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M Human-Technology Interaction
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Project code P2401

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Summary

Standard 1. Intended learning outcomes

The panel commends the Psychology & Technology (P&T) bachelor's and Human-Technology Interaction (HTI) master's programmes for their clear, academic and internationally oriented profiles and strong interdisciplinary focus, which effectively combine psychology, technology, and user-centric design. The P&T programme equips students with foundational knowledge and practical skills for addressing the interaction between human behaviour and technology, while the HTI programme prepares students to design innovative, human-centric technologies through a mix of theory, practical assignments, and industry collaboration. Both programmes benefit from their ties to the professional field through initiatives such as the Societal Council, alumni engagement, and hybrid teaching. The panel appreciates the detailed ILOs, and suggests continued fine-tuning them for clarity and usability. The panel also encourages benchmarking against similar programmes to refine the curriculum and further strengthen the programmes' identity in this evolving field.

Standard 2. Teaching-learning environment

The curricula of both the bachelor's programme P&T and the master's programme HTI are well-structured and align with their intended learning outcomes, offering interdisciplinary approaches that integrate psychology and technology with strong emphasis on research and practical applications. The P&T programme provides a flexible curriculum with diverse specializations and electives, supporting student preferences and career goals. The panel appreciates the introduction of Challenge-Based Learning into the curriculum and the opportunity that comes with it to further strengthen industry connections beyond academia and other research-oriented environments. Similarly, the HTI programme's multidisciplinary tracks, international opportunities, and thesis projects prepare students for impactful careers. The panel suggests asking students to explicitly reflect more on the societal relevance and impact of their theses, an aspect highly appreciated by the panel, as this will probably help make the connection to the industry clearer to them. Overall, the panel acknowledged the programmes' strong balance of flexibility, innovation, and academic rigor while encouraging further improvements in aligning curriculum outcomes with societal and industry needs. The choice of English as the language of instruction aligns with the programmes' international focus, enhancing graduates' competitiveness in the global market. Admission policies for both programmes ensure a well-prepared, diverse student body. The relatively low nominal completion rates can be largely explained by students that are highly motivated and engage in extracurricular activities, contributing to delayed graduation. The panel commends the programmes for addressing study duration issues by implementing stricter thesis deadlines. The panel also appreciates the introduction of tracks in the HTI programme, which improve feasibility by providing more guidance for students. The panel appreciates the guidance structures for students and highlights the programmes' effective support for students with impairments. The panel suggests clarifying formal mentorship role in HTI, appointing one or two dedicated mentors as part of the educational support staff to fulfil formal requirements, and allowing students to continue forming informal mentoring relationships with teaching staff. The teaching staff's diversity and multidisciplinary expertise were commended, alongside their teaching qualifications.

Standard 3. Student assessment

The panel commends the well-structured and transparent assessment systems of the P&T bachelor's and HTI master's programmes, which effectively align with their respective learning outcomes. Evaluations incorporate diverse methods, including written exams, group projects, and individual reflections, fostering a balance of theoretical understanding and practical application. The comprehensive evaluation approach to the newly introduced Challenge-Based Learning is also appreciated. Thesis assessment is built on solid

principles with two examiners and the use of a rubric to assist the examiners in grading. The panel, however, notes inconsistencies in the implementation of the P&T bachelor's thesis assessments. These inconsistencies can be traced back to the lack of guidelines on solving discrepancies between the two examiners, the absence of calibration, a convoluted rubric and the observed hierarchical relation that sometimes exists between first and second examiner. To repair the observed concerns, the panel recommends simplified rubrics with clearer minimum requirements to enhance consistency, and calibration sessions between members of staff to prevent discrepancies in assessments. The panel also recommends formulating guidelines on the independence of the second examiner. Finally, the Examination Committee needs to step up its monitoring of lower grades in the bachelor's programme, and monitor and advice on the implementation of the suggested improvements. The panel is positive about the HTI master's thesis assessment, praising it for its rigor and the involvement of several assessors, including one from outside the supervision team, though the panel suggests formalizing the selection of third assessors to avoid ad hoc arrangements and fixed teams carrying out assessments. The Examination Committee is lauded for its proactive and reflective approach, ensuring the quality and integrity of assessments, including addressing challenges posed by generative AI. Their commitment to continuous improvement and alignment with academic standards reinforces the programmes' credibility.

Standard 4. Achieved learning outcomes

The panel commends the high quality of HTI master theses, noting their scientific rigor, inclusion of the empirical cycle, societal relevance, and valuable collaborations with companies. For the P&T bachelor programme, while many theses demonstrated good quality and aligned with programme objectives, the panel found four out of twenty theses failed to meet minimum requirements, mostly related to deficiencies in the assessment process. This leads the panel to conclude that the programme will have to ensure that the final product of all bachelor graduates is of a sufficient academic level. Based on the discussions with programme management, teaching staff and the Examination Committee, the panel concludes that the system of assessment needs to be improved in order for this issue to be resolved (as discussed under Standard 3). Alumni success underscores programme effectiveness, with P&T graduates getting admitted to relevant MSc programmes and HTI graduates excelling in diverse professional and academic roles.

Score table

The panel assesses the programmes as follows:

Bachelor's programme Psychology & Technology	
Standard 1: Intended learning outcomes	meets the standard
Standard 2: Teaching-learning environment	meets the standard
Standard 3: Student assessment	partially meets the standard
Standard 4: Achieved learning outcomes	partially meets the standard
General conclusion	conditionally positive
Master's programme Human-Technology Interaction	
Standard 1: Intended learning outcomes	meets the standard
Standard 2: Teaching-learning environment	meets the standard
Standard 3: Student assessment	meets the standard
Standard 4: Achieved learning outcomes	meets the standard
General conclusion	positive

Prof. dr. Marie Šafář Postma, panel chair

Yannick Slagter MA., panel secretary

Date: 12 March 2025

Introduction

Procedure

Assessment

On 10 and 11 December 2024, the bachelor's programme Psychology & Technology and the master's programme Human-Technology Interaction of Eindhoven University of Technology were assessed by an independent peer review panel. The assessment followed the procedure and standards of the NVAO Assessment Framework for the Higher Education Accreditation System of the Netherlands (April 2024).

Quality assurance agency Academion coordinated the assessment upon request of Eindhoven University of Technology. Yannick Slagter acted as coordinator and panel secretary. He has been certified and registered by the NVAO.

Preparation

Academion composed the peer review panel in cooperation with the institutions and taking into account the expertise and independence of the members. On 10 September 2024, the NVAO approved the composition of the panel. The coordinator instructed the panel chair on her role in the site visit according to the Panel chair profile (NVAO 2016).

The programmes composed a site visit schedule in consultation with the coordinator (see appendix 3). The programmes selected representative partners for the various interviews. It also determined that the development dialogue would be made part of the site visit. A separate development report was made based on this dialogue.

The programmes provided the coordinator with a list of graduates over the period September 2021 and April 2024. In consultation with the secretary, the panel chair selected 15 theses for the Human-Technology Interaction programme and 20 theses for the Psychology & Technology programme. She took the diversity of final grades and examiners into account, as well as the various specializations in the bachelor's programme (see appendix 4). Tracks in the master's programme were only introduced since the 2024-2025 academic year, so these were not yet something to be considered in the thesis selection. Prior to the site visit, the programmes provided the panel with the theses and the accompanying assessment forms. They also provided the panel with the reading guides and additional materials (see appendix 4).

The panel members studied the information and sent their findings to the secretary. The secretary collected the panel's questions and remarks in a document and shared this with the panel members. In a preliminary meeting, the panel discussed the initial findings on the self-evaluation reports and the theses, as well as the division of tasks during the site visit. The panel was also informed on the assessment framework, the working method and the planning of the site visits and reports.

Site visit

During the site visit, the panel interviewed various programme representatives (see appendix 3). The panel also offered students and staff members an opportunity for confidential discussion during a consultation hour. No consultation was requested. The panel used the final part of the site visit to discuss its findings in an internal meeting. Afterwards, the panel chair publicly presented the preliminary findings.

Report

The secretary wrote a draft report based on the panel's findings and submitted it to an Academion colleague for peer assessment. Subsequently, the secretary sent the report to the panel for feedback. After processing this feedback, the secretary sent the draft report to the programme to have it checked for factual irregularities. The secretary discussed the ensuing comments with the panel chair and changes were implemented accordingly. The panel then finalised the report, and the coordinator sent it to Eindhoven University of Technology.

Panel

The panel assessing the Psychology & Technology and Human-Technology Interactions programmes at Eindhoven University of Technology consisted of the following members:

- Prof. dr. M. (Marie) Šafář Postma, full professor Computational Cognitive Science at the Department of Cognitive Science & Artificial Intelligence at the Tilburg School of Humanities and Digital Sciences [Chair];
- Prof. dr. ir. L. (Leentje) Volker, full professor of Integrated Project Delivery at the Department of Civil Engineering & Management of Faculty of Engineering Technology at the University of Twente;
- Prof. dr. P.S. (Pablo) Cesar Garcia, full professor of Human-Centered Multimedia Systems at the department for Intelligent Systems at the Delft University of Technology;
- N. (Nynke) Kreuwel BSc., master's student Human Factors and Engineering at the University of Twente [Student member].

All panel members, the secretary and the institution have signed a statement on impartiality and can confirm that the assessment was carried out in complete independence.

Information on the programmes

Name of the institution:	Eindhoven University of Technology
Status of the institution:	Publicly funded institution
Result institutional quality assurance assessment:	Positive
Programme name:	Psychology & Technology
CROHO number:	55824
Level:	Bachelor
Orientation:	Academic
Number of credits:	180 EC
Specializations or tracks:	Living Robots ICT
Location:	Eindhoven
Mode(s) of study:	Fulltime
Language of instruction:	English
Submission date NVAO:	1 May 2025

Programme name:	Human-Technology Interaction
CROHO number:	60431
Level:	Master
Orientation:	Academic
Number of credits:	120 EC
Specializations or tracks:	Behavioral and Social Computing Environmental Psychology Human-Centered AI Robots for Humans
Location:	Eindhoven
Mode(s) of study:	Fulltime
Language of instruction:	English
Submission date NVAO:	1 May 2025

Description of the assessment

Recommendations previous panel

The panel responsible for the limited initial accreditation of the programme in 2019 provided several suggestions for improvement of the Psychology & Technology BSc programme. These included finding a more suitable frame of reference by exploring related programmes, particularly those emphasizing multidisciplinarity, and enhancing the programmes' international positioning by adopting a stronger international profile and fostering a more diverse international staff. To strengthen academic rigor, the panel advised improving research methodology to align with the objectives of a research-focused bachelor's programme. Other recommendations included raising lecturer awareness of the Assessment Committee, expediting exam grading, and incorporating calibration of qualitative to numeric grading in rubrics to replace the old BEP assessment form with a rubric based on learning outcomes.

The previous accreditation panel for the Human-Technology Interaction MSc programme in 2017 provided several suggestions for improvement. These included strengthening the application of research methods and techniques in the curriculum and ensuring that all assessment criteria for the Graduation Project are satisfactory without allowing compensation. The panel advised introducing rubric forms for Graduation Project assessments to improve grade calibration and better align grades with written comments. They also emphasized the need to strengthen reflection on research design and methods in Graduation Projects and to require a dedicated section on technical work within them. To address potential increases in student numbers, the panel recommended maintaining a favourable student-to-staff ratio, monitoring lecturer workloads, and adequately training teaching assistants or junior lecturers if employed to support staff.

Standard 1. Intended learning outcomes

The intended learning outcomes tie in with the level and orientation of the programme; they are geared to the expectations of the professional field, the discipline, and international requirements.

Findings

The bachelor's programme Psychology & Technology (P&T) and the master's programme Human-Technology Interaction (HTI) are organized by the department of Industrial Engineering & Innovation Sciences (IE&IS) of Eindhoven University of Technology (TU/e). The P&T programme is part of the TU/e Bachelor College in which all bachelor's programmes are accommodated, and the HTI programme similarly is part of the TU/e Graduate School together with all TU/e master's programmes.

The P&T bachelor's programme aims to equip students with a deep understanding of how technology impacts human behaviour, alongside the skills to design technological solutions informed by psychological insights. Graduates are prepared for careers in research, design, or consultancy, or to pursue further studies. With immediate access to the HTI master's programme at TU/e, the P&T programmes also explicitly aims to prepare students for this programme. The P&T programme integrates psychology and technical knowledge, with a focus on real-world applications. Students begin with a fixed first year focused on foundational knowledge in both psychology and technology, alongside essential professional skills such as collaboration and project management. From the second year onward, they have the flexibility to tailor their studies by selecting a specialization in either Living, Robotics, or ICT. Living integrates psychology and engineering to design environments promoting health, performance, and pro-social behaviour, using advanced technical

theory and psychological research methods. The specialization Robotics focuses on sensors and control, for robotics and AI systems in healthcare, smart homes, industry, and service robotics, providing a technical foundation for advanced engineering specializations. ICT explores user interaction with ICT to enhance experiences in games, web technology, and e-commerce, offering a strong computer science foundation. The programme emphasizes hands-on learning through design assignments and real-world projects, fostering skills in collaboration and organization. The blend of disciplines prepares students for roles in technology design, user experience, and human-technology interaction.

The HTI master's programme aims to equip students with the skills to design and evaluate technology in a human-centric way, improving the interaction between people and technology. Graduates will be able to assess the feasibility of new technologies, contribute to their design, and ensure they are safe, effective, and user-friendly. The programme integrates knowledge from psychology, sociology, biology, and ergonomics with technical fields like ICT, AI, architecture, and robotics. Students learn to apply this interdisciplinary knowledge to create better user experiences, whether through digital environments, AI systems, or physical spaces. The programme uses a combination of theoretical study, practical assignments, and collaboration with industry partners to address real-world challenges. By the end of the programme, students will have the expertise to influence the development of technologies that enhance human functioning and align with human values.

Since September 2024, the HTI master offers four tracks:

- *Behavioral and Social Computing* examines digital interactions via psychology, sociology, and data science, aiming to improve online behaviour, identity, and information dissemination through design recommendations.
- *Environmental Psychology* studies human interactions with natural, built, and social environments to design spaces and technologies that enhance well-being and optimal functioning.
- *Human-Centered AI* focuses on designing AI systems that align with human cognition, UX, and ethics, ensuring meaningful, value-driven human-AI interactions.
- *Robots for Humans* develops socially aware robots for sectors like healthcare and education, using psychology and ethics to ensure humane, value-sensitive human-robot interactions.

The panel studied the profile and mission of both programmes and concludes that both programmes have a very clear, academic and internationally oriented profile. The panel concludes that the bachelor's programme P&T is designed to provide students with a solid foundation in understanding and improving the interaction between human behaviour and technology. The programme is interdisciplinary, providing students with the ability to approach problems from multiple perspectives, a skill that may prove useful for later in their career. The panel concludes that the master programme HTI offers a good combination of theory, practical assignments and collaboration with industry to enable students to play an important role in designing new technologies in which the user is central. The panel believes that it is valuable for a university of technology to offer programmes where the human factor is an important element. Furthermore, the panel concludes that the two programmes are complementary, and with their focus on human-centric technologies, are essential for the future of technology in society. In this light, the panel was somewhat surprised that the HTI programme was not included in 'Project Beethoven', aimed to bolster the Dutch chip industry and the Brainport Eindhoven hub. The panel is convinced that the expertise in the programme is not only valuable but a necessary addition to the Beethoven project. The panel therefore advices the TU/e to make the HTI master's programme part of the Beethoven project.

Intended learning outcomes
The intended learning outcomes of both programmes are divided into ten general ILOs (common to all bachelor's and master's programmes of TU/e) and a set of domain-specific ILOs that are characteristic of the P&T and HTI programmes.

To keep the programmes aligned with the expectations of the professional field, connections with the professional field are maintained through multiple initiatives. The Societal Council, shared across all IE&IS department programmes, includes representatives from companies such as ZIUZ and ASML, as well as government-related organizations and educational institutions. Meeting three times a year, the council focuses on general, research, and education-related topics. The study association Intermate facilitates further industry engagement through lunch meetings with business professionals, annual foreign excursions for career orientation, and visits to companies and universities abroad. The curriculum incorporates guest lecturers and hybrid teachers, who bring real-world experience into the classroom, and many students undertake graduation projects within companies, often facilitated by alumni. The alumni association ITEM actively connects alumni with current students, with alumni sharing their career experiences during master's programme introduction weeks and throughout the academic year.

The panel appreciates the ILOs of the programmes and noted that they were formulated at an academic bachelor's and master's level respectively. The panel values the detailed level of the ILOs for both programmes, and appreciates the addition of topical learning objectives on social impact. At the same time, too much detail can make them complicated to work with as a tool to assess students' progress, especially when the number of ILOs mount up. The panel therefore strongly suggests to continue the process of finetuning the ILOs to find an optimal balance between ILOs that need to cover everything in interdisciplinary programmes like P&T and HTI, and ILOs as a tool for evaluating student progress. For the P&T bachelor's programme, the panel suggests specifying which tracks the ILOs align with, linking them to track-specific content. This would enhance clarity and relevance for students. Furthermore, specific ILOs could then also be used for the assessment of theses (further discussed under Standard 3).

The panel acknowledges the strong involvement of the professional field in the programmes, which helps align programme goals with industry demands. This engagement is facilitated through the Societal Council, study association Intermate, the use of hybrid teachers, and alumni connections. The panel particularly values the role of alumni, who maintain contact with the programmes and strengthen its network. To keep pace with the rapidly evolving field, the panel advises to continue aligning the ILOs to industry demands. The panel noted from the documentation and the interviews with the management, that the programmes currently do not engage in benchmarking by comparing the programme against equivalent programmes at other universities. While the management views the programmes as unique and difficult to compare, the panel believes that similar interdisciplinary programmes exist and benchmarking against them could be beneficial. Such comparisons would help further refine the programmes and provide a clearer identity for students navigating their place within this rapidly developing discipline.

Considerations
The panel commends the P&T bachelor's and HTI master's programmes for their clear, academic and internationally oriented profiles and strong interdisciplinary focus, which effectively combine psychology, technology, and user-centric design. The P&T programme equips students with foundational knowledge and practical skills for addressing the interaction between human behaviour and technology, while the HTI programme prepares students to design innovative, human-centric technologies through a mix of theory, practical assignments, and industry collaboration. Both programmes benefit from their ties to the professional field through initiatives such as the Societal Council, alumni engagement, and hybrid teaching.

The panel appreciates the detailed ILOs, and suggests continued fine-tuning them for clarity and usability. The panel also encourages benchmarking against similar programmes to refine the curriculum and further strengthen the programmes' identity in this evolving field.

Conclusion

The panel concludes that both the bachelor's programme Psychology & Technology and the master's programme Human-Technology Interaction meet standard 1.

Standard 2. Teaching-learning environment

The curriculum, the teaching-learning environment and the quality of the teaching staff enable the incoming students to achieve the intended learning outcomes.

Findings

Curriculum BSc P&T

The Psychology & Technology (P&T) bachelor's programme offers an interdisciplinary curriculum that integrates psychology and engineering, designed to explore and enhance the interaction between humans and technology. The programme is structured across three years, providing foundational knowledge in the first year, specialized learning in the second, and a final project in the third. Students choose from three specializations - ICT, Living, and Robotics - each offering six technical courses that build expertise in specific domains.

The first year focuses on establishing a strong foundation in psychology, research methods, and technical skills. Core courses include Social & Environmental Psychology, Behavioral Research Methods, and Brain, Body, and Behavior, complemented by technical subjects such as Programming for Psychology and Technology and Applied Data Skills. Courses like Calculus and Introduction to Psychology & Technology provide essential mathematical and conceptual frameworks. All students also take the Engineering Ethics course from the Bachelor College Impact of Technology programme, emphasizing the ethical dimensions of technological advancements.

In the second year, students delve deeper into research methods and psychological theories while starting their specialization of choice. The core curriculum includes Behavioral Research Methods II, Thinking and Deciding, and Perception & Motor Control. Specialization courses tailor the learning experience to the chosen field:

- ICT Specialization
  The ICT specialization focuses on improving user-centred technology in domains like Web Technology, Social Media, Gaming, and Virtual Reality. Courses include Data Modelling and Databases, Programming, and Digital Tools & Human Wellbeing, equipping students with skills in data structures, algorithms, and user interaction.
- Living Specialization
  The Living specialization explores the interplay between environments and human behaviour, aiming to design spaces that promote health and well-being. Courses such as Healthful Environments: Light, Wellbeing, and the Biological Clock, Building Services, and Circularity and Energy Performance in the Built Environment teach students to quantify environmental conditions and create sustainable, human-centred designs.

- Robotics Specialization
  The Robotics specialization is the most technically intensive specialization, focusing on human-robot interaction, AI, and autonomous systems. Core courses include Signals and Systems, Fundamentals of Electronics, and Recognizing & Implementing Social Cues for HRI, preparing students for challenges in fields like healthcare robotics and autonomous vehicles.

In the third year, students focus on electives and complete a Bachelor Final Project, applying their knowledge to solve real-world problems. Courses such as Human-Centered AI and electives allow for further customization of their education. The 10 EC final project (BEP) integrates research, technical expertise, and psychology to address interdisciplinary challenges. The end result of the final project is a thesis that can either be an individual or a group report, but the project always starts out with group work pertaining mostly to the gathering of data. Afterwards students analyse the data individually in answer to their own research questions. Students also are given the option to develop a thesis at Innovation Space for 15 EC. Here they work in multidisciplinary groups with students from other studies, are given a challenge from a company, and also talk to the company as a stakeholder in the project. The end result is a design project resulting in a thesis and advice to the company.

The comprehensive curriculum, blending psychology and engineering, is aimed at preparing students for careers in diverse fields like technology design, AI development, and human-technology interaction. The curriculum is flexible, allowing students to tailor their education with electives, and is supported by personal guidance and a small-scale, interactive learning environment. Teaching methods in the regular courses are a mix of lectures and student-centred methods, such as interactive lectures, group assignments, tutorials and practical sessions. From the academic year 2024-2024 the programme will implement Challenge-Based Learning (CBL) into its curriculum, adding another element to the teaching methods used. Teaching staff hope to incorporate more design and engineering into the curriculum through CBL. A distinctive feature of the programme is the use of learning lines, in which courses are grouped by theme, to guide students through their development, avoiding unnecessary overlap and ensuring that essential competencies are developed across different stages. Themes include AI, Energy, Entrepreneurship, Materials, and Sustainability.

Based on the documentation and interviews during the site visit, the panel concludes that the P&T curriculum is well structured and well designed. The composition of the programme is good and the education in the programme viable. The content is in line with the intended learning outcomes. The courses and projects in the modules complement each other, with students using the knowledge and skills taught in the courses to carry out projects and their final project and using the projects to process and apply the course content. The panel feels that the specializations make sense, and from the student chapter and the discussions with the students during the site visit, it also became clear that students like the options. Teaching methods are varied and appropriate to the learning objectives of the courses, with sufficient attention to both academic and professional skills, and a good balance between group work and individual work. Students can tailor the curriculum to their own preferences with the three specializations to choose from, as well as with the many electives they can choose from in the ample space for it in the curriculum. The panel observed that the programme management and teaching staff are very aware of the advantages and disadvantages of the introduction of CBL into the curriculum. The panel therefore feels it can be a good new addition to the curriculum as well as an opportunity to connect more to the job market.

Curriculum MSc HTI

The Human-Technology Interaction (HTI) master's programme is a two-year, full-time study programme, organized into specialized tracks, designed to train students to bridge the gap between human behaviour

and technology. The curriculum emphasizes a multidisciplinary approach, combining insights from psychology, sociology, data science, artificial intelligence, and engineering. The programme consists of coursework, applied projects, and research activities.

In the first year, students build a solid foundation in understanding human behaviour and the principles of technology design. Courses span both theoretical knowledge and practical skills. A unique feature of the programme is the choice to specialize in one of the following tracks, which focus on different aspects of human-technology interaction:

- Behavioral and Social Computing
  Explores human behaviour in digital environments, including online interactions, virtual spaces, and the dynamics of social media. Students investigate topics such as the psychological impact of online games, the spread of information on networks, and the design of user-friendly online platforms.
- Environmental Psychology
  Examines the interplay between humans and their physical and social environments. Topics include the effects of indoor spaces augmented with smart technologies on health, cognition, and well-being, as well as the design of environments that promote human thriving.
- Human-Centered AI
  Focuses on designing AI systems that align with human values, needs, and limitations. Covers areas like explainable AI, machine learning, human decision-making in interaction with algorithms, and the ethics of AI applications.
- Robots for Humans
  Investigates human-robot interaction, emphasizing ethical, social, and psychological dimensions. Students learn to design robot behaviours that respect human values and enhance human-robot collaboration in domains like healthcare, education, and customer service.

Each track offers advanced courses tailored to its focus, providing deeper expertise. For example, the Behavioral and Social Computing track includes courses such as Network Society and Social Media & Life Online, which delve into the dynamics of digital interactions. The Environmental Psychology track offers Advanced Perception and Psychology of Light and Time, emphasizing how physical spaces influence human behaviour and well-being. In the Human-Centered AI track, students study topics like Human-AI Interaction and Explainable AI, focusing on designing transparent and trustworthy AI systems. Similarly, the Robots for Humans track features Human-Robot Interaction and Robot Ethics, addressing the societal and ethical implications of robotics. Across all tracks, students integrate theory and practice through coursework and projects, ensuring they graduate with a well-rounded skill set tailored to their interests. Students may combine courses across tracks, gaining expertise in multiple technical fields. This interdisciplinary approach is supplemented by short, hands-on projects that challenge students to integrate knowledge from diverse areas to solve real-world problems.

A defining aspect of the second year is the opportunity to gain international experience. Students may study at partner universities abroad and participate in collaborative research projects aligned with their chosen track. These experiences broaden students' perspectives on global challenges in human-technology interaction and provide exposure to cutting-edge research and practices in their field. Alternatively, students may opt for internships in international companies or research institutes. This pathway allows students to apply their knowledge in professional settings and gain insights into industry challenges and opportunities. From the discussion with the students and alumni, it became clear that the opportunities for outside experience are much appreciated by students of the programme as a way of getting soft skills that are very useful for their further career.

The final semester is dedicated to a graduation research project, which spans six months. Students conduct individual research on a topic of their choice under the supervision of HTI faculty. Research can take place at the university, in collaboration with a company, or within a public institution. The thesis explores a novel research question at the intersection of human behaviour and technology. Topics often align with the student's track, enabling them to specialize further in their area of interest.

The HTI curriculum includes a variety of core and track-specific courses, complemented by applied projects to provide both foundational knowledge and specialized expertise. Core courses such as User Experience Design focus on human-centred principles to ensure that technology aligns with user needs, while courses like Advanced Data Analysis strengthen statistical skills and encourage critical evaluation of data. The Literature Study of Real-World Cases prepares students to translate scientific insights into practical applications, fostering effective communication with stakeholders outside academia. In addition, students engage in Challenge-Based Learning (CBL) projects, where they work together on open-ended societal challenges relevant to their chosen track, with an emphasis on creativity, collaboration, and impact.

The panel appreciates that the HTI programme offers students flexibility in their learning paths while maintaining a good composition of the programme. Students are encouraged to select tracks and courses that align with their personal and professional interests, supported by mentors who ensure coherence in their choices and readiness for the thesis phase. In this way, the HTI programme fosters autonomy in constructing learning paths, with tracks that are appreciated by the students. By combining interdisciplinary coursework, applied projects, and opportunities for international exposure and industry collaboration, the programme prepares graduates to address complex challenges at the intersection of technology and human behaviour. Whether through research, design, or application, HTI graduates are well-positioned to lead advancements in creating technology that enhances human well-being and societal progress. The panel recommends the HTI programme to continue enhancing skills to prepare students of the programme for the job market. Even tough students are currently critical on this aspect, the panel finds that the student theses do have a high societal relevance which might need to be reflected upon more by the students . This might also explicate the connection to the industry and therefore also the societal relevance of the programme.

Language and internationalization
Both programmes are taught in English, and their names are also in English. This choice reflects the goal of preparing students for careers in an international oriented discipline, where graduates often collaborate with colleagues or clients from diverse cultural backgrounds, whether in academia or industry. By immersing students in an international environment during their studies, the programmes equip them with the skills and experience needed to succeed in the international professional field, aligning the programme with global career prospects. The choice for the English language is also driven by the need to train more engineers to meet the demands of the innovative high-tech industry, such as the Brainport region, and the ambition to attract international students and top talent. It is TU/e policy that all staff teaching in English are expected to have a command of English at CEFR level C1 or higher.

The panel fully supports the decision to use English as the language of instruction for both programmes. As technical programmes with a significant focus on specialized courses, they align closely with the demands of an international job market. Many developments in these fields are driven by global advancements, making English essential for students to stay informed and competitive. Furthermore, offering the programmes in English ensures their adaptability, enabling graduates to seamlessly integrate into international professional and academic environments.

Feasibility and guidance

Admission to the P&T programme is open to Dutch students with a vwo-degree that includes Mathematics B, as well as Dutch students with a proceeds or bachelor's degree in applied sciences (hbo), provided they have a vwo-certificate in Mathematics B and proficiency in English at a vwo-level. International students with a comparable degree and sufficient English proficiency are also eligible for admission to the programme. This ensures a diverse student body with a solid foundation in mathematics and language skills necessary for success in the programme. The HTI programme is open to students with a bachelor's degree in Psychology & Technology or Sustainable Innovation from TU/e, as well as students with a bachelor's degree in fields such as Psychology, Business Information Technology, Chemical Science and Engineering, Bouwkunde, or Technische Bestuurskunde. Students from other TU/e bachelor's programmes may be admitted if they have completed courses in behavioural research methods and at least 15 ECs of psychology-oriented courses. Dutch students with a relevant university of applied sciences degree may also be admitted after completing a 30 EC premaster's programme. The premaster's programme, starting annually in September and taking one semester to complete, offers two tracks: the Psychology track for those lacking psychological knowledge and the Technology track for those lacking technological knowledge. International students with a comparable degree and sufficient English proficiency can also apply. Studying the dropout rates of 11-18% for the P&T programme and a first-year dropout rate of approximately 6% for the HTI programme, the panel concludes that the completion rates for the programmes are good and admission requirements for both the P&T and HTI programmes are appropriate, ensuring a diverse and well-prepared student body with the necessary foundations for success.

Approximately 20–23% of students of the P&T programme graduate within the nominal three years, though this percentage declined in 2020-2021 due to the impact of Covid. Within four years, 65–70% of students successfully complete the programme, reflecting a steady progression for the majority beyond the standard duration. On average, 30% of HTI students graduate within the nominal two-year period, while 75–85% complete the programme within three years. The three-year graduation rate has remained consistent over time, indicating a reliable progression pattern for most students. The proportion of nominal students for both programmes, at 20–30%, is relatively low, indicating that many students take longer to complete their studies. This issue was discussed during the site visit. Discussing the workload with the students and alumni of the programmes, the panel found there is no indication that the workload is too high and concludes that the feasibility of both programmes is generally appropriate. One point of attention might be the courses that students are required from other departments, such as computer science. While these courses are designed to require no prior knowledge, students from the host programmes often have relevant background knowledge, which can leave students from the P&T and HTI programmes feeling somewhat behind. The panel advises the programmes to examine whether the workload of these courses is appropriate for P&T and HTI students, and to take action if students are structurally spending more time on these courses than the number of ECs indicates.

The programmes' staff explained that students are capable and could finish on time but often engage in extracurricular activities. Ultimately, it is the students who determine their pace. The programmes have implemented stricter deadlines in the thesis projects to address the issue of study duration. For some students, the work on their thesis could get delayed because of personal issues, and this delay could end up stretching out for months or even years. Now instead of prolonging for years, they need to end it early on and start anew. While this has increased dropout rates a little bit, overall it has fostered a more timely completion. Furthermore, the implementation of the four tracks in the HTI programme increases feasibility, as it guides students in their study process and increases alignment between courses. The panel commends the programmes for addressing study duration issues by implementing stricter thesis deadlines. The panel

also appreciates the introduction of the tracks in the HTI programme, which improves feasibility by providing more guidance for students. The panel highlights the programmes' balance between rigour and flexibility.

In preparation for the start of their studies, first-year students of the P&T programme are invited to participate in the interactive 'How to Uni'-programme. 'How to Uni' is an online onboarding module to introduce new students to the university, the city of Eindhoven, the department of IE&IS, digital systems, and gain some study tips. This programme seems to be a very valuable instrument to the panel. From the documentation and the interview during the site visit, students appeared enthusiastic about the scale of the programme and the level of teacher engagement, in general feeling that teachers are readily available for questions and guidance. This leads the panel to conclude that the guidance students of the P&T programme receive is of a good level.

In the student chapter of the HTI programme, students expressed criticism about the role of the mentor, describing it largely as a formality. This got the panel to discuss guidance that master's students receive. During the site visit, the panel discussed this with the teaching staff, who explained that each incoming student is assigned a mentor from the staff to assist with decisions about their study programme and future goals. This mentorship is a formal requirement outlined in the Teaching and Examination Regulations. The match between student and mentor is not always optimal, as indicated by students. Previously, mentors played a significant role in helping students choose electives, but with the introduction of tracks into the curriculum, their function has effectively been reduced to formalities such as signing off on international internships. According to staff and students it is, in practice, the teaching staff members who monitor the success and well-being of the students, not the mentors. When the panel discussed guidance with the students, they found that students were quite satisfied with the support that is provided, with advice primarily coming from the teachers of students' own choosing acting as informal mentors. The panel concludes that students appreciate the guidance they receive. The formal mentorship role does not align with actual practice, a mismatch that results from institution-wide policy. The panel suggests appointing one or two dedicated mentors for all students as part of the educational support staff to fulfil formal requirements, allowing for informal mentoring relationships which students appear to appreciate.

The P&T and HTI programmes provide comprehensive support for students with impairments through university-wide arrangements, besides the close interaction between students and teaching staff. All facilities are accessible for physical impairments. Academic advisors help create adjusted schedules and implement necessary programme modifications. Student counsellors can offer independent advice, financial support, and examination accommodations, such as extended time, specialized formats, or ergonomic arrangements. These measures aim to minimize obstacles and prevent study delays due to personal circumstances. Additional support is available from study management advisors and student psychologists, ensuring a well-rounded approach to student well-being. The panel feels that these resources reflect TU/e's commitment to creating an inclusive and accessible academic environment for all students and specifically noted the well-thought-out policies for students with neurodivergent profiles, both for the students and guidelines for the teachers.

Teaching staff

The teaching staff for both programmes primarily comprises members of the Human-Technology Interaction group (HTI), supported by staff from the IE&IS Technology, Innovation, and Society group, the Philosophy and Ethics group, and specialized faculty from the Built Environment, Electrical Engineering, and Mathematics and Computer Science departments. The HTI academic team consists of 44.6 FTE, including 9% professors, 14% associate professors, 19% assistant professors, and 58% PhD candidates. Following up on the recommendations of the previous accreditation panel, the staff has become more diverse and

international. Lectures are taught by professors, while PhD candidates play a significant role in supervising theses and group projects. Guest lecturers also teach in both programmes. Notably, 90% of the HTI academic staff (excluding PhD candidates) hold the University Teaching Qualification (UTQ), with the remainder actively pursuing it. All new academic staff are required to complete the UTQ programme, ensuring a consistent focus on teaching quality and pedagogical standards across the programme.

The panel concludes that the programmes have a strong diverse and multidisciplinary staff that is aware of each other's competences. Furthermore, the panel appreciates the large variety of courses and types of theses that are made possible by the broad expertise available within the Human-Technology Interaction academic team. The UTQ of the staff is in order. After interviews with the teaching staff, including some PhD candidates that were present, the panel also concludes that PhD candidates are not only well integrated in the educational programme, they are also supervised and trained very well, creating a valuable experience for the PhDs themselves. Furthermore, the panel considers the use of PhD candidates in the assessment of the theses an effective measure to follow up on the previous accreditation panel's recommendation to adequately train teaching assistants or junior lecturers to support the teaching staff in order to keep their workload manageable. At the same time, the panel suggests some adjustments to current practices in this regard, which are discussed further in Standard 3.

Considerations

The curricula of both the bachelor's programme Psychology & Technology and the master's programme Human-Technology Interaction are well-structured and align with their intended learning outcomes, offering interdisciplinary approaches that integrate psychology and technology with strong emphasis on research and practical applications. The P&T programme provides a flexible curriculum with diverse specializations and electives, supporting student preferences and career goals. The panel appreciates the introduction of Challenge-Based Learning into the curriculum and the opportunity that comes with it to further strengthen industry connections beyond academia and other research-oriented environments. Similarly, the HTI programme's multidisciplinary tracks, international opportunities, and thesis projects prepare students for impactful careers. The panel suggests asking students to explicitly reflect more on the societal relevance and impact of their theses, an aspect highly appreciated by the panel, as this will probably help make the connection to the industry clearer to them. Overall, the panel acknowledged the programmes' strong balance of flexibility, innovation, and academic rigor while encouraging further improvements in aligning curriculum outcomes with societal and industry needs. The choice of English as the language of instruction aligns with the programmes' international focus, enhancing graduates' competitiveness in the global market. Admission policies for both programmes ensure a well-prepared, diverse student body. The relatively low nominal completion rates can be largely explained by students that are highly motivated and engage in extracurricular activities, contributing to delayed graduation. The panel commends the programmes for addressing study duration issues by implementing stricter thesis deadlines. The panel also appreciates the introduction of tracks in the HTI programme, which improve feasibility by providing more guidance for students. The panel appreciates the guidance structures for students and highlights the programmes' effective support for students with impairments. The panel suggests clarifying formal mentorship role in HTI, appointing one or two dedicated mentors as part of the educational support staff to fulfil formal requirements, and allowing students to continue forming informal mentoring relationships with teaching staff. The teaching staff's diversity and multidisciplinary expertise were commended, alongside their teaching qualifications.

Conclusion

The panel concludes that both the bachelor's programme Psychology & Technology and the master's programme Human-Technology Interaction meet standard 2.

Standard 3. Student assessment

The programme has an adequate system of student assessment in place.

Findings

Assessment system

The assessment systems in place for the bachelor in Psychology & Technology and the master's in Human-Technology Interaction are designed to ensure that students achieve the programme-specific learning outcomes through a combination of evaluation methods and systematic quality assurance. These systems reflect the department's educational philosophy, focusing on developing students' knowledge, skills, and professional attitudes progressively.

In the P&T programme, assessment practices are closely tied to learning outcomes, ensuring alignment between what students learn and how their competencies are evaluated. Using the 'IE&IS course template' in the design and improvement of courses, outlining how courses need to be set up, each course within the programme specifies its learning goals, which are strategically connected to broader programme outcomes. This ensures a coherent academic journey, where students develop foundational competencies in the first year and build toward advanced problem-solving and independent work in later years. Examinations and assignments are the primary tools for evaluating students. Written exams are often used to test knowledge and understanding, while assignments, portfolios, and group projects assess their ability to apply knowledge, develop skills, and demonstrate evaluative abilities. For HTI students, assessments emphasize the integration of theoretical understanding with practical application. Assignments, reports, and group projects frequently serve as evaluation methods, fostering interdisciplinary collaboration and advanced analytical skills.

Both programmes prioritize quality and transparency in assessment. Examinations are crafted to be valid, reliable, and transparent. Each year, a comprehensive examination plan outlines the methods, materials, and evaluation forms, providing students and faculty with clarity about assessment criteria and expectations. Feedback mechanisms, including course evaluations and student input, ensure continuous improvement. After a course, complaints from students received through the Examination Committee, Programme Committee or the educational management (written complaints or course evaluations), may be reasons to discuss the alignment of the learning goals and the examinations with lecturers. In addition, innovative tools like digital assessments and learning analytics are increasingly employed to enhance the evaluation process and support student learning.

During the site visit, the panel discussed the approach to assessing Challenge-Based Learning (CBL) group projects introduced in the academic year 2024-2025 with teaching staff and the Examination Committee. It concludes that the assessment strategy for this curriculum component has been well thought through, incorporating three distinct elements: evaluation of the final product, assessment of the accompanying report, and an individual reflection component focused on personal growth throughout the course. The panel is pleased with the emphasis on individual-level assessment within CBL, ensuring a comprehensive evaluation of both group and personal contributions and mitigating the risk of free-riding in group projects.

The panel concludes that the programmes have a sound and well-structured system of assessment in place, with clear learning objectives that align effectively with the assessment methods. It commends the Programme Committee for its diligent work in evaluating courses and monitoring the effectiveness of implemented changes to ensure continuous improvement. The integration of digital assessment tools, such

as Ans, further enhances the efficiency of the assessment process. Ans allows for the scanning of paper-based exams and online grading, making written exams more streamlined and effective. This innovation also provides a practical means of addressing challenges posed by generative AI, ensuring the integrity of written assessments. The panel notes that programme management, teaching staff and the Examination Committee are well-aware of how generative AI can be used and manage its implications thoughtfully within assessments. The panel also commends how the programmes recognize their role as educators in guiding students on responsible AI usage.

Assessment bachelor and master assignment
The bachelor's and master's thesis processes serve as capstones for their respective programmes, offering students the opportunity to showcase their ability to conduct independent research and demonstrate their mastery of academic competencies. Both levels follow structured processes aimed to ensure that the theses meet rigorous academic and professional standards.

Bachelor thesis assessment
In the P&T programme, the thesis process begins with the preparation of a research proposal, which is assessed for alignment with programme goals and feasibility. The process is overseen by the BSc Thesis Committee, which includes a supervising mentor, who serves as the first assessor, and a second assessor. The thesis is evaluated based on a standardized rubric based on the learning outcomes, which is in accordance with the recommendations from the previous accreditation panel. The mentor supports the student throughout the project, while the second assessor checks the alignment of the project with academic standards. An interim rubric, used as a formative mid-term assessment, is filled in only by the supervisor. For the final grade, both assessors first grade separately, after which the final grade is determined collaboratively by the committee members. The final grade encompasses the written thesis and, where applicable, the student's professional skills. Confidentiality is maintained in storing and archiving the theses, ensuring proper handling of sensitive research outputs.

The panel appreciates the process for the assessment of bachelor's theses. The involvement of two examiners contributes to a reliable and valid assessment and the use of a standardized rubric is a valuable tool to promote alignment between examiners. At the same time, the panel found that these procedures do not always lead to satisfactory results in their actual implementation. As discussed under standard 4 (see below), the panel deemed four P&T bachelor theses out of a sample of 20 to not meet the minimum requirements for academic bachelor's programmes, while other theses to be graded too low. In reading the theses and their assessments, the panel found that sometimes the first and second examiners disagreed on the assessment, and sometimes even one of the examiners rated one of the criteria as insufficient, while the final overall result was a pass. For example, in one thesis unsatisfactory content of the work was compensated with favourable writing skills and professional attitude, resulting in a passing grade. In another case, a thesis passed while the second examiner rated several subcomponents as insufficient, including the student's quantitative research skills, with a difference of more than one point from the first examiner. However, these discrepancies were not addressed in the evaluation form. It was not clear to the panel how differences in judgment between the first and second assessor were dealt with in practice. Furthermore, it was also unclear to the panel what the minimum threshold was for accepting a thesis, especially in the case of insufficient subgrades.

During the site visit, the panel spoke about this with management, teaching staff and the Examination Committee. It became clear that the implementation of thesis assessment is up to the individual examiners, and that there are no strict guidelines for alignment between the two examiners, the way in which the criteria are evaluated and what format is used for the theses. Furthermore, the panel found that the rubrics,

designed to assist the examiners with their assessment are complicated, with many criteria to consider and no clear descriptions of the minimum requirements for each of the criteria. The panel feels that this complexity of the rubric adds to the risk of inconsistencies in the assessment of theses. The teaching staff and the Examination Committee indicated to share this observation and not be happy with the rubric because it takes a lot of time to fill out. They also indicated to be working on a solution to increase the quality of the rubric. The panel recognizes the difficulty the programme is facing, because the aim is for all the programme's ILOs to be covered in the rubrics. With the expansive set of ILOs and the multi- and interdisciplinary character of the programme, the panel feels the assessors are dealt a painstaking task. Even when done with great care and effort, oversights can easily be made.

The panel therefore advises to simplify the rubric. The starting point should be formulating clear and concise learning objectives for the bachelor thesis. The track-specific ILOs could be used to differentiate between the assessment of theses from different tracks. These learning objectives should be translated into assessment criteria and an associated rubric with clear descriptions of the minimum requirements for each assessment criterion. To be able to receive an overall passing grade, a thesis should satisfy all the assessment criteria in a minimal way, promoting consistency among individual examiners in grading borderline cases (see also standard 1). Furthermore, the panel recommends aligning the structure of theses more, to make theses more comparable and promote consistent grading. Finally, the panel recommends the introduction of calibration sessions for all staff (including the PhD students that supervise or teach) where assessors independently evaluate a recent thesis and compare and discuss the results, reaching standardization on what constitutes a grade. Given the interdisciplinary nature of the programme and the different backgrounds of the teaching staff, the panel believes that such calibration sessions will help prevent discrepancies in assessments.

Finally, with regard to the assessment procedure of the bachelor thesis, the panel learnt from discussions with the teaching staff and the Examination Committee that for a bachelor's thesis project, the second assessor is often a PhD student, taking on the role as part of their training. The student works with a supervisor on their topic. The supervisor is one of the professors on the HTI group and is also the first assessor of the thesis. Sometimes the PhD student that is the second assessor, working on the same topic with the professor who is the first assessor. Since this implies a hierarchical structure based on seniority, the panel believes that the first and second examiners in this composition cannot be considered independent peers, which hinders an equal discussion of grading. The panel therefore recommends formulating clear requirements to ensure that the first and second examiner are always sufficiently independent from each other.

Master thesis assessment
The HTI master's thesis builds upon this foundation with a more complex assessment structure. Students begin by developing a detailed research proposal, reviewed and approved by their mentor and a second supervisor. The thesis is then overseen by a three-member committee: a mentor, a second supervisor, and an independent assessor. This multidisciplinary committee ensures the thesis meets academic rigor and aligns with the programme's emphasis on interdisciplinary problem-solving. The evaluation process includes both a written thesis and an oral defence, with committee members providing individual grades before deliberating on a final evaluation. The master's thesis is made publicly accessible in the library, highlighting its role as a contribution to the broader academic and professional community. To ensure transparency and consistency, based on the recommendation from the previous accreditation panel, a standardized assessment rubric is used, and the Examination Committee regularly monitors the evaluation process.

The panel is positive about the procedure for the assessment of the HTI master's thesis. The involvement of several examiners promotes the validity and reliability of the assessment, in particular with the involvement

of one assessor from outside the supervision team. The panel agreed with the grades assigned to the HTI programme assignments that they had read prior to the site visit and felt that they were adequately justified on the assessment forms. The panel did not come across any assessments in which one or more criteria were unsatisfactory. This leads the panel to conclude that the programme has adequately dealt with recommendations from the previous assessment panel to make sure that all assessment criteria for the master's thesis are satisfactory without allowing compensation. This can also be said about the recommendation to introduce rubric forms to improve grade calibration. From discussion with the teaching staff, the panel learned that finding a third assessor is often arranged at the last minute and on an ad hoc basis, using informal channels to personally contact those members of the teaching staff who are suitable for the role. For the sake of the reliability and independence of assessors, the panel advises that the selection process for a third assessor should be organized in such a way as to ensure that there are no fixed teams carrying out assessments.

Examination Committee

The Examination Committee is an independent body in the department IE&IS. Its most important task in relation to examination quality is the embedding of the quality system and proactive involvement in the processes and procedures for quality assessment. Across both programmes, the Examination Committee plays a pivotal role in maintaining assessment quality. The committee ensures that exams align with programme goals and are administered and graded fairly. Its oversight extends to processes such as appointing examiners, reviewing assessment plans, and addressing any discrepancies in evaluation. This governance structure is aimed to reinforce the reliability and consistency of the assessment system. The panel studied reports by the Examination Committee and spoke with its members during the site visit. It is very positive about the Examination Committee, commending its effective and reflective approach. The committee is proactive, consistently seeking improvements, and demonstrates a strong awareness of developments in the field, particularly also in AI. They show due diligence and an ability to stay ahead of emerging challenges. Their commitment to excellence reinforces the quality and relevance of the programmes they oversee, earning the panel's full confidence. In the discussions with the Examination Committee, they explained to the panel how every two years they look at a sample of bachelor's theses to come up with improvement points. They mentioned to look especially if there's big differences in grades between assessors, and if so, discuss with the assessors. However, given that four P&T bachelor theses did not meet the minimum requirements for academic bachelor's programmes in the eyes of the panel, following the discussion on the grading of bachelor's theses, the panel recommends strengthening the monitoring of thesis quality, particularly for lower grades. A higher sample rate of such theses in the coming years should ensure that no more thesis is passed without meeting the minimum requirements. It also recommends the Committee following the implementation of the recommendations for improvement of the bachelor's thesis assessment procedures closely, and providing advice on for instance the rubrics, requirements for the second examiner and calibrations sessions.

Considerations

The panel commends the well-structured and transparent assessment systems of the P&T bachelor's and HTI master's programmes, which effectively align with their respective learning outcomes. Evaluations incorporate diverse methods, including written exams, group projects, and individual reflections, fostering a balance of theoretical understanding and practical application. The comprehensive evaluation approach to the newly introduced Challenge-Based Learning is also appreciated. Thesis assessment is built on solid principles with two examiners and the use of a rubric to assist the examiners in grading. The panel, however, notes inconsistencies in the implementation of the P&T bachelor's thesis assessments. These inconsistencies can be traced back to the lack of guidelines on solving discrepancies between the two examiners, the absence of calibration, a convoluted rubric and the observed hierarchical relation that sometimes exists

between first and second examiner. To repair the observed concerns, the panel recommends simplified rubrics with clearer minimum requirements to enhance consistency, and calibration sessions between members of staff to prevent discrepancies in assessments. The panel also recommends formulating guidelines on the independence of the second examiner. Finally, the Examination Committee needs to step up its monitoring of lower grades in the bachelor's programme, and monitor and advice on the implementation of the suggested improvements. The panel is positive about the HTI master's thesis assessment, praising it for its rigor and the involvement of several assessors, including one from outside the supervision team, though the panel suggests formalizing the selection of third assessors to avoid ad hoc arrangements and fixed teams carrying out assessments. The Examination Committee is lauded for its proactive and reflective approach, ensuring the quality and integrity of assessments, including addressing challenges posed by generative AI. Their commitment to continuous improvement and alignment with academic standards reinforces the programmes' credibility.

Conclusion

The panel concludes that the bachelor's programme Psychology & Technology partially meets standard 3.

The panel concludes that the master's programme Human-Technology Interaction meets standard 3.

Standard 4. Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.

Findings

Quality of theses

As preparation for the site visit, the panel studied 15 bachelor's assignments, spread over the various specializations in the P&T programme, and 15 master's assignments.

The panel found the quality of the master's theses to be high, with a strong scientific component on a diversity of topics. All theses address relevant topics in a scientific way and the intended learning objectives of the HTI programme were present in all the theses. The panel noted the inclusion of the complete empirical cycle in all the theses. The panel also applauds that some of the students collaborate with companies in their research. The theses have a high societal relevance.

For the bachelor's programme, the panel found that the theses addressed relevant topics, following the human-centric objective of the P&T programme. Many were of good quality, executed in a scientific way. However, after the first reading, an extra five theses on the lower end of the spectrum were selected for further investigation, because three of the theses did not meet the minimum requirements in the eyes of the panel. One of these also failed to meet the minimum requirements, meaning that from the total selection of 20 bachelor assignments, four theses did not meet the minimum requirements according to the panel. The issues were varied, ranging from methodology to quantitative skills and substandard content. According to the panel, these theses could pass due to shortcomings in the assessment process, such as inappropriate compensation between subcomponents and unclear definitions of minimum requirements for these subcomponents (see standard 3). The panel thinks that two of the theses that were found insufficient could have passed with revisions, for instance because the reporting was poor, demonstrating that the theses do not necessarily demonstrate issues with the exit level but most prominently of (repairable) issues with assessment. Even so, with four theses not meeting the minimum requirements, the panel concludes that the

intended learning outcomes for the P&T programme are not fully realized. In order to meet the standard, the programme will have to ensure that the final products of bachelor graduates meet the minimum requirements. Based on the discussions with programme management, teaching staff and the Examination Committee, the panel concludes that the system of assessment needs to be improved in order for this issue to be resolved (as discussed under Standard 3).

Alumni success
About 75% of the Psychology & Technology graduates stay at the TU/e, many of them going into the Human-Technology Interaction programme (60% of the students in the HTI programme come from the P&T programme), and smaller percentages going to other TU/e master's programmes like Innovation Management, Innovation Sciences, Data Science and Artificial Intelligence, and Data Science in Business and Entrepreneurship. The other 25% usually pursue a master's degree elsewhere. HTI graduates end up working in a wide variety of branches and companies as UX researcher, UX designer, software developer, data scientist, business analyst, project manager, and consultant. Others founded their own company or went on to pursue a PhD position. In the interview with the teaching staff, it was mentioned that there is quite some 'inbreeding' from the programme, meaning that students from the HTI programme end up on the teaching staff of the P&T and HTI programmes.

Based on the post-graduation careers of students and the positive feedback from alumni during the site visit, the panel concludes that the performance of graduates from both programmes supports the conclusion that students in both programmes meet the ILOs: P&T graduates are well trained and get admitted to relevant MSc programmes, and HTI graduates appear to find relevant jobs on the job market relatively easy and are admitted to PhD positions or other research oriented jobs.

Considerations
The panel commends the high quality of HTI master theses, noting their scientific rigor, inclusion of the empirical cycle, societal relevance, and valuable collaborations with companies. For the P&T bachelor programme, while many theses demonstrated good quality and aligned with programme objectives, the panel found four out of twenty theses failed to meet minimum requirements, mostly related to deficiencies in the assessment process. This leads the panel to conclude that the programme will have to ensure that the final product of all bachelor graduates is of a sufficient academic level. Based on the discussions with programme management, teaching staff and the Examination Committee, the panel concludes that the system of assessment needs to be improved in order for this issue to be resolved (as discussed under Standard 3). Alumni success underscores programme effectiveness, with P&T graduates getting admitted to relevant MSc programmes and HTI graduates excelling in diverse professional and academic roles.

Conclusion
The panel concludes that the bachelor's programme Psychology & Technology partially meets standard 4.

The panel concludes that the master's programme Human-Technology Interaction meets standard 4.

General conclusion

The panel concludes that the bachelor's programme Psychology & Technology meets Standards 1 and 2, and partially meets Standards 3 and 4. The panel's assessment of the bachelor's programme Psychology & Technology is conditionally positive.

The panel imposes the following conditions for the assessment and level of the bachelor's thesis to be met within two years:

1. Ensure that the final product of all BSc graduates is of a sufficient academic level. To achieve this, formulate clear and concise learning objectives for the BSc thesis, as well as assessment criteria and minimum requirements for each of these objectives.
2. Ensure thesis calibration between assessors as to what constitutes a grade.
3. Ensure the independency of the second assessor.
4. Have the exam committee structurally monitor lower grades.

The panel deems these conditions to be realistically achievable within a time period of two years.

The panel's assessment of the master's programme Human-Technology Interaction is positive.

Recommendations

1. Continue fine-tuning intended learning outcomes for clarity and usability for both programmes.
2. Benchmark both programmes against similar programmes to refine the curriculum and further strengthen the programmes' identities in this evolving field.
3. Ask students of the HTI programme to reflect more on the societal relevance and potential impact of their theses, to explicate the connection to the industry.
4. Clarify the formal mentorship role in the HTI programme, appointing one or two dedicated mentors as part of the educational support staff to fulfil formal requirements, and allowing students to continue forming informal mentoring relationships with teaching staff.
5. Formalize the selection of third assessors in the assessment of the HTI thesis project to avoid ad hoc arrangements and fixed teams carrying out assessments.

Appendix 1. Intended learning outcomes

Bachelor's programme Psychology & Technology

General learning outcomes of the degree program

Bachelor degree program graduates (Bachelor of Science):
• are academically qualified to degree level within the domain of engineering science and technology,
• are competent in the relevant domain-specific discipline(s) at the level of a Bachelor of Science, as specified in the Appendix 2, Article 1,
• are able to conduct research and design under supervision,
• are aware of the significance of other disciplines,
• take a scientific approach to non-complex problems and ideas, based on current knowledge,
• possess intellectual skills and are able to reflect critically, reason and form opinions under supervision,
• Have the ability to communicate the results of their learning, thinking, acts and decision-making processes,
• can plan and execute their activities,
• are aware of the temporal and societal contexts of science and technology (understanding and analysis),
• in addition to a recognizable domain-specific profile, possess a sufficiently broad basis to be able to work or collaborate in an interdisciplinary and multidisciplinary context. Here, multidisciplinary means focusing on other relevant disciplines needed to solve the design or research problem in question.

Following the defined competence areas, the intended learning outcomes of the BSc programme are specified as follows in terms of knowledge and skills of the graduates:

1. Competent in scientific disciplines
a. Knowledge of and insight into specific technological systems and their components in one of the following technology domains: Information and Communication Technologies, Robotics, and Built Environment.
b. Knowledge of and insight into the core concepts, theoretical frameworks and methodologies of psychology and insights into their application to understand the relationships between technology and users.
c. Knowledge of and basic skill in the relevant techniques of observation, data collection and analysis techniques, and an awareness of the scope and limitations of these methods.
d. Knowledge of and skills in the basics of the engineering profession such as mathematics, statistics and programming.

2. Competent in doing research
a. Ability to (re)formulate a research problem in terms of the core concepts and theories of psychology; in particular those pertaining to human-technology interactions.
b. Ability to develop and execute a research plan (with supervision).
c. Ability (with supervision) to contribute to the development of scientific knowledge in the area of the psychology of human-technology interactions.
d. Ability (with supervision) to identify and analyze problems typical for human-technology interaction from a technological and psychological perspective.
e. Ability to appraise (under supervision) relevant scientific evidence on its usefulness in addressing a given research problem.
f. Understanding of the ethics of psychological / user research and has both the ability and attitude to adhere to these rules.

3. Competent in designing
a. Ability to reformulate an ill-structured design problem in terms of the core concepts and theories of psychology; in particular those pertaining to human-technology interactions.
b. Ability to develop and execute (under supervision) a sound plan for formulating design requirements.
c. Ability to integrate existing knowledge on technological requirements for human-technology interactions in the (re-) design of (requirements for) products or systems.
d. Ability (with supervision) to merge knowledge, methods and concepts of the technological and psychological domains.
e. Ability to make decisions with respect to design requirements where they pertain to the interaction between the user and the system or product, and to provide justifications for these decisions.

4. A scientific approach
a. Ability to document the result of psychological or user requirement research for future use within the organization.
b. Ability to use a systematic approach characterized by the consistent application of existing theories, concepts and models of psychology and technology.
c. Ability to look beyond the borders of a specific discipline, to be sensitive to the relative contributions of various disciplines.
d. Basic understanding of the practices and principles of science.

5. Basic intellectual skills
a. A reflective attitude, with an ability to critically reflect (with supervision) on one's own thinking, decision making, and professional behavior.
b. A critical mindset and the ability to ask constructive questions regarding the basic problems in the field.
c. Ability to read and write scientific texts and evaluate argumentations.
d. Ability to think in abstract terms, including the ability to use and modify formal models of basic phenomena and processes in the domain.

6. Competent in co-operating and communicating
a. Capability of reporting and communicating the results of one’s learning and decision making – including one’s research outcomes –, both verbally and in writing, with academic peers, engineers in one’s domain, and users.
b. Awareness of differences in work practices between scientific disciplines.
c. Ability to work in (multidisciplinary) teams of engineers and academic peers.
d. Ability to listen, read, talk and write in English.

7. Takes account of the temporal, technological and social context
a. Ability to reflect on the relation between the use of scientific knowledge and technology, the implicated social, normative and ethical issues, and the way in which knowledge and technology development is influenced by its social and historical context.
b. Understanding of the different roles of engineers and related professionals in society.

Master's programme Human-Technology Interaction

General learning outcomes of the degree program

Master degree program graduates (Master of Science):
- are academically qualified to degree level within the domain of 'science, engineering & technology',
- are competent in the relevant domain-specific discipline(s) at the scientific master's degree level, as indicated in Appendix, Article 1,
- are able to conduct research and design independently,
- have the ability and attitude to include other disciplines in their research, where necessary,
- have a scientific approach to complex problems and ideas,
- possess intellectual skills that enable them to reflect critically, reason and form opinions,
- have the ability to communicate the results of their learning, thinking and decision-making processes at an international level,
- are aware of the temporal and societal context of science and technology (comprehension and analysis) and can integrate this context in their scientific work, in addition to a recognizable domain-specific profile,
- possess a sufficiently broad basis to be able to work or collaborate in an interdisciplinary and multidisciplinary context. In this context, multidisciplinary means being focused on other relevant disciplines needed to solve the design or research problem in question,
- have the ability and attitude to seek new potential applications, taking the societal context into consideration.

Following the defined competence areas, the intended learning outcomes of the MSc program Human-Technology Interaction are specified as follows in terms of knowledge and skills of the graduates:

1. Competent in scientific disciplines
1. Knowledge of and insight into technological systems and their components in a specialized area of their background engineering domain.
2. Thorough knowledge and understanding of concepts, theoretical frameworks and methodologies of psychology and the complex human-technology interactions.
3. Thorough knowledge of and advanced skills in the techniques of observation, data collection and analysis techniques in the human-technology domain, and an ability to critically reflect on the scope and limitations of these methods.

2. Competent in doing research
1. Ability to formulate research problems in terms of concepts and theories of psychology and human-technology interactions.
2. Ability to independently develop and execute a research plan.
3. Ability to contribute independently to the development of scientific knowledge in the area of the human-technology interactions.
4. Ability to identify and analyze problems typical for human technology interaction by integrating technological and psychological perspectives
5. Ability to appraise relevant scientific evidence on its usefulness in addressing research problems.
6. Consolidate the understanding of the ethics of psychological / user research, and has both the ability and attitude to adhere to these rules.

3. Competent in designing
1. Ability to formulate design problems in terms of concepts and theories of psychology and human-technology interaction.
2. Ability to develop and execute a sound plan for formulating design requirements.
3. Ability to integrate existing knowledge, or identify gaps therein, on technological requirements for human-technology interactions in the (re-)design of (requirements for) products or systems.
4. Ability to integrate the technological and psychological domains, merging knowledge, methods and concepts.
5. Ability to make decisions with respect to design requirements where they pertain to the interaction between the user and the system or product, and to justify these decisions in a systematic manner.

4. A scientific approach
1. Ability to document the result of psychological or user requirement research for the development of knowledge within the field and beyond.
2. Ability to apply and critically examine existing theories, concepts and models in the human-technology interaction domain in a systematic manner.
3. Ability to look beyond the borders of a specific discipline, to be sensitive to the relative contributions of various disciplines and to understand the knowledge demands of a specific discipline.
4. Understanding of the practices and principles of science, and knowledge of current debates about this.

5. Basic intellectual skills
1. A reflective attitude, with an ability to critically and independently reflect on own thinking, decision making, and professional behavior.
2. A critical mindset and the ability to ask constructive questions regarding complex problems in the field.
3. Ability to read and write scientific texts and build a solid argumentation.
4. Ability to think in abstract terms, including the ability to develop formal models of phenomena and processes in the domain.

6. Competent in co-operating and communicating
1. Capability of reporting and communicating the results of one's learning and decision making – including one's research outcomes –, both verbally and in writing, with academics and engineers in various domain, users, and the general public.
2. Ability to recognize and deal with differences in work practices between scientific disciplines and academics from other cultural backgrounds.
3. Ability to take a leading role in multi- or interdisciplinary teams of engineers and academics.
4. Ability to listen, read, talk and write in English on a professional level.

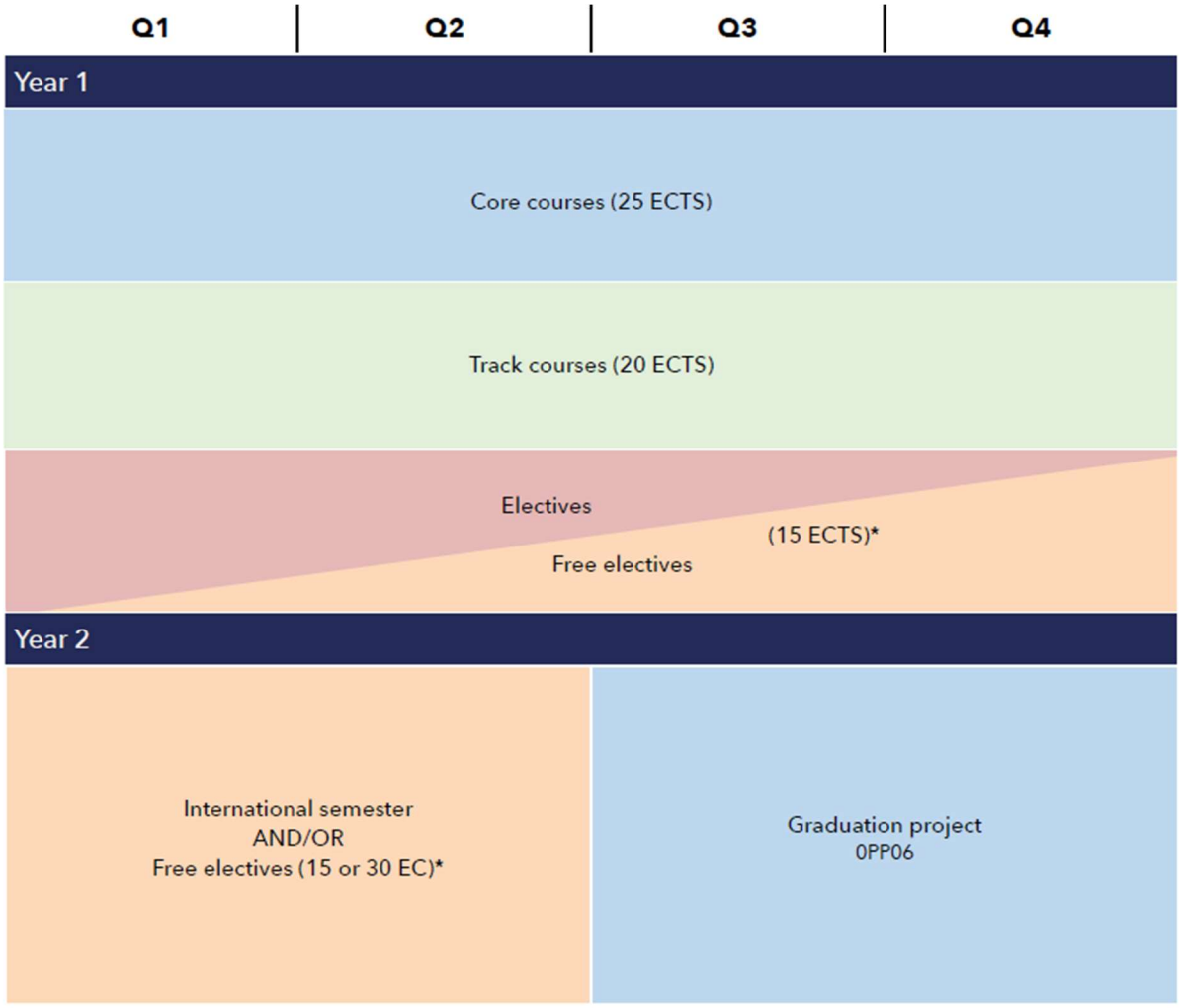
7. Takes account of the temporal, technological and social context
1. Ability to reflect on the relation between the use of scientific knowledge and technology, the implicated social, normative and ethical issues, and the way in which knowledge and technology development is influenced by its social and historical context, and the ability to integrate such relations and implications in their professional work.
2. Understanding of the different roles of engineers and related professionals in society, and the ability to determine one's own place as a professional in society.

Appendix 2. Programme curriculum

Bachelor's programma Psychology & Technology

	Q1	Q2	Q3	Q4
YEAR 1				
Course 1	Calculus (B) 2WBB0	Social & Environmental Psychology (E) 0HV30	Behavioral Research Methods I: Designing (C) 0HV00	Brain, Body, Behaviour (B) 0HV40
Course 2	Introduction Psychology & Technology (E) 0HV10	Technical Course	Applied Data Skills (E) 0HV130	OGO Qualitative Research (D) 0HV70
Course 3	Programming for Psychology and Technology (A) 0HV120	Technical Course	Technical Course	ITEC Engineering Ethics (E) 0LVX10
YEAR 2				
Course 1	Behavioral Research Methods II: Dealing with Data (C) 0HV50	Thinking and Deciding (D) 0HV60	Sociology & Social Network Analysis (E) 0HV150	Perception & Motor Control (E) 0HV20
Course 2	Technical Course	Technical Course	Technical Course	Advanced Research Methods and Research Ethics (A) 0HV110
Course 3	Elective	Elective	Elective	Multi CBL (C&D) 4CBLW00
YEAR 3: Starts AY 2025-2026				
Course 1	OGO Quantitative Research (B) 0HV90	Digital Tools & Human Wellbeing (C) 0HV100	Bachelor Final Project 0BEPP0	Bachelor Final Project 0BEPP0
Course 2	Human-Centered AI (D) 0HV140	Elective	ITEC Engineering for Society (B) 0LVX20	Elective
Course 3	Elective	Elective	Elective	Elective

Master's programme Human-Technology Interaction



Appendix 3. Programme of the site visit

Day 1: 10 December

12.15-13.15 Arrival and preparatory meeting- incl. lunch
13.15-14.15 Welcome and interview management
14.30-15.15 Interview teaching staff and program committee P&T
15.15-15.45 Break / panel meeting
15.45-16.30 Interview teaching staff and examination committee
16.45-17.30 Lab visit
17.30-18.00 Panel meeting

Day 2: 11 December

08.45-09.15 Preparatory panel meeting
09.15-10.00 Interview teaching staff and program committee HTI
10.15-11.15 Interview teaching staff and examination committee
11.15-11.45 Break / panel meeting
11.45-12.30 Interview students and alumni P&T and HTI
12.30-14.00 Panel meeting incl. lunch
14.00-14.30 Informing management
14.30-15.00 Preparation findings by panel
15.00-15.30 Oral reporting of findings and completion of the visit

Appendix 4. Materials

Prior to the site visit, the panel studied 15 theses for the Human-Technology Interaction programme and 20 theses for the Psychology & Technology programme. For P&T, weighing the number of theses per specialization within the programme, 10 theses were selected from ICT, 7 from the Living, and 3 from Robotics. Information on the theses is available from Academion upon request.

The panel also studied other materials, which included:

- Reading Guides for both programmes
- SWOT analyses for both programmes
- Intended learning outcomes BSc Psychology & Technology
- Intended learning outcomes MSc Human-Technology Interaction
- Minutes from the Societal Council
- How to Uni
- Osiris course descriptions
- Canvas course template IE&IS
- Regulations of the Examination Committee
- Academic staff HTI group
- Evalytics course results P&T + HTI
- Enrolment & intake P&T + HTI
- Study success rate P&T + HTI
- Diplomas & study duration P&T + HTI
- NSE results P&T + HTI
- Assessment policy IE&IS
- BSc P&T assessment plan
- Teaching and assessment plans for P&T courses 0HV40, 0HV60 and 0HV90 and HTI courses 0HM110, 0HM200 and 0HM260
- P&T theses interim assessment form and final assessment form
- HTI master thesis project study guide
- HTI theses assessment form
- Student perspective videos made by students of both programmes