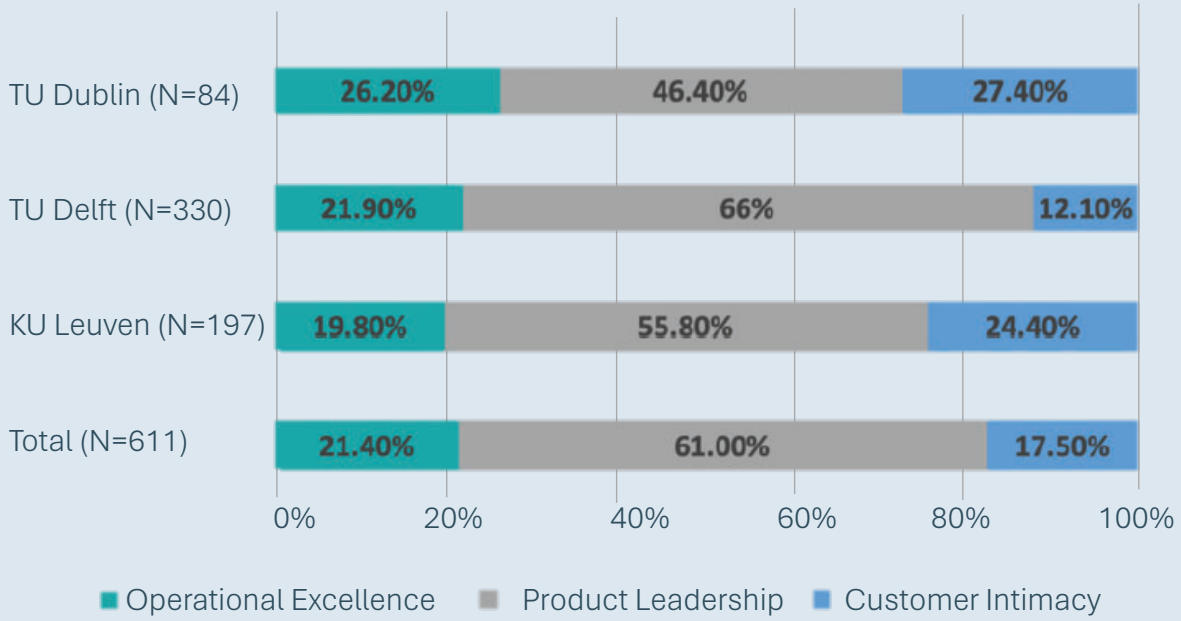
Competencies

PREFER Match

- 1 situational judgements test/rol (7-8 professional cases/test)
- Wrong and correct answers
- 10 à 15 minutes
- Feedback on **role alignment and competencies**

What did we notice?

Role preference of first-year (engineering) students



(Saunders-Smits et al. 2021)

Curriculum implementation in different stages

Introduction of different roles

Creating **awareness** of different roles through **industrial contacts**

Creating **awareness** of personal strengths and weaknesses through **testing**

Specific skills training and nurture of talents

Bachelor's programme

Master's programme

INFORM

IDENTIFY

TRAIN

(*Lange & Craps, 2020*)

Curriculum implementation in different stages

Bachelor's programme

Day with an engineer

Company visits

Reflection via e-portfolio in engineering experiences

Company visits

Master's programme

Preparing for internships

Elective modules

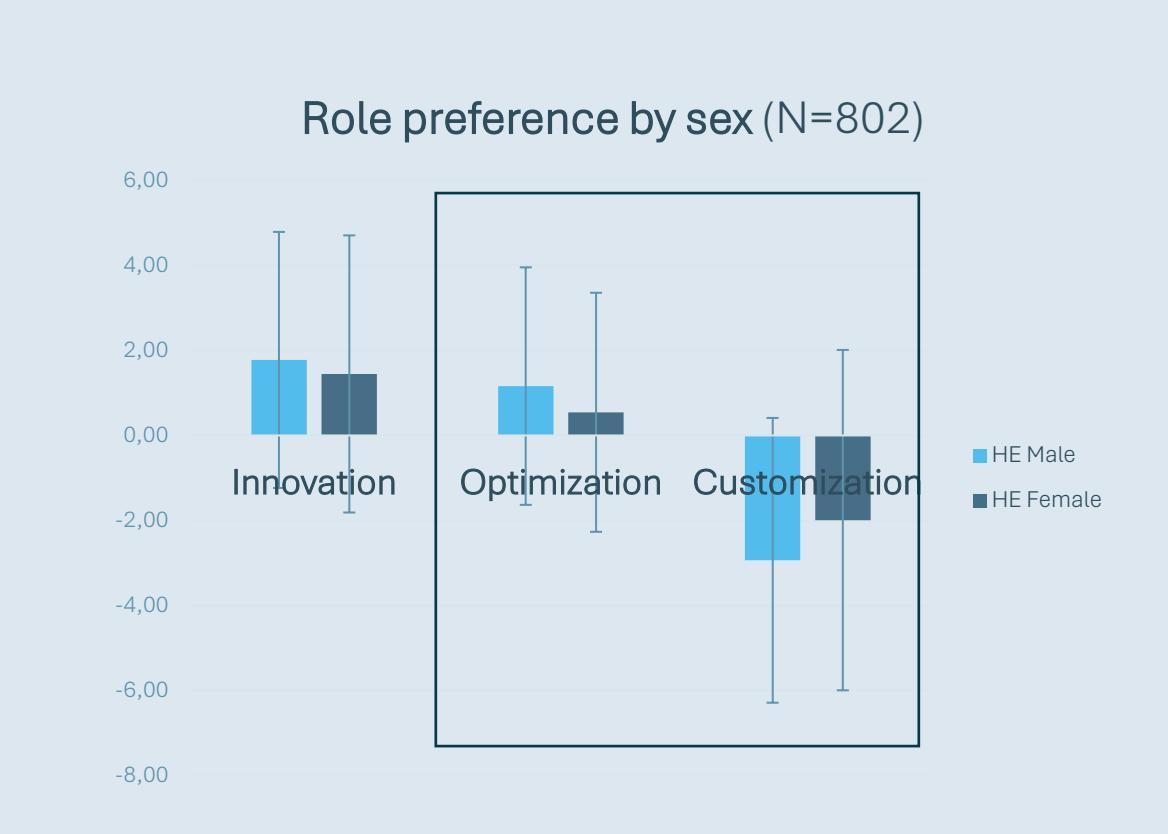
Preparing for job fairs

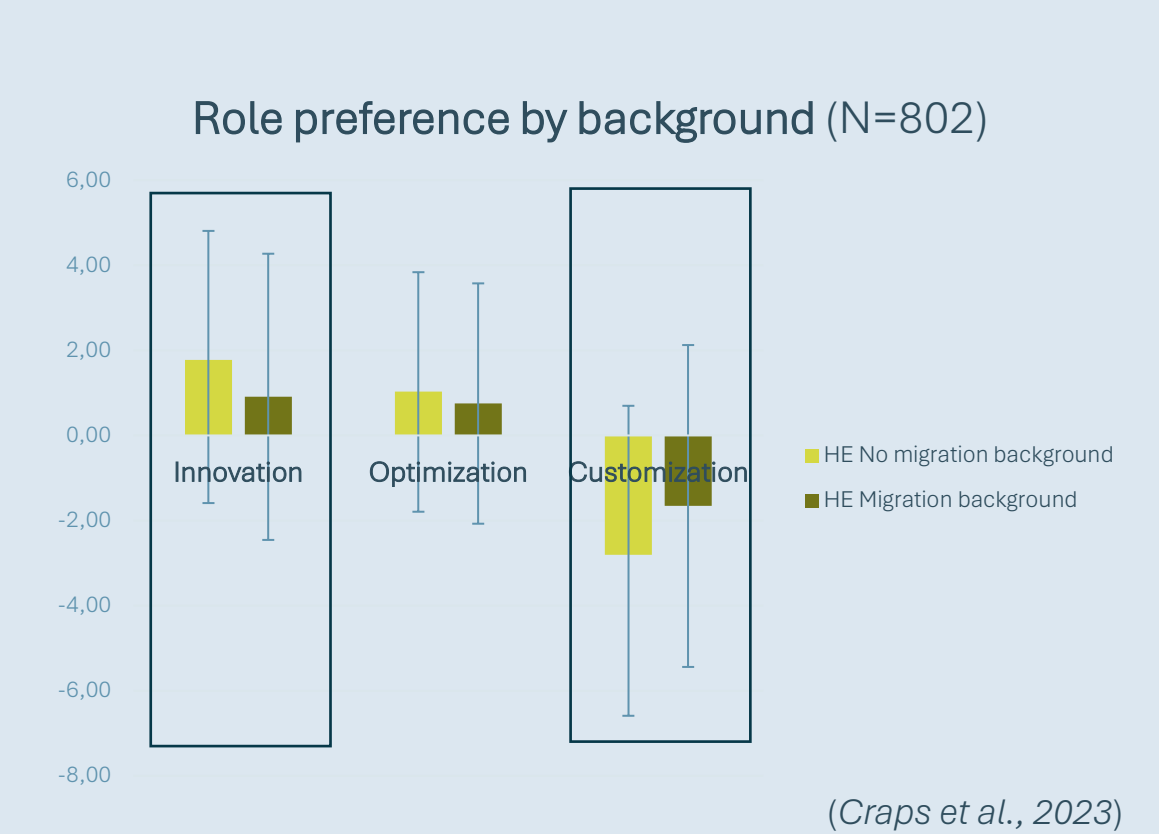
Collaboration with Student Career Center

… and increase attractiveness and diversity in engineering

What did we notice?

Role preference can vary per gender or background

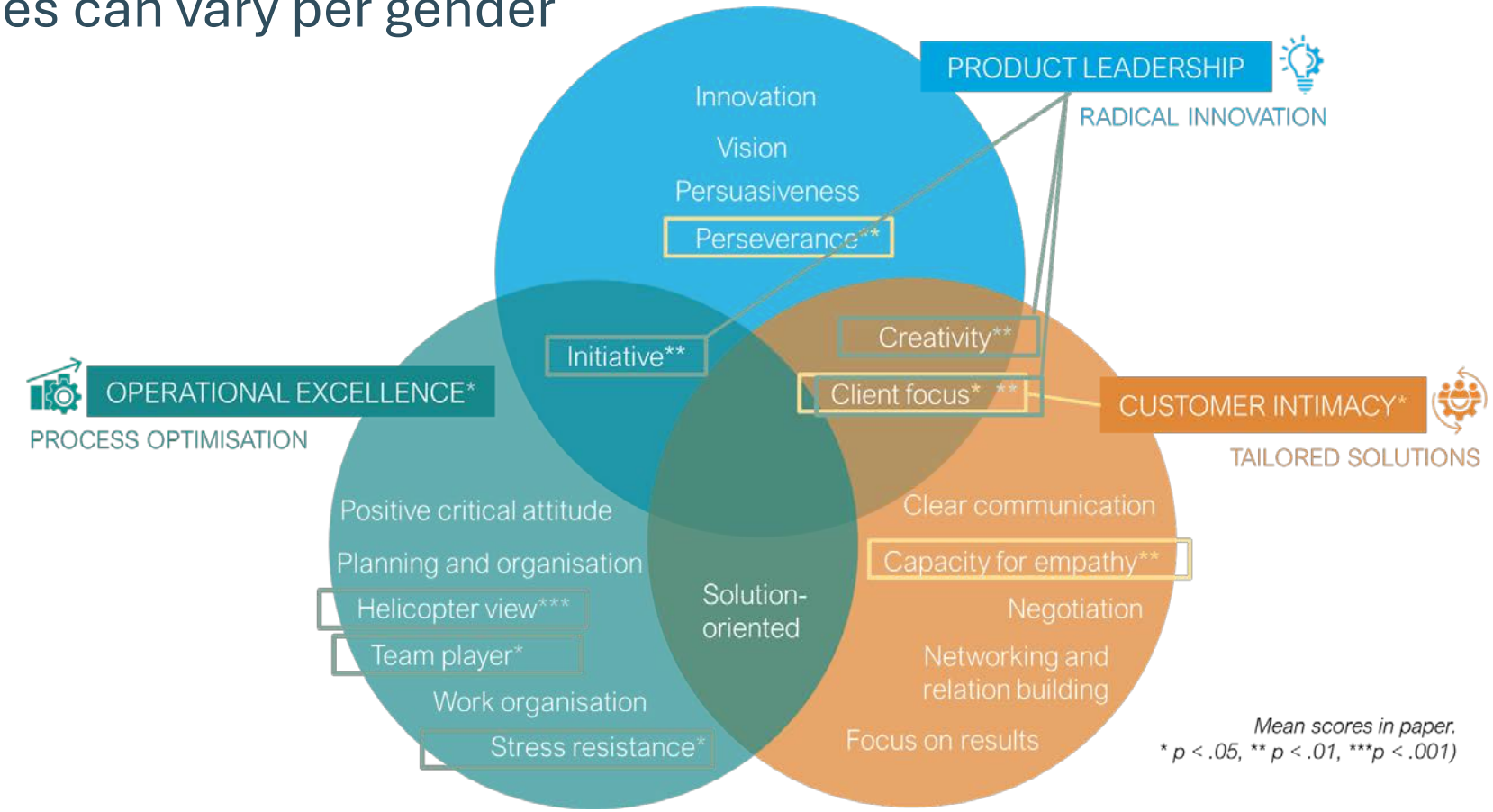




(*Craps et al., 2023*)

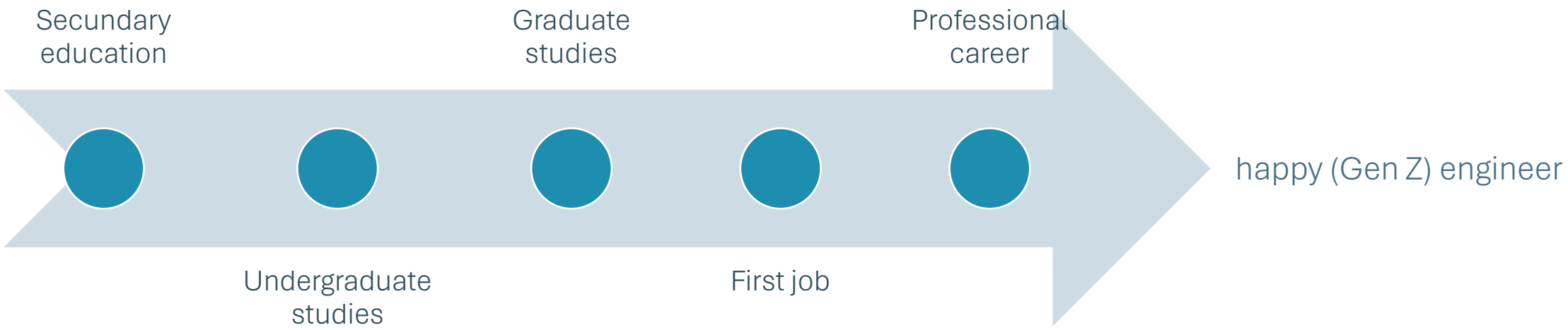
What did we notice

Competencies can vary per gender



(*Craps et al., 2024*)

Identity to increase attractiveness and retention



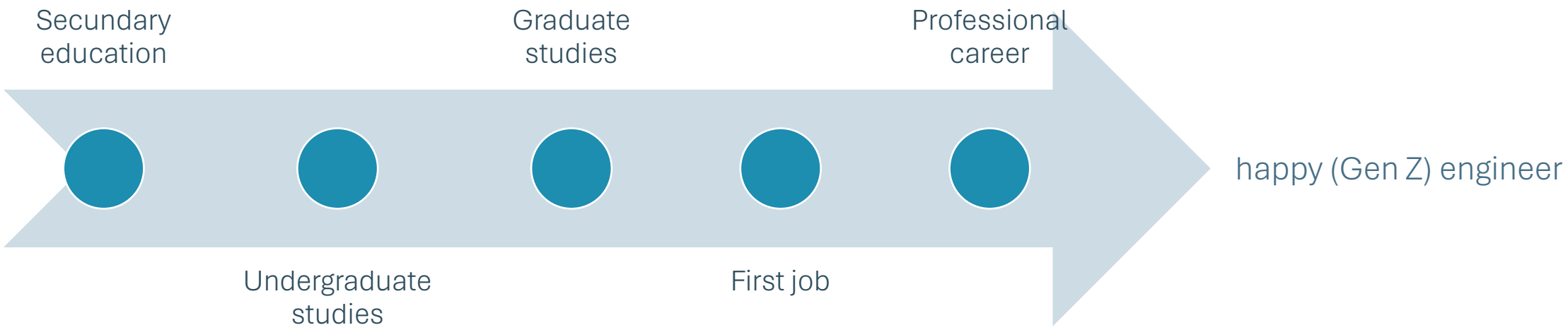
Study choice tools

PREFER Explore SE & Toolbox Engineer,
more than meets the eye

Break down stereotypes and creating awareness of

- the diverse set of career possibilities within engineering
- the societal impact an engineer can have

PREFER to increase attractiveness and retention



Study choice tools

Inclusive education

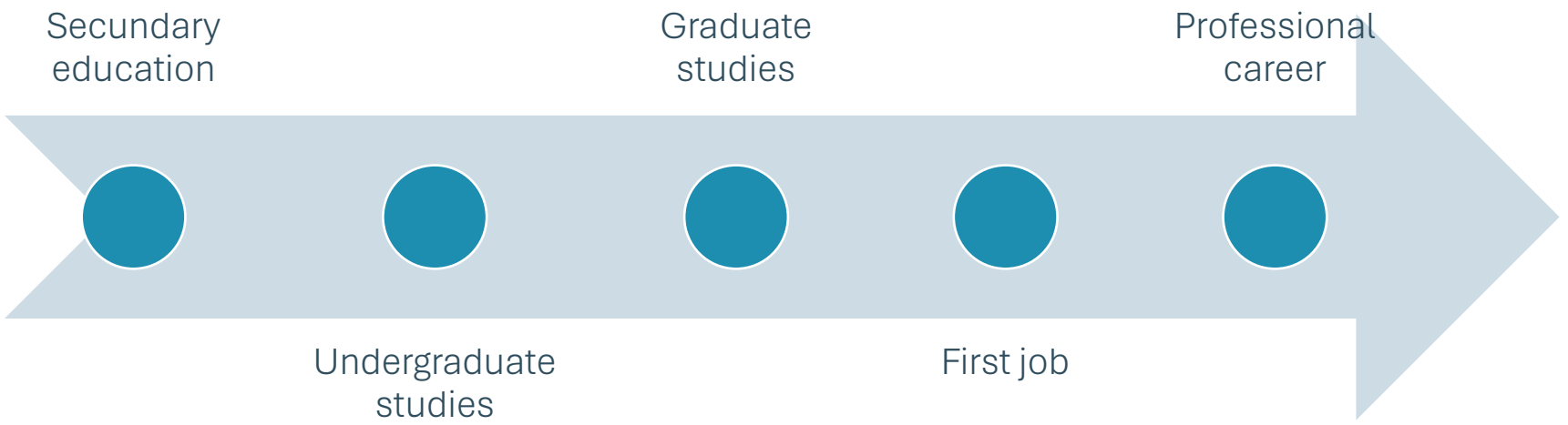
Support educators in

- designing their courses for all
- supporting students' personal development (via e-portfolio)

Towards inclusive learning environments IN ENGINEERING EDUCATION

TRAINengPDP

PREFER to increase attractiveness and retention



happy (Gen Z) engineer

Study choice tools

Inclusive education

MOOC Strategic Shift: Professional Development for the Engineer of the future

Focus on self-reflection, feedback literacy and self-regulation with the PREFER framework as backbone

Thank you!

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