Report for the research review of the Faculty of Science and Technology University of Twente

Research review Faculty of Science and Engineering
According to SEP over the period 2015-2022
University of Twente

Site visit: 26-29 February 2024
Date report: 8 July 2024

Content

Preface

This report presents the research review and assessment of the Faculty of Science and Technology (S&T) of the University of Twente. It was performed in accordance with the Strategy Evaluation Protocol. The review committee visited the Faculty from February 27 until February 29, 2024. The programme was full, but well prepared, and allowed us to "see" all the different aspects of the faculty.

The review documents that were provided in advance were very helpful to prepare the site visit and showed many impressive highlights of the different groups and departments, faculty, and university. The committee very much enjoyed the very open and often passionate discussions with members of the faculty, from management to scientific staff, from administrative to technical staff, and PhD candidates and Post Docs. Next to the many interviews and discussions, we were taken on well-prepared lab tours, bringing up to the impressive facilities and showing us "in speed-dating-style" the many research themes the many groups work on. Everyone felt enough at ease to talk openly to us, the committee, which helped the committee to provide (hopefully) useful advice for the faculty to go forward.

Overall, as this report will show, the committee is impressed by the research quality at S&T. At the same time, the organisation is going through major changes, which have been far from completed and appeared to be at different stages of the process in different parts of the organisation. The committee has provided comments to further strengthen the research and especially it's visibility, and at the meantime encourage S&T to work with *all stakeholders* to clarify and speed up the restructuring process, which is causing unrest in several parts of the faculty. A further important point of attention is gender diversity and inclusion, and with that social safety, for which a clear joint strategy should be developed.

We hope that the recommendations can help S&T to perform even better and move forward. In any case, the most important element of the success of the faculty are of course the scientists and their support staff. It became clear to us that all are excellent people that are very passionate about their work, the faculty, and the university. We hope that all will continue to work together constructively and successfully to further strengthen the faculty as a whole and put it even stronger on the national and international research roadmaps.

I want to thank the committee secretary Meg van Bogaert for supporting the evaluation process, and the review committee members for their work and a very enjoyable and inspiring time together.

Professor Moniek Tromp
Chair research evaluation committee

Executive summary

This report presents the research review and assessment of the Faculty of Science and Technology (S&T) at the University of Twente, conducted as part of the university's regular six-year quality assurance cycle. The review committee comprised of seven external experts from various international institutions. The committee's assessment was informed by a comprehensive site visit from February 27 to 29, 2024, which included detailed interviews with faculty members, staff, and PhD candidates, as well as lab tours showcasing the faculty's research infrastructure.

The committee was impressed by the high quality of research at S&T, with some research lines being internationally visible and well-known for their outstanding research. Nevertheless, the overall visibility of S&T's very good research could be improved through a clearer joint strategy and branding.

S&T is transitioning towards a departmental structure, aimed at enhancing strategic decision-making and collaboration. This shift from 45 chair groups to eight departments is expected to streamline operations and improve research synergies. The implementation of this new structure requires clear governance, transparent financial models, and well-defined roles and responsibilities. Also, developing a unified strategy that aligns with university-wide goals and leverages the strengths of individual departments is crucial. The committee recommends involving an external advisory body to provide valuable feedback in this process.

The committee highlighted the importance of a transparent allocation model to ensure fair distribution of resources. S&T faces budgetary constraints, necessitating careful planning and transparent financial management. The development of a new allocation model should be insulated from immediate financial pressures to ensure broad support.

The faculty's transition from a tenure track (TT) to a career track (CT) model is a positive development, aligning with national movements towards recognizing diverse academic contributions. However, challenges remain in ensuring transparent and unbiased career advancement. The committee emphasized the importance of medium to long-term strategic planning for filling permanent positions and maintaining a balanced distribution of faculty levels.

The committee noted significant blind spots regarding gender diversity and social safety within the faculty. There is a need for a comprehensive strategy to improve academic culture, gender diversity, and inclusion, with clear accountability measures at all levels.

The committee appreciated its interactions with PhD candidates and PostDocs. While many PhD candidates are satisfied with supervision, issues persist with inconsistent mentorship quality. The Graduate School provides support through courses and supervision plans. Many support structures and processes are in place, but not always known by junior research staff. In this respect, clear communication, information provision and expectation management are crucial. PhD and PostDoc representation at the faculty level is recommended.

Societal relevance is achieved both through education and research. The faculty trains future engineers and researchers and engages in fundamental and applied research, collaborating with industrial and societal partners in Health, Applied Physics, and Chemical Science. These collaborations lead to entrepreneurial activities, spin-offs, patents, and industrial contracts. Outreach activities, such as the Waterlab, demonstrate S&T's commitment to societal impact. Open Science is embraced, with a focus on FAIR principles and open access. The committee recommends clear, coherent, and faculty-wide strategies for outreach, open science, and citizen engagement.

The committee's observations aim to support S&T in achieving its strategic goals, continuation of the research quality and enhancing its visibility. The committee thanks all participants for their openness and collaboration during the review process and hopes that the findings will assist S&T in its ongoing development and success.

1. Introduction

1.1. Scope of the evaluation

The Executive Board of University of Twente commissioned a review of the research conducted in the Faculty of Science and Technology. The review is part of the regular six-year quality assurance cycle of the university and is intended to monitor and improve the quality of the research and fulfil the duty of accountability towards government and society. The quality evaluation in this report is based on the assessment system in the Strategy Evaluation Protocol for Public Research Organisations 2021-2027 (SEP) drawn up by the Universities of the Netherlands, the Dutch Research Council (NWO) and the Royal Netherlands Academy of Arts and Sciences (KNAW).

1.2. The review committee

The Executive Board of the University of Twente has appointed a review committee (hereafter: committee) of seven external peers according to SEP. The committee consisted of:

- Professor Moniek Tromp, Faculty of Science and Engineering, Zernike Institute for Advanced Materials, University of Groningen;
- Professor Metin Tolan, President of the University of Göttingen, Germany;
- Professor Duco Jansen, VanderBilt School of Engineering, Nashville, USA;
- Professor Margriet van der Heijden, Faculty of Applied Physics, Eindhoven University of Technology;
- Professor David Bogle, Department of Chemical Engineering, University College London, UK;
- Dr. Anne-laure Biance, Institut Lumière Matière, France;
- Dr. Martijn Nagtegaal, Leiden University Medical Centre (LUMC), Leiden University.

The University of Twente Executive Board appointed dr. Meg Van Bogaert as the secretary to the committee.

1.3. The evaluation criteria

The Standard Evaluation Protocol (SEP) was the starting point for the committee's evaluation. This protocol describes the objectives and methods for evaluating publicly funded research in the Netherlands. The SEP distinguishes three evaluation criteria: (1) quality of research, (2) societal relevance, and (3) viability. Additionally, the SEP asks committees to consider four specific aspects when evaluating the three central criteria. These aspects are: (1) Open Science, (2) PhD Policy and Training, (3) Academic Culture, and (4) Human Resources Policy. In addition to the guidelines and criteria in the SEP, the committee also considered its task established by the University Executive Board.

1.4. Procedures followed by the committee

The site visit of the Faculty of Science and Technology took place on 27-29 February 2024. Before the site visit, the committee members were asked to read the documentation and formulate preliminary findings and questions for the interviews.

Prior to the site visit, the committee received a presentation with an introduction to the SEP, specifics about the Dutch research landscape and the working methods. In an online kick-off meeting, approximately one week prior to the site visit, the committee agreed upon procedural matters.

On the evening of 26 February 2024, the committee discussed its preliminary findings and prepared the site visit. During the site visit, the committee met with representatives of the faculty and discussed its findings. To conclude the site visit, the committee chair presented the main preliminary conclusions to the faculty. The schedule for the site visit is included in appendix 1.

This report describes the findings, conclusions, and recommendations of the committee. The faculty is assessed based on its own objectives and strategies as well as in relation to departments and institutes worldwide in similar disciplines and on similar topics. The texts for the assessment report were finalised through e-mail exchanges. The final version of the report was presented to the Faculty Board, and Executive Board of the university for factual

corrections and comments. The report was finalised on 8 July 2024.

Information provided to the committee

The committee received the following information:

- Self-evaluation report;
- Report previous research review;
- Strategy Evaluation Protocol 2021-2027;
- S&T Faculty strategy 2023-2027.

2. Faculty of Science & Technology

2.1. Mission and strategy

In 2018, the mission of the Faculty of Science and Technology (S&T) was defined as "to provide excellent education in a selected number of academic programmes, encompassing disciplines in Science and Technology, as well as from the area of Health and Biomedical Technologies. To perform cutting-edge and societally relevant research in selected fields connected with these educational programmes".

This mission implicates that (1) the faculty should select focus areas for an excellent research portfolio for the future and make them visible, (2) be able to act more nimbly and effectively on the (inter)national stage in terms of research funding, in particular as part of large research consortia, and (3) be attractive for talent. Additionally, (4) the infrastructure should be kept at a high level. A final goal was (5) to improve the manageability of the faculty to be able to act more strategically rather than opportunistically. Throughout this report, the committee will reflect on these ambitions and goals.

At the time of the site visit, the S&T was working on the next step in its research strategy, alongside organisational changes (discussed later in this report). As was explained to the committee during the site visit, the modest size of the University of Twente does not allow the university to excel in a broad range of research topics. According to the committee, the objective to excel in a few, well-chosen areas is a reasonable and realistic approach. However, although much of the research at S&T is of very high quality, the three domains covered - Health, Chemical Science Engineering and Applied Physics - still allow for a very broad research portfolio and might not provide sufficient focus to create a S&T-brand for which the faculty is known worldwide.

The committee is of the opinion that further focus and alignment are needed for an effective strategy to achieve the S&T mission. It is important to develop a focused and long-term research strategy to adhere to the mission and ambition of S&T. The committee took note of the S&T Strategy document of September 2023 in which it is stated that research strategy and focus will be formulated in a next stage, with departments taking the lead. The committee encourages S&T to start with making further choices regarding research areas to highlight, to stimulate, to invest and to excel in. This includes the identification of core-expertise, appropriate and relevant themes and topics, viable areas and limiting opportunism. In this respect, bidirectional alignment with the University of Twente is important, as is alignment with the three research institutes, the existing infrastructure, and the (new) departments, with an open eye for regional, national and international stakeholders and initiatives. It is also important that the themes are defined for a certain period of time and a transparent, not too complex decision model would be appreciated by the research staff. The committee is aware that educational activities constitute an important part of the S&T activities (and funding) with influence on the research the strategy. For the committee, the lack of insight in educational activities at the University of Twente as a whole and S&T specifically, makes it difficult to evaluate how research and education are aligned and provide specific input on what focus areas would be appropriate.

The committee thinks that it is furthermore important to also include an external view on the research strategy. It therefore suggests to set-up an external advisory board that includes representation from industry, regional partners, academic members, etc. This advisory board can help S&T identifying (future) scientific and strategic opportunities and longer-term themes to focus on and provide more regular (semi-annual or annual) feedback to the leadership of the faculty than can be done via the required external reviews every six years.

In conclusion, S&T has a solid basis of high-quality research to initiate a forward-looking process that requires decisions on S&T's priorities and strategic research goals. The committee encountered an open

atmosphere during the site visit. It hopes that within S&T constructive, open, and honest discussions will stimulate the development of a joint research strategy to go forward.

Visibility

From the interviews during the site visit it was clear that one of the S&T ambitions is to increase its visibility at national and international level. Notwithstanding some research activities with a lot of international visibility, the committee did encounter excellent and impressive research activities that have limited visibility to the outside world. S&T as a whole would benefit of a stronger brand and marketing, and improving visibility of its research requires a clear strategy and resources. Currently, many of the communication activities are geared towards outreach and education, on specific (popular) topics only, and they are mostly coordinated at and decided upon by the central level of the university. To promote and highlight the S&T research and research ambitions, the committee recommends defining a clear S&T research communication strategy in collaboration with the faculty-based communication officer and to use their liaison with the central facilities to ensure that this strategy will be put in place consistently.

2.2. Organisation and restructuring

While historically, finances and positions were managed via the institutes, these now run via the faculty to the individual chair groups ('leerstoelen'). In the evaluation period, the strategy following the mission mentioned above, led to a grouping of chair groups into 11 research focus areas. These areas (or clusters) were aimed at enhancing collaboration and sharing of networks, blending fundamental and application-oriented research, increasing external visibility, better embedding young PIs and junior staff, optimising the use of infrastructure, and facilitating further strategic development. The cluster formation accomplished several of the aims, for example increased collaboration. However, the informal character of the clusters (without mandate and/or control over resources, including finances) limited real impact and success on many of the other aims. All financial streams and decisions were and still are at the chair group level, which means 45 budgets and plans within the faculty. Therefore, the decision was recently made to further restructure the faculty towards a departmental structure, with eight departments. S&T is the last faculty at the University of Twente to transition to a formal departmental structure. The committee is positive about this initiative; eight departments compared to 45 chair groups will facilitate strategic decision-making processes, and thereby many of the other set out goals. Hence, setting-up departments with a clear mandate and research strategy seems to be the next logical step forward.

The committee members are no experts on organisational structures and change processes and is thus not in the position (nor has the information) to give detailed recommendations. Nevertheless, in the various meetings during the site visit, the committee made several observations. It encountered both criticism and enthusiasm concerning the restructuring plans. Positive responses were particularly encountered in the groups of young PIs. They expect to get more visibility, to have more influence on strategic and financial decisions and to get more opportunities overall. Larger entities will support the development of joint strategies, both on research, but also on other (important) topics such as outreach, societal impact, diversity and inclusion, academic culture (incl. social safety), open science etc. The committee also noted that support and technical staff not feel (properly) included in the discussions towards the new organisation. This group sees advantages, but also has legitimate concerns. Since this group of staff members is essential in the day-to-day operation of the laboratories, groups, and institutes, it is essential to get them involved. The committee therefore stresses to the faculty board to make use of their experience and get their buy-in and help.

At the moment of the site visit, S&T was in the middle of the transition, making it difficult for the committee to assess if the current (proposed) model will work as expected. The committee does conclude that significant progress has already been made in the process towards a restructured departmental organisation. Several departments made progress towards the establishment of a departmental board and new governance; other departments are still at an early stage. The differences between departments can be explained by the extent to which the clusters

already functioned as a unit and the level of cooperation in the use of infrastructure. In several meetings, it was mentioned that collaboration between multiple chair groups towards a department requires trust to be successful. It was clear from the conversations that this level of trust varies significantly amongst and between departments. The committee suggests making use of best practices, from within S&T as well as from other faculties and universities.

For all eight departments, as well as at S&T and university level, there is still much work to be done and decisions to be made. In the meetings with the committee recurring questions and concerns were raised, including clarity and timelines of decision-making processes, mandate, financial allocation model; transparency of procedures and models; communication (around the entire process); inclusion of all stakeholders, support needed at departmental level. The dean and faculty board clearly stated that the restructuring is a co-creation process. The committee understands this approach as it ensures wider support within the faculty. According to the Faculty Board, the initiative now lies with the new departments, with respect to forming a departmental board and drawing up a research strategy and budget plan. Departments are, however, very reluctant to start drafting a strategy without clear perceived mandate and a chosen/ known financial allocation model (vide infra). Departments (in particular scientific, administrative, and technical staff) also informed the committee that they are concerned about an increase in workload and require clear guidance on what is expected of them. The committee thinks that (some) top-down decisions might be inevitable and clear guidelines should be in place soon and communicated.

Overall, the committee observed that different people in the organisation, on different levels, are waiting for each other, with everyone being reluctant to move first. According to the committee, this 'chicken and egg' situation requires clear ownership of the process by stakeholders as well as leadership to provide direction. The Faculty Board should act on requests for guidance from the departments in order to make sure that the process continues at a solid pace. Again, departments are at different stages in the process and have different challenges and difficulties – this needs to be addressed. This might require stronger and more frequent interactions between the departments and the Faculty Board until the process is completed and the new organisational structure is operational. Moreover, the financial structure/position need to be clarified before any of this can be consolidated.

Position of chair groups

With the initiation of the departments, individual chair group leaders will lose (some of) the power that they historically had. The Faculty Board is not anticipating any conflict as the departments also offer opportunities like shared resources and lab facilities. To ensure that (research and support) staff have a home in smaller units than departments, and to soften the transition towards a new structure, in some departments the chair groups will informally remain in place. Although the committee understands this to a certain extent, this should not lead to multi-level administration, which will only increase administrative pressure and hurdles. One of the advantages of departments is precisely that groups can pool their support and administration and benefit from the critical mass. The committee is not in favour of informally holding on to old structures. The risk, according to the committee, is that some of the group leaders will "continue business as usual" with the younger staff in those groups being left outside and/or at risk of getting lost in a convoluted administrative structure.

Allocation model

In addition to the restructuring process, S&T is working towards a new allocation model. In all interviews with the committee, the development of a new clear, detailed, and transparent allocation model was strongly advocated as the current model lacks the necessary transparency and it is unclear to most staff members what criteria were and are used. Within some chair groups, it is not even clear to the research staff what is the budget and what happens to it, often not even concerning the grants they brought in themselves. Although all agree that a new allocation model should be in place, it is not clear what criteria should be included (and what their weight should be). Moreover, the committee understood that also the university allocation model (determining the funding from university to faculties) is also under development. The committee urges the

university and faculty to work together to get this clarified as soon as possible. Without a clear transparent university allocation model, it is not possible to develop a (transparent) faculty model, and departments have no clarity on their finances, let alone be able to develop a budget and strategy. The committee also noted that there seems to be little to no central S&T budget allocated to address and invest in strategic needs and opportunities, for example providing seed funding for emerging and innovative themes. The committee therefore recommends reserving some resources for strategic purposes (somehow built in into the new allocation model) which could be leveraged with departmental resources.

Although for 2024 the old financial model is still being used, departments need to know the new allocation model to draft a multiyear budget proposal and develop a strategy. At S&T level, a co-creation process was chosen and in early 2024 a task force was initiated. This task force includes representatives of different departments and different groups of staff. The committee believes that this is an excellent approach, although again, ownership of decision-making must be clear, including a timeline. From the interviews, the committee learned that a number of aspects should be included in the allocation model, such as past performance in research quality, future themes at university and faculty level, contribution to education and infrastructure. Other parameters used in other universities that committee members know of are for example amount of education performed (teching hours), funding brought in, number of PhDs finished (in previous x years), size of the research groups, number of support staff. The new allocation model does require a faculty-wide discussion on, for example, what entails research quality beyond the use of quantitative information. For the three domains and the departments in these domains, a new allocation model and especially the chosen parameters might have a different impact.

A complicating factor in the implementation and execution of a new allocation model is the lack of availability of detailed data at the level of department (or chair group). Without clear insight in past and current performance on a granular level (e.g., PhDs delivered, external grants obtained, output (papers, patents, etc.), outreach activities), it will be difficult to create a widely accepted allocation model. The data should be used to inform the allocation model. The committee was pleased to learn that S&T is developing dashboards to pull this type of information from the system. This will be a crucial part of the strategy and allocation model as decisions should be made on data.

Another complicating factor in the development of a new allocation model is the current financial situation of the University of Twente and subsequently S&T (like many other universities in the country). The university as well as S&T face a significant budget shortfall that in the upcoming years may require budget cuts. With these budget cuts in the (near) future, the new allocation model is of decisive importance for the future development of the faculty. The committee therefore emphasizes again that it is very important to have a transparent and clear model. The committee recommends that the development of the allocation model should be about the parameters to be used and ideally not be influenced by these possible financial cuts a priori as this would reduce support.

2.3. Human Resources Policy

The committee met with many passionate, talented, and excellent staff during the site visit, research as well as support staff. This human capital is extremely important for the quality of the research (and education), the (running of the) organisation and the success of S&T. All staff the committee met was overall positive about their work at their respective groups, the faculty and university, while at the same time critical about specific aspects.

Career development

One of the plans of S&T is to attract talent in line with the strategic focus areas. The current tenure track (TT) system was introduced in 2012. The large number of TT candidates (45 in 2014) prevented a sustainable future strategic capacity planning and therefore the TT system required changes. Moreover, in addition to PIs starting as TT candidate, the faculty has employed non-tenure track faculty. Despite best efforts and intentions of the Faculty Board, discrimination is felt between TT and non-TT researchers. The committee is very positive that, also

due to changes in Dutch Labour Law, the decision was made to move away from TT towards a career track (CT) model for all. This does, however, not solve all problems, and the committee does emphasise the continued need for and importance of a medium to long term planning for filling permanent positions. The transition towards the CT will also be used to revise the performance indicators from mostly quantitative criteria associated with research metrics, towards encompassing transparent (qualitative) indicators on research quality, societal impact, the quality of education, service to the faculty and the profession and/or collaborative activities. These changes are in line with the nationwide Recognition & Rewards (R&R) movement and are welcomed by the young PIs, as well as strongly supported by the committee. Another change that was implemented, was the provision of startup packages for starting PIs, which increases the chance of success in hiring promising candidates as well as their successful start, especially important if one wants to hire on strategic themes.

The committee notes that there is a need for a balanced structure and population of positions (levels), as too many tenured positions at assistant professor level can cause an imbalance. From the interviews during the site visit, the committee learned that S&T is now working on a strategy towards a balance in positions, and alongside with the revised CT criteria to also provide more transparent and unbiased career advancement procedures. The committee finds the latter especially important, since the young PIs indicate that the current promotion process is unclear, lacks transparency and seems mostly dependent on the willingness and action of the line manager.

For young PIs, a mentoring system is in place. In addition to a supervisor within the chair group (or department) to deal with day-to-day issues, young PIs have a mentor from a different faculty to discuss other aspects concerning career development. This mentoring process is a strength of the S&T faculty and should be further embraced and cultivated so it can be available and accessible to all junior faculty members. Overall, the young PIs who met with the committee are happy with their positions, opportunities, and research. This group is particularly positive about the developments in departmental structure, they hope and expect to get more insights in as well as influence on the organisation and management, including money streams.

In the interviews it was mentioned that it is difficult to attract (international) research talent to Twente. Reasons are the location in the Eastern part of the Netherlands, in combination with limited options for offering competing starting packages and career development opportunities (see paragraph on ius promovendi). Hence, in order to attract talent, it is important to have high quality research groups and researchers who are well known in their areas, and to provide world-class research infrastructure in the areas the S&T faculty decides to emphasize. The committee agrees and points out that visibility, branding, and focus are required in this respect. S&T and the University of Twente could come up with an attractive deal for new researchers, like a startup package, supporting *ius promovendi* at the assistant and associate professor level and emphasizing the relatively low living costs in Enschede.

Throughout the site visit, the committee discussed workload. Although workload is high, no disconcerting signals were received. It was mentioned in several meetings that tenure trackers are most at risk, with potentially very high perceived workload. The Faculty Board emphasises a good work-life balance, which is important. However, concerns were raised that the restructuring, but even more so the budget cuts, will result in increased workload across the faculty. The committee encourages S&T to carefully monitor the impact of the restructuring on administrative workload and act and adjust where and when necessary.

Ius promovendi

One issue that came up repeatedly throughout the site visit, is the extension of *ius promovendi* to associate professors and assistant professors. Within S&T, most signals the committee received were in favour of opening up the *ius promovendi* to assistant professors that have shown to fulfil certain criteria, for example having supervised two PhD candidates up to completion as co-promotor and successfully completed a PhD supervision course. It is imperative that the university and the S&T faculty provides adequate education and mentorship to the early

career professors to help them learn to become effective and dedicated mentors of PhD candidates. The committee fully concurs with the importance to guard the quality of the supervision and making clear what is required to be a promotor. However, this is also valid for the full professors with *ius promovendi*.

The Faculty Board stated to support the opening up of *ius promovendi* and the committee strongly supports this, actually, in an international (and more and more also national) perspective this change is important. It appears that at the level of the Executive Board of the University of Twente, a more conservative approach is taken. In the view of the committee this is unfortunate and undesirable. Expanding the *ius* promovendi emphasises the importance of young PIs not only being responsible for their PhD candidates, their research and impact, and successful graduation, but also getting recognition for their efforts and successes. Moreover, in other universities (e.g., the University of Groningen), the transition has been made, and therefore the lack of *ius promovendi* will clearly affect the employability of UT as a university and limit the university of Twente in its ability to attract world-class researchers. The recommendation of the committee is that the university and the S&T faculty in particular should open up the *ius promovendi* to associate and assistant professors that meet certain criteria and that those criteria, including the procedure to obtain *ius promovendi*, are clearly laid out.

Technicians

The committee was impressed by dedication of the technical support staff, who could clearly articulate what is going well and where things could be improved. According to the committee this group is very important for the organisation of S&T as well as the quality of the research (and the education). The support staff is a stable factor within the faculty providing institutional memory and continuity, ensures research and groups are running effectively and are often close to staff, students, and researchers at all levels, picking up (personal and interpersonal) problems much quicker than group leaders and management. The committee stresses that it is important to include this group in the process of restructuring. On the one hand, they can contribute to the process and on the other hand, this group will (also) be significantly impacted by the changes.

Overall, the added value of the technical support staff is recognised in S&T. The signal to the committee was that they often not only do their technician job but are also responsible for financial activities, are crucial in the mentoring of young people as well as solving interpersonal problems of and between group members. An important point for improvement, which is not unique to the University of Twente, is the lack of opportunities for career progression for the technical as well as the administrative support staff. The combination of budget cuts and a competitive labour market require that S&T should nurture this group.

Diversity and inclusion

S&T is striving for a diverse workforce, to perform better in all aspects and to contribute to a greater sense of community as well as a stronger home base for the large diversity of students. In terms of nationalities, the cultural diversity and awareness in S&T is very positive. The committee does emphasise the importance of inclusivity, which for example means that all activities and communication should be conducted in English.

In contrast to the positive diversity in nationalities, S&T has a major issue in gender diversity. In the past ten years, only the health domain made significant progress, while in the other domains the percentage of female scientific staff remained the same, or even decreased. In particular at full professor level, S&T is not doing well. Although this issue is recognised, the committee does not feel that all levels and members of the faculty consider it a real problem.

While with 9% female professors there is clearly a gender diversity issue at the faculty level, due to the high aggregation level of quantitative information, it was difficult for the committee to discern whether the issue (diversity, retention, etc.) varies between domains, departments, or groups. In most interviews, S&T representatives agreed that changes should be made. However, at group and departmental level, the diversity issue did not seem to be a priority, as the awareness in the interviews often seemed limited and/or not considered a

priority. While there is a university wide DE&I strategy, this is not very concrete towards the improvement of (gender) diversity. In addition, the S&T 2023 strategy document does not contain anything with respect to ED&I. The committee is of the opinion that especially the S&T faculty requires a coherent strategy toward gender diversity and inclusion, including timeline and well-defined targets. The committee emphasises the importance of critical mass (being at least more than 30%!) at all levels to attract female students at the bachelor's and master's level and to fill the pipeline at all career stages. A good and safe academic culture are crucial to attract, include and retain female researchers. To actively pursue an increase in female research staff, in particular at the higher level, a faculty wide diversity strategy is urgently needed, and the departments and faculty board need to be held accountable. The committee recognises that there are no easy fixes and that it will take time to change the culture as well as the metrics. However, the S&T faculty needs to outline a short and long-term strategy urgently.

Some actions are taken, for example the offering of unconscious bias courses. Unfortunately, these courses are not mandatory except for those involved in the hiring of sectorplan positions. The committee signals a lack of awareness of the unconscious bias that is still present at all levels, also at the higher board levels, and may play an important and counterproductive role in attracting, hiring, and retaining talented researchers. Current selection criteria, as well as implicit bias, often put female candidates in a disadvantaged position compared to male candidates. According to the committee, the current attitude is too passive. To really make a difference, a strategy and good (and strong) process for ensuring progress should be made. In this respect, unconscious bias training is helpful, but not adequate as an action plan.

2.4. Academic culture

The Faculty Board aims at creating awareness and dialogue on the topic of academic culture. The dean meets new employees and provides them with information. Occasionally, faculty wide dialogues are organised to engage on specific topics and a faculty club is in place to organise and stimulate social activities. The university offers courses on social safety and active bystander courses and the committee was informed that a strategy is in place that focuses on inclusion and individual development.

The committee concludes that the structures for a good academic culture and positive working climate are in place. For example, there are independent trust persons, and the university has an ombuds person who can act as mediator before formal procedures are initiated. However, in the interviews the committee observed that the awareness of the availability of these resources is generally lacking, and that staff is not able to find these structures and people when necessary. Hence it is not clear that the structures work adequately. The resources that are in place are not easily identifiable or known to (often more junior) staff. The committee also heard from several people that if and when the available resources, at faculty and/or central level, are found and used, it is often a black-box experience; the process lacks transparency, and it is often not clear what happens with signals, complaints, or other issues. The committee was made aware of several examples where no action was taken, and the situation was not dealt with and/or resolved. The committee could also not identify a structure to ensure that people and leadership are held accountable. The accountability at all levels is crucial to build and strengthen trust in the process for staff and students to actually report misconduct.

Throughout the site visit the committee received signals that staff members who are not in leadership positions do not always feel free and safe to raise difficult topics and concerns. There are differences between chair groups, and it appears to be clear to staff throughout S&T which chair groups are problematic. According to the committee, there are blind spots at the senior level that might lead to a disconnect in perception and lack of recognition of existing issues. The committee emphasises the importance for supervisors and leadership to be aware of issues that are on people's minds as well as having a system or process in place that works in case something goes wrong. Having confidential advisors is helpful but insufficient when they do not appear to have any true authority and thus are not in

a position to take any action to mitigate or solve problems when they arise.

In conclusion, the S&T Faculty Board is aware of the importance of a good working atmosphere and culture, and has introduced structures, processes, and discussions on this topic. However, the committee found the policies and processes to lack in clarity, and many staff members are not aware of the existing structures and processes or believe that they do not work properly. Clear communication on where to go in case of issues or problems is important and should improve. Moreover, there needs to be a proper accountability at all levels for issues that arise.

One way to keep a better eye on what is happening in the groups and departments (and overall towards the performance of PIs) is to hold annual appraisal interview with all PIs, which currently does not seem to be happening right now. In these appraisals the PIs can and will need to be held accountable for their performance in research, education and management, but also towards the academic culture in their group and department. In the new departmental structure the Dean should have appraisals with the department head (or chair of the board) with respect to academic culture in the departments, whereas the department head should hold appraisal interviews with the PIs in their respective department towards their performance including academic culture in their own group.

2.5. PhD policy and training

The committee very much enjoyed its open interaction with the outstanding group of PhD candidates and PostDocs.

Twente Graduate School

The doctoral training programme for all PhD candidates is coordinated by the Twente Graduate School (TGS). University wide, TGS has a total of 1600 PhD candidates in five faculties and there are common doctoral regulations. In the four-year PhD project, the PhD candidate is required to obtain 30 ECTS of education, composed of 15 ECTS in various scientific disciplines and 15 ECTS in academic skills, personal (transferable) skills and career development. TGS offers many skills courses, which are often appreciated by the PhD candidates. The mandatory research integrity training is also evaluated positively by PhD candidates. At the start of the PhD project, a personalised Training and Supervision Plan is made that is reviewed and updated annually. PhD candidates upload their progress report in *Hora Finita*. The committee views this as a positive process that is in line with international standards for PhD candidates. However, PhD candidates are not aware what is happening with the information they upload or what it is used for. The committee finds this very surprising. These annual R&O interviews should include aspects with respect to progress, working conditions, interpersonal relationships both the sides of supervisor and student and are therefore a perfect means to tackle problems early on (early warning system). The committee therefore recommend TGS to ensure the reports are being used as such (AGV allowing), possibly by GTS and department head/dean.

Supervision

From the meeting with PhD candidates, the committee concludes that there is a broad spectrum of experiences that seem to strongly depend on the candidate's daily supervisor. Many PhD candidates are happy with their research project and the supervision/mentorship they receive. However, numerous PhD candidates also know colleagues that are less fortunate with the supervision and in some cases, the mentorship that PhD candidates receive is substandard. In situations that PhD candidates have issues with their supervisor, it is the impression of the committee that it is not always clear to the candidates what they can do or who they can turn to. If a complaint is made, it is often not clear that information is conveyed to the supervisor, that corrective actions are taken or a solution is brokered, or - if necessary - that the supervisor is reprimanded. The committee did learn about a vocal PhD candidate who was heard and supported in making changes. TGS and the faculty should put a system in place to ensure supervision and mentoring is effective and PIs are being held accountable for progress as well as guidance, for example via annual appraisals.

The TGS is available for support of PhD candidates with courses, TSP (Training and Supervision Plan)

and issues or conflict situations with supervisors. When enrolling in the PhD graduate programme, an intake or orientation meeting is organised by TGS in which a lot of information is shared. As is commonly the case with those approaches, these orientation activities tend to suffer from information overload and PhD candidates tend to forget much of what they're told at that stage. Hence it is important to clearly and frequently communicate important information. TGS is working on short video clips on the website to provide information. Also, a brochure was produced with important steps and aspects of supervision, both for candidate and supervisor. These activities might help the PhD candidates find the procedures and steps to take. The committee strongly encourages TGS to follow through with these activities and regularly check their impact at faculty, department and PI level.

The committee emphasises the importance of expectation management and clear communication. For example, the criteria for completion of a thesis does not seem to be uniform and are often unclear to PhD candidates. The vast majority of supervisors have the candidates' best interests at heart. However, the committee received signals that some supervisors do not adhere to the rules and regulations that TGS has in place to ensure the quality of supervision and mentorship. For example, two supervisors are required (in order to not make PhD candidates depending on one single PI). However, on occasion the formal second supervisor is never involved in the supervision (not even during annual evaluation meetings). TGS offers PhD supervision courses but cannot make them mandatory. According to the committee, it is important that the TGS and the S&T Faculty Board should be more attentive to those situations where supervisors do not comply to the regulations. The committee therefore recommends an independent mentoring system for PhD candidates, including (again) clear accountability. TGS can and should play a role in that.

PhD representation

University wide, P-NUT is the PhD association providing information and organising events. The committee thinks it would be good to set up a PhD representation at faculty level as well. Through a cross-departmental faculty-wide PhD network, this group can be represented within the faculty, e.g. engaging with the Faculty Board on aspects that are and are not going well in supervision. The committee suggest the same for the group of postdoctoral researchers, often a forgotten (but important) group. The initiation of a representation of early career research staff can and should be stimulated and cherished by S&T.

Duration of PhD

The dropout rate of approximately 10% is lower than in other faculties at the University of Twente. Mostly, the reason is that PhD candidates do not pass the qualifying decision (go/no-go). The duration of PhD projects at S&T on average is 56 months. Taking into consideration the time between finalising the thesis and defence, this is a reasonable duration. The challenge lies with the significant group that takes five year or more to complete. It did not become clear to the committee what are the causes for the long duration and if specific actions are taken to help this group. Moreover, if the data allow, it would be good for the faculty board to analyse where these PhDs work and if the problem arises in specific groups or departments. In any case, the scientific staff needs to be reminded and held accountable for the fact that a PhD employment is four years only and therefore the student should finish its thesis within that time.

PostDocs

The group of PostDoc researchers is often a difficult group to support. The committee learned that in some clusters (departments) PostDocs are actively included in meetings and strategy discussions. These bottom-up activities are appreciated and could be used as best practices faculty-wide. At the more individual level, it is important to guide PostDocs in their career development which might be in careers beyond academia. Implementation of an annual Individual Development Plan (IDP), similar to the Training & Supervision Plan that is in place for PhD candidates, that outlines achievements and goals is recommended and conform international standards and expectations. The committee is surprised that a career planning aspect is not part of the TSP for either PhD candidates or PostDocs, since there is a clear role for S&T and its PIs to help them proceed in their careers. The committee suggests to add this to the annual appraisal forms.

3. Research quality

3.1. General

Overall, the committee was impressed by the scientific environment and the very high quality of research it encountered. In many labs it observed that fundamental questions are leading to applications. The laboratories are industry focused (with good connections to industry), but research groups are able to extract fundamental questions. This balance between fundamental and applied sciences is considered a significant strength of S&T.

The committee also established that S&T fosters a collaborative environment, both within and between groups and departments, for example the membrane lab and pilot plant on water quality. The university wide research institutes facilitate collaboration across faculties and with outside institutes, leading to impressive collaborative projects, for example with hospitals. The committee was impressed by the vision and added value of the three university wide research institutes, stimulating collaboration, and acting as the face to the outside world. The institutes play an important role in bringing together groups from different faculties and departments to collaborate on grants and on interdisciplinary research activities. The results are impressive, with also successes in national consortia, like the National Growth Funds and other large, consortium grants.

The indicators show that the research output in terms of publications, patents, and other tangible research products, is very good overall, although significant differences exist between the three domains. Moreover, the output is aggregated at the level of the three domains, making it difficult for the committee to discern how consistent results are across the groups. A point of attention is that some of the metrics seem to be declining over the review period.

Housing and infrastructure

The impressive, world-class facilities and infrastructure are important drivers of the research quality. The joint use of facilities and infrastructure will push the research excellence forward and further stimulates collaboration across groups, departments, and faculties.

It is a challenge to maintain infrastructure as many grants allow for new infrastructure, but less funding is available for maintenance. The decision was made to fund maintenance partly by 'renting out' the facilities to commercial parties. The fees charged for the use of the various research facilities appears to be somewhat inconsistent (or inconsistently applied). At the moment, to some researchers, it is unclear what the costs are.

Central services

The university of Twente offers central support services. Throughout the site visit, some of these central support services were mentioned to be very useful, for example the support for technology transfer and intellectual property protection (e.g., patents, copyrights). Less positive were the comments about grant support, which is considered by many not to be very useful. One specific point for improvement is that grant support is provided at several levels (institute and central) but does not seem to be aligned. Information on the same calls is provided from both levels, but actual support is very limited. For example, general parts of EU grant applications on diversity are not provided.

3.2. Health Domain

Despite having significant educational responsibilities that take up much effort and bandwidth, the health domain has a strong profile on biomedical and bio-engineering related research and makes excellent use of the facilities of the TechMed institute. Through many collaborations with companies and academic medical centres the domain is able to be societally relevant. The committee therefore believes that this domain aligns very well with the mission of the faculty, combing society, cutting-edge research, and education. Even though there is no medical school or academic medical centre near the TU, the health domain has done a nice job aligning itself and establishing fruitful collaborations with several hospitals nearby as well as with some of the academic medical centres at other universities in the Netherlands. This

provides PIs with access to clinical problems and students, PhD candidates and PostDocs access to translate their laboratory-based discoveries and innovations into the clinical environment. The medical simulation and imaging facilities provided through the TechMed institute are outstanding and cutting-edge. It is worth mentioning that the health domain leads the S&T in terms of research productivity per staff FTE, most prominently in the number of refereed journal articles as well as in the number of top 10% of most cited publications per domain and the citations / publication. All three of these metrics are strong indicators of the research productivity as well as the quality of the research in this domain.

3.3. Applied Physics Domain

The domain of Applied physics is distributed over three departments, with heterogeneities. Fundamental research in some specific domains is a at world top level (on the fundamental part), as regard to the number of ERC and NWO grants for example. This dynamism should be preserved and maintained. Many examples show a good connection with applications and industries in these groups, for example with the development of large national programmes on novel battery materials. Other groups performed research in very close connection with industries, required as expensive machines are necessary for the research theme.

The committee saw excellent research in the Applied Physics Domain. The Physics of Fluids department shows world-class experiments combined with theoretical explanations plus direct applications that are fully in-line with the mission of S&T. This department is outstanding and a world-leader in its field. Other fields like Applied Nanophotonics, Soft Matter, Energy Materials & Systems, and Nano Electronic Materials are also very strong and make impact, also via national consortia they are part of. At least one division (XUV optics) is strongly focused on collaborating with industry, with clear and significant impact, but sometimes at odds with scientific publications. Here one should carefully look at the latter aspect, especially if PhD candidates and PostDocs pursuing an academic career, are involved.

3.4. Chemical Science and Engineering Domain

The chemical science and engineering domain demonstrates high quality research in timely areas related to important societal challenges, in a combination of exciting fundamental and impactful applied research, The domain is making a significant contribution to S&T both in research and teaching. The area brings together groups on membranes and fluids, molecules and materials, and chemical engineering. There is a lot of excellent work on fundamental science. The committee was particularly impressed with the way that through the many collaborations, often working at the more applied end, the collaborative work informed the identification of new areas of fundamental research that were then pursued. Chemical engineering work is focused strongly on sustainability both of industry but also of wider societal use of resources. The Membranes group shows to have performed excellent research and provided an impressive demonstration particularly related to water use.

There is much work on energy in many of the groups in this domain (as well as the Applied Physics domain) although it is not well recognised at central level which is a challenge for the department. The topic of energy could be an area which could be encouraged more through collaborations across the university and the region (including into Germany). The metrics are strong showing high productivity and good international visibility.

4. Societal relevance

Roughly speaking societal relevance is created in two domains. First, by educating new generations of engineers and researchers who - in the future – will do research, help developing and implementing new technologies, and do teaching and lecturing themselves. Second is through the research. On a more fundamental level research helps to invent new technologies, and - in next stages - helps to develop such technologies and bring them to a next "readiness" level for implementation in society.

The faculty itself can and does directly reach out to industrial and societal partners through their (regional) network. The committee was impressed by the cooperation and collaboration with such partners, not only in the health domain, which is well suited for these activities, but also in the domains of Applied Physics and Chemical Science and Engineering. Most research groups the committee visited have initiated several entrepreneurial activities, some of them also intensively included societal partners - such as patient groups. Moreover, the institutes play an important and supportive role in such collaborations. Spinouts, patents filed, and industrial contracts underline that there is a clear and coherent strategy here, although the committee lacked the metrics to assess their success in a more numerical manner. The committee is furthermore positive about the S&T links to the SDG's with many very good outputs, including spin-offs, patents filed and industrial contracts. For the committee, it is more difficult to establish the actual use of these outputs.

The cooperation and collaboration with societal partners is impressive, especially in the health domain, which is well suited for these activities. In the Domains of Applied Physics and Chemical Science and Engineering, there is a clear and large involvement of industrial partners. A lot of entrepreneurial activities are initiated in many groups. The institutes play an important role in this, and the committee concludes that the strategy and vision on this topic work well.

4.1. Outreach and science communication

It is crucially important to be visible to and/or 'discoverable' for potential stakeholders outside of the existing networks and for prospective students who are not in the schools for which excursions are being organised. This requires outreach activities, active participation in the dialogue between science and society, ambassadors who can represent the university in gremia where (funding) decisions are being made, 'branding', and - related - defining a clear research profile that highlights well-selected, outstanding fields of research.

It is clear to the committee that S&T highly values all such outreach and communication activities and even is actively deploying them. The committee was impressed by the Waterlab that is a wonderful illustration of how societal relevance (clean water), R&D (e.g. upscaling novel membrane technologies), outreach (school visits), collaboration with various stakeholders (companies, sport fields) etc. can go hand in hand. The Health labs are another impressive example, also through their collaboration with patient groups.

At the same time a coherent, faculty wide strategy on impact and societal relevance (related to the chosen research foci), with well-defined ambitions and targets seems to be underdeveloped. For example, how can outreach and communication activities be more precisely geared towards the specific target groups that correspond to the ambitions and aims of the faculty. Who are these target audiences? When is the focus national, international, or regional? How does one want to position and present the faculty in the (inter)national landscape?

The performance in the media is specified in the self-evaluation report, but it is not clear to the committee if a specific strategy on outreach and impact has been defined to get attention from (international) news media. The committee advises the faculty to set up a clear and overarching outreach strategy, addressing the questions as raised above.

4.2. Open Science

Within S&T research outputs, use and reuse are according to the FAIR principles. Openness of research goes beyond S&T, for example in large consortia and in alliances with and for patient groups, and memberships of civil society advisory bodies.

Open access publication is the standard, preferably immediately with a licence for reuse, but at the latest six months after the first online publication date. In the evaluation period, the number of closed publications has reduced from over 50% to 4%, which is in line with the overall ambition. The committee did discuss the integrity rules on open access publications. In this respect, the collaboration with industrial partners may also have a drawback, as patents or other restrictions may lead to situations where not all results may be published. This could negatively impact young researchers, like PhD candidates or post-docs, who are at the beginning of an academic career and for whom publications may be crucially important. The committee urges to clearly discuss such potential restrictions before the start of PhD trajectories.

4.3. Citizen science

From the documentation it was not fully clear to the committee if and to what extent 'citizen science' - or actively engaging citizens - is part of S&T's strategy on societal relevance. From the interview with full professors, it became clear that citizen science and patient participation are included in the research activities, especially in the health domain, but are scattered and not based on a clear strategy or ambition. The committee did learn about several very impressive examples of patient participation for example, in collaborative projects with academic medical hospitals.

The committee is also aware that not all R&D activities lend themselves to traditional citizen science or cocreation projects. However, it does recommend keeping an open and keen eye on the Open Science Agenda and its focus on societal engagement and citizen participation - through (traditional) citizen science, co-creation or other activities that actively engage people.

For example, it was not clear to the committee to what extent early career physicist are encouraged to become involved in such projects, or to receive science communication training that helps them to conduct such activities in an impactful manner.

4.4. Conclusion

In conclusion, the committee is enthusiastic about the entrepreneurial attitude at S&T and attention for societal outreach and impact. In the evaluation period, this created a lot of societal impact and has led to outstanding examples of societal relevant R&D. The committee thinks that the S&T wide strategy will be a good starting point for making strategic actions to help making both the faculty itself and its societal impact more visible.

5. Viability

The combination of high-quality research, motivated and talented research staff, excellent infrastructure and support staff, good earning capacity and entrepreneurship form an outstanding basis for the coming period. S&T is working hard to develop and improve its organisation and strategy. In addition to a joint research strategy with clear focus, the committee emphasises the importance of a strategy on funding and human resources.

The committee believes that the plans and initiatives discussed during the site visit will contribute to further strengthening the research quality and improve the conditions of research and support staff. Having said that, the committee notes that much remains unclear leading to uncertainty and, in some respects, deadlock.

The change towards a department structure and larger units is supported by almost everyone in the faculty. In particular, young PIs and junior researchers see this development as very positive. The committee also believes that the further formalisation of department formation can and will bring a lot of positive changes to the organisation. The committee stresses the importance, when making the changes, of making clear decisions, organising good communication and offering clarity. Next, the step of developing and implementing joint strategies and policies can be taken, like the research strategy, discussions on the subjects to focus on at S&T, diversity, social relevance, and branding.

The committee hopes its observations, suggestions and advice will encourage and help the faculty in its further development.

Recommendations

At the time of the visit in Twente, the committee encountered an S&T faculty that was undergoing major changes. It was difficult for the committee for the various assessment criteria to identify where in the process S&T is and it was apparent that some parts of the faculty are further along in this process than others. At the same time, the committee is encouraged by the work being done to improve the organisation, strengthen strategy and support and maintain the high quality of research. The committee therefore hopes that its observations and recommendations will help the faculty to further deploy and implement changes. Perhaps the most important step, forming departments, has been taken. This will hopefully lead to more synergy between research groups as well as a joint strategy and approach to various topics. In this report, the committee provides many suggestions and ideas, below the committee has summarised the most important ones.

Restructuring

At the moment of the site visit, S&T was in the middle of a transition on many aspects. While accepting that the main structural change towards departments has already happened, its practical implementation has not yet, and its operation now needs to be embedded more strongly through governance, management, and finances. According to the committee, the Department-structure is a clear improvement, allowing for joint strategies on many topics, and better division of tasks and responsibilities within a larger unit. For the Departments to really function as envisioned, steps need to be taken.

1. The first – and maybe most important – step is that a new and **transparent allocation model**, with clear parameters, should be developed and implemented.
2. Furthermore, **ownership and decision-making power** (including accountability) should be clearly defined, assigned, and **communicated** towards all levels. It should be clear what mandate is given to Departments concerning strategy, financial aspects, hiring decisions etc.
3. For a department, as well as for the Faculty Board, it is important to have insights into the **performance of departments** as well as individual staff and research programmes. The development of a **Dashboard**, which is currently ongoing, should be put into use as soon as possible. Data at the level of PI, group and department is crucial to make decisions on strategic level.

Strategy

The modest size of the university emphasises the need to focus and highlight a number of themes. A new S&T strategy (2023) was presented to the committee during the site visit. This strategy mainly describes the current situation and organisational developments. It also became clear during the visit that this document and its status were not well known to the researchers.

4. The committee recommends that S&T works on developing a **joint research strategy** in collaboration with the departments, institutes, and university and align with industrial and regional stakeholders and initiatives.
5. The portfolio of S&T is very broad and, according to the committee, **focus** is required. By making choices, S&T will be able to make its vision and research strategy clear to the outside world and show the excellent research that is being performed.

6. The research at S&T is of very good to outstanding quality. Although some research lines have international visibility, visibility for S&T could and should improve. This requires a clear, joint strategy and branding.
7. The input of an **external advisory body** will be indispensable when developing a joint, faculty wide vision and strategy.

Best practices

8. Although there are many aspects of the restructuring that require further attention, the committee also encountered many good examples and best practices. These should be shared between departments, within S&T, in other faculties and universities which already have the departmental system in place.

Academic culture and diversity

The committee noticed many blind spots and in multiple interviews a passive approach. In some cases, even the recognition of a lack of diversity and unsafe working environment did not seem to exist. The committee did not find a joint strategy concerning academic culture and diversity.

9. A vision and strategy for improving gender **diversity,** hand in hand with inclusion and social safety (academic culture), should be jointly developed and executed. The strategy should include accountability at the different levels in the faculty and university to be effective.

Appendices

Appendix 1: Schedule of the site visit

26 February	19:00	Committee preparatory meeting and dinner with words of welcome from the S&T dean
27 February	8.15-9.30	Internal committee meeting
	9.30-10.15	Rector Magnificus & Faculty Board
	10.20-10.50	TechMed lab-tour (Hybride OK, Ehealth Huis, Intensive Care)
	11.00-12.00	CE department
	12.00-12.45	Lunch with PhD candidates (
	13.30-14.00	High-pressure lab guided tour
	14:10-15.10	Magnetic Detection & Imaging (MD&I)
	15.15-16.15	Meeting with BET department
	16.15-16.45	Break
	16.45-17.15	Waterlab visit
	17:30-19:00	Internal committee meeting: recap day 1
	19.00	Committee dinner
28 February	9.00-9.30	Internal committee meeting
	9.30-10.15	Meeting with Twente Graduate School (TGS)
	10.15-11.15	Faculty Council
	11.30-12.30	XUV lab facilities
	12.30-13.30	lunch with tenure trackers
	13.30-14.00	Scientific Directors institutes TechMed and Mesa
	14.00-15.00	PoF lab facilities
	15.00-15.30	Break
	15.30-16.15	Full professors
	16.15-17.00	Drinks with PostDocs
	17.00-17:45	Internal committee meeting: recap day 2
	18.30	Committee dinner
29 February	9.00-9.30	Internal committee meeting
	9.30-10.15	Meeting with Faculty Board
	10.30-12.00	Meeting with ANP department plus visit lab facilities
	12.15-13.15	Lunch with non-tenure track Assistant and Associate professors
	13.15-14.00	Technicians
	14.00-16:00	Internal committee meeting
	16.00-17.00	Presentation of findings & drinks

Appendix 2: Quantitative information according to SEP

Table 1: Research staff Faculty of Science and Engineering

	2015		2016		2017		2018	
TOTAL S&T RESEARCH	#	FTE	#	FTE	#	FTE	#	FTE
Scientific staff								
Assistant professor	35	26	39	26	38	29	41	36
Associate professor	36	32	37	30	34	31	34	28
Full professor	46	33	50	34	44	34	43	35
Postdoc	138	85	125	60	117	85	152	100
PhD candidates	432	314	393	281	408	313	409	306
Total research staff	**687**	**491**	**644**	**432**	**641**	**491**	**679**	**505**
Support staff	110	74	103	74	104	75	105	77
Visiting fellows	97	46	118	29	94	36	88	35
Total staff	**894**	**611**	**865**	**536**	**839**	**602**	**872**	**617**

	2019		2020		2021		2022	
TOTAL S&T RESEARCH	#	FTE	#	FTE	#	FTE	#	FTE
Scientific staff								
Assistant professor	45	41	53	44	53	46	58	47
Associate professor	32	24	34	26	34	29	39	32
Full professor	50	41	57	47	59	48	63	51
Postdoc	155	101	163	105	178	118	175	110
PhD candidates	417	320	444	342	471	348	473	359
Total research staff	**699**	**527**	**751**	**564**	**795**	**590**	**808**	**600**
Support staff	115	82	120	89	137	93	133	91
Visiting fellows	82	25	66	27	130	42	174	47
Total staff	**896**	**634**	**937**	**680**	**1.062**	**725**	**1.115**	**738**

Table 2: Funding Faculty of Science and Engineering

	2015		2016		2017		2018	
TOTAL	IN K€	IN %	IN K€	IN %	IN K€	IN %	IN K€	IN %
Funding:								
Direct funding (1st money stream)	26,500	47%	29,332	53%	29,806	54%	31,788	54%
Research grants (2nd money stream)	12,418	22%	9,918	18%	11,226	20%	12,092	21%
Contract research (3rd money stream)	17,819	31%	16,085	29%	14,194	26%	15,020	26%
Total funding	**56,738**		**55,335**		**55,226**		**58,900**	
Expenditure:								
Personnel costs	33,394	59%	31,299	57%	31,680	58%	35,056	60%
Material costs	3,291	6%	3,243	6%	3,015	5%	3,516	6%
Other costs	19,860	35%	20,618	37%	20,327	37%	20,328	35%
Total expenditure	**56,545**		**55,161**		**55,022**		**58,900**	

	2019		2020		2021		2022	
TOTAL	IN K€	IN %	IN K€	IN %	IN K€	IN %	IN K€	IN %
Funding:								
Direct funding (1st money stream)	32,355	54%	35,959	57%	38,730	56%	42,878	58%
Research grants (2nd money stream)	12,582	21%	11,737	19%	12,877	19%	10,865	15%
Contract research (3rd money stream)	14,525	24%	14,957	24%	17,443	25%	20,451	28%
Total funding	**59,462**		**62,652**		**69,050**		**74,194**	
Expenditure:								
Personnel costs	37,674	63%	41,384	66%	45,180	65%	48,646	66%
Material costs	3,118	5%	2,847	5%	4,048	6%	4,221	6%
Other costs	18,670	31%	18,345	29%	19,822	29%	21,327	29%
Total expenditure	**59,462**		**62,575**		**69,050**		**74,194**	