

innovation

Space

from dream  
to demo



TU/e

INNOVATION  
SPACE

## How it all started

TU/e has made an impressive educational transition with a forward-perspective on engineering education and educating future engineers by implementing the Bachelor College in 2012 and Graduate School in 2013. These changes allow students to tailor their curriculum towards their own dreams, whilst still ensuring the broad basis of all TU/e Engineers. These new educational structures allow students to specialize as well as to broaden. As a next step, **TU/e innovation Space (more information)** started at the end 2015 as a pilot to increase the focus on interdisciplinarity, the integration of theory and practice, and entrepreneurship and design. Innovative industry in the Brainport region indicates that future engineers need a new set of skills: they need to be able to collaborate in interdisciplinary teams, have an entrepreneurial mindset, and think on a systems level.

## Challenge-Based Learning

The well-known interdisciplinary student teams like Solar Team Eindhoven (**more information**) demonstrate what kind of learning is needed to achieve this: students work with passion on **open challenges** with a competitive edge, learn to think at **systems level, collaborate with companies and society**, experiment with users, and show **entrepreneurial behaviour**. They do not only develop their professional skills, but also learn to apply their disciplinary skills in context and deepen their disciplinary knowledge. TU/e embraces these skills and behaviour, and through TU/e innovation Space, facilitates this approach to learning for all students. This innovative type of learning, called **Challenge-Based Learning (CBL)**, forms the core of the TU/e educational vision for 2030.

Students are offered challenges they are passionate about and which make them learn based on intrinsic motivation. Since there is no answer known in advance to the open-ended challenges, teachers learn together with the students, shifting attention **from teaching to facilitating learning** and from knowledge transfer to **coaching**. This way, students are guided by their coach and **in charge of their own learning path (self-directed and active learning)**. Students can work on and learn from challenges in projects during redesigned and new courses, as well as extra-curricular activities pursued by honors teams, student teams and student entrepreneurs.

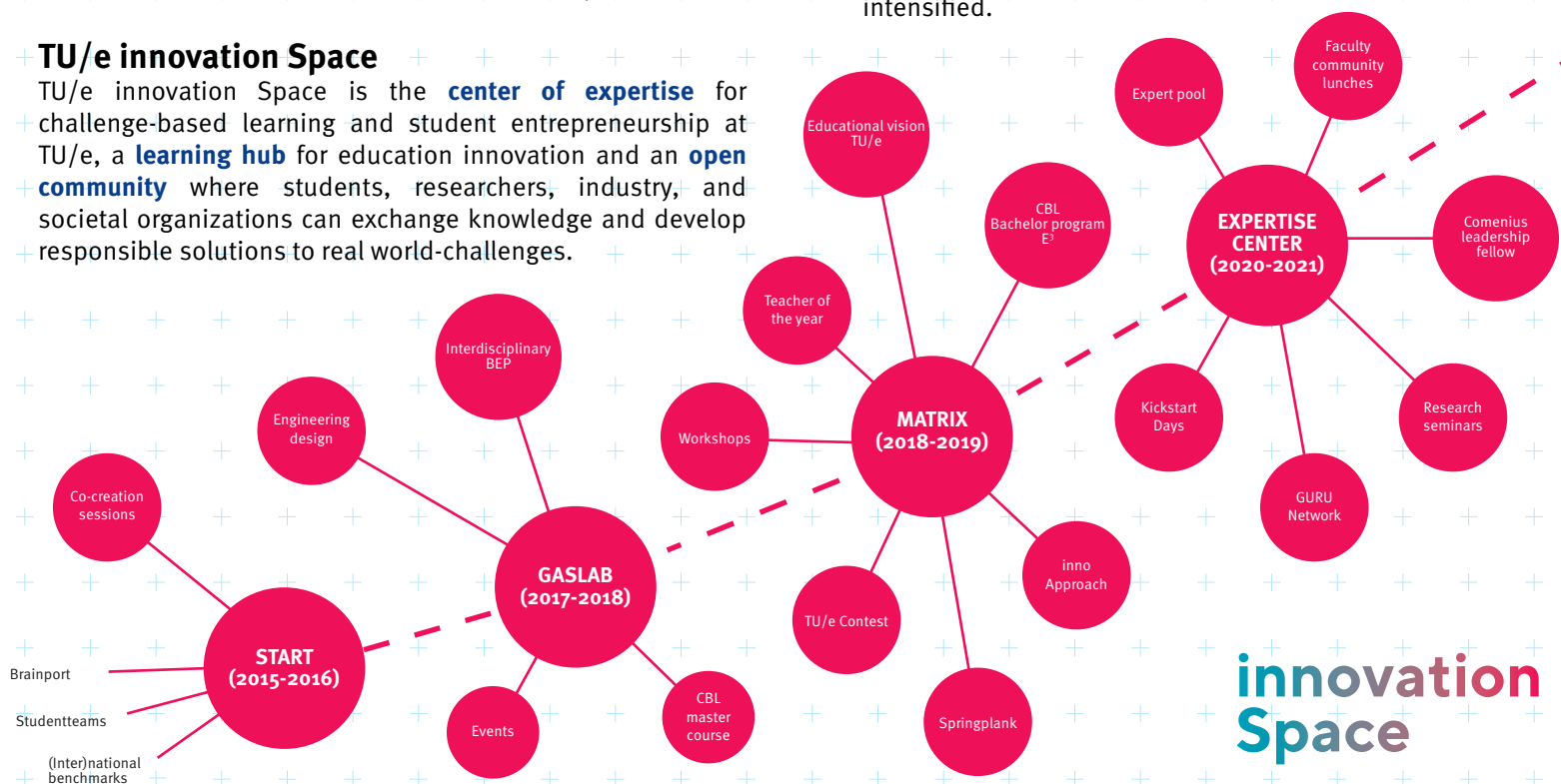
## TU/e innovation Space

TU/e innovation Space is the **center of expertise** for challenge-based learning and student entrepreneurship at TU/e, a **learning hub** for education innovation and an **open community** where students, researchers, industry, and societal organizations can exchange knowledge and develop responsible solutions to real world-challenges.

The education team started with two initiatives: **innovation Space Bachelor End Project (ISBEP)** and the course innovation Space Project (ISP). Up until today, these two innovations are the “flagships” of TU/e on interdisciplinary education and continue to be a playground for educational innovation. Next to facilitating courses, innovation Space offers **students prototyping facilities** with technical support; innoApproach workshops, providing diverse topics to develop both professional and personal skills; Springplank, a unique extra-curricular initiative to support students and their projects towards their next milestones as entrepreneurs and student teams in an informal setting; TU/e Contest, an entrepreneurship competition for all TU/e students; and many more peer learning and community building events, organized by, for, and with the students, researchers, industry and societal organizations.

## Evidence-Based innovation

Aim of the education team is to create **structural change in education**. This requires extensive research and upscaling of initiatives. For campus-wide implementation, focus on student experiences and learning gains, and achieving teacher involvement and professionalization are key. Large new experiments are being set up with TU/e innovation Space, like the E3 (Eindhoven Engineering Education) program. TU/e innovation Space plays a central role in these developments, e.g. with the **Comenius Leadership Fellow project (more information)**, or by supporting teachers at the university with the **Expert Pool (more information)**. The team also starts new initiatives: innovation Space currently works on supporting entrepreneurial learning (with 4TU) and facilitating challenges with other universities (alliance with UU, UMC, and WUR). A next step is to develop challenges in which students at different levels (Bachelor, Master, PdEng) work together, including students from Fontys, Avans, and Summa. Furthermore, international collaborations in the Eurotech partnership will be intensified.



# Click on the concepts for more information...

Our vision

Prototyping Facilities (video)



An impression of TU/e innovation Space (video)

**General information**



**Annemieke van Harten - Student CBL course at TU/e innovation Space**

"I followed multiple courses which innovation Space supports. I enjoyed them all. It's really fun to work on real challenges and to be a member of a multidisciplinary team. It feels like your work isn't just for your education. Even though you are still a student you can create a real impact with your project. The courses don't only focus on the development of knowledge. They also help you to develop collaboration skills such as planning, management and good communication with team members. I also learned a lot from our challenge owner and my fellow students."

**Johanna Höffken - Lecturer at TU/e innovation Space and teacher of the year 2020**  
(Photo taken by Bart van Overbeeke)

"innovation Space plays a key role in my teaching as it offers me the space and inspiration to innovate my education and make it impactful. In the BSC course Responsible Innovation students work on real-world projects, supervised by societal stakeholders. Students work on these challenges in innovation Space, exchange ideas with other teams and can transform their ideas into prototypes and products. innovation Space offers the ideal platform and tools for realizing this. Yet, innovation Space is much more than that. It is a community of enthusiastic professionals and students who want to make an impact in the world and want to contribute to responsibly tackling the grand societal challenges of our times. I am happy and proud to be part of this."

Education in innovation Space (video)

**Challenge-Based Learning**

Overview: extra-curricular student projects

Testimonials: students and lecturers

Testimonial from NSO (video)

**Challenge owners**



**Ricky van Broekhoven - Challenge owner**

"I was really amazed with the opportunity to work with a multi-disciplinary team of students, that all have their qualities, a lot of qualities that I don't have"

Testimonial from DAF (video)

Would you like to know more?

# Join the ISBEP journey!

## innovation Space Bachelor End Project

It is Friday 9:00 am. You arrive in the Matrix building at the university to meet your bachelor end-project team. This team is composed of two Biomedical students, a Psychology and Technology student, and a Mechanical Engineering student. Together, you work to find a solution to a challenge you have deemed relevant: How to remove orthopedic casts in a friendly way for child patients (See Table 1 for the challenge description).

### A patient-friendly cast-remover

#### Description

Casts, for instance for fixing broken bones, need to be removed at a certain time. This is done using a noisy and dangerously looking rotating saw, which has an ancient appearance. Although completely safe, using this saw is especially unpleasant for children, who may actually panic during the removal of the cast. The challenge is to develop a friendlier saw or other means to remove casts. In this project a collaboration with an orthopedic surgeon for children of the Maxima Medical Center is established, who first-hand notices this problem.

#### Desired outcome

The desired solution is a method to remove casts such that even young children will not be anxious when this is done. In practice, solutions may range from an update of the present saw (less noisy, less vibrating, less scary), to a completely different approach to remove the cast.

Table 1: Challenge description

This challenge was brought forward by a local hospital (i.e., the challenge owner), which believes students can bring in a fresh perspective, and help find a feasible solution to this issue. During the pitch event, the orthopedic surgeon from the hospital was present to explain the challenge more in depth and answer questions. He also showed a movie of a child in stress during the removal of the cast. The personal story made you apply for this challenge as the first choice.



Currently used method for cast removal causing stress by children



TU/e innovation Space provides a 'hub' and resources where you can work on this interdisciplinary project (e.g., prototyping rooms, working areas, etc.). It also facilitates weekly coaching sessions with innovation Space coaches on the interdisciplinary aspects of the projects, such as team communication, stakeholder management and integration of ideas. You can join innoApproach workshops (**more information**) in the evening with students of other courses on topics such as prototyping or the visualization of ideas. Furthermore, each team member is supported by an academic coach from your respective program, who guides and supports the development of the project from the different disciplinary perspectives.



During the first two weeks of the challenge, you and your teammates work closely together with the surgeon and the linked researcher within the university to find a relevant direction to solve this challenge, to find out what is already known, and to define a concrete problem definition.

Beside the problem definition, you work on a plan for the project, your team goals, and of course your individual goals. In the beginning of the challenge, you have meetings with your challenge owner, the academic coaches and the innovation Space coaches relatively often. The guidance team also meets up at least once without any students present to make sure everyone is well aligned. The further in the process, the more your team is working independently. You do not only design a solution, but also create a prototype with the tools in one of the dedicated workshops (**more information**), with the help of experienced staff.

During the final pitch event, your team are selected as a winner, i.e. among all other project teams working on their ISBEP (on different challenges) that semester your team shows the best worked out solution! And... the hospital wants to explore the viability of the prototype further. In order to do this, you continue working in innovation Space and join the Springplank program (**more information**). Maybe, you will become innovation Space project team (**more information**) in a while and join the TU/e innovation Space community fulltime!

Winning the contest!



As a last step, you, and your teammates hand in your individual reports for your BEP. To become a Bachelor of Science, you defend your individual work within your department. The exam committee of your Bachelor program assesses your work. This assessment is your individual accomplishment during the project and the quality of your academic report. Because you were guided well during the project by your academic coach of your individual program, you graduate as expected and will start your Master in September!



(Photo taken by Bart van Overbeeke)

Graduated!





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## Contact & Socials

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