FACULTY OF ELECTRICAL ENGINEERING,
MATHEMATICS AND COMPUTER SCIENCE

POSITION PAPER

following the

RESEARCH EVALUATION
2017 - 2022

ELECTRICAL ENGINEERING

June 2025

UNIVERSITY OF TWENTE.

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This position paper has been compiled and partly written by Gijs Krijnen with input from members of the Discipline Council Electrical Engineering at the University of Twente.

Position Paper

following the
Research Evaluation
2017-2022

ELECTRICAL ENGINEERING
UNIVERSITY OF TWENTE

June 2025

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Preface

This document forms the position paper of the Electrical Engineering discipline at the faculty of Electrical Engineering, Mathematics and Computer Science (EEMCS), which we will refer to simply by EE@UT. The document addresses the recommendations of the Research Visitation Committee (RVC) which assessed both the Electrical Engineering faculty at the Technical University of Eindhoven (EE@TU/e for short) and EE@UT in the last week of June 2024.

Overall the assessment by the RVC has been very useful; the tone of the committee, chaired by prof. dr. ir. Sonja Berlijn has been friendly, positive and constructive, both during their site visit and in their written report. We are grateful that the committee has gone into great depths to get a clear picture of the activities of EE@TU/e and EE@UT and, therefore, we feel sincerely obliged to look closely at the various observations and recommendations.

The recommendations of the committee are various in nature; some can be used in a short time-frame, others require more time to rethink, discuss, decide and implement. In this position paper we will elaborate on how we think we can use the recommendations for improving EE@UT.

The document has two chapters. In the first chapter we give our reactions to the recommendations that the RVC has made for both EE@TU/e and EE@UT. In the second chapter we will deal with the recommendations that the committee has specifically made for EE@UT.

Once more we want to express our gratitude to the committee for their thorough work, sharp observations, and constructive recommendations!

Prof. dr. ir. G.J.M. Krijnen   Prof.dr. ir. Boudewijn Haverkort

Chair of the EE discipline   Dean EEMCS

Hoofdin

Contents

Acronyms

4TU	4TU.Federation
AM	Applied Mathematics
BME	Biomedical Engineering
BMS	Behaviour, Management and Social sciences
BSc	Bachelor of Science
BSS	Biomedical Signals and Systems
CS	Computer Science
DC-EE	Discipline Council EE
DEI	Diversity, Equity and Inclusion
EB	Executive Board
ECIU	European Consortium of Innovative Universities
EE	Electrical Engineering
EE-NL	Dutch Electrical Engineering Council
EEMCS	Electrical Engineering, Mathematics and Computer Science
eH	eHealth
ET	Engineering Technology
EU	European Union
FA	Financial Administration
FB	Faculty Board
GO	Grant Office
HR	Human Resources
IC	Integrated Circuit
IDS	Integrated Devices and Systems
KPI	Key Performance Indicator
MSc	Master of Science
NL	Netherlands
NWO	Dutch Research Council
PhD	Doctor of Philosophy
QAR	Quality Assessment Report
RCT	Robotics Centre Twente
RSR	Research Self-evaluation Report
RU	Radboud University
RUG	University of Groningen
RVC	Research Visitation Committee
S&T	Science & Technology
SA	Student Assistant
SDG	Sustainable Development Goal
SEP	Strategy Evaluation Protocol
SIL-EE	Systems Integration Lab EE
SME	Small & Medium Enterprise
SP	Sector Plan
SPA	Stimulating Project Acquisition
STEM	Science, Technology, Engineering and Mathematics
TA	Technical Assistant
TAO	non-Dutch-taught education
TGS	Twente Graduate School
TM	Technical Medicine
TU/e	Eindhoven University of Technology
TUD	Delft University of Technology
TUHH	Hamburg University of Technology
UN	United Nations
UNL	Universities of the Netherlands
UT	University of Twente
VU	Free University of Amsterdam

"Creating more impact, a stronger international brand, and growth in the field of Electrical Engineering (EE) by setting a clear and differentiating vision and increasing the awareness of its own strengths" [2]

Committee recommendations for both EE@TU/e and EE@UT

Improve their mission statements to better reflect their key strengths and activities and make their unique vision and competitive edge visible.

R1

We feel that this recommendation is strongly related to recommendation R21 on page 5. We have taken the recommendations R1 and R21 together in our reply here below.

The EE@UT discipline sees the limitation of the mission statement as formulated in the Research Self-evaluation Report (RSR) [3]; it is of great internal value for the organisation we want to be, but clearly lacks convincing power when used to promote our discipline to the outside world. In the feedback of the committee some strong points of our discipline have been mentioned, e.g. our social relevance as indicated by the strong collaboration that we have with industry and society, the way our research can be linked to the United Nations (UN) Sustainable Development Goals (SDGs) [4][1], the collaborative way our discipline works allowing for inter- and multi-disciplinary approaches in education and research, our state-of-the-art labs and other infrastructure, and our high quality and often fundamental research as e.g. evidenced by the many prestigious grants obtained by EE@UT staff.

The Electrical Engineering, Mathematics and Computer Science (EEMCS) faculty has recently produced its "Multi-annual strategy 2025-2029" 5-year strategy plan. In it both a mission and vision statement were formulated which give some pointers as to what the EE@UT mission statement could look like. Nevertheless, although the EE@UT mission statement should certainly not conflict with the faculty's mission statement we feel we have an obligation to formulate our own statement[2].

We feel that a strong mission statement, that can serve us for a long time to come, should be well thought through, be distinctive and should stick easily[3]. Therefore we have started to discuss a new mission statement at our recent strategy day and will continue to discuss our mission in the coming time. It opens up again the question as to what we are as a discipline, how we want to operate collectively and what we aspire to mean for society. We plan to deliver a new mission statement and research strategy mid 2026. This could potentially coincide with a midterm evaluation (2023 – 2025).

EE@UT will discuss and further develop its mission statement in its yearly strategy meetings and formulate a new mission strategy around the summer of 2026.

Action 1

Adopt a recruitment approach that attracts more women.

R2

The recruitment of a more gender-balanced staff has been a long existing challenge in Science, Technology, Engineering and Mathematics (STEM) in general and EE in particular. It is especially a pressing problem in the Netherlands where STEM-interest of female students seems limited, even at high-schools, compared to other countries.

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[1] One can see how our research directly links to the UN SDGs: 3 *Good health and wellbeing*, 4 *Quality education*, 7 *Affordable and clean energy*, 9 *Industry innovation and infrastructure*, 13 *Climate action*.

[2] After all the formulation of the faculties mission statement is in part a bottom-up process in which EE@UT should take its responsibility.

[3] E.g. the UT as *Entrepreneurial University* was for a long time a distinctive quality and stuck easily

Anecdotical insight from current female EE staff indicates that the poor gender balance in the Bachelor of Science (BSc) and Master of Science (MSc) phases itself is already discouraging potential female EE students to indeed choose EE. This suggests there may be a threshold gender ratio before female students feel encouraged to study EE. To counteract these influences one of our faculty (co-)organises the yearly "Girls days" [5].

Other anecdotical evidence suggests that female students, more often than male students, tend to choose for studies focusing on societal applications of technology, rather than technology itself. E.g. the gender balance in Biomedical Engineering (BME) (53% female BSc influx in 2023) and Technical Medicine (TM) (72% female BSc influx) is much better than in EE (13% BSc influx) [6]. Nevertheless, many of the female students of these education programmes choose to have their BSc or MSc assignments in EE groups, just because EE is such an important part in medical applications. This raises the question if a rebranding of EE in more modern terms and applications would be helpful in improving the gender balance in EE.

Obviously, though the entire chain from kindergarten to university is involved in the formation of the gender gap in EE, measures can be taken to improve the recruitment of females at the University of Twente (UT) in general [7] or EE@UT in particular. A recently carried out "Gender Scan Universiteit Twente Elektrotechniek" indicated many, sometimes rather subtle, points for improvement to make our discipline more attractive for females, both in education as well as in the staff [8]. Quoting from this report regarding policies: *Universiteit Twente has put in place targets for female (associate) professors*, *HR is aware of the importance of increasing the number of female teachers and has put in place several measures to reach that goal* and *HR has formulated guidelines for more diverse selection-committees and appointment advisory committees*. Recommendations for policies were: *Further objectify the assessment process to ensure a gender inclusive working environment*, *Encourage and promote the use of family-friendly arrangements under men too*, *Keep an eye on possible pay-gaps by making sure this topic remains on the agenda*, *When conducting employee satisfaction surveys, make sure to improve the anonymity of respondents to safely test for m/f differences*. Since the availability of this report the faculty EEMCS has founded a Diversity, Equity and Inclusion (DEI) team to more closely monitor the DEI developments in the faculty.

As for far-reaching policies, such as the preferential application procedures previously executed by Eindhoven University of Technology (TU/e), we do think this cannot be done separately by a discipline, or even faculty, but only on a university level. Nevertheless, the Sector Plans (SPs), with specific gender-balance requirements, have helped to positively shift the female/male ratios.

From what has been described above it may be concluded that EE@UT has no answer yet as to how to adopt a recruitment process that attracts more women[4]. Nevertheless, while working on improved recruitment policies, we can start meanwhile by making our discipline more female friendly. E.g. by creating a more family friendly university, by having an eye for informal care tasks, and by making people aware of the subconscious behaviour they have towards diversity. Apart from these actions, on faculty and/or UT level, we have started to offer "unconscious bias" and "active bystanders" training to employees, to scan vacancy texts on unconscious bias terminology, and have made new promotion videos taking into account diversity of role models. Needless to say that we need to, and will, put this subject on the agenda of our strategy discussions.

Action 2	EE@UT will put the lack of gender balance structurally on the agenda of its yearly strategy meetings and discuss the possible adoption of measures alike the ones that were taken by TU/e to improve the gender balance. In Dutch Electrical Engineering Council (EE-NL) context we will make sure to benefit from best practices with our sister EE departments.

R3	**Make a plan to increase external funding or reduce costs in case the base funding will be cut drastically.**

We fully support this recommendation by the Research Visitation Committee (RVC), which was in a way anticipatory to the reduction in first money stream means that we will have in 2026 and 2027, as announced in the fall of 2024.

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[4] Apart from the already implemented measures such as critical assessment of the wording of vacancies and gender diverse application committees

In the context of this recommendation it should be noted that the EEMCS faculty has been rather financial conscious in general since its reorganisation in 2014. Since this year the EEMCS Faculty Board (FB) has started to request the groups to make integral multi-annual plans where their complete operations in strategic, personnel and financial perspectives are considered. In this context, the groups are asked to reflect on the diversity of their funding portfolio, in particular in terms of funding covering for overheads or not. Further, in the EEMCS annual plan for 2025, initiative 2 is about optimising operations in education, research, organisation, etc. Here also activities other than the research groups are addressed, i.e. Human Resources (HR), Financial Administration (FA), FB support, housing and maintenance, etc. leading to a leaner faculty organisation. Further, on UT level, following a relatively long period in which we had to work with poor (financial) management software, recently the possibilities have markedly improved. We welcome these positive changes and will use them to more closely follow the financial developments of our chairs and discipline.

Next to reducing costs, we prefer a constructive and supportive approach in increasing the external funding. In the past, scientific staff was encouraged to submit personal grants, amongst others, by giving them an EEMCS grant when an internally positively assessed grant was eventually not financed externally. This was a very stimulating incentive, but could not be continued in the light of the financial situation of the UT. In the mathematics department of the faculty the financial reserves are still used to award those grants. We will look at financially neutral alternatives to stimulate the writing of such proposals for external funding, e.g. by temporarily reducing educational tasks.

Action 3

We will take action along two lines:
1. As requested by the FB, the EE@UT groups make explicit plans for developing their project port-folio, based on their mission, ensuring diverse funding sources, adequate overall contribution margin, taking into account development perspective of staff (before the end of 2025).
2. We will make increased use of the Grant Office (GO) to improve our success rates in European Union (EU), national and regional funding schemes and, where sensible and possible, use the Stimulating Project Acquisition (SPA) to financial support these activities.

R4

Team-up with 4TU to present a united front regarding important topics such as internationalisation and base funding.

We fully support this recommendation by the RVC! Forming a united front currently seems more important than ever. The current political developments, like limits on the number of foreign students and the financial cuts imposed by the current government, are affecting many more educational programmes, faculties and universities in the Netherlands (NL). Therefore, through our EEMCS faculty as well as directly to the Executive Board (EB) members, we communicate our concerns, challenges and possible actions in order that they feed this into the larger fora such as Universities of the Netherlands (UNL) [10] and 4TU.Federation (4TU) [11] which form much larger and more visible collectives to ventilate our common opinions about the agendas of the political parties in the NL[5].

As a result of the previous research visitation the EE departments of the TU/e, Delft University of Technology (TUD) and the UT have been looking at a renewed form of collaboration in the form of EE-NL [13]. EE-NL is establishing itself slowly through its board's activity, which meets monthly to address common questions and actions, the yearly EE-NL day and by EE-NL lunches, thematic meetings in which speakers of "the other universities" give lectures about their research.

EE-NL is an important platform to address common challenges including how to keep up with the growing demand for EE graduates in view of demographics and challenges resulting from the internationalisation debate, the (too) lengthy Doctor of Philosophy (PhD) trajectories, collaborative project proposals, etc. Presently a vision 2040 paper is being written outlining long term scientific challenges as an input for strategic choices to be made. As the EE@UT discipline we will make sure that we have ample and appropriate representation in EE-NL and we seek to play an active role in it. Meanwhile the Dutch Research Council (NWO) has acknowledged the importance of an EE council by giving financial and personnel support. Both help to make the council grow in its role as representation of the EE activities in the NL.

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[5] The recent developments concerning non-Dutch-taught education (TAO) [12], where the parliament has deflected intended adverse legislation, show a recent success of this approach.

Action 4

Within the EE-NL council we will (further) team up regarding EE related issues. We will also use the momentum of the Beethoven plan [14] (see also recommendation R23 on page 5) to promote awareness of the necessity and added value of EE to society. For more general issues we will communicate our concerns with the FB and EB to further address them on 4TU and UNL levels.

R5

Account for the maintenance and depreciation of the facilities and professionalise the planning and use of laboratory time and support staff.

Action 5

1. We will address this to the faculty board and the financial administration to be well informed about the various facets of depreciation and its impact on our operations and then determine appropriate measures to counteract the negative effects of depreciation.

As for the professionalisation and planning of the use of laboratories see R29 on page 8.

We also feel that job descriptions of technicians could be more accurate and account for all the kinds of tasks of the Technical Assistants (TAs). This should also provide a mechanism to pool TAs to some degree.

Action 5

2. Parallel to the faculty wide inventory of all lab-facilities and the UT wide activity to improve synergy and efficiency of the labs, we also support an action by the TAs to efficiently organise themselves, get a better overview of existing infrastructure and expertises and form a more unified voice in discussions on discipline and faculty levels. In the long run this will allow for further professionalisation of technical infrastructure and support.

2

Committee recommendations for EE@UT

Rebrand the mission statement to one that is inspiring, easily communicated, and aligned with sustainability goals.

We feel that this recommendation is strongly related to recommendation R1 on page 1. We have taken this recommendation R21 and R1 together and refer to our reply to R1.

Determine and emphasise their unique strengths and opportunities in their communications.

Especially for EE@UT this is a challenging recommendation; with 12 groups in our discipline we represent strong research in a diverse landscape of health, quantum technology, Integrated Circuit (IC) technology and design, embedded systems, power electronics, edge and advance computing, and robotics. Actually, this diversity at the forefront of the developments in our field also constitutes one of the unique strengths of our discipline.

So we consider this something for the long run in the sense that we should communicate a "strong brand" based on a recognisable and solid foundation. It will be beneficial to consider the Dutch EE landscape, especially in EE-NL context, and promote both the individual, complementary, as well as the common strengths of the EE departments in the NL. Meanwhile, we have started to put short stories on the EEMCS web-pages, to introduce our diverse staff and show-case their contributions to the UT impact themes.

Articulate the ambitions and formulate more concrete objectives and targets for the next period.

To formulate realistic[1] ambitions, the EE@UT looks at UT impact themes, the Dutch funding landscape, the EU agenda and the UN SDGs.

We want to be at the front of chip-tech research and education, e.g. through the ChipTech Twente initiative [15] and the Beethoven plan [14] by which we have made obligations on how many MSc-students to educate[2].

We strengthen our efforts on energy-efficient computing where, through SP1 and SP2, EEMCS makes a large investment in new scientific staff positions and where our research ranges from physical to systems stack. We collaborate here UT-internally (within EEMCS with groups in Computer Science (CS) and Applied Mathematics (AM) and with groups in the Science & Technology (S&T) faculty), nationally (Mission10X) and at EU level.

We aspire to be a leading centre on health research in general and eHealth (eH) in particular. Again through SP1 and SP2, we have recently created new scientific staff positions in image analysis, robotics for health and eH (collaboration of EE@UT with groups in CS and in the faculty of Behaviour, Management and Social sciences (BMS)). Our research in the field of lab-on-a-chip and organ-on-a-chip technology is strong and we aspire to be world leading.

To consolidate and further advance our position in the field of robotics we have managed to rejuvenate retiring senior staff members and together with the Engineering Technology (ET) faculty

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[1] In the sense of societally relevant and financially feasible

[2] In the Beethoven plan our ambition is to increase the total number of MSc students from 141 to 182 in the EE, Embedded Systems and Robotics programmes.

established the Robotics Centre Twente (RCT). With the new staff we aspire to strengthen our role in theoretical foundations of robotics on one side and on service and health robotics on the other side.

From our recently established EDGE center [16] and in (inter)national consortia we work on 6G technology [17], strengthening our position in the field of safe and energy-efficient communication (in collaboration with CS a.o.)

Action 23	We are aware that the ambitions formulated above need to be translated into more concrete objectives.
	1. We will have ongoing discussions between the 12 groups in the discipline and will address our ambitions in our periodic strategy days. This will be connected to the vision and mission statements and the overall research strategy.
	2. With the multi-annual plans for research groups, as recently introduced by the new FB, we will stimulate the conscious choice and underpinning of our ambitions.

R24	**Structurally embed KPIs into the research processes, not only for periodic reviews but as a continual part of the research culture.**
	Part of our Key Performance Indicators (KPIs) are embedded in the Quality Assessment Report (QAR) reports, which are produced yearly by EEMCS since many years. For example the numbers of publications, patents, our staff composition, the number of graduating PhDs, our spin-offs, etc. per research group, can be found in these annual reports. However, related to the introduction of the Strategy Evaluation Protocol (SEP) protocol 2021 - 2027 the wish to incorporate new as well as less quantitive but more qualitative KPIs such as outreach, long-term research collaboration with industry, technical products and projects with industry, senior positions in research related organisations, etc. see [3], are more difficult to capture and have not been recorded over the previous years.
	In general the senior staff is well aware of the QARs and embedded KPIs and takes notice with respect to their own and other group's performance.

Action 24	We will carry out the following actions:
	1. Together with the two other disciplines (AM and CS) in our EEMCS faculty we will look into revisiting the information as tracked in PURE (UT research info system) and in the QARs to properly represent KPIs chosen for reviews.
	2. We will (further) emphasise the importance of the QARs to the junior staff to promote self-critical and goal oriented performance, by discussing these topics in the regular meetings of senior staff with junior staff.

R25	**Enhance its visibility and narrative to attract a broader audience and more effectively communicate its impact on society.**
	Visibility of EE@UT is hampered by at least two disadvantageous circumstances: the field of EE is generally poorly understood and appreciated by laymen and students of secondary education and the UT as 'University in the (far) east' is often poorly in sight of the public of the western part of the NL. However, both can be addressed by tailored outreach, e.g. by popular lectures at large festivals such as Lowlands or the Zwarte Cross (as done in the past by members of EE@UT).
	To encourage this type of activities we think that outreach activities should be valued more by the management than it is currently done. Possible funding could e.g. come from EU funds since outreach generally is an important point in EU funding. In terms of web-presence we will have an up to date site showing some of our (more easily conveyable) achievements and their impact on society, making ourselves better known to the general public. The EEMCS faculty, with the help of the Marketing & Communication department, has meanwhile started such activities by putting appealing research in the spot-lights, introducing the diverse staff and their connection to the impact themes of the UT. Additionally we can use such web-presence to facilitate streamlined access to outreach activities by EE@UT staff, e.g. by channeling this through the Discipline Council EE (DC-EE)

| **R26** | **Capitalise on UT's location, as it is central in Western Europe, providing opportunities for collaboration with institutions like Münster University.** |

UT's location is generally perceived in an ambivalent manner. While not being in the centre of the country, the Twente/Overijssel region has ample Small & Medium Enterprise (SME) businesses, is considered a very pleasant area to live due to its natural character, coherent communities and (relatively) affordable housing. Being situated close to the German border is something the UT has been benefitting from for years, e.g. through influx of German students, collaboration with the University of Münster and the various Interreg [18] and NWO Weave [19] funding grants. However, the RVC clearly emphasises the more holistic take on UT's location as literally being in the centre of Western Europe. Both culture wise and geographically we are at short distances from major EU universities[3]. This opens many possibilities for collaboration with universities, institutes and companies which can be the backbone for (EU-wide) projects and programmes.

On UT level there are various partnerships, e.g. with the Free University of Amsterdam (VU), University of Groningen (RUG), Radboud University (RU), Hamburg University of Technology (TUHH) and the European Consortium of Innovative Universities (ECIU). As EE@UT we prefer to make use of these UT partnerships, above making our own, as these tend to provide more extensive frameworks and possibilities.

Capitilising on UT's central location in Western Europe will be done along multiple lines ranging from stronger participation in the UT partnerships to increasing our personal endeavours to participate in EU wide projects and programmes.	**Action 26**

Reduce and improve bureaucracy by ensuring stakeholder (including faculty) involvement in the design of the administration, improvement of existing processes and improving software tools for communication, particularly concerning financial issues.	**R27**

In the annual plan of the EEMCS faculty of 2025 initiative 2 relates to "Structural improvement of priorities and processes to improve operational resilience". The faculty "....*intends to improve operations in the primary processes (education and research), in faculty level support and organisation in order to improve resilience against potential future external influences, like reduction of student numbers, potential government-imposed restrictions concerning intake of international students, and reduced 1st, 2nd and 3rd money income possibilities. Conditions for structural measures are that quality of our primary process activities will continue to be high and quantity is at a good level for resilient operation. Improvement of the resilience of our operational processes is important in itself, but should also ensure that our financial operations remain healthy despite varying external circumstances and our current short-term measures (initiative 1) can be lifted and will not be required again at a later stage."* [20].

The faculty's initiative seems to deliver the proper momentum to discuss the pros and cons of the various software tools and the bureaucratic processes they underpin. We will use this momentum to request for changes in those processes and operational support systems that keep us from efficiently working on our main tasks: education and research. Above all we will argue that those procedures which only put managerial checkmarks in place of trusted relations are counterproductive and tend to "drain the oil from the machine", often through inefficient chains of email and phone calls.

Further we will stimulate reduced dependency on closed, commercial software and services that are not EU based, as these can cause a lock-in and force scientists to use tools that they do not want to use[4]. In a changing world it is uncertain if these services can be trusted with our data. Open and EU based services should be the first choice for academia. Moreover, being part of the EEMCS faculty we will promote the use of in-house software[5].

On a continuous basis we wil discuss the sensibility and desirability of processes and associated software in the light of bureaucracy and efficiency, both on faculty and university level (through the FB's presence in the UT fora). We will encourage and support the use of open and EU-based software. To be effective we will urge our FB to team up with the other faculties in order to have a strong (enough) say in the future of our core and administrative processes and supporting software.	**Action 27**

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[3] For example Münster, Hamburg, Berlin, Hannover, Bremen, Aken, etc. in Germany, Aarhus, Aalborg, Copenhagen in Denmark, Lund, Gothenburg, Jönköping, Linköping, Stockolm in Sweden, etc.

[4] Examples are microsoft e-mail, office365, teams, google docs etc.

[5] For example the utilitarian educational software maintained by the EduLabs group [21].

R28

Build on the competence of the research group chairs, adopt bold leadership that guides the organisation towards a strong mission, vision, and strategy with concrete objectives.

We appreciate the recommendation of the committee as it invites us to strongly serve our EE interests. This recommendation touches upon the question raised as item 5 in the "Terms of Reference Research Evaluation Electrical Engineering": *EE@UT is a discipline. i.e. part of a faculty. The discipline sits between faculty management and a range of (reasonably) autonomous research groups without clear governance mandates. In this context the discipline reconsiders how to organise itself (better) and to redefine its identity. The assessment committee may have a critical look at this situation and potentially formulate some insights or examples of best practices.*

The RVC notices in its report [2], p34: *The Committee felt that the Faculty Board was somewhat distant from the discipline, unaware of specific challenges facing EE, and therefore not well-equipped to develop effective strategies and lobby for their interest. The Committee concluded that this is more of an operational issue, i.e., related to the interactions between the two levels, than a governance structure issue.*

The RVC further suggests: *Therefore, while the governance structure can remain unchanged, a stronger top-down and robust leadership is desirable, particularly in preparation for crises and to address issues such as clear career paths for junior staff, stability for PhD students, and fairness in expectation levels. The Committee strongly recommends that the new dean adopts bold leadership. In doing so, The Committee recommends to work very closely with the research group chairs, who form a strong and very capable group and who -today- carry the de facto vision of the Department, and who should be used as a key asset and sounding board.*

Action 28

We warmly welcome this recommendation for a stronger cooperation between the FB and EE@UT and have taken a variety of initiatives to intensify and improve the dialogue between the two.

R29

Develop a business case around the infrastructure, considering both financing and commercialisation of the facilities.

EE@UT has started to work in this direction by using its strategic budgets from 2022 - 2024 for the foundation of the Systems Integration Lab EE (SIL-EE). Here the idea is to have a combination of tools, technologies and equipment available to not only EE@UT members but also to student associations and SME type of companies. In this way we can facilitate proof-of-concept activities meanwhile knitting a network of SMEs around EE@UT forming (part of) the societal eco-system in which our research is anchored. The management of our SIL-EE has been combined with the SmartXP lab to unify its management and to be more efficient.

This is not yet a commercialisation of our infrastructure as this requires careful balancing of the interests of the owners of the specific infrastructure and potential external users. This can be done relatively well on research group level. As an example the Integrated Devices and Systems (IDS) group and the company Bronkhorst High Tech have a longstanding collaboration (>15 years) on micro flow-sensor and associated micro-fluidics technology with a part-time professor and researcher located in the IDS group. However it is more challenging to have such collaborations on wide scale, i.e. on the EE@UT discipline scale.

Note that the NanoLab facilities are part of both NanoLabNL and EuroNanoLab and have (historically already) well-established practices on how SMEs can make use of the infrastructure[6]. Current usage is such that external parties are responsible for a substantial part of the turnover of the NanoLab. On a larger scale the Chip Tech Twente ecosystem [15] comprises more companies that are not only involved in micro- and nano-fabrication but also in the the design and fabrication of the necessary tools (e.g. Demcon).

The FB currently develops a policy regarding lab infrastructure development. The objective is to agree on a limited number of strategic facilities, which will be strengthened at faculty and UT levels. In the latter, methods to involve (more) external users of lab facilities are currently developed.

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[6] Companies that make extensive use of the NanoLab facilities are e.g. Lionix, Bronkhorst High Tech, UNeedle, Micronit [22].

We propose the following actions:

1. Though we have already started with the SIL-EE we will need to bring it to a higher level. We do this by integrating the lab into the SmartXP group to create better continuity and professionalism. We will also relocate the SIL-EE lab to a larger, well-equipped room allowing for more users and more diverse technology (autumn 2025). Subsequently we will actively inform our SME contacts and advertise the facilities and possibilities (spring 2026) .
2. We will actively support the faculty lab strategy, i.e. executing an inventarisation of all our lab-facilities, with the aim to improve efficiency of the use of the lab facilities.
3. To improve visibility to stakeholders and provide one-stop interaction, combinations of our research groups will collaborate and form centres with shared facilities where sensible, as we have done for example with the Robotics [23] and EDGE centres [16] (see also [24]).

Action 29

Encourage the availability of software and data alongside publications.

R30

We think that encouraging the publication of software and data, whether alongside publication or as an independent research output, is indeed a good ambition, while at the same time reflecting good practices in the current scientific landscape (open science). This will need some push from the leadership[7], foremost on the level of the research groups, by raising awareness of the value and long-term benefits such contributions bring in terms of impact on the research community and recognition. Additionally we can put it on the agenda of the recently established EEMCS assistant professor network. We will define it as one of our KPIs (as we did in the last RSR) and register this type of output in the QARs.

We will encourage publication and availability of data and software by (further) raising awareness through coaching of junior and temporary scientific staff and by requiring the faculty to include data and software publications as part of the KPIs as used in the QARs. This is supported by obligatory courses on data-management that our PhDs have to take from the Twente Graduate School (TGS).

Action 30

Make the criteria for success clear, fair and transparent, ensuring that a student's success does not depend on external factors.

R31

This recommendation refers to the criteria PhDs candidates should meet to complete their research and defend their thesis. At EE@UT first step has been taken by the Biomedical Signals and Systems (BSS) group which has made an inventory of implicit expectations of PhDs and developed a document with guidelines and criteria for PhD candidates in the BSS group.

In a recent strategy day of the DC-EE, we have started the discussion on PhD guidelines and practices, how they differ over the various groups and how we can align them over the entire discipline. These discussions clearly reflect the variety in PhD assessment criteria. Simultaneously, we recognise the need to address this topic at broader institutional levels, including the faculty, the UT, and national initiatives such as EE-NL and UNL[8] (see also the next recommendation).

1. We will continue the process of comparing and understanding the variety of the assessment criteria over the groups. We will make sure that this will lead to clear and fair assessment criteria, at least for each group. Where possible we will align these requirements over the EE@UT discipline.
2. The FB will improve the mentoring of PhD students, provide improved facilities for empowering PhD supervisors, including intervision opportunities and workshops, and stimulate PhD supervisors to use these facilities (before end of 2025).
3. In EE-NL setting we will exchange the assessment criteria between the 3 EE departments to adopt best practices (spring 2026).

Action 31

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[7] This is currently discussed at EB level; availability in PhD theses is expected to become rule. Moreover, the UT is further developing its open science policy.

[8] There is a new set of guidelines of UNL in the making, expected to be available may this year, that we will take note of.

R32   **Conduct evaluations of the PhD trajectory, especially to identify the causes of the high dropout rate and long PhD durations.**

We agree with the RVC that both PhD trajectories (and especially the duration of it) and to the drop-out rate of PhD students should be improved and that this needs our attention urgently. In EE-NL context we have discussed the topic on the last EE-NL day (2024) and are also addressing this topic in the EE-NL board. TU/e has taken the lead in an investigation by post-PhD interviews to make an anecdotal inventory of possible factors for delayed trajectories. Importantly, the data needs to be analysed thoroughly in the context of the multiple PhD categories[9].

Action 32
1. At EE@UT we will organise post-PhD interviews, alike the one done at TU/e, shortly.
2. Within the EEMCS faculty we team up with the CS and AM disciplines to introduce some measures. We plan to introduce a mentor for each and every PhD student. Additionally we want to introduce intervision to groups of PhD supervisors to help them improve their PhD coaching where needed and possible.

R33   **Encourage staff to address the topic of integrity more actively, for instance, by periodically including it on the agenda of department or group meetings for discussion.**

We firmly believe that integrity is integral in our operation, i.e. that it should be present in each and every decision we take, in every conversation in which we engage. It should be fed by academic standards as well as clear rules of engagement, the most prominent being the "Universal Declaration of Human Rights" [25], followed by Dutch laws and UT policies.

Integrity is not simply obtained by managerial rules or guidelines, although they can be supportive, but needs to be carried by all persons in the organisation; from the starting BSc student up to the members of the Executive Board, from the management assistant to the service director. Important in this process is that individuals understand their rights and their obligations and, moreover, that they feel empowered to speak out against integrity breaches.

With our diverse personnel constitution and dito cultural differences we think it is important that each new employee has one, or multiple meeting(s) with (a) specific person(s), e.g. a faculty member with verified integrity, to give the new employee total and unconditional security about their rights. For example, make truly clear to PhD students that if their promotor/supervisor would exploit them for his/her own advantage, they can report that and finish their PhD with a different promotor/supervisor. Additional reinforcement of integrity awareness and the roles each person of the organisation plays in this can be addressed in the PhD and assistant professor network meetings as well as in the town-hall meetings as organised by the FB. Furthermore, PhD students must follow scientific integrity course as part of their PhD educational training, so that they get aware of the importance of this topic. We believe that regular meetings at the group level or between PhD students should be implemented to reflect on good practices, using for instance specific case studies. A helpful tool is e.g. the so-called dilemma game [26] which organisation can be facilitated by the HR department.

Action 33   With HR and specifically the DEI committee we will discuss the way we can encourage the staff to better address the topic of integrity. One obvious way is to organise the dilemma game in all research groups.

R34   **Encourage and support young staff to apply for prestigious personal grants.**

Supervisors of young staff have the responsibility to guide their staff in developing their career, make explicit plans and regularly evaluate the progress in their development relative to these plans. It is important that acquisition of personal grants is considered for these personal plans.

We can invite the GO to the DC-EE to organise 1 – 4 times a year a meeting in which they point out all possible grant possibilities, especially with respect to EE suitable funding opportunities. Furthermore, we will (stronger) encourage our junior staff members to attend GO meetings on personal grant opportunities.

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[9] In the *Een gezonde promotiepraktijk 2.0* from UNL no less than 6 categories of PhDs are distinguished.

On faculty level potential candidates for personal grants are already scouted and helped by a faculty contact person and by the GO in focusing and writing their research proposals.

1. As supervisors we will encourage the young staff to think big and go for prestigious (personal) grants. We do so by helping them to build self-confidence; in practical sense also by e.g. freeing time (e.g. less educational tasks for a certain time), facilitating building networks, attending conferences, etc. to be on top of the subject and well connected to the international communities.
2. Furthermore, see our response to R3 on 2 on EEMCS supported personal grants in case positively assessed grants were eventually not financed. Potentially such support could come from the EE@UT reserves.

Action 34

Provide opportunities and encourage staff sabbaticals to bring back expertise and stimulate new insights to the university.

R35

Sabbaticals can be excellent to bring new expertise and insights into the research group and discipline and to offer researchers with opportunities to explore new research ideas or areas, which is often essential when writing competitive personal grants. Furthermore, sabbaticals may facilitate consortium grant-applications, by giving time to visit (potential) partners and building networks. Nevertheless, quite often it is difficult to organise it on research group level (e.g. because of educational duties).

Sabbaticals are better to organise on DC-EE level than on group level. We will discuss how to better organise temporary replacements, especially in education, over the group boundaries. Where sabbaticals can be used for setting up (large) network proposals additional financial means in support of proposal writing, as available on faculty level (SPA), will be addressed.

Action 35

Give staff members sufficient space and time to grow, define their research niches, and build their network of collaborators.

R36

Though we wholeheartedly agree on this recommendation, honesty demands that we mention that since the research visitation (financial) matters have not changed for the better. E.g. the starter grants were abandoned by the government (and subsequently by the EB of the UT). Overall budget cuts have reduced the possibilities to travel on first money stream, strongly hampering junior staff to attend conferences and build their networks. It also has forced us to reduce the number of Student Assistants (SAs) in education, effectively increasing the educational obligations of PhDs and staff.

Nevertheless, we feel the need more than ever, to create this space and time for our (junior) staff to grow. As we know from experience, staff may get frustrated, overburdened and burnt out when there is no space to develop their own research and careers; in the end academic freedom is the core attraction of an academic career. How to provide the necessary space is yet unclear. What is clear, though, is that the future of our discipline hangs in the balance with motivated, talented young academics.

1. We will look for creative possibilities to provide this space by balancing workloads over groups and discipline members, and by properly prioritising educational aspirations and research focus. Where possible we will combine this with the actions on sabbaticals as mentioned in R35.
2. We will look into possibilities to use unique one time financial surpluses, e.g. in the SPs to find room to compensate for the cancelled starter grants.

Action 36

Note that on UT level, in the context of the *Reinventing UT* programme [27], there are various activities addressing the efficiency of our educational programmes. These improvements should help us to reduce our workloads, creating more time to define and develop our research profiles.

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