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BSc Industrial Design Engineering / Industrieel Ontwerpen
MSc Design for Interaction
MSc Integrated Product Design
MSc Strategic Product Design

Faculty of Industrial Design Engineering
Delft University of Technology

Report of the limited programme assessments
1-2 April 2019

Utrecht, The Netherlands
July 2019
www.AeQui.nl
Assessment Agency for Higher Education

Colophon

Programmes
Delft University of Technology, Faculty of Industrial Design Engineering
BSc Industrieel Ontwerpen – Croho: 56955 – ECTS: 180 study points
MSc Design for Interaction – Croho: 60355 – ECTS: 120 study points
MSc Integrated Product Design – Croho: 60354 – ECTS: 120 study points
MSc Strategic Product Design – Croho: 60356 – ECTS: 120 study points
Location: Delft
Mode of study: full-time
Result of institutional assessment: positive

Panel
Prof. dr. em. Anton de Goeij, chair
Prof. dr. Saeema Ahmed-Kristensen, domain expert
Prof. dr. Jacob Buur, domain expert
Prof. dr. Ann Heylighen, domain expert
Carlijn Compen MSc, industry expert
Mrs. Rianne Hagen, student-member
Mark Delmartino MA, secretary and process co-ordinator

The panel has been approved by NVAO

The assessment was conducted under responsibility of AeQui VBI
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This document is best printed in duplex

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Summary

On 1 and 2 April 2019 an assessment committee of AeQui visited the Faculty of Industrial Design Engineering (IDE) at the Delft University of Technology (TU Delft). The visit is part of the cluster assessment of eight degree programmes in Industrial Design Engineering at the universities of Eindhoven, Delft and Twente. This report presents the committee's findings, considerations and recommendations on TU Delft's three-year bachelor programme *Industrial Design Engineering (IDE) / Industrieel Ontwerpen* and on its three two-year master programmes *Design for Interaction (DfI)*, *Integrated Product Design (IPD)* and *Strategic Product Design (SPD)*. The assessment committee has used the NVAO framework 2018 for the limited assessment of existing programmes and judges that all four programmes meet all NVAO standards. It therefore issues a **positive** recommendation on the quality of the bachelor and the three master programmes of *Industrial Design Engineering* at TU Delft.

Intended learning outcomes
The IDE bachelor and master programmes at TU Delft are embedded in the Faculty of Industrial Design Engineering; their objectives align with the mission and vision of the university and the faculty. The four programmes have both common characteristics and distinctive features. The respective intended learning outcomes are adequate and their insightful formulation of disciplinary knowledge, skills and attitudes demonstrates clearly what each programme is about. All four programmes have a long-standing tradition and good reputation. In order to maintain this level of excellence, however, the faculty started a process of updating the scope and content of the bachelor programme in 2016-2017. Furthermore, the respective master programmes may want to ensure they reflect the most recent developments in the domains of design for interaction, integrated product design and strategic product design. The committee judges that the IDE bachelor and the three master programmes **meet the standard.**

Teaching-learning environment
The teaching-learning environment is well developed at the IDE Faculty in Delft. All four programmes are adequately structured and feature a coherent combination of courses and projects. Academic staff, student mentors, student assistants and the staff of the Department of Education & Student Affairs together allow for a smooth and effective organisation of the respective IDE programmes. The staff have an adequate command of the English language. The IDE building and its facilities reflect the educational model of the Faculty. The quality of the programmes can be further enhanced by offering more challenging and in-depth knowledge courses, more elective courses at an earlier stage in the programmes, and more opportunities for students to tailor the programme curricula to their individual interests. The committee judges that the IDE bachelor and the three master programmes **meet the standard.**

Student assessment
Student assessment in the four IDE programmes is based on an elaborate system with clear principles and robust instruments. Across the programmes, individual course assessments are valid, reliable and transparent. The Board of Examiners and its Small Board have been instrumental in designing, implementing and quality-assuring a new assessment system. As a result, teaching staff is increasingly aware of the importance of student assessment. The thesis evaluation forms allow for careful grading and insightful assessments. The samples of completed forms demonstrate that thesis evaluation is adequate in the IDE bachelor and IPD programmes, acceptable in the DfI programme and up for improvement in the SPD programme. The committee judges that the IDE bachelor and the three master programmes **meet the standard.**

Achieved learning outcomes
Students who graduate from the IDE bachelor and master programmes at TU Delft are adequately prepared for a follow-up study or a position on the labour market. The sample review of 60 bachelor and master theses shows that the individual quality differs but that the level achieved is adequate across all programmes. Upon graduation, students found a relevant job in which they can display the competences they acquired during their studies at IDE. The

performance of thesis students and graduates can still be enhanced, though, by paying more attention to the critical and reflective attitude of students and by managing the expectations of (potential) employers regarding the IDE graduate profiles. The committee judges that the IDE bachelor and the three master programmes **meet the standard.**

Recommendations
Although the committee considers that the IDE bachelor and master programmes meet the four quality standards set by the NVAO framework, it noticed that there is still room for improvement on individual components of the respective programmes. The committee therefore issues the following recommendations:

- to continue and implement the process of updating the scope of the (current and forthcoming) bachelor programme;
- to incorporate in the respective master curricula the most recent developments in the fields of IfD, IPD and SPD;
- to pay more attention to developing a critical attitude of students, and to monitor student progress in this regard;
- to offer students more opportunities for tailoring their own curricula of compulsory and elective courses;
- to challenge students by offering more in-depth courses;
- to include the formative assessment of courses more systematically in the learning trajectory of students;
- to ensure that all – not merely many - thesis evaluations are graded consistently, completed insightfully and archived properly;
- to promote more (time for) reflection among students across the curriculum and in particular during their work on the final bachelor and master thesis projects;
- to clarify towards potential employers what IDE graduates from TU Delft stand for in general and with regard to the respective master profiles.

In sum, the IDE bachelor programme and the three master programmes meet each of the four standards of the NVAO assessment framework. Hence, the panel recommends NVAO to issue a positive conclusion regarding the bachelor programme *Industrial Design Engineering / Industrieel Ontwerpen* and the master programmes *Design for Interaction*, *Integrated Product Development* and *Strategic Product Development* of the Delft University of Technology.

On behalf of the entire assessment committee,

Utrecht, July 2019

Anton de Goeij
Chair

Mark Delmartino
Secretary

Introduction

The bachelor and master programmes *Industrial Design Engineering* at the Delft University of Technology are embedded in the Faculty of Industrial Design Engineering. The programmes reflect the mission and vision of both university and faculty in their ambition to deliver designers with a multidisciplinary education who employ a methodological integrative approach and have a strong connection to practice. The three-year IDE bachelor programme *Industrieel Ontwerpen* was set up in 2007, is delivered in Dutch and is currently being redefined. The three two-year IDE master programmes – *Design for Interaction*, *Integrated Product Design* and *Strategic Product Design* – established in 2003 and lastly revised in 2016, are offered in English and reflect the research strengths of the faculty's academic departments. The master students graduate as industrial design engineers in the respective master programmes. While students obtain master specific competencies per programme, they also share common competencies because the three programmes are grounded in the same phases of the product and service development process.

The institution

The Delft University of Technology (TU Delft) was founded around 1840. It is the oldest and largest technical university in the Netherlands covering nearly the entire spectrum of engineering sciences. The university is composed of eight faculties and counts more than 24000 students and over 5000 scientific and professional staff. According to its vision, TU Delft contributes to solving global challenges by educating new generations of socially responsible engineers and by expanding the frontiers of the engineering sciences.

The faculty of Industrial Design Engineering (IDE) was established 50 years ago, in 1969, and has grown from a school with modest means and a few lecturers and students into an international teaching and research institution in design. In 2017-2018, the faculty educated 1035 bachelor and 876 master students and awarded 218 bachelor and 305 master degrees.

IDE's motto is *design for our future*: in designing products and services it integrates technology as well as the interests of industry, society and the environment. IDE research is carried out in three academic departments: *Industrial Design* focuses on human experience; *Design Engineering* addresses technology inspired design; and *Product Innovation Management* deals with strategic design. Across its endeavours, IDE looks into three themes with societal impact: health care, sustainability, and multimodal mobility systems.

The programmes

The accreditation assessment concerns four programmes, each with its own CROHO registration number. The three-year full-time IDE bachelor programme *Industrieel Ontwerpen* (180 ECTS) provides students with a basic understanding of design principles with a focus on tangible products and related services. Since 2012, the faculty restricts the number of new bachelor students to maximum 330 students per year. In 2017 the intake was raised to 350 students. The language of instruction is Dutch, with some courses being offered in English. The bachelor programme in its current outlook was introduced in 2007. The faculty is in the process of redefining the curriculum and aims to start the new programme in September 2020.

Initially the faculty offered a single MSc degree in Industrial Design Engineering. The three master programmes under review were established in 2003 and have been revised most recently in 2016. They are delivered in the English language to provide a truly international environment and attract students and staff from abroad. Over the past six years, student intake varied per year and per programme within a range of 80 and 120 students. In 2017-2018, each programme attracted

between 120 and 125 new students. Upon successfully completing the two-year full-time programme (120 ECTS), all IDE master graduates become industrial design engineers because the three programmes share common competencies and take the phases of the product and service development process as the basis for their profile:

- the *Design for Interaction* (*DfI*) programme trains students to design for impact on people and society, i.e. to become research-driven, human-centred designers;
- the *Integrated Product Design* (*IPD*) students learn to design for more complex cases with specific attention to embodiment design;
- the *Strategic Product Design* (*SPD*) programme adopts a strategic approach to product and service development: students and graduates focus on innovation strategy.

The assessment visit

The Faculty of Industrial Design Engineering at Delft University of Technology assigned AeQui VBI to perform a quality assessment of its bachelor and master programmes. This assessment takes place in the framework of a broader exercise: in spring 2019 a cluster of eight Industrial Design Engineering programmes from three universities (TU Eindhoven, TU Delft and U Twente) is assessed by a panel of domain and industry experts including an ID student. In close co-operation with the three institutions, AeQui convened an independent and competent assessment committee that was eventually validated by NVAO. The assessment committee is presented in Attachment 1 to this report.

AeQui organised a preparatory meeting with representatives of the respective departments / faculties and degree programmes to exchange information on the organisation and implementation of the visit, as well as on the timing and contents of the supporting materials. The site visit to TU Delft was carried out on 1 and 2 April 2019 according to the programme presented in Attachment 2.

In the run-up to the site visit, the assessment committee studied the self-evaluation report prepared by the IDE Faculty and reviewed for each programme a sample of theses accepted during the last two years. The experts' impressions on the report and the results of the thesis review served as input for discussion during the visit. The materials put at disposition by the Faculty prior to and during the visit are listed in Attachment 5.

The committee assessed the programmes in an independent manner; at the end of the visit, the chair of the assessment committee presented the initial findings of the committee to representatives of the programmes and the Faculty. The underlying report was prepared after the site visit and contains in a systematic way the committee's findings, considerations and conclusions according to the 2018 NVAO framework for limited programme assessment. A draft version of the report was sent to the IDE Faculty at TU Delft; their reaction has led to this final version of the report.

The NVAO assessment framework includes a Development Dialogue. The three institutions involved in the Industrial Design Engineering cluster have decided that such dialogue will take place a few months after the site visit. The results of this Development Dialogue have no impact on the findings, considerations and recommendations expressed in this report.

Intended learning outcomes

The IDE bachelor and three master programmes at TU Delft are embedded in the Faculty of Industrial Design Engineering; their objectives align with the mission and vision of the University and the Faculty. The four programmes have both common characteristics and distinctive features. The respective intended learning outcomes are adequate and their insightful formulation of disciplinary knowledge, skills and attitudes demonstrates clearly what each programme is about. All programmes have a long-standing tradition and good reputation. In order to maintain this level of excellence, however, the scope and content of the bachelor programme needs updating, while the respective master programmes may want to ensure they reflect the most recent developments in the domains of design for interaction, integrated product design and strategic product design.

Findings

Mission and vision

The committee understood from the very informative self-evaluation of education report and the discussions with programme staff and management that there is a clear link between the respective programme profiles, the motto of the IDE Faculty and the overall vision of the university. According to this vision, TU Delft contributes to solving global challenges by educating new generations of socially responsible engineers and by expanding the frontiers of the engineering sciences. IDE's motto is *design for our future*: in designing products and services, it integrates technology as well as the interests of industry, society and the environment. IDE graduates, therefore, are designers with a multi-disciplinary education who employ a methodological integrative approach and have a strong connection to practice.

Programme profiles

The committee noticed that the four degree programmes have several features in common, while they also position themselves as stand-alone programmes with specific profiles. All programmes, moreover, have a long-standing track record. The current **bachelor programme** was introduced in 2007 and educates students to become critical academic designers who are well aware of developments in the professional field of the industrial designer. Students are trained to become competent industrial design engineers with three key characteristics: they are multi-disciplinary, academic and investigative product developers. In designing products and services, students integrate aspects related to people, technology and business with an emphasis on using design methods and tools. Recent programme updates include the revision of the courses of the Technology Learning Line and the introduction of a 'Design for Sustainability' course.

The **three master programmes** were set up in 2003 and have been revised most recently in 2016. All master graduates are industrial design engineers: across the three programmes they share several competencies and have a common approach to the product and service development process. The committee gathered from the materials and the discussions on site that in addition to common characteristics, each programme also has its own distinct profile and purpose. The purpose of the ***Design for Interaction*** (*DfI*) programme is to educate specialist designers who adopt a human centred focus. *DfI* graduates design innovative products and services by assigning human-product interaction a central role in the design process. Technology in this regard is a means to an end: human purpose and societal impact lead the conceptualisation. This in turn entails that the *DfI* design process requires a critical position as well as an awareness of the broader ethical implications of design.

In the ***Integrated Product Design*** (*IPD*) programme students tackle complex design challenges, integrating multi-disciplinary aspects into a wide range of products and product-service systems. It requires students to take an integrated approach to fields such as design theory, aesthetics, ergonomics, engineering, etc. *IPD* graduates generate knowledge that has a strong applied focus; their profile closely matches the design practice.

The ***Strategic Product Design*** (*SPD*) programme prepares students to use design practices, tools and mind-set to identify promising innovation directions in organisations, to translate these directions in product and service concepts, and to guide stakeholders to support the implementation of these directions. Throughout the programme *SPD* students use core design principles and practices such as user-centred research, prototyping, co-creation etc. in the broader context of the innovation strategy.

Domain specific reference framework

In the domain specific reference framework, the three Schools of Industrial Design Engineering (IDE) in the Netherlands (TU Delft, TU Eindhoven and U Twente) have described the profile and labour market position of academic IDE graduates. According to this document, industry needs academically trained product designers who can integrate knowledge from different fields of technology with human factors, who can see signals from the market and can generate creative ideas with new solutions. An IDE graduate is therefore able to operate as an inter-disciplinary designer in the field of ID. The committee understood from the self-evaluation report and the discussions on site that the profile, competencies and labour market perspective of IDE graduates at TU Delft are very much in line with the provisions of the domain specific reference document.

Intended learning outcomes

The intended learning outcomes of the IDE bachelor and three master programmes are listed in Attachment 3 to this report. When introducing the current **bachelor programme**, the team of lecturers and the Board of Education identified twelve competency areas, which form the basis for the programme's intended learning outcomes. The committee noticed that these competencies cover the wide range of IDE and are formulated in good detail. Moreover the Faculty has set a number of quality indicators which allow to measure the relevance of the IDE bachelor programme and the operationalisation of its final qualifications.

The profile and final qualifications of the bachelor programme were developed in 2006 and underwent only minor changes since. However, the design field has evolved and it turns out to be increasingly difficult to incorporate important new developments in the existing programme. Hence, the Faculty's decision to develop a revised bachelor curriculum: the preparations are ongoing and the aim is to start the first year of the revised programme in September 2020. The assessment committee was informed that the process of reform started in 2017, and has resulted in a description of the basic principles underlying the revision in the *Manifesto* for education, a description of the desired profile of new bachelors and eight guiding principles for education. All students will start (or are transferred to) the revised bachelor programme as of September 2020, i.e. at a single moment.

The intended learning outcomes of the three **master programmes** cover seven generic competencies common to all TU Delft master graduates and between six and nine specific competencies linked to the respective domains of *DfI*, *IPD* and *SPD*. The Faculty also set a number of quality indicators to measure the relevance of the three master programmes. The committee welcomes the attention in the university-wide competencies to the international environment and to the awareness of possible ethical implications of the work. Furthermore, the programme-specific qualifications have been adjusted over time to make them more consistent with recent developments

in the field of IDE. The committee also noticed that the specific competencies of the three programmes properly reflect the profiles of the respective *DfI*, *IPD* and *SPD* programmes.

Considerations

The written materials and the discussions on site have demonstrated convincingly, according to the committee, that the four IDE programmes under review have common characteristics and distinctive features. In all four cases, their rationale is well embedded in the vision and mission of the Faculty and the University.

The committee considers that the intended learning outcomes for the bachelor and the master programmes are adequate. The intended learning outcomes reflect the provisions of the domain-specific reference framework for academic IDE programmes. Moreover, each set of learning outcomes is formulated in such a way that they refer to disciplinary knowledge, skills and attitudes at the appropriate bachelor and master level, respectively.

The intended learning outcomes have been formulated in an insightful way: the twelve bachelor competency areas indicate clearly what this undergraduate programme is about. Similarly, the final qualifications of each of the three master programmes have common focus areas, as well as explicit domain-specific features that set the three programmes apart in full compliance with their respective profiles.

The committee has established that the intended learning outcomes cover the respective programme profiles and reflect the Delft traditions and virtues. It supports the ambition of the faculty to completely renew the bachelor programme. The faculty is putting a lot of effort in this revision, and quite rightly so, as the process entails a comprehensive adaptation of programme perspective, content and structure. Nonetheless, the committee is concerned that the revised bachelor programme will be overhauled by the rapid and profound changes in digital technology-driven design by the time it is rolled out completely. It therefore invites the Faculty to carefully monitor the process of renewal and its implementation.

Also, new developments and trends in the fields of *IfD*, *IPD* and *SPD* should be monitored attentively and, where appropriate, incorporated in the respective master programmes. Part of the TU Delft tradition is the strong emphasis on formulating design practice in methods. To the committee this is very visible in the bachelor and master theses: the students learn a diversity of methods, sometimes with less reflection on the adequacy of the methods. In an increasingly complex and rapidly changing world, the viability of a 'method for everything' may be questionable. The committee suggests a more pronounced reflective stance may be at place. Moreover, during the site visit the committee has shared the concern – which is based on both written materials and the discussions – with the Faculty management that the long-standing tradition of the IDE Faculty and its programmes may reduce the resilience of these programmes and jeopardise a culture of reflexivity towards outside developments.

Based on the interviews and examination of the underlying documentation, **the assessment committee concludes that the IDE bachelor and the three master programmes meet standard 1, intended learning outcomes.**

Teaching-learning environment

The teaching-learning environment is well developed at the IDE Faculty in Delft. All four programmes are adequately structured and feature a coherent combination of courses and projects. Academic staff, student mentors, student assistants and the staff of the Department of Education & Student Affairs together allow for a smooth and effective organisation of the respective IDE programmes. The IDE building and its facilities reflect the educational model of the Faculty. The study association ID manages student expectations and advances the educational interests of the IDE students. Notwithstanding these positive findings, there is room for improvement on specific aspects of the respective curricula: more in-depth knowledge courses and more opportunities for students to tailor the study programmes to their individual interests, for instance by more elective courses at an earlier stage in the programmes.

Findings

Programme

In line with its findings in the previous section, the committee noticed that several components of the teaching and learning environment are common to all four programmes under review. Different elements of this environment, such as the curriculum structure, the didactic concept, student intake, staff and facilities are described in good detail in the self-evaluation report. This written information in combination with the interviews on site make a compelling case that the respective programmes are very well established.

The three-year full-time **bachelor programme *Industrieel Ontwerpen*** provides students with a basic understanding of design principles with a focus on tangible products and related services. The language of instruction is Dutch, with some courses being offered in English. The first and second year of the programme consist entirely of mandatory courses; in the third year, students pursue individual study paths with a minor, two electives and the final bachelor project. Attachment 4 to this report contains an overview of the bachelor curriculum, which amounts to 180 ECTS.

The bachelor programme is set up as an integrated thematic programme: it brings disciplines together in individual courses and introduces a multi-disciplinary approach in product design.
Five product development courses form the backbone of the programme; the technology learning line addresses specific engineering design methods. Other courses relate to research, to the thematic interests of the Faculty (such as sustainability) and the specific domains of the master programmes (such as strategic product innovation). As part of the product development courses, students take lessons in hand-drawing and technical documentation. The minor can be taken inside or outside the faculty; the majority of students reportedly choose an internship or a study period abroad. In the final bachelor project students work on a client case and are acquainted with the different phases of the development process: it starts with framing a design challenge and ends with a visual presentation and a design. One third of the courses are taught in English language; about 30% of the students spend one semester abroad.

Education is to a large extent provided in the form of tasks and projects related to product development. Other courses deliver discipline-related knowledge and skills that students need to integrate primarily into the product development process. Students learn designing by doing which is supported by the integrated thematic approach of the programme. Active learning is stimulated in the courses.

From the discussions with bachelor staff and students it was apparent that students appreciate the very broad education, the logical and systematic build-up of the product development courses

and the openness of the staff. The breadth of the bachelor programme definitely provides a solid basis for the master programmes. Overall, they feel well supported; some students even think there could be a bit less of project guidance by coaches. Students, moreover, indicated they welcome the availability of an honours programme of 20 ECTS to broaden or deepen their knowledge and skills.

When asked for suggestions to improve the curriculum, bachelor students would like more courses on digital aspects of design, more - and more in-depth - coverage of research across the curriculum, a longer design project before the bachelor thesis, and a bigger role for sustainability topics. The committee noticed that several of these strengths (broadness, preparation for master programme) and development suggestions (sustainability, digital design) were also raised by the alumni. Furthermore, the committee observed during the meetings with staff and students that sometimes there is a mismatch in how students and staff perceive the teaching reality, for instance with regard to formative assessment (to what extent such intermediate test always indicates students' progress in view of the summative exam) and the attention to research in the bachelor education (with students indicating that exposure to research is limited).

All **three master degrees** consist of two-year full-time programmes (120 ECTS); they share the same structure, didactic concepts and a few courses. Each programme consists in the first year of profile-specific courses (51 ECTS) and shared courses (9 ECTS); in the second year, students take electives (30 ECTS) and work on the graduation project (30 ECTS). Attachment 4 to this report contains an overview of the three master curricula.

The first year consists of theoretical courses and design projects. The courses provide a theoretical and methodological basis; in the design projects students apply and integrate the theory acquired during the courses. The master programmes stimulate active learning through different teaching methods featuring individual and group work. Staff integrate their research results in the education delivery, notably in electives and the graduation project. On average master students have 15 hours of contact time per week.

Each master programme has two entry options, in September and February. As courses are taught only once per year, there is course coherence within a semester and the first two semesters can be taken in either order. A semester of each master programme is dedicated to electives, which are all scheduled in year two. Students can choose for a specialisation, such as *Medisign* or university-wide annotations such as *Entrepreneurship*, *Technology in sustainable development*, or the *Education* track. In these cases students take at least 9 ECTS of dedicated elective courses and have a related thesis topic. In the graduation project, students complete a complex project independently; the project can be conducted with an external party or with an IDE research group. Thesis supervision is handled by the supervisory team, which for external projects also includes a company mentor. The graduation support desk provides help, advice and expertise on the project. Students wishing to pursue the Honours Programme Master (21 ECTS) follow the university-wide *Critical Reflection on Technology* course and develop their own individual project related to a specific aspect of design that is not (sufficiently) covered in their regular programme.

The master programme ***Design for Interaction*** is built around three design projects, which are supported by parallel courses in which theory and methods are taught. One semester focuses on research, analysis and concept generation; the other semester on interactive products and services. *DfI* is connected to the research programme of the Faculty both in content and in teaching staff.

The discussions with *DfI* students revealed that they like the broadness of the programme and the flexibility and individual responsibility to

choose what you want to do and want to become. Several students mentioned that they have learned a lot of new things during the first year and are able to become the designer they envisage to be through the elective courses in year two. Staff play an important role in this development as they are both knowledgeable and approachable. Asked for suggestions to improve the *DfI* curriculum, several students would like to select more courses already within the first year. Some students also complained about the study load and the conflicting deadlines towards the end of the teaching period. As a result students have either little time for reflection or skip/delay courses to relieve the pressure. While *DFI* explores with students how to solve certain problems, there could be a stronger connection with companies in grasping how solutions can be applied in the real world. Asked whether there are sufficient opportunities for students to make choices in the first year, teaching staff indicated that the first year courses are mandatory but that there is enough room to make choices within these courses. The committee learned that the teaching staff is aware of the request from students for a more self-directed curriculum, hence the recent efforts of course coordinators to allow for choice within the core courses.

Two large courses on Concept Design and Embodiment Design form the backbone of the ***Integrated Product Design*** programme. The drivers of these courses are real-life problems initiated by external parties and shaped into assignments in close dialogue with teaching staff. The *IPD* master programme interacts with the IDE research portfolio in *Technology Transformation* and *User Experience*.

IPD students very much appreciated the way in which the master programme had been redesigned with compulsory courses in year one and lots of freedom to tailor the curriculum according to one's individual interests. One student who follows the *Medisign* specialisation track mentioned that companies are very interested in students with this particular profile. Moreover, the work with hospitals is reportedly inspiring and makes students feel they are doing relevant work.

Although they are satisfied with the quality of the teaching staff, several students indicated that some courses are a bit superficial and do not go very much in depth. The curriculum is broad rather than deep: it offers a flavour of many disciplines but leaves little room to acquire in-depth knowledge. Confronted with this feedback, staff acknowledged that the design profession is broad and that they expect students to see the full spectrum of *IPD*. According to the teaching staff, however, there is depth in the programme but this depth is achieved by integrating subcourses into main courses. If anything, there is room for the programme and for the teaching staff to manage student expectations better.

The curriculum of the ***Strategic Product Design*** programme is clustered around two themes and three courses: the fall semester focuses on designing innovation opportunities in the *Design Strategy Project*; the spring semester is about positioning innovative solutions and about research. Core courses include *Brand & Product Commercialisation* and the *SPD Research Project* course. The *SPD* programme is embedded in the IDE research portfolio on *Strategic Design*.

SPD students indicated to the committee that they appreciate the expertise of the programme staff, notably the practical input provided by teachers of practice and coaches. The contacts students have with companies as part of their curriculum are very useful in getting a broad view on the professional field and in identifying which career options are interesting for individual students. Asked what parts can be improved, students mentioned that the bachelor programme could pay more attention to the field of *SPD*, that some *SPD* courses are not up to date and that it is difficult to connect the academic and the practical side of *SPD* whereby the quality balance currently is in favour of practice.

Staff, students and alumni confirmed the statement in the self-evaluation report that the profile of the *SPD* graduate closely matches the professional field and that industry is discovering the value of the specific *SPD* focus. However, they also shared the concern that *SPD* graduates face increasing competition from business school graduates who have taken design-related courses such as design thinking or user-centric innovation. The panel understood from several discussions that there is a clear distinction between the *SPD* graduate profile and the design-oriented business graduate, that the Faculty is creating a distinctive and recognisable *SPD* brand to be communicated to the outside world, and that the *SPD* curriculum may be expanded with specific courses addressing emerging professional specialisations such as entrepreneurship, design for sustainability or design for Artificial Intelligence.

The committee understands from the self-evaluation report that each programme has defined how the final qualifications are addressed in individual courses. Moreover, a matrix figure for each programme illustrates which competencies are trained in every course and which final qualifications are included in the course assessment. Similarly, the committee learned which teaching methods and examination formats are adopted for each course.

Furthermore, the committee acknowledges that there is a clear link between the bachelor programme and the three master programmes. All four programmes, moreover, are built in a coherent way and do justice to the educational principles of active learning and multi-disciplinary teaching. Education is administered in different forms and clearly interwoven with the research priorities of the Faculty and the individual staff members.

Admissions

The bachelor and master programmes adopt admission criteria, which are described in the Teaching and Examination Regulations. Following the growing bachelor student inflow, the Faculty decided to introduce a selection procedure and a numerus fixus in 2012. Initially set at 330 students per year, the inflow was raised to 350 students in 2017. The selection is based on the profile of secondary school degree, the average grades in high school and the participation in selection activities. As a result of this approach, about 300 bachelor students per year have enrolled between 2012 and 2016; since 2017 this number has grown to about 320 new students.

Every master programme has a dedicated admissions procedure, which takes into account the specific situation of each applicant. Master cohorts consist of IDE bachelor graduates, TU Delft graduates, Dutch students with a professional bachelor degree and international students with a bachelor degree. Students with an IDE bachelor degree from Eindhoven, Delft or Twente have direct access to the *DfI*, *IPD* and *SPD* programmes. Admission criteria for the other students include a 75% grade point average, proof of English language proficiency, mathematical skills, motivation and reference letters, and a portfolio. Applicants may be asked to enrol in the pre-master programme of maximum 30 ECTS. Although the number of pre-master students is limited, the committee learned that those students who successfully pass this programme also tend to complete the master programme. Over the past six years, student intake varied per year and per programme within a range of 80 and 150 students. In 2017-2018, each programme attracted between 120 and 125 new students. The committee learned that the Faculty aspires a 30% intake of international students in the master programmes, a share that was reached in September 2017.

The committee noticed from the materials and the discussions that IDE programmes pay considerable attention to the feasibility of the curricula. In addition to monitoring the study load in individual courses and avoiding as much as possible conflicting deadlines for assignments and exams, the Faculty set up a system to monitor individual students' study progress and to support them

with their study planning. This system involves both student mentors and academic counsellors. The emphasis is on first-year students, but also in the later years the academic counsellors perform guidance activities for students. After one year, students have to obtain 45 out of 60 ECTS in order to continue their studies. Moreover, bachelor students have to complete the entire BSc programme before they can enrol in the master programme. The detailed information in the self-evaluation report shows that the drop-out rate of first-year bachelor students reduced from almost 20% in 2012 to 10% in 2017. Similarly, the share of students that obtain a positive 'Binding Study Advice' after year one has been growing from 80% to 87% in the same period. The committee learned that these figures are well above the targets set by the Faculty and the average performance figures for the entire university. Almost all students who pass the first year, eventually complete the bachelor programme; between 70% and 80% do so within four years. Also this success rate is considerably higher than the TU Delft average of 58%.

Roughly 90% of the master students who enrol in one of the programmes eventually complete it successfully. However, the average duration of study is 36 months, exceeding the scheduled period of time with 50%. The committee understood from the materials and discussions that the Faculty has taken several measures to reduce this duration. One important adjustment has been to facilitate the integration of an internship or study period abroad in the regular curriculum. Moreover, the process governing the final master project has been streamlined with clear milestones and deadlines. The committee understands from the discussions that these measures have been taken and will likely generate a positive impact; however, it is too early to confirm this impact through hard figures.

Staff

According to the self-evaluation report, the IDE Faculty at TU Delft features 210 academic staff members (headcount), which amounts to 154 full-time equivalents. The total staff figure includes 78 teachers, who often combine education with design practice. Across the four programmes, about 82 full-time equivalents are spent on education. Comparing the Faculty's academic staff with the number of students, the ratio is 1 on 12. Based on the educational equivalents, the staff – student ratio is 1 on 23. The committee noticed that these ratios are much better than the TU Delft averages (1 on 25 and 1 on 39, respectively).

The committee understood from the materials that the Faculty has formulated quality targets for its personnel: teaching staff are active in both research and education, have an international orientation and are/were active in the professional field of IDE. It is university-wide policy that all staff have at least C1-level of English, possess a University Teaching Qualification (UTQ) or can demonstrate similar expertise. Through this UTQ staff acquire the necessary competencies to develop, teach, assess and supervise courses. The Faculty attaches importance to the teaching abilities of its staff. Nowadays specific attention is paid within the regular staff appraisal process to teaching and education. This appraisal has also been extended to teachers, who are offered career opportunities up to a level that is similar to associate professor. Students indicated to the committee that the level of English of their professors and teachers is adequate.

Furthermore, the committee learned that both the University and the Faculty offer several opportunities for staff development in terms of educational practices. The IDE Education & Student Affairs department has an educational expert and an expert in online and blended education, who support academic staff in developing or implementing their courses.

Facilities

Since 2001, the IDE faculty is located in building 32 on the TU Delft campus where almost all teaching and research take place. The building was especially renovated to house IDE. The committee was shown around the education rooms,

studios, labs, lecture theatres and drawing rooms. Having stayed for two days in one of the lecture rooms and having held the debriefing in the newly developed IDE Arena, the committee noticed that these facilities were state-of-the-art.

The committee learned that the study association *ID* is highly valued by students, staff and management. It was established in 1973, addresses both students and staff, and is active in five domains: education, career, social, travel and skills. The self-evaluation report covered extensively the structure and endeavours of *ID*. The panel noticed with interest that the study association *ID* pays proper attention to all programmes; each master programme has its own *ID* community of students.

Considerations

Based on the written materials and the discussions on site, the committee considers that the teaching-learning environment is well developed at the IDE Faculty in Delft. This appreciation applies to the bachelor and the three master curricula, the educational concept, the admission procedures, the student performance, the quality and quantity of the staff, and the relevance of the programme-specific facilities.

The committee considers that all four programmes are well structured and feature a coherent combination of courses and projects. The dual enrolment approach requires that the respective master curricula are built very systematically, which in turn makes it easy for students to understand what is expected of them. Moreover, in this way the programmes are able to cater for a high number of students. The committee appreciates that both bachelor and master students can spend a period abroad and that the Faculty is offering sufficient opportunities to effectively go abroad. The growing number of international students and staff is also a positive indicator of the Faculty's ambitions with regard to internationalisation.

Nonetheless, and further to the Faculty's claim that it delivers designers with a multi-disciplinary education, the committee wonders to what extent the curriculum allows students to collaborate with colleagues from other disciplines and invites the Faculty to consider enhancing interprofessional learning in the programmes.

The discussions on site have convinced the committee that the programmes and the quality targets are monitored carefully and that solutions are sought and implemented in order to counter possible negative developments. In this regard, the committee welcomes the efforts of the Faculty to reduce the average study duration in the master programmes. The recent structural provisions on the final Graduation project are likely to reduce the average duration of the master thesis without jeopardising the quality of this final product.

The Faculty has sufficient and properly qualified staff at its disposition with an adequate command of the English language. The combination of academic staff, student mentors and student assistants and the staff of the Department of Education & Student Affairs allows for a smooth and effective organisation of the four programmes. The committee appreciates the fact that teachers who combine education with design practice are linked to a department, which in turn keeps them informed about ongoing research.

According to the committee, the IDE building and its facilities reflect the educational model of the Faculty. The study association *ID* plays an important role in managing student expectations and advancing educational interests of the IDE students. Moreover, the study visit demonstrated that the programmes and the Faculty can rely on a strong commitment from students, staff and alumni.

Having established that the teaching-learning environment is adequate across all components, there is room for improvement on individual elements. The committee considers that students and alumni have raised a number of curriculum-related issues that are worth addressing and

therefore invites the programme management to look into the research competencies in the bachelor programme, and into a more prominent incorporation of topics such as sustainability and digital design, as well as the academic component in the *SPD* programme. In this regard, the committee observed that sometimes there is a mismatch in how students and teachers perceive teaching, and hence in the priorities of what one finds important and less important. The assessment committee recommends to conduct an open dialogue between staff and students on these issues.

Most students appreciate the broad character of the bachelor and master programmes, but they miss the opportunity to acquire enough in-depth knowledge. Moreover, students ask for more challenges, in particular in the master programmes. Several bachelor graduates from Delft indicated that they were very satisfied with this programme but expected to be challenged more in the master programme. By offering more opportunities for in-depth learning in the curriculum, the programmes could meet this ambition of the students.

Furthermore, the committee appreciates that students are offered well-structured curricula that cover many aspects of design. However, there are many designers on the job market, and even non-designers who have acquired design thinking skills. The committee considers it critical for students to develop their own personal profile and identity as a designer. This can be realised, according to the committee, by offering more elective courses at an earlier stage in the respective programmes, in addition to the obvious opportunities for students to tailor their curriculum in year 3 of the bachelor programme and in year 2 of each master programme. This in turn may increase the intrinsic motivation of students to complete the programme within the nominal duration. The committee therefore encourages the programmes to think about ways for staff and coaches to support students in carving out their own individual pathways within the curricula. Such opportunities for tailoring individual learning pathways may be found in offering elective courses in earlier years of the bachelor and master programmes, as suggested before. In addition, staff may be aware and willing to actively coach and facilitate students to make choices within the framework of thematic courses, to explore new developments in design, to stimulate interdisciplinary and interprofessional collaborations, etc.

Based on the interviews and examination of the underlying documentation, **the assessment committee concludes that the IDE bachelor and the three master programmes meet standard 2, teaching-learning environment.**

Student assessment

Student assessment in the four IDE programmes is based on an elaborate system with clear principles and robust instruments. Across the programmes, individual course assessments are valid, reliable and transparent in so far as summative assessments are concerned; formative assessment can be addressed more systematically, notably in the bachelor programme. The Board of Examiners and its Small Board are on top of their tasks: they have been instrumental in designing, implementing and quality-assuring a new assessment system and increased the awareness of teaching staff on the importance of student assessment. The bachelor and master thesis evaluation forms allow for careful grading and insightful assessments. The samples of completed forms demonstrate that thesis evaluation is adequate in the bachelor and *IPD* programmes, acceptable in the *DfI* programme and up for improvement in the *SPD* programme. The quality of student assessment has improved considerably over the years. Nonetheless, there is still room for improvement with regard to formative assessment and in terms of all – not merely most - thesis evaluations being graded consistently, completed insightfully and archived properly.

Findings

Assessment system

The committee noticed in the self-evaluation report that the IDE Faculty has an elaborate assessment system in place that aligns neatly with the central provisions at university level. For instance, all regulations governing the examination duties, responsibilities and procedures are set out in two documents: the IDE Teaching and Examination Regulations and the IDE Rules and Guidelines from the Board of Examiners. In the interest of uniformity across faculties and to simplify and improve administrative procedures, these documents are based on formats issued by the university. Similarly, an examination at IDE comprises – in line with TU Delft regulations – both the assessment of student competencies in relation to the course objectives and the marking of that assessment.

Furthermore, the written materials and the discussions on site revealed that the Faculty set out a number of principles concerning the quality of examinations, such as constructive alignment, transparency and consistency, division of duties and responsibilities, etc. In this regard, all course coordinators are instructed to use an examination matrix, which allows to verify the constructive alignment of the assessment with the course goals and thus the validity of the examination. In order to guarantee transparency and consistency, course coordinators are requested to devise all examinations in collaboration with other teachers, and publicise information on the assessment modes before. In order to realise consistent and transparent marking, rubrics are used for design projects and answer keys for written exams.

The IDE programmes under review use a variety of teaching methods and examination formats. This variety is important as it reflects the different learning styles of students and encourages them to engage in active learning. Assessment formats comprise both individual and group variants and include written reports, written or digital tests, visual representations, oral presentations, reflections, peer review and active participation. The committee looked into the overview tables that were provided in the report for each of the four programmes and noticed that there is indeed a diversity in teaching methods and examination formats.

Both bachelor and master students indicated during the visit that they are informed in a transparent and timely way about the learning goals, assessment types and rubrics. In most cases, students are satisfied with the match between course content, education method, assessment mode and examination. If anything, mostly bachelor

students mentioned that the structure of the academic year in ten-week quarters often entails time pressure periods at the end of each quarter when assignment deadlines are conflicting with the preparation and delivery of examinations.

According to the self-evaluation report, courses apply both formative and summative assessments. The committee acknowledges from the discussions with students and staff that the summative assessments tend to be well organised in line with the above-mentioned provisions and regulations. The same observation applies to the formative components of the final thesis bachelor and master thesis projects. However, the committee did notice from discussions with (mainly bachelor) students and staff that there is room for improvement in the way formative assessment is organised systematically in regular courses and experienced as enhancing the learning curve of students. Staff indicated that formative assessment is an integral part of work in the studios where coaches see and give feedback on how students are progressing. Students from their side noticed that formative assessment is applied in different ways across courses: in some cases there is useful feedback throughout the course, in other cases the coach could give more advice and guidance, and in still other cases there is reportedly no interim feedback at all.

Board of Examiners

The written materials and the discussions on site have demonstrated that the IDE Board of Examiners (BoE) plays an important role in enhancing and ensuring the quality of student assessment. The BoE is set up in accordance with the Dutch Higher Education Act: it approves the degree audits, drafts and adopts the Teaching and Examination Regulations, and monitors the quality of tests and assessments. At IDE, the BoE consists of nine members who are appointed by the Dean. There is one BoE for all four degree programmes. In line with university-wide practice, a staff member from another faculty joins the board as external member to provide a different perspective on the quality assurance of examinations and assessments. One of the members of the BoE is an assessment expert. The BoE has delegated a number of day-to-day activities to an executive committee, the so-called Small Board, which consists of three members and the BoE secretary. The committee learned that that BoE secretary has particular expertise in legal matters.

The panel gathered from the session with representatives of the BoE that over the years, the Board has slowly but steadily managed to adjust the assessment practices and align these with developments at national level and with the conditions set by the Faculty for good quality examinations. The procedure for ensuring the quality of examinations of courses was developed and implemented by the BoE in 2014-2015. Nowadays, the BoE appoints the course coordinators as examiners for the course provided they have obtained the University Teaching Qualification. Moreover, the BoE evaluates all bachelor courses and mandatory master courses at least every four years, thereby providing the course coordinator with written feedback and suggested actions and following-up on the response (plan for improvement) of the course coordinator. The committee was informed that recently this evaluation procedure is being extended to elective courses in the master programmes and the Bachelor Final Project. The existing Master Graduation Project's evaluation procedure will be further revised to improve the transparency of the assessment. Although initially perceived as somewhat intrusive, staff members have come to realise the value added of the system and eventually welcome the feedback of the BoE. In addition to the BoE, also students assess the quality of examinations in their course evaluations.

Thesis evaluation

As part of its thesis review, the committee studied for each programme a sample of thesis evaluation forms completed in 2016-2017 and 2017-2018. The evaluation of the bachelor thesis was also documented in the information materials and

consists of two interim assessments, one final assessment and a final project rubric. Each assessment form and the rubric are built around the same learning objectives: integration of interests and constraints, gaining (new) knowledge, project planning and methodical execution, communication and cooperation, professional growth. Students are graded for each learning objective on a five-point scale: poor – insufficient – sufficient – good – excellent. The rubric document contains relevant indicators but is not linked to (sub-)grades. The committee members noticed in their review of 15 completed evaluations that the forms are robust and allow for transparent grading and feedback. In almost all cases the evaluation was insightful in the sense that it motivated properly the sub-grades and final grade of the assessors. The form and the feedback, however, did neither indicate to what extent individual assessors had come to independent judgements (in score and feedback) on the thesis quality, nor how the final grade of the thesis had come about. Moreover, in four cases the committee would have graded the thesis differently and in all these cases the committee's score was lower.

The assessment form and rubric for the master graduation project was also part of the information materials and is identical for the three programmes under review. The final grade is based on thirteen grading components, organised around five elements that can be complemented with specific comments: knowledge, methods, project result, communication, and project management and planning. The rubric defines each of the five elements and specifies the quality to be delivered for the grade ranges 4, 5, 6, 7-8, and 9-10. Also for the master thesis assessment, the committee members noticed in their review of the completed evaluations that the forms are robust and allow for transparent grading and feedback; the rubric, moreover, is a very useful and detailed tool linking indicators to (sub-)grades. The form and the feedback, however, did indicate neither to what extent individual assessors had come to independent judgements (in score and feedback) on the thesis quality, nor how the final grade of the thesis had come about. Furthermore, the committee members reported in several cases that the feedback in the evaluation forms was not particularly insightful: motivations for scores were either very brief, only addressing part of the criteria or completely absent. In five cases, moreover, the evaluation form was missing and could not be provided upon request. Finally, the committee agreed to almost all scores of the *IPD* theses, whereas it would have graded several *DfI* and *SPD* theses differently; three *DfI* theses deserved higher scores, whereas four *SPD* and two *DfI* theses were graded too high.

Confronted with these findings, the BoE indicated that student assessment, including the evaluation of the final bachelor and master projects, has come a long way and that good progress has been made over the past few years. Moreover, the assessment of the final thesis projects is set up in such a way that each assessor is reviewing the thesis independently and then contributes during the graduation process to the completion of the evaluation form and the final grade in a joint endeavour. The revision of the master programmes in 2016 entailed an adjustment of the graduation project, which explains to some extent the different levels of qualitative and insightful feedback, compared to the bachelor programme. Nonetheless, the BoE is confident that the current and future evaluation forms (which were not part of the sample) will be completed more extensively and graded more consistently. The BoE also reported that in the meantime a digital procedure has been developed for the thesis assessment, which will facilitate qualitative feedback on the different rubrics and ensure that all forms are archived properly and can be retrieved upon request. Moreover, the BoE has started to look at the overall quality and consistency of the thesis projects by performing an internal quality control on a small sample of bachelor and master theses.

Considerations

Based on the written materials and the discussions on site, the committee considers that student assessment at the IDE faculty of TU Delft is

well organised. The assessment system is elaborate, the principles clear and the processes and instruments at disposition are robust. The discussions have demonstrated, according to the committee, that the assessment system allows for valid, reliable and transparent examinations.

The committee thinks highly of the Board of Examiners and its Small Board: both bodies are on top of their tasks and their individual members are competent and committed. In this regard, the committee appreciates the Boards' year-long efforts to not only improve the system but also raise staff awareness on the importance of student assessment.

According to the committee, the assessment of the final bachelor/master thesis project is based on a robust set of tools that allow to demonstrate and to report on the extent to which students have achieved the end-level qualifications at bachelor and master level, respectively. The evaluation forms allow for insightful assessments as they combine comprehensive and relevant assessment rubrics with room for personalised feedback. Based on a sample of 60 bachelor and master thesis evaluations, the committee considers that the forms are very often used in an optimal way. Nonetheless, in several cases there is room for more explicit, extensive and insightful feedback. Taking the quality of the completed forms as an indicator, the committee thought that the samples it reviewed for the bachelor programme and the IPD programmes were adequate. While the sample of *DfI* forms was acceptable, the evaluation forms in the *SPD* sample left somewhat to be desired. In fact, just over half of the *SPD* evaluations were insightful and scored in line with the committee's appreciation.

In order to enhance further the quality of student assessment in the IDE programmes, the committee suggests to give more (systematically) attention to formative assessment as a learning tool throughout the courses in the respective curricula, notably in the bachelor programme. Moreover, the committee invites the Board of Examiners to continue its efforts in monitoring the quality of written feedback in the thesis evaluation forms, to assure the consistency in thesis grading, and to ensure that all thesis evaluation forms are archived properly. The committee is confident that the Board of Examiners has the potential to achieve these improvements. However, such quality enhancement also requires an awareness of all staff involved in assessment, as well as sufficient (human and time) resources for the BoE to realise this next level in quality assuring student assessment.

Based on the interviews and examination of the underlying documentation, **the assessment committee concludes that the IDE bachelor and the three master programmes meet standard 3, student assessment.**

Achieved learning outcomes

Students who graduate from the IDE bachelor and master programmes at TU Delft are adequately prepared for a follow-up study or a position on the labour market. The sample review of 60 bachelor and master theses shows that the individual quality differs but that the level achieved is adequate across all programmes. Upon graduation, moreover, students find a relevant job in which they can display the competences they acquired during their studies at IDE. In sum, it is fair to state that the intended learning outcomes of the respective programmes are eventually achieved at the end of the bachelor and master curriculum. Nonetheless, there is room for improvement: the programmes can pay more attention to the critical and reflective attitude of students, notably by encouraging students to more independently frame the problems in the context of their theses and projects undertaken in collaboration with companies and organisations. The Faculty may also want to make its programmes (even) more relevant and future-proof through emphasising the economics and business aspects of IDE, internationalising the curricula and communicating what IDE graduates stand for in terms of profile and competencies.

Findings

Final projects

In the self-evaluation report it is mentioned that the Faculty considers the final qualifications of the bachelor programme to be met if the competencies of the graduates correspond to the intended learning outcomes and if graduates are well prepared to successfully continue with one of the IDE master programmes. Similarly, the master programme objectives are met if the competencies correspond to the intended learning outcomes and if graduates find employment in IDE or a related field, use their knowledge and skills in their job, and experience that the competencies learned at TU Delft are relevant to professional practice.

According to the self-evaluation report, the combination of courses in the curriculum determines the level of the respective IDE programmes. In the final bachelor and master projects students are expected to demonstrate in an integrated way the range of competencies they have been acquiring throughout the programme. In order to establish whether students do achieve the end level qualifications, the assessment committee has reviewed a sample of final bachelor and master projects. In the run-up to the site visit, the Faculty provided an overview of the final projects that were accepted in the academic years 2016-2017 and 2017-2018. The project coordinator of the assessment committee made a selection of the projects to be reviewed ensuring per programme a fair distribution across scores, date of project acceptance and, where applicable, language and assignment company.

The committee chair, domain and industry experts were each allocated a number of final projects and their respective evaluation forms. For each set of products the committee answered four questions: (i) Is the final project of sufficient quality to pass? (ii) Do you agree to the score given by the assessors? (iii) Based on the evaluation form, is the assessment clear and insightful? (iv) Are there any particularly strong or weak elements in the execution of the final project? Moreover, having reviewed their sample of final projects, the committee members provided an overall appreciation at programme level on the quality of the final project and on the quality and transparency of the assessment. The committee's findings on the assessment of the final bachelor and master projects have been described in the previous section on student assessment.

The bachelor final project amounts to 15 ECTS and constitutes the final stage of the **bachelor programme**. It takes the form of a design chal-

lenge provided by a client from a company, organisation or IDE research group. In this project, students demonstrate individually that they are academically trained designers at bachelor level. This means that students are able to integrate interests and constraints, execute methodologically a design project, achieve valuable design for relevant stakeholders, acquire (new) knowledge and arrive at a credible design result. The assessment committee reviewed 15 bachelor theses. In all but one case the committee found the quality of the thesis to be in line with what can be expected of a final academic deliverable at bachelor level. The single thesis that the committee thought was just under the quality threshold had received a mere pass grade by the assessors.

Looking at individual strengths and weaknesses of the bachelor theses, committee members noticed that students all learn the same design process and apply this process through a wide range of interesting topics and research questions. Moreover, students build up a close relation with the companies and organisations during their bachelor project. While in-company assignments have the benefit of addressing real-world issues with real-world clients, the committee found that in certain cases students were working very much according to the expectations of the client rather than exploring design opportunities freely or providing a critical stance towards the client's brief. Without questioning the required minimum level of thesis quality, the committee noticed that across the sample, there are big differences in the visual quality of the projects and the way students collect data and analyse these as part of their user research. Whereas several students were performing well across the board, the committee was surprised to see that one thesis which it found limited and weak in terms of user research analysis eventually received an excellent grade. Moreover, theses at the lower end were often rather weak in consistency, language and referencing.

Once all courses have been followed during the first three semesters of the IDE **master programmes,** students dedicate the final semester to the preparation and implementation of the master thesis, which amounts to 30 ECTS. In their final project, students demonstrate both their ability to work independently and their professional competences as an industrial design engineer with a specific DfI / *IPD* / *SPD* profile at master level. The assessment committee reviewed 15 theses for each master programme. In all cases the committee found the quality of the thesis to be in line with what can be expected of a final academic deliverable at master level. Looking at individual strengths and weaknesses of the master theses, committee members noticed that students across the three programmes address a wide range of interesting topics through diverse research questions and a broad spectrum of methodologies. The level of argumentation, language and referencing is fine.

Regarding the sample of ***Design for Interaction*** theses, the committee noticed that students tend to address data collection and analysis more extensively and to a higher level of proficiency than in the other two programmes. Moreover, students investigate a topic through a good combination of field study, data and literature. In this way they present new (or at least newly structured) knowledge. While *DFI* final projects seem to pay a large amount of attention to literature research, the committee noticed that the client perspective is missing in some theses.

The sample of ***Integrated Product Design*** theses very often contained a thorough analysis of the collected data, which in some cases required and/or demonstrated in-depth knowledge of different areas. Moreover, several theses were quite strong in their presentation. A user perspective was not always taken into account to the extent that committee members would expect it. Several *IPD* theses were more client oriented than one would usually see in academia. On the one hand such company relation is a strength; but on the other hand students should also see the larger picture of their project: why a product is relevant per se (and not only for the company), and how is

the product positioned within the broader range of competitors, i.e. beyond the 'usual suspects' of the assignment company.

The sample of ***Strategic Product Design*** theses contained similar strengths and weaknesses: diversity in topics, use of real-world data, logical and consistent argumentation on the positive side; limited user research, (too) strong focus on the company perspective and challenges on the development side. In one case, the committee reviewed a very methodical marketing thesis, but missed the design contribution. In another case the committee was surprised that a thesis with an almost perfect score showed several important weaknesses in its execution.

Employability of graduates

In addition to verifying the quality of the final deliverables, the labour market performance of graduates is another way to establish whether students achieve the intended learning outcomes upon completion of the programme. The committee gathered from the materials and the discussions on site that in general students do not only have a positive opinion on their ability to pursue a follow-up study or a professional career, but are also effective in their education or employment career.

Students and alumni appreciate the breadth of the bachelor programme, which provides a solid basis for the IDE master programmes. Currently, about 70% of the bachelor graduates continue their education in one of the three IDE master programmes; other students decide to enrol in a different master programme at TU Delft, notably the master Biomedical Engineering, or elsewhere. Most master graduates find their first paid job in relation with their study and within six months. According to the self-evaluation report, *IPD* graduates are particularly successful in finding a suitable job shortly after graduation.

Reflecting on the contribution of the IDE (master) programmes to their first jobs, alumni pointed positively to their broad education and their ability to communicate with colleagues from various levels and disciplines. They valued being trained to have a critical mindset entails that one takes the time to reflect, to identify the real problem and to look for a solution that takes on board the position of the different stakeholders. Furthermore, alumni thought that the visualisation skills they learned at IDE are particularly useful in the job context. Asked what was missing in the programmes and how IDE could prepare graduates (even) better for employment, alumni indicated that the economics and business aspects of the profession could receive more attention: IDE graduates from TU Delft know how to do things, yet got little training in how to sell design and how to position oneself and one's product in the market. Moreover, alumni pointed to the fact that their curricula focused very much on concept design. However, the next stage, i.e. the production part, got less attention during their studies while it plays an important role on the job. The interviewees also thought that more attention could be paid to the requirements and expectations of design agencies in digital fields: the IDE programmes pay attention to design thinking, but provide little training on techniques and methods in digital design, such as Lean, Canvas or Scrum.

Looking towards the future of IDE, the chair of the educational advisory committee (and alumnus of IDE) suggested that all four programmes should get their curricula fit for the challenges and opportunities of internationalisation, thereby ensuring that students and graduates are able to work in an international context. Alumni furthermore indicated that the transition from education to employment could be facilitated by a better communication on what Industrial Design Engineering stands for in the labour market. Graduates from all three master programmes acknowledge that they have been well trained during their studies and that as a result they feel confident as competent professionals within their respective domains. However, the names of the programmes are quite challenging in managing the expectations of potential employers. Alumni indicated in

particular that it is difficult to emphasise one's engineering qualities if engineering is absent from all programme titles. One *IPD* graduate mentioned that the 'integrated' dimension of *Integrated Product Design* provides little additional information to a potential recruiter, while adding the 'engineering' dimension to Product Design would clarify much better what competences IDE graduates from TU Delft stand for.

Considerations

Based on its final project review and the discussions on site, the committee considers that students who graduate from the IDE bachelor and master programmes are adequately prepared for a follow-up study or a position on the labour market. *In this regard, the above-mentioned programme objectives are met.*

Taking the final project as a key performance indicator for this standard, the committee considers that the thesis quality in the bachelor and master programmes is adequate. Having established that 59 out of 60 final bachelor and master theses meet at least the minimum requirements of what can be expected of a final academic project at bachelor or master level, it is fair to state that the intended learning outcomes of the respective programmes are eventually achieved at the end of the bachelor and master curriculum.

Without affecting its overall appreciation, the committee considers that the quality of the final projects – and thus the achievement of the learning outcomes - could be enhanced by paying more attention to developing a critical attitude of students. Although developing a critical attitude is explicitly mentioned amongst the competency areas of all bachelor and master students, the committee has seen little evidence of this critical attitude in the final projects it reviewed, even in theses with very high marks. The committee was struck in particular by the fact that students were not critical towards the companies / organisations and their design briefs for the final project. In general, the committee noticed little awareness of, or reflection on the limitations of the methods used in the thesis. This finding in turn seems to resonate with the impression the committee got from talking to students that they actually have little opportunity for critical reflection.

With regard to the other key performance indicator for this standard, the assessment committee considers that both bachelor and master graduates are very well qualified to pursue a follow-up study or enter the labour market. Following its informative interview with alumni and alumni members of the professional advisory board, the committee understands what strengths IDE graduates from TU Delft bring to the job. The committee encourages the Faculty to look into the issues raised by the alumni with regard to making the programme curricula (even) more relevant and future-proof: more attention to the economics and business side of IDE, further internationalisation of the curriculum contents and clear communication towards the labour market of what IDE graduates stand for in terms of profile and competencies. Finally, the assessment committee strongly advises to emphasize interdisciplinary education and explore opportunities for interprofessional learning in the programmes.

Based on the interviews and examination of the underlying documentation, **the assessment committee concludes that the IDE bachelor and the three master programmes meet standard 4, achieved learning outcomes.**

Attachments

Attachment 1. Assessment committee

Anton de Goeij, panel chair
Anton is emeritus professor Curriculum Development at Maastricht University. He has an extensive track record in international consulting and implementing curriculum development trajectories.

Saeema Ahmed-Kristensen, domain expert
Saeema is Head of Design Products, and a Professor of Engineering Design at Royal College of art, she was the deputy-head of the Dyson School of Design at Imperial College London.

Jacob Buur, domain expert
Jacob is Research director of SDU Design at the University of Southern Denmark. He studied Electrical Engineering at the Technical University of Denmark and obtained a PhD from that same institution.

Ann Heylighen, domain expert
Ann is full professor at the faculty of Engineering Science, Department of Architecture at KU Leuven (Belgium).

Carlijn Compen, industry expert
Carlijn is Head of Design at Océ Technologies in Venlo.

Rianne Hagen, student-member
Rianne is studying Industrial Design at the University of Twente.

Attachment 2. Programme of the assessment visit

Venue: Bernd Schierbeek lecture room, Faculty of Industrial Design Engineering, building 32, Tu/D campus

Monday 1 April 2019

08.45 Arrival panel

09.00 Internal panel meeting

11.00 Meet & Greet
- Welcome presentation by Dean and Director of Education
- Presentation of student projects
- Guided tour of the faculty

12.00 Session with Dean and Board of Education

12.45 Internal panel meeting and lunch

13.45 Session with bachelor students Industrial Engineering

14.30 Session with staff Bachelor programme

15.30 Session with master students Strategic Product Design

16.15 Session with staff Strategic Product Design programme

17.15 Session with alumni and industry representatives

18.00 Internal panel meeting (until 19.00)

Tuesday 2 April 2019

08.30 Open Consultation hour

09.45 Session with Board of Examiners

10.45 Session with master students Integrated Product Design

11.30 Session with staff Integrated Product Design programme

12.15 Internal panel meeting and lunch

13.00 Session with master students Design for Interaction

13.45 Session with staff Design for Interaction programme

14.30 Internal panel meeting

15.30 Session with Dean and Board of Education

16.15 Internal meeting panel

17.30 Plenary feedback (until end of assessment visit at 18.00)

Attachment 3. Final qualifications

Bachelor Industrial Design Engineering (Industrieel Ontwerpen)

1. Academic approach

1.1 Inquisitive attitude and lifelong learning

You are able to focus your inquisitiveness into studying the hows and whys of the world around you; you have developed an attitude of lifelong learning, which involves striving to achieve knowledge that is objective and has overall validity.

1.2 Dealing with gaps in knowledge

You are able to collect and analyse relevant information and knowledge in order to achieve a design objective.

1.3 Systematic approach, well-founded decision-making

With the help of models and simulations, you can systematically predict technical, ergonomic and aesthetic qualities of a design (or partial solutions of a design) and make well-founded decisions based on these predictions.

2. Intellectual skills

2.1 Critical and constructive attitude and reflection

You are able to ask questions effectively and adopt a critical and constructive attitude to the analysis and solution of design problems; through critical reflection, you have an understanding of your own behaviour (thinking, deciding, acting), of design methods and of your own working methods and you can adjust your behaviour and working method.

2.2 Logical reasoning

You are capable of logical reasoning, applying 'why' and 'what if' questions; you can reason at various levels of abstraction, including system level.

2.3 Understanding orders of magnitude

You have basic numerical skills and an understanding of orders of magnitude.

2.4 Developing and defending your position/vision

You can develop a well-founded position with regard to a subject relevant to a course, and effectively defend and communicate your position.

3. Communication and teamwork

3.1 Reporting in words and images

You are capable of reporting your vision, concepts and designs in writing in a way that is informative and convincing.

3.2 Presenting orally in words and images

You are capable of presenting and communicating your vision, concepts and designs in a way that is convincing and inspiring.

3.3 Working professionally/planning/teamwork

You are proficient in the principles of project management and can draw up and implement a plan for a multidisciplinary team for the purposes of a development project.

3.4 International orientation

You have an international orientation and in developing products you are open to information, inspiration and ideas from all parts of the world.

4. IDE and society

4.1 History of industrial design engineering, role in and impact on society

You are aware of the most important developments that the discipline of industrial design engineering has undergone since the Industrial Revolution and how these relate to social developments.

4.2 Ethical and normative aspects of industrial design engineering

You are aware of the impact that new products can have, for example in such areas as privacy or sustainability; you know how to deal effectively with the positive and negative effects of a specific development process.

4.3 Trends and developments in society

You are open to developments in areas that may be of relevance for industrial designers and can use these in your designs; examples include developments relating to science and technology, media, art, fashion, architecture, music, dance, culture and subculture, etc.

4.4 Cultural differences

In developing products and/or services, you are able to take account of cultural differences that may occur in the world.

5. Product strategy

5.1 Basic knowledge of business economics

You understand the principles of the organisation of the innovation process and the economic aspects of innovation and production.

5.2 Strategic methods

You are aware of a selection of strategic methods (e.g. swot analysis, ViP method) and can apply these in order to reach a well-founded product or service market strategy.

5.3 Market launch

You can develop a market launch strategy and devise a marketing plan, including the four Ps: product, price, place, promotion.

6. User

6.1 People-product relationship

You know when and how to study groups of users in relation to the use of a product and your design objective.

6.2 Physical and cognitive interaction between people and products

You know how to use usability tests and observation research to determine physical or cognitive variables in people that are of relevance to design and to relate these through research or estimates to the corresponding product or service requirements.

6.3 Setting up and conducting usability tests

You can set up and conduct a usability test with a view to evaluating a selected design concept and optimising it in terms of its user aspects.

7. Operation and construction

7.1 Working principles, functions and systems theory

You are familiar with the most important technological working principles (levers, transmission, electronics etc.) of products and can apply these innovatively in your own design process.

7.2 Modelling with the help of statics/material mechanics, dynamics, mathematics

You are capable of using a variety of theoretical models to make predictions and choices with regard to whether a specific solution will work; these include useful ways of determining the right thickness of material relative to its rigidity and the strength of a product or component.

7.3 Construction and operational reliability

You can put a selected working principle into practice in such a way that the resulting product works according to the set specifications, where the expected life-cycle plays a key role.

8. Production

8.1 Materials and material properties

You are aware of materials applied industrially and their physical properties; you are able to reach a substantiated choice of materials for your design work using tools such as CES (Cambridge Engineering Selector), while taking into account the functionality of your product and the available possibilities for manufacture.

8.2 Production processes

You can optimise a design in terms of production quantity, quality and cost price by investigating relevant production processes such as manufacturing, assembly and finishing.

9. Design

9.1 Form
You are aware of the functional aspects of form and the sensory experiences that are influenced by the interplay of geometry, material, texture, colour, tactility, sound, odour, etc.
9.2 The meaning of form
You are able to give your design and details meaning for the user; examples of this include semantics, symbolism, (brand) identity.
9.3 Aesthetics
You are familiar with a variety of design techniques, processes and strategies to achieve form and meaning; you can conduct a structured form and colour study and justify your choices.

10. Visualisation
10.1 Design drawing
You can visualise ideas, draft designs, details and the product- user relationship and effectively communicate these using design sketches and/or renderings.
10.2 Technical documentation
You are capable of providing technical documentation for a draft design and a completed design and effectively communicate these using a 3D CAD program, especially SolidWorks.
10.3 Model building
You can visualise ideas, draft designs and a completed design using a 3D outline model, proof of concept model, prototype, scale model and/or visual model.

11. Research
11.1 Formulating and reformulating research problems
You can formulate and reformulate a research problem and corroborate your interpretation.
11.2 Research methods and statistics
You are familiar with relevant research methods, such as: generative research methods; quantitative and qualitative data analysis methods; usability tests; product analysis; market research; consumer research. You are capable of gauging the usefulness of research results and can apply relevant statistical methods for the purposes of research.
11.3 Devising and implementing a research plan for product development
You can set up and conduct research in order to investigate potential solutions and/or justify choices and decisions taken as part of a product development project.

12. Product Development
12.1 Formulating and reformulating design problems
You can formulate and reformulate a design problem and corroborate your interpretation.
12.2 Understanding aspects of product development and integrating them in design
You are aware of the wide range of different aspects that play a role in product development; you can integrate and prioritise these aspects within your design process.
12.3 Creative capacity and skills of synthesis
You can generate solutions for design problems and ideas for new products and develop these into product proposals; you can evaluate product concepts and design solutions and make well-considered decisions.
12.4 Design methods and techniques
You are familiar with various design methods and techniques and can – in response to a design problem – select a working method based on a reasoned approach. (design methods include: Roozenburg & Eekels, Fuik model, ViP, …) (design techniques include: process tree, SoR, datum method, Harris profile, morphological chart, …)

Final attainment level IDE Master Programmes

A TU Delft master's graduate in general:

1. Is capable of being analytical in his/her work on the basis of a broad and deep scientific knowledge;
2. Is able to synthesise knowledge and solve problems in a creative way dealing with complex issues;
3. Has the qualities needed for employment in circumstances requiring sound judgement, personal responsibility and initiative in complex and unpredictable professional environments;
4. Is able to assume leading roles, including management roles, in companies and research organisations, and to contribute to innovation;
5. Is able to work in an international environment, helped by his/her social and cultural sensitivity and language and communication abilities, partly acquired through experience of team work and any study periods abroad;
6. Is aware of possible ethical, social, environmental, aesthetic and economic implications of his/her work and to act accordingly;
7. Is aware of his/her need to update their knowledge and skills.

In addition, a master's graduate in ***Design for Interaction*** is capable of:

1. Gathering and communicating specialist knowledge from the humanities and behavioural sciences, and translating this knowledge into design parameters;
2. Analysing product use and its various contexts and communicating the findings effectively to other people involved in the design process;
3. Conceptualising the above into new products or services;
4. Gathering and integrating knowledge on new technologies (e.g. materials, sensors, ...) into design opportunities;
5. Developing prototypes of experiential quality and test these with users;
6. Independently setting up and conducting research projects;
7. Presenting and reporting design concepts and research findings in a professional manner;
8. Answering research questions by designing products/prototypes;
9. Contributing effectively to design teams.

In addition, a master's graduate in ***Integrated Product Design***:

1. Is capable of developing innovative products and product-service combinations to satisfy the needs of the stakeholders, based on balancing the interests of users, business and societal challenges and with due regard to international ethical issues;
2. Has a thorough knowledge and understanding of, and is proficient in, the execution of the total product design process with a focus on conceptualization and embodiment design;
3. Is able to perform and manage the design process independently or as a member or the leader of a team, often in an international setting;
4. Has a thorough knowledge of the aesthetical, ergonomic, technical and environmental issues involved and is acquainted with the organizational and economic aspects of products;

5. Has the skills to use integrative approaches to these (aesthetical, ergonomic, engineering-related and environmental) issues into the product development;
6. Is capable of generating new knowledge, based on research performed with scientific rigor.

In addition, a master's graduate in ***Strategic Product Design*** is capable of:

7. Applying tools and techniques to collect information on customer behaviour, competitive behaviour, market trends and technological developments;
8. Translating firm innovation strategies into conceptualized and visualized product/service (line) directions;
9. Synthesizing data on the firm and its external international environment, including the firm-related strategic value of design into realistic product/service concepts and their business cases;
10. Translating product/service line strategies, mission statements, brand identities and information on the firm and its external network of strategic partners into design and engineering guidelines;
11. Independently setting up and conducting a complex multidisciplinary strategic design, design consulting or research project;
12. Presenting and reporting design concepts and (strategic and/or scientific) research findings in a professional manner;
13. Leading an innovation team and delivering strategic input to the team.

Attachment 4. Overview of the programme

Bachelor programme *Industrial Design Engineering / Industrieel Ontwerpen*

Year 1 – 60 ECTS

- Ergonomics and consumer behaviour (7.5)
- Product Development 1: Introduction IDE (7.5)
- Form & Experience (7.5)
- Product Statistics (7.5)
- Business, Culture and Technology (7.5)
- Product Development 2: Concept Design (7.5)
- Engineering for Design (7.5)
- Research & Design (7.5)

Year 2 – 60 ECTS

- Product Dynamics (7.5)
- Strategic Product Innovation (7.5)
- Manufacturing and Design (7.5)
- Product Development 3: Design Driven Innovations (7.5)
- Design for Sustainability (7.5)
- Interaction & Electronics (7.5)
- Integrated Technology (7.5)
- Product Development 4: Embodiment and Detail Design (7.5)

Year 3 – 60 ECTS

- Minor (30)
- Elective 1 (7.5)
- Elective 2 (7.5)
- Product Development 5: Bachelor Final Project (15)

Master programme *Design for Interaction*

Year 1 – 60 ECTS

- IDE Academy (4)
- Manage your Master (2)
- Design Theory and Methodology (3)
- Project Exploring Interactions (12)
- Product Understanding, Use & Experience (6)
- Context and Conceptualisation (6)
- Visual Communication Design (3)
- Reflection on Design (3)
- DfI Research Methodology (3)
- Project Usability and User Experience, Assessment in Design (9)
- Interactive Technology Design (9)

Year 2 – 60 ECTS

- Elective courses (30)
- Graduation project (30)

Master Programme *Integrated Product Design*

Year 1 – 60 ECTS

- IDE Academy (4)
- Manage your Master (2)
- Design Theory and Methodology (3)
- Managing Product Innovation (3)
- Advanced Concept Design (21)
- Modelling (3)
- Strategic & Sustainable Design (3)
- Advanced Embodiment Design (21)

Year 2 – 60 ECTS

- Elective courses (30)
- Graduation project (30)

Master Programme *Strategic Product Design*

Year 1 – 60 ECTS

- IDE Academy (4)
- Manage your Master (2)
- Design Theory and Methodology (3)
- Design Strategy Project (12)
- Design Roadmapping (3)
- New Product Economics (3)
- Context and Conceptualisation (6)
- Strategic Value of Design (3)
- SPD Media (3)
- SPD Research (13)
- Brand & Product Commercialisation (8)

Year 2 – 60 ECTS

- Elective courses (30)
- Graduation project (30)

Attachment 5. Documents

Information Report

- Self-Evaluation of Education 2019. Industrial Design Engineering, Delft University of Technology.
    - Introduction
    - IDE Bachelor programme
    - IDE Master programmes
    - Student Assessment
    - Environment
    - Summary and Plans of Action

- Appendices to Self-Evaluation of Education 2019, Industrial Design Engineering, TU Delft:
    - Who is who in IDE Faculty
    - Former accreditation and plan of actions
    - Script and storyboard of IDE student animation video
    - IDE partnerships with other universities
    - Format examination matrix – IDE Board of Examiners
    - Feedback form examination quality – IDE Board of Examiners
    - Final qualifications IDE bachelor programme
    - Teaching and Examination regulations
    - Teaching methods and Examination formats
    - IDE minors and electives
    - Assessment form and rubric – bachelor final project
    - Assessment form and rubric – graduation project
    - Development of new bachelor programme
    - Impression of IDE Academy
    - Overview of master electives 2018-2019
    - Master specialisation Medisign

Materials made available electronically and/or on site

- The vision of the students on the current IDE curriculum and education is presented through an animation video
- Posters bachelor and master graduation projects
- Honours programme
- Advisory committee
- OKIO advice IDE Bachelor
- OKIO Annhual report
- BSc revision in progress
- Research evaluation mid-term review 2013-2017
- Course materials bachelor Industrial Engineering
- Course materials master Design for Interaction
- Course materials master Integrated Product Design
- Course materials master Strategic Product Design
- Minor on Education
- Erratum to Self-Evaluation of Education 2019

Final Bachelor Projects *Industrial Design Engineering / Industrieel Ontwerpen*
15 bachelor projects and their evaluations selected among the students who graduated in 2016-2017 and 2017-2018

Final Master Projects *Design for Interaction*
15 master projects and their evaluations selected among the DfI students who graduated in 2016-2017 and 2017-2018

Final Master Projects *Integrated Product Design*
15 master projects and their evaluations selected among the IPD students who graduated in 2016-2017 and 2017-2018

Final Master Projects *Strategic Product Design*
15 master projects and their evaluations selected among the SPD students who graduated in 2016-2017 and 2017-2018