RESEARCH REVIEW

INDUSTRIAL DESIGN

EINDHOVEN UNIVERSITY OF TECHNOLOGY

REPORT ON THE RESEARCH REVIEW IN INDUSTRIAL DESIGN OF EINDHOVEN UNIVERSITY OF TECHNOLOGY

Table of Content

1. FOREWORD BY COMMITTEE CHAIR

The Department of Industrial Design found its unique position in the landscape of design research. It operates in the high-tech environment of Eindhoven, where it takes a leading role, at national and international levels, in connecting between new technologies and individuals and increasingly between technical and social systems. When I left the Netherlands six years ago, I already had a very positive impression of the Department of Industrial Design, but I am really positively surprised about the progress that has been made over the last years. The Department has become mature in terms of research capabilities, infrastructure and impact. The Department is very well connected to many companies and institutions that have a role in bringing innovations to live.

As the chair of the committee, I was delighted to be surrounded by fist-class scholars in the committee. Together we were able to acknowledge and appreciate the achievements of the department, while coming up with some suggestions to its further development. We all wish the Department of Industrial Design to further grow along the paths that it defined for itself and to inspire new generations of design researchers around the world.

Cees de Bont
Chair of the committee

2. THE REVIEW COMMITTEE AND THE PROCEDURES

2.1. Scope of the review

The review committee has been asked to perform a review of research in Industrial Design conducted by Eindhoven University of Technology. The review includes the Department of Industrial Design as the research unit. The major part of the review period the research was organised in four research programmes. At the time of the site visit, the Department was being reorganised into two research clusters:

- Future Everyday
- Systemic Change

In accordance with the Standard Evaluation Protocol 2015 – 2021 (SEP) for research reviews in the Netherlands, the committee was asked to assess the research quality, the relevance to society and the viability of the scientific research at the research unit as well as the strategic targets and the extent to which the unit is equipped to achieve these targets. Furthermore, a qualitative review of the PhD training programme, research integrity policy and diversity was part of the committee's assignment.

2.2. Composition of the committee

The composition of the committee was as follows:

- Professor Cees de Bont, School of Design, Hong Kong Polytechnic University, Hong Kong;
- Professor Jodi Forlizzi, Human Computer Interaction Institute, School of Computer Science, Carnegie Mellon University, US;
- Professor Hiroshi Ishii, MIT Media Lab, MIT, US;
- Professor Johan Redström, Umeå Institute of Design, Umeå University, Sweden;
- Professor Toshimasa Yamanaka, Faculty of Art & Design, University of Tsukuba, Japan.

The curricula vitae of the committee members are included in Appendix 2. The committee was supported by dr. Meg Van Bogaert, who acted as secretary on behalf of QANU.

2.3. Independence

All members of the committee signed a statement of independence to guarantee an unbiased and independent assessment of the quality of Industrial Design of Eindhoven University of Technology. Personal or professional relationships between committee members and the research unit under review were reported and discussed at the start of the site visit amongst committee members. The committee concluded that no specific risk in terms of bias or undue influence existed and that all members were sufficiently independent.

2.4. Data provided to the committee

The committee received the self-evaluation report from the unit under review, including all the information required by the SEP.

The committee also received the following documents:

- the SEP 2015-2021;
- the previous review report;
- lists of publications, consisting of key publications.

The self-assessment report was very informative to the committee members, it included information on the history and background of the Department. This provided some context on the current organisation of the Department, as well as on the strengths and weaknesses.

2.5. Procedures followed by the committee

The committee proceeded according to the SEP. Prior to the first meeting, all committee members prepared by reading the documentation provided by the Department. The final review is based on both the documentation provided by the Department and the information gathered during the interviews with management and representatives of the research unit during the site visit. The site visit took place on 17, 18 and 19 December 2017 in Eindhoven (see the schedule in Appendix 3).

Preceding the interviews, the committee was briefed by the secretary about research reviews according to SEP. It also discussed its preliminary assessments and decided upon a number of comments and questions. The committee also agreed upon procedural matters and aspects of the review. After the interviews the committee discussed its findings and comments to allow the chair to present the preliminary findings and to provide the secretary with argumentation to draft a first version of the review report.

The draft report by committee and secretary was presented to the Department of Industrial Design for factual corrections and comments. In close consultation with the chair and other committee members, the comments were reviewed to draft the final report. The final report was presented to the Board of the University and to the management of the research unit.

The committee used the criteria and categories of the Standard Evaluation Protocol 2015-2021 (SEP). For more information see Appendix 1.

2.6. Application of the SEP and scores

The committee used the criteria and categories of the Standard Evaluation Protocol 2015-2021 (SEP), for more information see Appendix 1. The committee would like to make a number of remarks with respect to using the SEP scores that should be carefully taken into consideration when comparing the outcomes of this review with the previous review or any other research review according to SEP.

The committee agreed that by giving the score 1 (excellent), the committee had to be unanimous that the major part of the work of the research unit deserved the judgement: "one of the few leading groups worldwide" (SEP definition). Thereby the committee explicitly applied the scores as were intended in the current SEP. Furthermore, the present SEP scores range between 1 (excellent), 2 (very good), 3 (good) and 4 (unsatisfactory), while those of the previous SEP ranged between 5 (excellent), 4 (very good), 3 (good), 2 (satisfactory) and 1 (unsatisfactory). According to the committee a current *very good (2)* score should therefore be valued higher compared to the *very good (4)* score in the previous SEP, since the criteria for obtaining the score *excellent* are more strict in the current protocol.

Within the research unit, which is the entire Department, two clusters involving several research groups are combined, each with its own quality, relevance and viability. The committee combined the work of all research into its findings and scores, also including the interaction between the research clusters and the overarching findings at the level of the Department. This obviously led to an "averaged" score, which – again - cannot be compared with the scores on the four research programmes of previous review without reading the qualitative comments in the text.

3. ASSESSMENT OF THE DEPARTMENT OF INDUSTRIAL DESIGN AT EINDHOVEN UNIVERSITY OF TECHNOLOGY

3.1. Introduction

The Department of Industrial Design is one of nine Departments of Eindhoven University of Technology (TU/e). The mission of the Department is *Research on and Education in the Design of Systems with Emerging Technologies in as Societal Context*. With this mission, integration of various disciplines is aimed for, including engineering, business and social sciences. The research at the Department focuses on two thematic clusters:

- Future Everyday: investigates the everyday interactions between people and the highly interconnected technology that surrounds them. The cluster measures, models and designs for the user experience when individuals interact with social-technological networks in their homes, at work, in transit, while doing sports or going out.
- Systemic Change: focuses on designing innovations that have impact on systemic structures and groups of people, ultimately aiming to address large-scale issues such as urban health, future mobility and sustainability.

During the site visit the committee met with representatives of the Department in an open and positive atmosphere. Although this exercise includes an assessment of the past performance, both committee and Department focussed on aspects of improvement with respect to the upcoming period (and beyond). The committee met with enthusiastic management and faculty, who were all looking forward to the development of both the Future Everyday and the Systemic Change clusters.

3.2. Profile, mission, vision and strategy

The Department of Industrial Design (ID) at Eindhoven University of Technology TU/e has defined its mission statement as follows: "Research on and Education in the Design of Systems with Emerging Technologies in a Societal Context." Central to this mission is a multidisciplinary, high tech research through design approach, grounded in the discipline of industrial design, where the products of research are developed and evaluated in real world settings.

Industrial design at TU/e has acknowledged that its mission makes the Department unique among design departments worldwide. This mission also provides a basis for international research collaboration and strengthening of industrial and academic partnerships worldwide. However, the committee recognized an opportunity to push this mission even further. It feels that the Department is well positioned to redefine the field of industrial design, and to emerge as one of the leaders in the discipline. This shift will address a gap in education in industrial design and create market advantage for TU/e to recruit students worldwide at the undergrad, master, and PhD levels who want to study industrial design.

The Department of Industrial Design has developed a strategy whereby four previously existing research areas are merged into two clusters: Future Everyday and Systemic Change. The committee considers that the Department took a bold step by reorganizing into two newly defined clusters. Although they are generic and open-ended terms, the committee expects that these clusters will guide the Department to identify clear and strategic goals. In addition, the committee expects that the change from four groups to two clusters will facilitate communication and collaboration within the Department. This was confirmed by the stakeholders the committee met during the site visit, who declared that the Department's focus is much more clear to outsiders when using the two clusters.

The two clusters adequately capture changes taking place at the level of the Department, in the field of design, and in society at large. While the cluster strategy is still in development, it can be used to define all actions and activities to shape the future of the Department. These could include, but are not limited to: mentoring students and junior faculty members; developing collective knowledge

about the discipline of industrial design as it is taught at Eindhoven; refining research methodology; guiding collaborative work with other disciplines; seeking research funding; hiring and project staffing; communications; collaborative relationships with industrial partners; and most importantly, increasing the awareness and importance of industrial design within TU/e, nationally, and worldwide.

3.3. Research quality

The committee is of the opinion that the general level of research at the Department of Industrial Design is very good. The committee recognises that at all levels many very good researchers have a position in the Department, as well as very good designers. In a number of targeted areas, the Department is considered to have a leading position, in other areas it is doing very good and in some areas there is a lot of potential.

The Department has built up a proven track record in the cluster of Future Everyday. One example of this is the research done on wearable electronics where knowledge and expertise in textiles and manufacturing technologies are a source of inspiration for new applications which can be developed in strong collaboration with companies in the industry. The cluster on Systemic Change is newer and it is more difficult to pinpoint success cases at this point in time. The transition between the two clusters is gradual, but research in the new cluster (Systemic Change) may require new expertise. How this will play out in the near future is not yet fully clear. It seems to be a step in the right direction, but the specific research agenda and the roles and responsibilities of designers in this new space are to be defined with more precision in the coming years.

The selected key publications are very good, although there seems to be an issue with the communication of results towards peers. The Department focuses on projects and communication of results on these projects, while there seems to be less focus on the communication of academic research findings and on academic insights across projects. The committee concludes that the high quality of the Department's work could benefit from improved academic impact. The Department has been building capacity over the past years and is now starting to deliver. To obtain more even recognition and to excel, the Department should also articulate more on developments within and methodological contributions to the field of industrial design.

To a significant extent the department seems to be following its own methodological orientation of 'research through design', also when it comes to the strategy for achieving outstanding international excellence. Indeed, design research in the form of projects and labs often seems to precede precise articulations and it is through these examples that a more general understanding is formed. During the period reviewed the Department has expanded its repertoire of design experiments to the point where two clusters have been conceptualised, thus explicitly extending previous methodological orientations focusing on the one-to-one interactions between people and products in a specific activity, context or situation, to more intensively engage in the spectra and systems of things and their more complex and increasingly dynamic roles in social life and everyday practices. The clusters are well positioned in relation to the front end of research in the field.

Tracing the development trajectory, it is the committee's view that the Department is very close to reaching a significant breakthrough in its research: to articulate and embody a new definition of what industrial design is. This will not be a general definition, but a specific one describing precisely the kind of industrial designer the Department is educating, and thus the kind of design practice that the Department's research is cultivating. This new practice of industrial design can to a significant degree already be seen in the 'doings' of the Department, and in particular in the ways it educates designers. But by also bringing it into the 'thinking', completely revealing its bold character –explicitly articulating its values and perspectives, its conceptual, theoretical and methodological foundations and its relations to other disciplines – this shared understanding could transform current forms of 'multidisciplinarity' to a foundational idea about what the 'new' discipline of industrial design at this University entails and implies. Indeed, as such a definition of industrial design (in its wide sense, not just in words but as practiced) would not only support internal development, shared discussion and

critical reflection but also be instrumental in articulating the unique, important and extremely relevant research contributions that this Department will achieve in the coming years.

Overall, the committee observes that the Department's scientific impact has increased. In the past 10 years, the Department has played a leading role in the ACM TEI (Tangible, Embedded, and Embodied Interactions) conferences. The scientific and academic contribution of the Department is solid and well-respected in the fields of Human-Computer Interactions (e.g. CHI, UIST, DIS) and TEI. On the other hand, there was no mention of patents in the chapter on performance indicators in self-evaluation report, which the committee considers a critical part of measuring technological contributions. The Department's strategy to focus on a small number of top research conferences (e.g. CHI, TEI) and to make focused impacts and build a strong reputation in those academic communities seems to be working. This focusing method of selectively targeting specific academic areas can be effective to raise up the productivity in statistics, but at the same time contains the risk of anti-diversity. The new clustered organisation is expected to more strongly advocate new problem finding, which might be hampered by this focusing method. Therefore, it is important for the Department to find the balance between focus and the diversity of research.

As mentioned above, the Department has a strong presence in HCI and TEI communities with large numbers of publications and presentations. The impact is less clear from the documentation provided to the committee. The Department would have benefited from conducting a data-driven scientific analysis to compare itself with top-class rival universities and position itself on the international research map. The committee recommends to define quality indicators for the upcoming period, including data that can be measured to validate the indicators.

The Department considers itself multidisciplinary. The committee considers that within the disciplines and Departments present at TU/e, Industrial Design indeed is multidisciplinary. However, when taking the humanities and social sciences into consideration, the committee does not encounter an actual multidisciplinary environment. This is not necessarily problematic and makes it even more important to continue collaborating with other institutes and universities. In this respect the committee learned of a number of interesting collaborations, although it has not observed a clearly developed strategy on approaching and working with partners and collaborators with respect to multidisciplinary aspects of the research.

3.4. Relevance to society
The Department of Industrial Design at TU/e is bridging disciplines, with the innovative, high tech context on one side and the social sciences and people on the other. This allows for excellent societal relevance in a technological intensive environment such as TU/e. The Department is well connected to stakeholders and is able to function as the middle grounds between technology and people.

The Department developed a profile that is internationally recognised and most specifically visible in the graduates that it provides. The Department recognizes that one of the most important contributions to society are these graduates. This was clearly confirmed by the representatives of the external partners of the Department, such as Philips. It is the can-do mentality that is strongly present throughout the Department, and it is carried forward to the students who are mostly capable of proposing new possibilities inspired by advanced technological developments. The graduates flow out at different levels, from bachelor level to PhD level, including also the PDEng programme.

The Department of Industrial Design is well connected at local/regional, national and international levels. In the Brainport Eindhoven area it has the field labs, such as the one on sports and vitality in the North of Eindhoven. In this lab, children, policemen and the military, among others, take advantage of the facilities. In the area of smart textiles there are several small companies involved in the research work. It brings together material scientists, fashion designers, artists and entrepreneurs.

Eindhoven is truly an innovative city, because of projects such as Glow and the Dutch Design Week. These big events are major attractions to large crowds and bring design closer to the public, many local and international media reports on these events. The Department is represented in developing the strategic agenda for the city. The Department's design projects are also exhibited in many international locations. An example of this is the Nano Supermarket.

From the very beginning the Department was involved in setting up and in running the initiative by the name of CRISP. This large-scale initiative was a major step forward in the collaboration with other design schools in the country and established research connections with many different partners, including many design consultancies. This experience qualified the Department to be involved in further developing the research agenda for the creative industries. In addition to CRISP, there is a close collaboration with Utrecht University to work on health-related topics, sometimes dealing with matters of life and death. There have been projects on dementia, which has become the number one death cause, and on neonatology. The dean is the representative for all universities in the Netherlands in the Topteam that deals with sports.

The research is often conducted with a social agenda, zooming into the challenges of young people who are physically and socially challenged and those who are from lower-income neighborhoods. Through investing time and effort in building up domain knowledge in areas such as sports and smart textiles, the Department is well equipped to demonstrate advanced innovation practices, e.g. through the Experiential Design Landscapes to a wide variety of stakeholders, thereby showcasing the relevance of their contribution.

The single critical remark the committee has in this regard, has to do with presenting the societal relevance in the self-evaluation report and the choice of indicators. These indicators clearly did not reflect the excellent work and initiatives that make the Department societally relevant.

3.5. Viability
Prior to the site visit the committee had some reservations with respect to the balance between teaching load and research time. The teaching load was very high in the review period. The introduction of squads, where students and staff work on joint projects seems to be working very well. Not only is it reducing teaching load, it also seems to energise staff members (as well as students) in their research. Furthermore, it seems to have added to the current financial stable situation of the Department. The funding for the upcoming period also seems to be stable with respect to direct funding. The competition on grants (European and Dutch) will increase in the upcoming period, making it even more difficult to obtain grants. The committee nevertheless stimulates the Department to aim at obtaining a number of these grants, which will express the high academic quality of the work that is being done. In the past period the Department has been building up resources, leading to the present excellent group of staff. Making use of the international connections of the staff will help the Department to a regular income on second and third-stream funding.

The new dean, who will be starting March 2018, not only knows the Department inside out; she is also among the small circle of academic leaders in design worldwide. The new dean knows quite well what kind and what quality of research is being produced in the best design schools in the world. This will be extremely useful in positioning the Department in the academic landscape and in making connections to other leading scholars.

The committee has discussed the collaboration of other disciplines with the Industrial Design Department at TU/e. The question is not whether they will benefit from collaboration with the Industrial Design Department, but whether other Departments see the surplus value of collaborating. The committee was pleased to learn the positive view of the rector in this respect. The committee is convinced that the surplus value is clear and that other departments can be convinced of the impact of industrial design on those disciplines. The Department of Industrial Design will have to find a way to sell itself, since they will most likely not automatically be invited. Connecting people and technology is recognised at European level and by the Dutch government. This is an advantage since

other departments require collaboration with the bridging position of industrial design to be successful in grant applications.

In the self-evaluation report and in interviews during the site visit, the Department proposed a number of changes that are ongoing. These have, for example, led to the reorganisation of the research into two clusters. From the site visit, the committee learned that there are some concerns among staff members that some of the good practices from the period before the introduction of the two clusters, e.g. sessions with PhD students who work on related topics, will get lost in the big clusters. The Department management should be aware of these concerns and deal with them sensibly. Overall, the committee is positive on the proposed changes, but did not see evaluation criteria in this respect. It recommends formulating clear criteria to help evaluate the changes that were introduced.

The committee felt that it is imperative that Industrial Design at TU/e leverages the mission and develops a clear focus with respect to its strategy, and how to advance in the next 5-10 years. The committee heard a deep commitment to identifying, framing, and solving societal problems. This is a fine commitment and the committee suggests that this meta level goal can be carried out with small initial efforts that are selected in keeping with the strategy. Once successes are demonstrated relative to these small efforts, larger goals for societal problems can be set and reached. At the same time, this work can lead to a new definition of industrial design, the development of new kinds of industrial design graduates that have interdisciplinary abilities, and a body of work that is strong, novel, and complementary to things that are already going on at the university. Outcomes of this work should be demonstrated and published in a number of ways, so that the awareness of Industrial Design at TU/e continues to grow, not only in academic communities, but also for the public at large, who looks to these outcomes to make sense of what living with future technologies might be like.

Although the Department clearly made significant progress in the past years, the strategy should and can become even more clear. In this report the committee tried to provide recommendations to the Department on how to continue its reorganisation. An important part of the strategy is already in place, but it is very implicit. By making the strategy more explicit and focus more strongly on long term projects, the committee is confident that the Department, which is already well recognized internationally, has a lot of potential.

3.6. PhD training
The PhD programme is primarily aimed at educating PhD students towards becoming qualified and independent research professionals. In 2013 the TU/e Graduate School was established, with the Industrial Design PhD programme as one of the graduate programmes. In 2016 a position paper has led to more structure and coherence of the PhD programmes and the creation of a platform to connect PhD students as members of the academic community of TU/e. The committee noticed that the establishment of the graduate school is still in progress and although some positive effects are already observed, it is difficult for the committee to assess the PhD training and supervision in the new situation.

All PhD students were positive on the frequency and content of the supervision they received. Supervisors seem to be closely connected to the work of their PhD students. The committee did notice that PhD students not always have a clear understanding of what is required to successfully obtain a PhD. It is obvious to the candidates that they have to contribute to the field, but the impact of their work is also an aspect that could be explained to them more clearly. Furthermore, the committee considers it important that the PhD students learn about the vision and spirit of education they receive.

From the interview with the PhD students the committee learned that PhD students have personal freedom to work on projects and are involved in their own development. This individual approach has advantages, since students can develop themselves in directions that benefit their own research and do not need to follow training outside the scope of their interest. The committee learned that

with the previous four research groups, PhD students were more isolated within those groups and within individual projects. The organisation of research into two clusters thus seems to also have a positive effect on the PhD community within the Department. With the arrival of the two clusters there lies a major opportunity to create a PhD community and graduate school that involves topics all PhD students should learn about and know. The committee considers it important that in addition to a certain amount of personal freedom, PhD students benefit from a more common theoretical basis, framework and shared methodologies.

For an international committee the duration to graduation and drop-out rates of PhD students are often cause for concern. In case of the Department of Industrial Design in Eindhoven specifically the dropout rates were remarkable. The interview with the management of the graduate school took away some of the concern. They seem to be aware of the issue, are looking for good ways to match PhD students with the positions and if discontinuation is unavoidable, this should happen as early in the trajectory as possible. With respect to duration, the results of the Department are comparable to the Dutch average. Nevertheless, the committee urges the Department to continuously pay attention to this.

3.7. Research integrity policy
A number of scandals across the Netherlands have led to increased focus on research integrity in the past period of the review. Also at TU/e action has been taken and a specific TU/e Code of Conduct was produced.

Within the Department, a full professor is assigned to this topic. At more junior level, all PhD students follow a mandatory course on integrity and ethics. The committee observes awareness of the issues that are involved in research integrity, but the formal, legal system is not always clear. The committee noticed that there is awareness, but rather implicit and based on common sense. It would appreciate some additional and explicit attention to this aspect. Since experimental methods always push the boundaries, continuous attention is required.

Part of research integrity is data management, especially with respect to 'big data'. The Department informed the committee that they are struggling with this aspect, even at national level, and that they are aware of the issues.

3.8. Diversity
The Department provided the committee information on diversity in gender, age and nationality. From the discussion during the site visit, the committee learned that most efforts are aimed at equal gender diversity. The Department already reached many of the targets that were set in this respect. Although this is very good, one could wonder whether the targets could have been more ambitious. With respect to the Departments' international ambitions, it has successfully hired international academic staff, exceeding the minimum requirement of 1/3.

With its international composition the committee is able to compare the Dutch with the international situation. It concludes that in the Netherlands the topic of diversity is not really being pushed, except with respect to gender. It would be great if more types of diversity would be thought of, specifically in relation to industrial design. Most obvious would be to focus on cultural and ethnic diversity, to strengthen the global design for the world as well as locally.

3.9. Conclusion
The committee was overall impressed by the Department, its staff, the research that is done and its major contribution to society. This report is aimed at stimulating the process that was already started within the Department, rather than providing explicit recommendations or detailed feedback on the findings. The committee met with a Department that is still young and developing in maturity. In the past period they have been building op capabilities, now with a sizable team of 35 staff members excluding PhD candidates.

The committee concludes that the Department of Industrial Design in Eindhoven is doing technology inspired research in Industrial Design. It met with a clear *can-do* mentality, which is reflected in the projects. In addition to this mentality, time for reflection is required. Faculty need to take a step back and jointly reflect on where they are going and why.

The committee has in depth discussed the contribution of the Department to the field of Industrial Design. It concluded that there is explicit focus on the projects and contributions within those projects. The contribution of the Department to the field, beyond the projects, is much more implicit. Furthermore, the Industrial Design Department can support more foundational departments in TU/e to better illustrate the impact of its research.

The Department has been building capacity over the past period, leading to an impressive faculty and research. The next step is to consider what the Department is fundamentally adding to the field of design. This might require more clarification on the vision and aims, and maybe even a redefinition of Industrial Design. The Department seems to be on the verge of a major contribution and should be bold and take leadership.

3.10. Overview of the quantitative assessment of the research unit

After having assessed the research quality, relevance to society and viability, and comparing that to the developments and standard in the field of industrial engineering, the committee comes to the following quantitative assessments:

Research quality: very good
Relevance to society: excellent
Viability: very good

4. RECOMMENDATIONS

- The mission of the Department Industrial Design in Eindhoven is unique among design departments worldwide and provides an excellent basis for international research collaboration and strengthening partnerships worldwide. The committee is of opinion that the mission could be pushed even further. The Department is in an excellent position to redefine the field of industrial design and to emerge as one of the leaders in the discipline.
- The strategy on reorganization of the Department into two clusters is still in development. The Department should make use of the momentum to shape its future. This could include, but is not limited to: mentoring students and junior faculty members; developing collective knowledge about the discipline of industrial design as it is taught at Eindhoven; refining research methodology; guiding collaborative work with other disciplines; seeking research funding; hiring and project staffing; communications; collaborative relationships with industrial partners; reporting research results worldwide; and most importantly, increasing the awareness and importance of industrial design within TU/e, nationally, and worldwide.
- The Department of Industrial Design has ambitions, but the impact of the research – also in comparison with international departments in industrial design – is not always clear and according to the committee could improve. It is therefore recommended that the Department conducts a data-driven scientific analysis to compare itself with top-class rival institutes in order to position itself on the international research map. Defining quality indicators will also help to focus in the upcoming period of review.
- Despite the very high quality of the research, the communication of results towards peers could be improved. The building of capacity over the past years will help the Department to deliver in the upcoming period. The committee recommends that – to have even more recognition – the Department should articulate more explicitly on developments and methodological contributions to the field of industrial design.

APPENDICES

APPENDIX 1: THE SEP CRITERIA AND CATEGORIES

There are three criteria that have to be assessed.

- Research quality:
    - o Level of excellence in the international field;
    - o Quality and Scientific relevance of research;
    - o Contribution to body of scientific knowledge;
    - o Academic reputation;
    - o Scale of the unit's research results (scientific publications, instruments and infrastructure developed and other contributions).

- Relevance to society:
    - o quality, scale and relevance of contributions targeting specific economic, social or cultural target groups;
    - o advisory reports for policy;
    - o contributions to public debates.

The point is to assess contributions in areas that the research unit has itself designated as target areas.

- Viability:
    - the strategy that the research unit intends to pursue in the years ahead and the extent to which it is capable of meeting its targets in research and society during this period;
    - the governance and leadership skills of the research unit's management.

Category	Meaning	Research quality	Relevance to society	Viability
1	World leading/excellent	The unit has been shown to be one of the most influential research groups in the world in its particular field.	The unit makes an outstanding contribution to society	The unit is excellently equipped for the future
2	Very good	The unit conducts very good, internationally recognised research	The unit makes a very good contribution to society	The unit is very well equipped for the future
3	Good	The unit conducts good research	The unit makes a good contribution to society	The unit makes responsible strategic decisions and is therefore well equipped for the future
4	Unsatisfactory	The unit does not achieve satisfactory results in its field	The unit does not make a satisfactory contribution to society	The unit is not adequately equipped for the future

APPENDIX 2: CURRICULA VITAE OF THE COMMITTEE MEMBERS

Professor Cees de Bont (chair) has solid experience and track records in the management and leadership of a sizable and leading design schools in the world. He took up the deanship in the Faculty of Industrial Design Engineering of the Delft University of Technology in 2005 and carries responsibility for the School of Design of The Hong Kong Polytechnic University since February 2012. Professor de Bont started his academic career in 1993 as Assistant Professor of Economic Psychology at the University of Tilburg. In 1995, he joined Philips Design to become responsible for the Human Behaviour Research Centre. He was subsequently Head of Marketing Research and Strategy at Philips Domestic Appliances and Personal Care from 1997 to 2005 when he was responsible for generating and utilizing market information for the formulation of the strategy, R&D and marketing plans of the company. Professor de Bont's research interests are in the areas of early concept testing of consumer acceptance, consumer behaviour, innovation adoption, and networked innovation.

Professor Jodi Forlizzi holds interdisciplinary appointments as associate professor both in Carnegie Mellon's School of Design and its Human-Computer Interaction Institute. She teaches graduate level courses in advanced interface and interaction design. She is interested in how people experience products, in order to develop a theory of experience as it relates to interaction design. She conducts research on how technology can bring people new kinds of experiences, beyond those traditionally associated with human-computer interaction. Prior to going to Carnegie Mellon, Forlizzi held positions as Innovator and Project Manager for E-Lab in Chicago, where she specialized in research for new product design. She also performed design research at the Novum Design Center, and prior to that was an information designer at the University of Pennsylvania and the founder of Inks Creative Services. She holds a BFA in Illustration from the Philadelphia College of Art, an MDes in Interaction Design from Carnegie Mellon's School of Design, and a PhD in Design in Human-Computer Interaction from Carnegie Mellon's School of Computer Science.

Professor Hiroshi Ishii is the Jerome B. Wiesner Professor of Media Arts and Sciences, at the MIT Media Lab. He joined the MIT Media Lab in October 1995, and founded the Tangible Media Group. He currently directs the Tangible Media Group. Hiroshi's research focuses upon the design of seamless interfaces between humans, digital information, and the physical environment. In 2012, he presented the new vision "Radical Atoms" to take a leap beyond "Tangible Bits" by assuming a hypothetical generation of materials that can change form and appearance dynamically, becoming as reconfigurable as pixels on a screen. Prior to MIT, from 1988-1994, he led a CSCW research group at the NTT Human Interface Laboratories, where his team invented TeamWorkStation and ClearBoard. In 1993 and 1994, he was a visiting assistant professor at the University of Toronto, Canada. He served as an Associate Editor of ACM TOCHI (Transactions on Computer Human Interactions) and ACM TOIS (Transactions on Office Information Systems). He also serves as a programme committee member of many international conferences including ACM CHI, CSCW, UIST, TEI, SIGGRAPH, Multimedia, Interact, ISMAR, and ECSCW. He received B. E. degree in electronic engineering, M. E. and Ph. D. degrees in computer engineering from Hokkaido University, Japan, in 1978, 1980 and 1992, respectively.

Professor Johan Redström joined UID as professor of design in 2012, and has been responsible for the PhD programme and research direction at UID. Going into design was initially the result of a collision: on one side music, on the other philosophy. After studies in both areas (and some more), he ended up as a PhD student in philosophy but in parallel still experimenting with interactive and electronic music. He then was recruited to a new research group working with applied research on art and technology (Göteborg University). This work, basically what we now call interaction design, turned out to be a perfect combination of projects together with industrial partners, design experimentation and practice-based research, and in 2001 led to his PhD thesis called 'Designing Everyday Computational Things'. Since then he has primarily been doing and directing design research at the Interactive Institute, has been adjunct professor at the School of Textiles at the University of Borås, Sweden, and associate research professor at the Royal Academy of Fine Arts,

School of Architecture, Denmark. His research is in general centred on experimental and critical design practices, and on theory development in the context of practice-based research.

Professor Toshimasa Yamanaka is Professor and Provost at the Faculty of Art and Design of the University of Tsukuba. Also, Professor at Kansei Information Science group of the doctoral program in Kansei, Behavioral and Brain Science of the Graduate School of Comprehensive Human Science. He researches Kansei information science, design processes and human factors. Moreover, Toshimasa is former president of Japanese Society of the Science of Design, 2012-2016 and vice president of the Japan Society of Kansei Engineering (2009-2012). He was the executive board member of the International Conference of Kansei Engineering and Emotion Research (KEER) since 2007. Also, he is board member of International Association of Societies of Design Research (IASDR) since 2005 and currently secretary of general at the board. Also, during his carrier as professional designer and researcher at the Asahi Opt. Co. Ltd (known as PENTAX), his design works are awarded as Good Design and other design competitions. He was a research associate at the Illinois institute of Technology (1990-1991) and Delft University of Technology (2002).

APPENDIX 3: PROGRAMME OF THE SITE VISIT

Sunday December 17, 2017

Welcome dinner with committee and ID staff

Monday December 18, 2017

8:30 - 9:00 Daily board welcomes Committee members
TU/e Rector Frank Baaijens welcomes and briefly meets with the committee, dean and vice-deans

9:00 - 11:00 Preparations Committee

11:00 - 11.30 Meeting with the Management of the Department
Aarnout Brombacher, Lin-Lin Chen, Berry Eggen, Jos Hermus, Stephan Wensveen

11:30 - 12:30 Introduction ID Research
Professors/Members of the Management Teams of the FE and SC clusters:
Berry Eggen, Lin-Lin Chen, Caroline Hummels, Panos Markopoulos, Jean-Bernard Martens, Ron Wakkary, Aarnout Brombacher
>   **11:30 - 11:40** Short presentation ID Research
>   [Berry Eggen (Intro); Lin-Lin Chen (FE); Caroline Hummels (SC)]
>   **11:40 - 12:30** Discussion

12:30 - 13:30 Lunch

13:30 - 14:15 Scientific Quality
Panos Markopoulos, Mathias Funk, Pierre Lévy, Ron Wakkary, Lin-Lin Chen
>   **13:30 - 13:40** Short presentation Research Quality [Panos Markopoulos]
>   **13:40 - 14:15** Discussion Research Quality

14:15 - 14:25 Reflection committee members and secretary
14:25 - 14:40 Break

14:40 - 15:25 Societal Relevance
Caroline Hummels, Tilde Bekker, Rens Brankaert, Jun Hu, Panos Markopoulos
>   **14:40 - 14:50** Short presentation Societal Relevance [Caroline Hummels]
>   **14:50 - 15:25** Discussion Societal Relevance

15:25 - 15:35 Reflection committee members and secretary
15:35 - 15:50 Break

15:50 - 16:35 Viability
Ron Wakkary, Aarnout Brombacher, Miguel Bruns, Lin-Lin Chen, Berry Eggen, Jos Hermus, Caroline Hummels
>   **15:50 - 16:00** Short presentation Viability
>   [Ron Wakkary (International), Aarnout Brombacher (National), Miguel Bruns (Local)]
>   **16:00 - 16:35** Discussion Viability

16:35 - 16:45 Reflection committee members and secretary
16:45 - 17:00 Break

17:00 - 17:30 Meeting with Assistant and Associate Professors

17:30 - 18:10 Stakeholders
Ad van Berlo (Chairman at VanBerlo Group), Paul Gardien (Vice President at Philips Design), Koert van Mensvoort (Creative Director Next Nature Network) and Vera Winthagen (Strategic Design Consultant at City of Eindhoven)

19:00 Dinner + Reflection

Tuesday December 19, 2017

08:30 - 10:30 Lab visits
10:30 - 10:45 Break

10:45 - 12:00 Meeting with PhD students and graduate school
      10:45 - 10:55 Short presentation by PhD students
      10:55 - 11:30 Discussion with PhD Students
      11:30 - 12:00 Discussion with supervisors and management graduate school

12:00 - 12:45 Lunch
TU/e Rector, Frank Baaijens and (vice) dean(s) will briefly join lunch for some preliminary feedback from the committee

12:45 - 13:30 Meeting with the Management of the Department
Final meeting with Management of the Department to share first impressions and check for wrong or missing information. If necessary the committee will ask additional clarification questions.

13:30 - 15:00 Reflection committee members and secretary and writing session

15:00 - 15:30 Oral feedback of recommendations

APPENDIX 4: QUANTITATIVE DATA

Staff (table 1 self-assessment report)

Table 1. Summary of the full-time equivalents of the department from 2009 to 2016.

Research staff in fte[1]	2009	2010	2011	2012	2013	2014	2015	2016
Scientific staff[2] (40% time)	12.7	11.5	10.9	9.9	10.7	8.3	8.2	12.8
Post-docs and researchers[3] (90% time)	4.0	5.3	3.1	1.3	1.5	1.8	0.4	3.7
PhD Students[4] (90% time)	23.0	27.4	31.7	26.6	27.4	26.8	26.3	25.7
Total research staff	**39.7**	**44.2**	**45.7**	**37.8**	**39.6**	**36.9**	**34.9**	**42.2**

[1] The MYEs (man-year equivalents) research staff are multiplied by the percentage of time actually spent on research.
[2] Full, associate and assistant professors; tenured and non-tenured staff. On average scientific staff spent 40% of their time on research; in 2014 and 2015 only 30% research time could be realised due to significant reorganizations in the university and departmental educational organizational structures.
[3] Post-docs and additional researchers spent 90% of their time on research.
[4] PhD students paid by the department (on the payroll) spent 90% of their time on research.

Output (table 4.1 self-assessment report)

	2009	2010	2011	2012	2013	2014	2015	2016
Refereed articles	45	44	27	45	54	45	56	59
PhD thesis	9	10	5	7	8	11	8	9
Conference papers	124	82	105	85	114	106	117	118
Books	3	1	2	2	3	4	2	4
Book chapters	14	5	10	12	6	7	5	16
Total	195	142	149	151	185	173	188	206

Table 4.1. Main categories of scientific output.

Funding (table 1.2 self-assessment report)

Table 1.2 Funding and expenditures of the department from 2009 to 2016 (funding in FTE and in k€).

Research Unit	2009	2010	2011	2012	2013	2014	2015	2016
Funding:								
Direct funding	108 (78%)	111 (79%)	99 (74%)	92 (76%)	92 (74%)	87 (73%)	83 (74%)	94 (76%)
Research grants	1 (1%)	3 (2%)	2 (2%)	3 (3%)	3 (2%)	6 (5%)	5 (4%)	5 (4%)
Contract research	29 (21%)	26 (19%)	32 (24%)	25 (21%)	29 (24%)	22 (18%)	17 (15%)	17 (14%)
Other[1]						4 (4%)	7 (6%)	8 (6%)
Total Funding	138	140	133	121	124	120	113	125
Expenditure:								
Personnel costs	8,916 (84%)	9,402 (84%)	9,314 (84%)	8,813 (84%)	9,072 (83%)	9,374 (84%)	8,451 (82%)	8,875 (80%)
Other costs	1,713 (16%)	1,844 (16%)	1,837 (16%)	1,677 (16%)	1,887 (17%)	1,804 (16%)	1,871 (18%)	2,192 (20%)
Total expenditures	10,630	11,246	11,151	10,489	10,959	11,178	10,323	11,067

[1]Other: Impuls PhDs directly funded by the Board of the University