More than ‘more engineers’: Perspectives on TU/e’s growth

Eindhoven Young Academy of Engineering (EYAE)

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Advice to be shared with the executive board and scale jump think tank (Xavier Theunissen)

Overview

Introduction

In October 2022, the EYAE launched a committee focusing on the expected accelerated growth of TU/e, i.e., the scale jump. This document shares the EYAE member’s perspectives on accelerated growth and provides implementation advice. We believe that our advice is valuable independently of the source of growth, e.g., a “scale jump” or autonomous growth via the Sectorplans and increasing student populations. Our advice is based on discussions within the EYAE, meetings with internal experts on TU/e’s future growth, and a survey among assistant and associate professors (N=148). We present survey insights where appropriate. The section “Summary and analysis of the survey results” on page 7 contains frequency tables and a brief interpretation.

We first discuss the impact of accelerated growth on TU/e’s regional role, vision, and external communication. We then focus on the three central domains of education, research, and infrastructure by sharing our perspective on the potential impact of accelerated growth on each domain and providing advice on navigating the expected impact, keeping young researchers' needs in mind. We then summarize the survey data and discuss the insights from the survey in reflection of our recommendations.

Vision on the role of TU/e

TU/e has grown substantially over the past 10 years, from 7600 students in 2012 to 12800 students in 2022. The current discussions about TU/e’s growth are focused on training more highly skilled engineers to accommodate the needs of the Brainport region. Next to being a “highly skilled human capital producer,” we perceive TU/e to have additional roles, such as:

- Innovation creator and entrepreneurship stimulator.
- Scientific and technological discovery and boundary pusher.
- Enabler of critical reflection and producer of change agents.

We recommend that the executive board expresses their vision on the different roles of TU/e and the importance of these visions for the university's overall mission. In addition, we recommend that the board communicate their internal motivation for the growth of TU/e (as opposed to external motivation by requests from the region), emphasizing how future growth could benefit the TU/e (community) in different aspects. We believe that transparency regarding the internal motive is essential for ensuring support for growth among staff and for defining implementation strategies.

Survey insights: While participants clearly identify with "A place of scientific and technological discovery and boundary pusher", there seem to be two different perspectives in what follow: "A high-skilled human capital producer" or "A place of critical reflection and producer of change agents"—only the letter speaks primarily to scholarship. Within the sample, the idea of innovation and entrepreneurship takes the last rank and is among the least popular choices.

Education

Effects of the scale jump on education

Growth leads to opportunities but also threats when it comes to our education. Growth leads to a larger pool of students to recruit for student teams working on societal challenges and more high-skilled master students to perform research in their thesis projects. Launching new programs focused on pressing societal and scientific challenges is an opportunity. It also leads to increased diversity, which means that some minorities may reach the critical mass to organize themselves into student clubs where like-minded people feel at home. Potential investments accompanying growth will likely result in new lab infrastructure, which can also be used in master's projects.

Risks: At the same time, significant growth comes with significant risks: larger class sizes may cause the university to lose its small-scale feel and drop in the educational rankings, while the added inflow of international students can make TU/e less attractive for Dutch students and lead to political difficulties. The dependence on international students to fill our classrooms poses a financial risk in the unstable geopolitical landscape. Finally, increasing the number of master projects to supervise may lead to a focus on 'safer' projects rather than projects with a higher risk and time investment, which are those that typically increase the likelihood of publication.

Based on our analysis of risks and opportunities, we recommend the following for education at the bachelor's and master's levels alike:

Recommendations for education

Streamline the supervision of master students. The intended growth in the master programs leads to a significant increase in the number of master thesis projects that must be supervised. We firmly believe in the importance of individual thesis projects for students.

To handle the increased numbers efficiently, we recommend *streamlining the supervision of thesis projects, for example, by:*

1. *Setting fixed start- and end-terms for master thesis projects* to ensure pools of students have the same challenges, e.g., formulating a research question and writing an abstract simultaneously.
    a. Arranging group meetings and peer feedback for common topics.
    b. Survey insight: The preference for MSc projects with a slight openness for other types of assessment can be shown in our survey.
2. *Make agreements about the number of rounds of feedback that students* get on a particular section of their thesis.
3. *Incorporate a 'preparation phase,'* which happens before the official start of the thesis project, in which practical aspects (access to labs, data, resources) are handled so projects can run on schedule once started as much as possible, and in which the students define the timeline and milestones of their own projects.
4. *Formalize and streamline the processes to match master students to clusters and supervisors.*
    a. This streamlined process is already implemented locally (e.g., in the ME department), with good outcomes. It protects students from excessively lengthy graduation projects, provides them with a pool of opportunities to choose from and chances for interactions with industry and international stakeholders, and makes the staff's job more agile regarding the organization.

Exploit digital assessment to reduce the teaching load for large courses. The pandemic has given a boost to several software systems for digital assessment. Widespread adoption of these tools can increase the efficiency of administering

final exams while also giving students opportunities for frequent summative feedback. Exams taken on ANS (either on a laptop or paper-based) can be horizontally graded simultaneously by a team of lecturers and tutors. The system also makes exam inspection much easier to arrange. When it comes to assignments for summative and formative feedback, a combination of computer-graded questions, open-ended questions graded by staff, and open-ended peer-reviewed questions can provide good feedback efficiently.

Professionalize teaching. Growth is an opportunity to professionalize the organization of teaching through the use of teaching teams. The team responsible for a course should combine a subject expert with didactic experts, educational ICT support, and student assistants or Ph.D. students for grading work and tutorials. We recommend investing in course support staff to help organize and administer large courses and adopt digital tools. Giving support staff a career perspective and pay grade is expected to positively affect qualified staff retention.

Professionalize the usage of student assistants (SA's). Using student assistants is a cost-effective way to provide learners with feedback on their performance and support them during lab sessions and tutorials. In the current approach, SA's are typically hired course-by-course. The preparation for their tasks typically consists of a brief kick-off meeting before the start of the course. The growth in courses and class sizes incurred by upscaling leads to increased demands of SA support for courses.

To provide such support efficiently and ensure high quality, *we propose to hire a pool of skilled student assistants on a 1-year contract and to provide them with more extended training at the beginning of the academic year.* This reduces the administrative overhead of appointing the SA's and leads to higher quality on account of the initial training and accumulating experience throughout the year.

Teach large courses live in parallel. Growth has already led to courses too large to fit a lecture room—a situation that has already emerged in, for example, mechanical engineering. Rather than resorting to live-streaming or recorded lectures, a solution can be having multiple lecturers present the material in different rooms simultaneously. This gives the students valuable face-to-face time with their instructors and stimulates the interaction lost when streaming or recording lectures.

Survey insight: How to scale is a hot topic heavily discussed in our qualitative feedback. However, when comparing parallel lectures to creating MOOC-style courses (n=44), we find a slight preference for parallel lectures (n=61).

Invest in lecturer positions. Hiring staff on a combined teaching and research position has a limited effect on lightening the teaching load: such staff members typically want to launch a master's course in their area of expertise (creating new teaching tasks) and arrive at a start-up package that reduces their teaching capacity.

Hiring in lecturer positions is much more effective in reducing the workload of teaching tasks. University lecturers can form an essential part of the teaching teams responsible for extensive courses. To attract and retain good university lecturers, we recommend making a clear and appealing career development trajectory for staff on such positions, including promotion steps and timelines analogous to those for research-focused staff positions.

Research

Effects of the scale jump on research

TU/e has some unique strengths that growth can reinforce. There is a strong emphasis on collaboration, fostering inter-/multidisciplinary projects, and shared lab facilities that allow access to many state-of-the-art tools. The growth of the university would further contribute to collaboration and shared laboratories.

TU/e has a culture of cultivating synergies with the local industrial ecosystem, i.e., Brainport, and to "feel small" and communal with a relatively high student/staff ratio and emphasis on teamwork. Growth has the potential to threaten the communal feeling of the university. However, tools for responsible growth are starting to be in place, e.g., the

Sectorplan, consideration regarding internationalization, and a definition of strategies for talent attraction and retention.

These strategies need to be reinforced because there are also aspects that hamper retention. Remnants of an older hierarchical system limit the independence of early-career staff members, e.g., the PI model is not systematically in place, and *ius promovendi* is not provided to assistant professors. In addition, there is a lack of structural funding and limited national funding for individual research growth, a lack of transparency in promotion procedures and first-tier funding allocation, and a lack of suitable infrastructure for productive independent work.

Well-planned growth, combined with policy to collectively work past issues thwarting autonomy, could lead to important opportunities for TU/e, i.e., increased chances to foster bottom-up innovation, a broader spectrum of research lines, increasing visibility and international exchanges (also via student exchange programs), and embedding TU/e even deeper in the Brainport's ecosystem.

Potential threats: Growing the number of staff members will lead to increased competition for already limited national funding. Industry funding will thus become even more dominant, which can come "with strings attached" and with less space for innovative and speculative research. The risk is to become a "service institution" to local companies instead of an independent and creative academic institution.

Recommendations for research

Guarantee intellectual independence of the academic institution. TU/e should define a unique, sharp and independent vision of its goals and principles, which will shape research lines. These should be based on broad societal, industrial, scientific and intellectual challenges. Researchers should freely find their place within a wide and ambitious vision, empowering TU/e's excellence and visibility.

Survey insight: The survey suggests that a clear, sharp, and unique vision is very important to extremely important for about 1/3 of our participants.

Strengthen the support structure for project development and funding applications. The existing support staff tends to be overwhelmed in the most critical times (around grant call deadlines) and should, therefore, be reinforced. On top of personal grant writing, TU/e should recruit trained support staff for collaborative grants. Matchmaking and consortium grant writing services are important resources that many universities (especially in the south of Europe) provide. Without these resources, faculty members working on consortium writing often need to find potentially costly support externally. Matchmaking initiatives would be particularly valuable at TU/e to foster cooperation within the Brainport region.

Survey insights: Increasing first-tier funding for Ph.D. positions (n=125) is preferred over increasing research support staff for grant acquisition (n=23).

Provide support for talent attraction at the student level. Support staff for the recruitment of excellent international students is valuable. Promoting TU/e as a leading research institution in foreign universities will help attract excellent international students. This is already in place in the US for both inter-state and international student recruitment. It is especially efficient and effective to hire excellent prospective PhD students. Student exchange programs at the MSc level, aimed at having excellent students from abroad carry out their master's thesis at TU/e, will also provide research talent.

Foster multidisciplinarity. Some of TU/e's institutes have created initiatives to promote inter-departmental and multidisciplinary collaborations. These initiatives have often been in the form of funding made available for joint Ph.D./postdoc projects, and they have been accompanied by matchmaking events where researchers pitch their interests and expertise. *These initiatives should be increased and reinforced.* They can involve Brainport companies, and they should span a broad spectrum of themes. They will also help compensating for the low success rate of national funding applications.

Enable and facilitate research. In the current global academic research arena, facilitating research is key. TU/e should start considering that the total funding that each staff member requires goes beyond their salary and startup fund, and that it should include resources for retention. Structural funding is offered in foreign institutions that TU/e benchmarks itself against. The concept of *Universal Basic Research Income*[1] is also being proven to be instrumental in empowering underrepresented minorities, on top of guaranteeing that each and every faculty member will be able to sustainably carry out the research core that they have been hired for. Considering TU/e's ambitions for staff/students ratio, a more feasible and immediate option would be to allocate to each department funding for some first-tier PhD positions to be assigned every year. The assignment can be based on internal calls for project proposals or awarded to researchers who "almost-but-not-quite" got a grant. Beyond structural funding, NWO applications' discouragingly low success rate also calls for lobbying to increase national funding availability to minimize "very good" and "excellent" projects that do not receive funding. Supporting research also means providing suitable workspaces and facilities: individual offices and suitable laboratory spaces (see infrastructure).

Guarantee the independence and development of PIs. The PI model does not need to conflict with the Section model, but it often does. The PI model allows all faculty members (UDs included) to conduct scientifically independent research autonomously within the framework of the projects that they have been awarded. The section model clusters PIs with similar research interests into groups (sections) that share an overall budget and facilities. An obstacle to the independence of early-career researchers is the lack of *ius promovendi* at the Assistant Professor level, in stark contrast with the figure of Assistant Professor abroad. The need to involve a promotor leads to non-uniformities throughout TU/e: Some UDs supervise their Ph.D. students de facto alone, while others feel their research plans are steered beyond their control. TU/e should extend the *ius promovendi* to UDs. Meanwhile, uniform guidelines should be created and followed to guarantee the independence of early-career PIs. Additionally, a clear faculty promotion track that does not only depend on one's supervisor should be defined and uniformly implemented.

Dedicate resources to an increasingly diverse staff and student population. Diversity is growing at TU/e, which is a great asset for both inclusivity and the fostering of creativity. Diversity must be considered in all its nuances: culture, origin, gender, (dis)ability, family situation, etc. The existing mentor system is valuable in enabling communication and integration, but it is not widely known or used. It should be better communicated to new TU/e members. TU/e should also consider championing equitable opportunities by providing resources and flexibility for, e.g., parents, caregivers, and members affected by visible or invisible disabilities (see also infrastructure). Resources for dedicated childcare on campus and for parents travelling to international meetings exemplify valuable support.

Infrastructure

Effects of the scale jump on infrastructure

The growth scenario is an opportunity for TU/e to increase its societal impact, to (re)consider the optimal distribution of space allocated to the university's activities, and to improve its research and teaching facilities. However, as for research and education, investments in infrastructure should be taken under consideration of TU/e's vision and with the goal in mind to improve working conditions. A general risk regarding these investments is that infrastructure is rather inflexible when it comes to accommodating future changes in needs. For example, the current plans to renovate Gemini are already outdated compared to the effect of the Sectorplan; the planned lab spaces are small, and office space is insufficient, resulting in detrimental effects on staff acquisition and retention.

Many challenges related to growth concern the infrastructure of the whole Brainport region. Below, we restrict ourselves to recommendations regarding aspects that TU/e can influence.

[1] Jebsen J.M., Nicoll Baines K., Oliver R.A. & Jayasinghe I. (2022). Dismantling barriers faced by women in STEM. *Nature Chemistry 14*, 1203-1206.

Recommendations for infrastructure

Avoid shared offices for academic staff. An increase in staff comes with tensions in the allocation of the existing space and risks of overcrowded spaces. This raises the question as to whether academic staff members should share offices. Due to the high number of meetings that they usually have, office sharing may dramatically disrupt the working dynamics, and it may lead to either complicated internal arrangements between officemates or empty offices because staff members will prefer to work from home. We therefore recommend keeping individual offices as a priority in infrastructure plans. If that is not possible, a possible strategy could be to work with a dynamic allocation system of individual offices.

Survey insight: Assuming private offices are not an option, participants indicated that they prefer fixed desks over flexible private offices and 4-person shared offices over a place in an office garden. Our advice and the perspective of the survey participants diverge. The importance of a fixed desk is higher than we assumed. Small individual offices, e.g., of the size or even smaller of the booth on Atlas floor 10, provide another solution. We recognize the complexity of this discussion.

Improve working conditions at the campus. Enlarging the size of TU/e is an opportunity to enhance the working conditions by adding more restaurants and shops. It would also be a chance to improve the e-bike infrastructure and to organize subsidized high-quality meals. Concretely, this requires improved food quality all over campus and improved diversity of food offers. Assure that all dietary needs and wishes are met, e.g., vegan, vegetarian, lactose and gluten intolerances, and cultural preferences. Improve offer and affordability: Increase operational hours, offer warm and cold meal options, and differentiate rates between students, staff and guests.

We also strongly recommend supporting parents by prioritizing childcare on campus for academic staff. These improvements will help attract and retain students and staff members.

Survey insight: Food-related changes and accessibility have higher relevance when compared to sports and cultural activities.

Stimulate Brainport companies to invest in infrastructure. TU/e has grown substantially over the past years without expanding similarly in infrastructure. This has resulted in (over)crowded labs and a lack of proper offices supporting academic staff in their work. Growth provides an opportunity to improve the infrastructure of TU/e to (1) restore good working conditions and better retain academic and support staff and (2) make TU/e more attractive for students. To support this, Brainport companies should be invited to sponsor parts of TU/e's infrastructure (e.g., buildings), where examples can be taken from WUR.

Concentrate research and education on a central campus / build a satellite campus better connected to the Brainport industry. If the expansion requires building a satellite campus, TU/e should develop a strong vision of how it wants to present itself so that the infrastructure can facilitate this. If TU/e gives priority to fostering (interdisciplinary) collaborations within TU/e and keeps the 'feeling small' atmosphere, then it would be good to concentrate research and education on a central campus and move other parts of TU/e (e.g., student housing, sports center) to the satellite campus. Suppose TU/e aims to increase collaboration with industry, the satellite campus should be founded close to the locations of Brainport companies (e.g., the HTC) and host departments and/or research areas expected to benefit most from being closely connected to the industry. When developing satellite campuses, people commuting from within and outside of Eindhoven needs to be considered, e.g., commuting times from different locations are estimated based on the train station being close to campus.

Survey insights: Participants prefer to remain at a single campus (n=104) compared to satellite campuses (n=43).

Summary and analysis of the survey results

Demographic Variables

Position	n	%
Assistant Professor	95	64.19%
Associate Professor	53	35.81%
Department		
Industrial Engineering and Innovation Science	31	20.95%
Mathematics and Computer Science	26	17.57%
Electrical Engineering	21	14.19%
Mechanical Engineering	21	14.19%
Applied Physics and Education Science	18	12.16%
Build Environment	14	9.46%
Industrial Design	7	4.73%
Biomedical Engineering	6	4.05%
Chemical Engineering and Chemistry	4	2.70%
Children		
Yes	87	58.78%
No	50	33.78%
Prefer not to answer	10	6.76%
Dutch National		
Yes	78	52.70%
No	62	41.89%
Prefer not to anwser	8	5.41%

Table 1. . Overview of Demographic Variables, i.e., Position, Department, Children, and Dutch Nationality.

Interpretation:

Position: About 2/3 of the participants were assistant professors during the survey. 1/3 held an associate professor position.

Department: Industrial Engineering and Innovation Sciences shows the highest participation rate (n=31), followed by Mathematics and Computer Science (n=26), Electrical Engineering (n=21), Mechanical Engineering (n=21), Applied Physics and Education Science (n=18), and Build Environment (N=14). Industrial Design (n=7), Biomedical Engineering (n=6), and Chemical Engineering and Chemistry (n=4) contributed the least to the survey results, combined less than 10%.

Children: Slightly less than 2/3 of the participants indicated to have children.

Dutch National: The split between Dutch nationals and non-Dutch participants is relatively equal, with a slightly lower n of non-Dutch nationals.

TU/e's perceived role

What roles do you find most important for the TU/e to take?	Rank 1	Rank 2	Rank 3	Rank 4
High-skilled human capital producer	30	42	33	43
As innovation creator and entrepreneurship stimulator	2	15	67	64
As place of scientific and technological discovery and boundary pusher	94	45	5	4
As place of critical reflection and producer of change agents	22	46	43	37

Table 2. Rank data for four responses to the future role of TU/e. Colours range from yellow to green, where darker green indicates higher values.

Interpretation

The data for Rank 1 shows that participants see TU/e clearly as “A place of scientific and technological discovery and boundary pusher” n=95.

The data for Rank 2 is more ambiguous, showing similar frequencies for “High-skilled human capital producer” (n=42), “A place of scientific and technological discovery and boundary pusher” (n=45), and “As a place of critical reflection and producer of change agent” (n=46). “As innovation creator and entrepreneurship stimulator” remains low (n=15).

The data for Rank 3 and Rank 4 show the highest frequency for “As innovation creator and entrepreneurship stimulator”, n=67.

Based on the distribution at the different ranks, we can conclude that the ranking of the perception of TU/e’s role within the given sample can be characterized as follows:

1. A place of scientific and technological discovery and boundary pusher
    a. The highest agreement in Rank 1, and high agreement in Rank 2
2. Equally on Rank 2: A place for critical reflection and producer of change agents and Human-Capital Producer
    a. High agreement on Rank 1 and Rank 2
3. As an innovation creator and entrepreneurship stimulator,
    a. The highest frequency for Rank 3 and 4

While participants clearly identify with “A place of scientific and technological discovery and boundary pusher“, there seem to be two different perspectives in what follow: “A high-skilled human capital producer” or “A place of critical reflection and producer of change agents”—only the letter speaks primarily to scholarship. Within the sample, the idea of innovation and entrepreneurship takes the last rank and is among the choices the least popular.

Education

Scaling teaching

Which of the following alternatives would you consider best?	n	%
Having a team of lecturers giving the same lecture in parallel, to allow face-to-face instruction in small groups	61	41.22%
Arranging large courses in a MOOC-fashion in which students interact among themselves in peer groups and with the lecturer in office hours	44	29.73%
It depends. I want to describe the dependencies (text box will appear).	43	29.05%

Interpretation

Our participants prefer parallel lectures to ensure face-to-face interactions within the two options we provided. However, almost 1/3 of the participants wanted to discuss the dependencies, suggesting that there are a) multiple perspectives on the topic, b) that the presented alternatives are insufficient, and c) that people are engaged and have formed opinions. Responses can be seen in Appendix A.

Acceptable Graduation Requirement

Acceptable Graduation	N	%	1	1,2	1,3	1,4	1,5	1,2,3	1,3,4	1,2,3,4	4	1,2,4
1: Individual scientific master thesis project	146	98.65%	81	14	14	10	10	8	5	3		1
2: A group project	26	17.57%		14				8		3		1
3: An internship	30	20.27%			14			8	5	3		
4: A 1-year fast track applied 'non-research' master	21	14.19%				10			5	3	2	1
5: None	10	6.76%					10					

Table 3. Acceptable graduation approaches. The numbers on the top row of the table to the right indicate graduation approaches as numbered on the left.

Interpretation

The perspective on acceptable graduation activities paints a complex picture. Almost everyone finds the current thesis approach acceptable (n=146). More than 50% find only a thesis acceptable (n=81). 32% of participants find other options in addition to the thesis acceptable, i.e., a group project (n=14), an internship (n=14), or a 1-year non-research master's is acceptable (n=10). Around 9% (n=14) of participants find the thesis plus two additional options, i.e., a group project and/or an internship, acceptable. 2% (n=3) of participants find all options acceptable. 1% (n=2) find that a 1-year fast-track master suffices. 6% (n=10) find none of the options to be acceptable.

While there is openness to explore other graduation options, our data clearly prefers the current thesis project-based approach.

Establishing New Programs

Which types of new master programs should be started in case the university continues growing?	Rank 1	Rank 2	Rank 3
Fundamental programs aiming at the cutting edge of science	86	40	22
Applied programs aligning closely with industry	20	53	75
Programs focused on pressing societal problems	42	55	51

When asked about the type or program TU/e should establish, for Rank 1, participants indicated a preference for "fundamental programs aiming at the cutting edge of science" (n=86), followed by "Programs focused on pressing societal problems" (n=42). For Rank 2, all alternatives were ranked similarly (n=40, 53, 53). Rank 3 shows the highest frequency in response for "Applied programs aligning closely with industry."

The responses show that the combination of working on cutting-edge technology and societal issues resonates well with faculty when scaling up. Application and alignment with industry is wanted, but in direct comparison, less preferred.

Research

Scaling research

Which of the following would you rather invest in:	N	%
Appoint more structural research support staff for matchmaking and consortium grant writing	23	15.54%
Allocate first-tier funding to each department to allow a number of PhD-TA positions to be awarded each year, to compensate for decreasing acceptance chances for grants	125	84.46%

Interpretation: When provided with a choice between more Ph.D. positions and support for grant writing, the preferences of UD/UHD prefer an increase in PhD positions (84.46%).

Concerning your own research, how would you prefer to grow?	N	%
Diversify research by opening up new directions	81	54.73%
Attract colleagues working on topics closely aligned to mine, to boost the research line	49	33.11%
It depends. I want to describe the dependencies (text box will appear).	18	12.16%

Interpretation: More than 50% of participants prefer diversifying research by opening new directions. About 1/3 want to work with people closely aligned with their research. Considering that only about 12% are interested in explaining the dependencies, the options either sufficiently capture the two dominant strategies or the participants have not sufficiently reflected on the topic. Open responses addressing dependencies can be found in Appendix B.

What types of research should TU/e invest in for the new positions? Rank the following.	Rank 1	Rank 2	Rank 3
Fundamental research aiming at the cutting edge of science	75	35	18
Applied research aligning closely with industry	14	47	67
Research focused on pressing societal problems	39	46	43

Table 4. Ranks of research types that should be pursued (question was not mandatory)

Interpretation: The question was not mandatory, resulting in N = 128. For Rank 1, participants preferred positions focused on "fundamental research and cutting-edge science" (n = 75), which aligns with education preferences. Research focused on pressing societal problems follows (n = 39). For Rank 2, "Research focused on pressing societal problems" and "Applied research aligning closely with industry" are similarly frequent, n=46 and n=47, respectively. Rank 3 shows "Applied research aligning closely with industry" to be ranked highest.

The responses suggest that the emphasis should be on creating positions on the cutting-edge of science. At the same time, there is a discrepancy between the focus on societal issues and industry in research.

Do you consider it important that there is a clear, sharp, and unique overall vision of the university's research ambitions?	**Mean**	**SD**
	2.98	1.09
Extremely important	10	6.76%
Very important	39	26.35%
Moderately important	55	37.16%
Slightly important	27	18.24%
Not at all important	17	11.49%

Interpretation: 1/3 of our participants find the vision extremely or very important. About another 1/3 finds the vision moderately important. The remaining 1/3 find the vision not important at all or only slightly important.

Responses to the open questions **"Suppose the growth of TU/e makes it possible to invest in one research direction to become (or remain) world-class: which should it be?"** can be found in Appendix C

Infrastructure

How would you prefer to expand the university physically?	N	%
Try to keep all activity located at a central campus at Den Dolech	104	70.27%
Expand to include research activities at external satellite buildings, for example on the High-tech campus and Automotive campus, to strengthen ties to industry	43	29.05%

Interpretation: While almost 1/3 is open for expansion, most participants prefer to stay at a central campus.

Rank your preferences for the following alternatives, in case the growth makes it impossible to give all staff members a private office?	Rank 1	Rank 2	Rank 3
Having a fixed private desk, which is reserved throughout the year, in a 4-person shared office	86	39	5
Having a fixed private desk, which is reserved throughout the year in an office garden (a collection of somehow separated desks in an open office space)	9	65	56
Having a flexible office assignment, in which you share a block of offices with colleagues and use a flexible room planning based on absences that allows you to work in a (flexible) private office whenever you are on campus.	35	26	69

Interpretation: For Rank 1, participants preferred a fixed desk in a 4-person office (n=86), followed by a flexible office assignment (n=35). For Rank 2, participants preferred a fixed-desk in an office garden (n=65). For Rank 3, participants indicated with almost equal preference a private desk in an office garden (n=56) or a flexible office assignment (n=69).

Private offices and room planning are also discussed in our open questions and are a hot topic; see Appendix D. Our suggestion is that fixed-desks are valued above private offices. There is a preference for 4-person offices over office gardens.

Miscellaneous Investments

From high to low, rank the importance of investing in the following aspects:	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Subsidized high-quality warm meals on campus	63	29	26	21	9
Attract commercial catering industry to campus (coffee houses, international restaurants, bars)	23	41	37	18	37
Expanded and cheaper sports facilities	5	23	31	53	36
More cultural activities on campus	8	25	36	38	**41**
Improved accessibility (public transportation, parking lots, bike racks)	49	30	26	18	25

Interpretation

We find warm meals and improved catering rank high among participants looking at Rank 1 and 2 combined. Accessibility plays an equally relevant role (Rank 1 n=49). Culture and cheaper sports facilities rank equal when summing is interesting but not particularly pronounced.

Open Responses

Please see Appendix D for responses to a call for open responses.