MAGAZINE FOR ALUMNI AND PARTNERS

WINTER 2017/2018

UNIVERSITY OF TWENTE.

Keuzegids Universiteiten
BEST TECHNICAL UNIVERSITY
2018

SMARTER THAN OUR BRAIN
Neuromorphic engineering

CREATE,CONNECT & CONTRIBUTE
Diestalk and research

UNDAGRID SPREAD ITS WINGS
Track & trace system from Enschede

Cover image: Rikkert Harink

For an online version of this magazine in English please visit: www.utwente.nl/magazine/en

HOLD UP A MIRROR

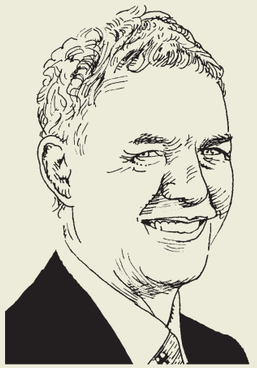
As a university, we are often forced to take a good look at ourselves in a mirror. Are we heading in the right direction? What does our environment expect from us? The United Nations, for example, got us thinking about the choices we make in our research. Do our choices contribute to a better, sustainable world? The UN's "Sustainable Development Goals," seventeen in all, deal with urgent issues such as combating poverty, the development of "smart and resilient cities," healthcare for everyone, safe drinking water and sustainable energy. For the most part, these goals are reflected in the European research agenda. Perhaps more than ever, society asks us to make clear choices. Recently, this has been reason for the University of Twente to sharpen our focus.

The five new research themes we have formulated are interdisciplinary in nature and have an impact on our society. They concern such topics as "digital society" and "personalized healthcare." At the same time, we want to invest in talent: our new organisation gives room to people who not only excel themselves, but who also allow others to flourish and therefore develop excellent teams. Suzanne Hulscher, our professor of Water Engineering and Management who gave the dies speech this year, is a prime example. She is working on solutions for protection against water that utilise the resilience of people and our natural environment. In this edition, you will find an extensive article about her and her work.

Our most important clients, the students, also hold up a mirror for us. The Higher Education Guide is based on their evaluation of our educational programmes. This year, we were thrilled by our university's spectacular rise in the overall ranking. We received the title of best technical university and four of our programmes are among the best in the Netherlands. In recent years, the entire UT community has devoted a ton of time and effort to the innovation of our education. That investment is now paying off.

Finally, I would like to invite you, an alumnus or relation of the UT, to also hold up a mirror for us from time to time. It helps to keep us sharp! ●

"WE RECEIVED THE TITLE OF BEST TECHNICAL UNIVERSITY AND FOUR OF OUR PROGRAMMES ARE AMONG THE BEST IN THE NETHERLANDS"

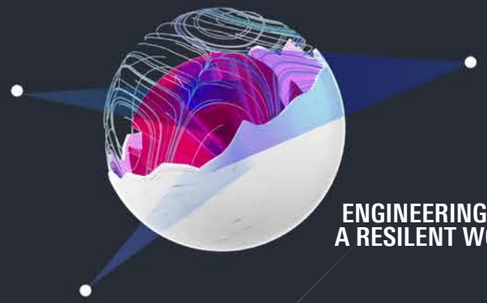


SINCE 25 NOVEMBER 2016, **THOM PALSTRA** HAS BEEN RECTOR MAGNIFICUS OF THE UNIVERSITY OF TWENTE.

SHARP FOCUS ON FIVE 'CHALLENGES'

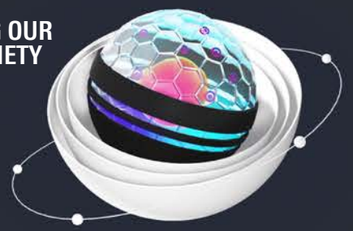
Society's 'grand challenges' unmistakably require the scientific community to do its part. The University of Twente has now formulated five relevant themes that combine excellent disciplines from the technical and social sciences – themes with an economic and social impact. BY **Wiebe van der Veen** ILLUSTRATION **Studio MAD**

SHAPING OUR WORLD WITH SMART MATERIALS

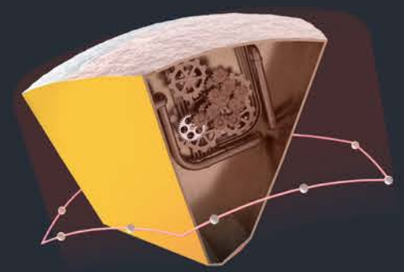


ENGINEERING FOR A RESILENT WORLD

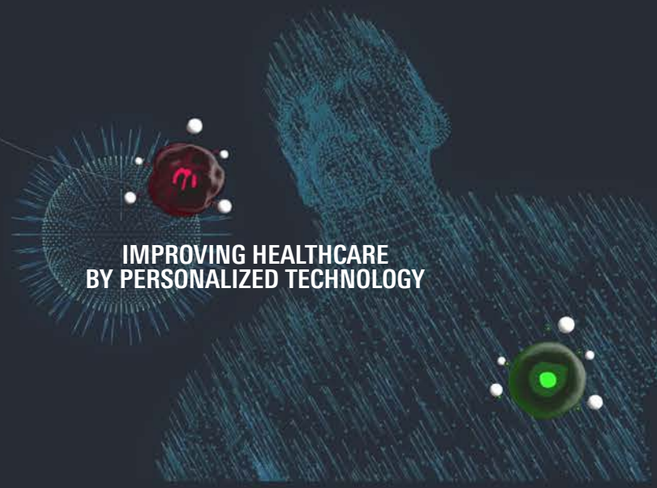
ENGINEERING OUR DIGITAL SOCIETY



CREATING INTELLIGENT MANUFACTURING SYSTEMS



IMPROVING HEALTHCARE BY PERSONALIZED TECHNOLOY



CREATE, CONNECT & CONTRIBUTE

CREATING INTELLIGENT MANUFACTURING SYSTEMS
As natural resources become scarcer, we are forced to look at production and consumption in a different light. At the same time, consumers desire better and custom-designed products that must also be affordable. The manufacturing industry is therefore transforming from isolated factories and chains to networks that share knowledge in order to realise more efficient production, predictive maintenance and reuse. This calls for new business models and a combination of production technology, IT and supply chain management: a combination which the UT excels at.

ENGINEERING OUR DIGITAL SOCIETY
Digitisation is rapidly changing the world. Our old notions of influence and control, privacy and identity and even democracy are irrevocably changing in today's "digital society." The UT is a game changer when it comes to the development of reliable digital systems that fit into our modern environment in an intuitive and natural manner. The trick is to make data analysis and decision-making processes transparent.

SHAPING OUR WORLD WITH SMART MATERIALS
By cleverly manipulating the building blocks of nature, we can develop materials that have entirely new properties: lighter, cheaper, stronger, more versatile and easier to produce and maintain. The UT facilitates the entire process from fundamental research into materials to their applications, using e.g. advanced computer simulations. The new materials are used in the healthcare, IT and sustainable energy sectors.

ENGINEERING FOR A RESILIENT WORLD
If the United Nation's Global Goals tell us anything, it is that the planet we inhabit is vulnerable. Can we end poverty, handle climate chance better and be more responsible about our production and consumption? To help improve the resilience of our society in a sustainable manner, the UT combines three pillars: data, technology and people.

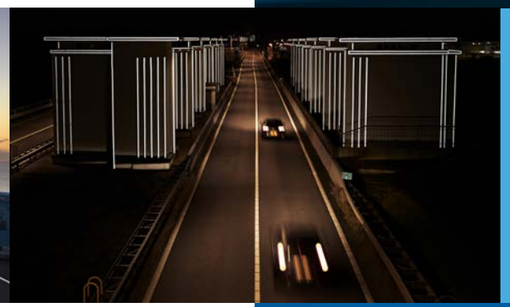
IMPROVING HEALTHCARE BY PERSONALIZED TECHNOLOY
Good healthcare for everyone is a challenge on a global scale. We can make treatments more effective through extensive personalization. Technology plays a vital role in this process. The University of Twente leads the way in this new approach to healthcare: from early detection and effective treatment to using information technology to make patients more self-sufficient.

Scan the QR-code for the film about our 5 themes.

The Netherlands is a country of water. For centuries, we have lived with the threats and the possibilities that rivers and the sea present. We sail and dredge, we erect dykes and build sluices. However, to truly manage water properly, you need to understand the dynamic of water systems. UT professor Suzanne Hulscher conducts in-depth research in this field. She was recently awarded the title of Stevin Meester and gave the dies speech on 24 November.

BY **Frederike Krommendijk** PHOTOGRAPHY **Arjan Reef**

HOW DOES WATER WORK?



"My goal is to develop knowledge that can be applied on a global scale"

PROF. SUZANNE HULSCHER, PH.D.
received the title of professor in 2002 at the age of 36. She was recently awarded the title of Simon Stevin Meester (the most prestigious Dutch award for applied scientific research). She was also elected as a member of the Royal Netherlands Academy of Arts and Sciences (KNAW). Years ago, she was part of the Innovation Platform under J.P. Balkenende. Suzanne will be a key figure in the new UT research theme of engineering for a resilient world.

SUZANNE HULSCHER STUDIES THE DYNAMIC OF RIVERS AND SEAS

Water systems are not static phenomena. Even during a calm sea or in a slow-moving river, myriad changes occur on the bottom. "Sand is carried along or billows up as a result of currents or waves. Those are natural processes. However, when we build dykes or dredge deep, wide trenches, these patterns are disturbed. In order to intervene in water systems in a more sustainable manner in the future, you must first have a thorough understanding of this dynamic," Hulscher explains.

Rijkswaterstaat, engineering agencies, water authorities: they all do their part when it comes to water, e.g. to increase safety, facilitate shipping or stimulate recreation. They like to collaborate with the University of Twente to apply the insights from the research conducted by Hulscher and her colleagues. "The strain on our water systems is growing as a result of human intervention and climate change. The sea level is rising, rivers have to process higher peak volumes and storms are becoming more severe. As a result, you have to think all the more carefully about how you intervene, to avoid taking useless measures or measures that have negative side effects somewhere down the line." Since 1 January 2017, our legislation places more focus on the strength of our water barriers, rather than just on the water level itself.

To predict

In order to predict the 'behaviour' of water in extreme situations, Hulscher and her students study the dynamic on the bottom. "You can find bottom patterns at the bottom of a river. River dunes, waves of sand along the bottom, slow down the water in a natural manner. When water flows faster, these bottom patterns become higher and longer. What happens, though, when the water volume increases drastically? Will these inhibiting patterns become even higher and longer or will they level off at some point? What does that mean for the water level and the current? We want to predict these factors as well as possible."

Rijkswaterstaat can use the research data to take appropriate measures. "Only when you know how water behaves can you determine which measures are useful and sustainable. Strengthening every dyke is far too costly, but also unnecessary. In some cases, it is sufficient to strengthen the vulnerable transitions in dykes. Another method is to use plants along the banks of the river, which is a natural process. We also examine the effects of such sustainable solutions. Sometimes, immediate intervention is not even necessary. When a storm destroys a section of dune, it will be restored naturally in time. You can make use of that cyclical resilience."

People tend to act quickly, sometimes with far-reaching effects. For example, during her dies speech, Hulscher posed the question of whether it would still be considered a good idea to build the Afsluitdijk in this day and age. "That was a major project with far-reaching consequences. Usability and safety were the key factors. Compare it to the Oosterscheldekering many years later and you can already see perspectives shifting."

Waiting for results

Hulscher is proud of this socially relevant area of research. "The Netherlands is a small country that has always had to cope with water. That has given us an edge in water science. It has also stimulated collaboration between universities and parties such as water authorities and Rijkswaterstaat. They sometimes pose questions that force us to develop ourselves further. The great thing about this research is that people are actually waiting to put the results into practice. That motivates me and the doctoral candidates."

Hulscher was honoured to give the dies speech and receive the title of Simon Stevin Meester, which is awarded by AES (NWO Domain Applied and Engineering Sciences). Her research is lauded for its quality, but also for its ties to parties outside the university. For Hulscher, the work does not end with her research's applicability in our own country.

"My goal is to develop knowledge that can be applied on a global scale. The Netherlands possesses a wealth of knowledge about water that we must share. I am no climatologist, but it is clear that our water landscape will change in the years to come. It is a question of 'when,' not 'if.' It is up to us to predict what will happen as accurately as possible, so we can take timely and sustainable measures."

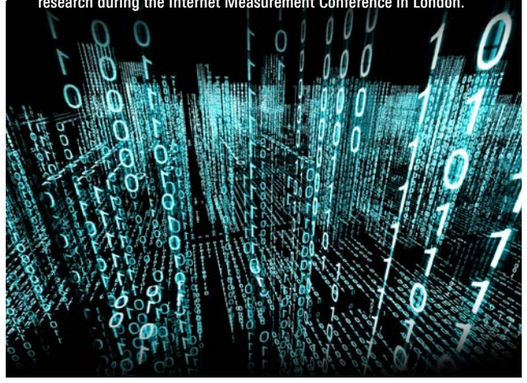
IN **BRIEF**

ISLANDS

Researchers from the University of Twente, among other institutions, have developed a membrane that can be used to encapsulate the individual islands of Langerhans – clumps of cells that produce insulin. The underlying idea is that these islands can ultimately be transplanted safely, which can cure type 1 diabetes in patients. The challenge was to design a material that would allow oxygen, nutrients and insulin to pass through, while simultaneously protecting the cells against the body's immune system to avoid a rejection response. UT researcher Dimitrios Stamatiali calls this a major breakthrough in the research, although he cautions that it will take many years before a membrane like this can be implanted in humans.

30,000 ATTACKS

The number of cyberattacks on the internet is a thousand times larger than previously assumed. UT researcher Mattijs Jonker determined that circa 30,000 DDoS attacks take place every day. Most attacks occur in the United States, which also has the most internet addresses in the world. Those two figures are not directly linked, however: Japan has the third-highest number of internet addresses, yet its number of cyberattacks is relatively low. Russia, on the other hand, faces far more attacks than one might expect based on its number of internet addresses. The Netherlands is average in terms of both the number of internet addresses and the number of attacks that occur here. Jonker recently presented his research during the Internet Measurement Conference in London.



U PARKHOTEL

In the fall of 2018, the existing conference hotel Drienerburght on the campus will move to the Hogekamp building, the former faculty building for Electrical Engineering and Applied Physics. At the same time, the hotel will be given a more internationally recognisable name: the U Parkhotel. The new hotel will boast 72 rooms, a spacious restaurant with a terrace, a bar, state-of-the-art conference facilities and a modern, warm appearance.

CO_2 FROM THE AIR

A new technology, developed by the University of Twente, can extract CO_2 from the air in an efficient and cheap manner. The recovered CO_2 is used to grow algae, the new resource for food and chemistry, but it can also be used in a closed cycle to store solar and wind energy. The test setup was designed to extract at least 500 grams of CO_2 from the air per day and use it to produce microalgae. Although cooling and heating require energy, the net energy consumption of the setup is relatively low.

BEST TECH IDEA

The editors of Kijk magazine selected the invention of UT researcher David Fernandez Rivas as the best tech idea of 2017. As part of the start-up InkBeams, he developed a method to inject medication without the use of needles. Astrid Poot, one of the judges, is excited: "InkBeams is a great and highly relevant idea. Many people are afraid of needles and if this innovation also leads to less waste from discarded needles, that would be perfect." The InkBeams system uses a laser to create a thin jet of fluid that can penetrate a patient's skin without causing any damage.

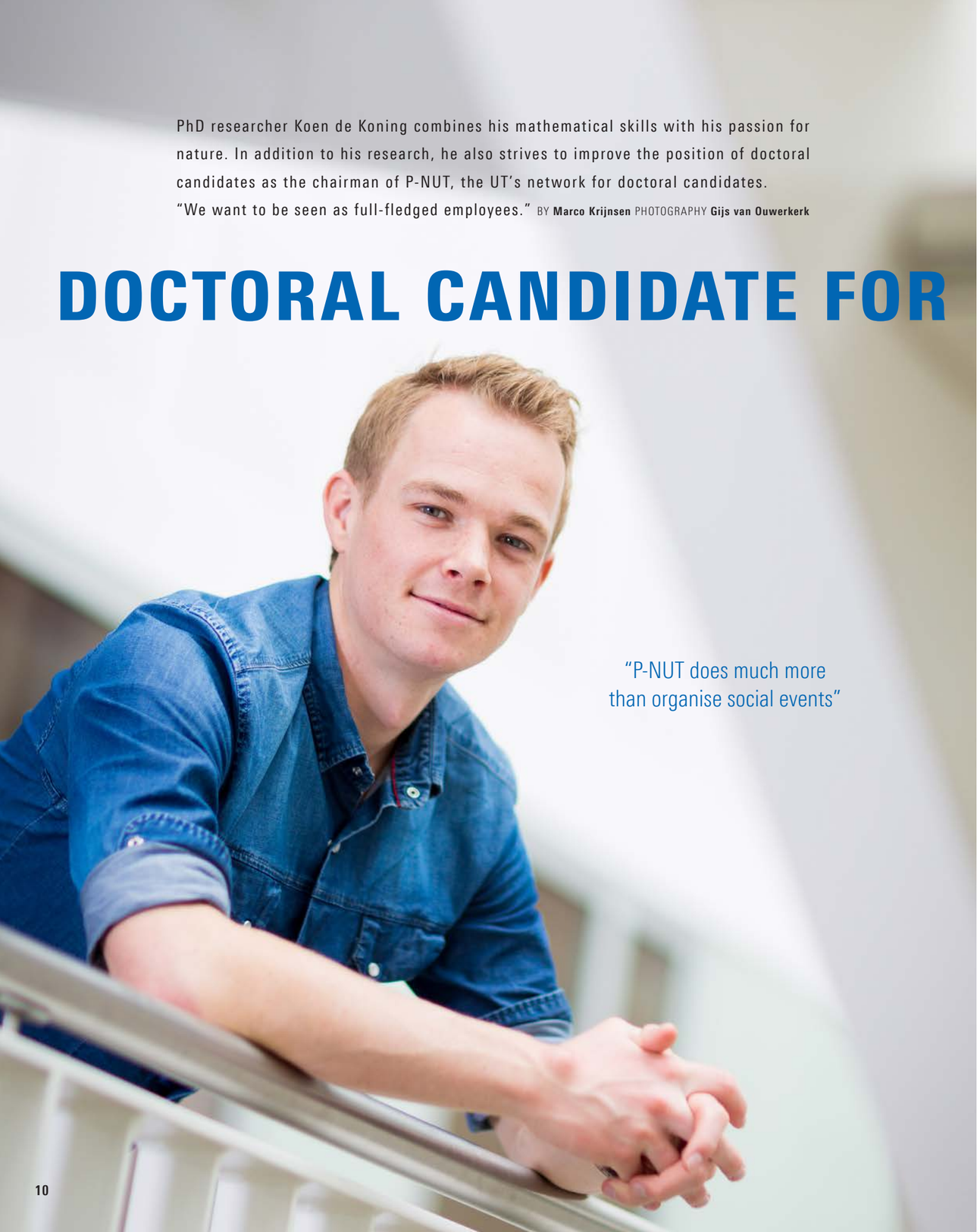
NOCTURNAL ANIMALS

In areas with heavy poaching, elephants change their daily routine. Instead of sleeping at night, they will eat and travel during that time. That is one of the findings of a study conducted by Save The Elephants and the University of Twente in collaboration with the Kenya Wildlife Service. These results not only suggest that elephants fear for their lives, but that they are also intelligent enough to realise when they are in mortal danger. The researchers used GPS equipment to track 28 female and 32 male elephants during periods ranging from several months to more than three years.

More information about these items can be found at: www.utwente.nl/en

PhD researcher Koen de Koning combines his mathematical skills with his passion for nature. In addition to his research, he also strives to improve the position of doctoral candidates as the chairman of P-NUT, the UT's network for doctoral candidates. "We want to be seen as full-fledged employees." BY **Marco Krijnsen** PHOTOGRAPHY **Gijs van Ouwerkerk**

DOCTORAL CANDIDATE FOR DOCTORAL CANDIDATES



"P-NUT does much more than organise social events"

Koen de Koning is anything but proud of the fact that out of all of the University of Twente's doctoral candidates only 36% has joined the P-NUT network. All in all, the network has 355 members. "That number is far too low compared to the study associations that most students join. It cannot be because of our membership costs, because that is just €12 per year – a cup of coffee a month."

The limited interest is mainly attributable to Dutch doctoral candidates, De Koning believes. "They think all we do is organise social events for foreign members who do not have a social network here. We do much more than that, however. Every year, for example, we host a PhD Day with interesting workshops and an inspirational keynote speaker. Doctoral candidates can truly benefit from that. You can earn back your membership fee just by attending that event."

Vulnerable PhD

P-NUT protects the interests of its members. De Koning believes it is important that PhDs are properly represented within a university, because their position is a vulnerable one. "We participate in this discussion on a national level, since P-NUT is part of the PhD candidates Network of the Netherlands. A PhD researcher is often seen as a student. That is because of the situation in other countries, where PhDs are students who pay a tuition fee. In the Netherlands, however, we work on our research fulltime for four years. That is a completely different situation. On top of that, many doctoral candidates are afraid to oppose their superior, as other staff members would do. They go with the flow, because they still have to obtain their doctoral degree with the support of that same superior. PhDs are therefore not always happy in their work. We want to change that."

Protecting the environment

De Koning himself is enrolled in the third year of his doctoral research at the Behavioural Management & Social Sciences (BMS) faculty. He came to Twente to expand his knowledge after finishing the Forest and Nature Conservation bachelor's and master's programmes in Wageningen. "Technology enables us to analyse an enormous quantity of data. Corporations use these analyses to make our lives easier or to affect our purchasing behaviour. However, technology also offers a range of possibilities to nature conservationists."

At the BMS faculty, De Koning studies the relation between the housing market and environmental factors and risks such as floods. He focuses on the situation in Greenville in the American state of North Carolina. That city is bisected by the Tar river. In 1996, 1999 and 2016, the city was hit by massive floods. Field research is part of his PhD track. De Koning travelled to the US to interview residents, realtors and other parties involved in the situation and conduct questionnaires.

"As a researcher, you are constantly at risk of drowning in a sea of information. You find one thing and then spot something else that you cannot explain. Everything is always more complex than you initially believed. Economic theories failed to sufficiently explain the data, so I had to go to Greenville myself. That took a lot of time. I am back on track now and working hard to finish my research by early 2019."

This year, the Twente University Fund received more than 750 donations from alumni and relations of the university. Among them were Suzanne Stouten (22), Daan Kater (36) and Wessel Straatman (27), three young contributors. They each explain why they donated money to this fund. BY **Josine Meerburg** PHOTOGRAPHY **Proprietary pictures**

A FEW EUROS EACH ADDS UP TO A NICE SUM

Suzanne: "Last year, our sorority donated money to Solar Team Twente. There are quite a few of us and I figured that if everyone donated a little bit, it could really add up for Solar Team Twente. I contacted sorority members who are still studying here and former members. Most were familiar with Solar Team Twente and happy to contribute. By donating just a few euros each, we were still able to offer the team a nice sum. Every bit helps! It is important to me as a student to also support my university and my fellow students. Because of our contribution, we felt even more involved with "our" team down under.

"At the University of Twente, it is clear that a lot is being done and organised by students for students. They always enjoy doing this and everyone appreciates their efforts. I love my life as a student and being active in various capacities. An unforgettable year on the board of Piranha as it celebrated a lustrum brought me a wealth of knowledge, experience and friendships. That is so valuable, I want everyone to have that. After I graduate, I intend to continue to contribute, because I know how much it can mean to students!"

Suzanne Stouten (links op de foto)

SUZANNE STOUTEN is a master's student of technical medicine at the UT. In addition to her studies, she acts as coordinator of the Students' Lab of Pre-U, she is an active member of the Ta Phemme sorority, she plays volleyball for Harambee and she was on the board of ZPV Piranha for a year.

DAAN KATER is a commercial airline pilot at KLM. In 2006, he earned his bachelor's degree in Applied Physics from the UT and he acquired his master's degree in Aerospace Engineering from the TU Delft in 2015. During his student years, he served as both founder and board member of the Piranha diving club.

Daan: "During my bachelor's programme, I was able to take a minor in Australia with the help of the University Fund. A brief internship at an Australian aviation company rekindled an old dream of mine to become a commercial airline pilot. After completing my bachelor's degree, I was able to make this dream come true. I work as a pilot at KLM since 2008. I wanted to give back to the UT. Because the University Fund played such an important role in my own professional development, it makes sense for me to make an annual contribution. The student activism found at the UT is unique in the Netherlands; it is dear to me and it deserves our support.

During my student years, I founded the Piranha diving club. That was an educational and fun experience. It was such a rush when I pulled it off. I still think back fondly of the diving tank we installed on campus. The club still exists today and continues to offer new generations of students a great time. Students' workloads are growing, so they have less time and money available for development outside their studies. That is why student activism needs our support so badly."

Wessel: "I was a very active student myself. I organised all kinds of events, I was on boards and I participated in a lot of fun activities as well. As a board member, the four of us worked really hard for a year and organised some wonderful activities. I learned a lot from that and I got a lot of satisfaction from it, as well as from the members' enthusiasm. During that time, I became familiar with the University Fund as a sponsor of sports, culture and, of course, many parties!

Because of my activism, I was able to kick off my professional career with the right background. Once I got a job after my amazing student years in Enschede, it only made sense for me to give back to my own university. Supporting student activism is important to me. I see young, recently graduated alumni join my organisation and I miss their initiative and decisiveness. Today's students are under a lot of pressure, so it is more important than ever to give them a chance to develop themselves as well. Besides acquiring new knowledge during lectures, it is important to also expand one's point of view by e.g. organising a study trip or a sports event or by serving on a board for a year. The University Fund can help students realise this."

WESSEL STRAATMAN is a research and development engineer at Clear Flight Solutions. He earned a bachelor's degree in Advanced Technology in 2013 and a master's degree in Systems and Control in 2014, both at the University of Twente. During his student years, he was a board member of the Astatine study association, among other things.

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NEUROMORPHIC ENGINEERING: UNRAVELLING THE BRAIN'S ELECTRONIC CONNECTIONS

Wilfred van der Wiel, professor of nanoelectronics, is working on a computer that functions similarly to the human brain – or, fed with big data, can even outperform our brain. "If we pull this off, the possibilities are endless." BY **Frederike Krommendijk** PHOTOGRAPHY **Rikkert Harink**

SMARTER THAN OUR BRAIN

Computers can do virtually everything, often better than humans. Even a thirty-year-old calculator can beat any man at maths. However, the way today's computers are constructed has one major downside: the entire process is handled one step at a time, sequentially. Our brain, on the other hand, can do thousands of things at once in parallel. Our brain's neural network is extensively branched and interwoven. "Neurons fire when they receive a certain stimulus, which in turn activates other neurons. That allows us to recognise patterns or faces or evaluate situations in the blink of an eye," Van der Wiel explains.

"We focus on the many wonderful potential applications, for example in the medical world"

Of course, if you want a computer to perform a complicated task that consists of multiple simultaneous processes, e.g. driving a car, you could theoretically link hundreds of computers together and have each one perform a single small task very quickly. "Aside from the fact that this quantity of hardware could never fit into e.g. a smartphone or an airplane, it is also a tremendous waste of energy. Our brain has another major advantage besides its parallel processing capacities: it is exceptionally efficient and requires just ten to twenty Watt. To compare, a simple laptop uses between one and two hundred Watt. By creating connections that mimic the human brain's neural network, we can make our computers far more energy-efficient and effective." This process is called neuromorphic engineering. As part of the research programme, physicists Van der Wiel and three colleagues in his department focus on unravelling the electronic connections that allow our brain to transmit signals so efficiently.

Should the MESA+ (institute for nanotechnology) and the CTIT (institute for IT research) succeed in mimicking the neural transmission of information, major corporations will line up outside the UT's door to apply this technology. "Take self-driving cars, for example. Driving a car is a prime example of a dynamic process that requires you to interpret signals quickly and take the appropriate action. Our brain's parallel processing method is excellently suited for this. Our challenge is to translate our brain's rapid, efficient processes into usable and efficient hardware."

A self-driving car must have the brains to correctly assess any situation. "As a basic structure, a neuromorphic computer cannot do anything yet. You can, however, feed it data on millions of traffic situations and how to act correctly in each one. A human would have to spend three hundred years driving day and night to learn how to drive that well. Similarly, a computer can learn to play chess far better than any man once you feed it data on millions of chess matches. Artificial intelligence can dedicate itself entirely to a single task, without distractions or emotions. That makes it better than humans."

Van der Wiel understands that people might be a bit intimidated by a computer that can outsmart our own brain. "Those scary stories are everywhere, about cyborgs taking over our planet and such. It is easy to focus on the negative aspects: a hammer can be used for carpentry, but you can also bash someone's head in with it. The same goes for any invention. Instead, we focus on the many wonderful potential applications, for example in the medical world. A chip with neural processing capabilities might take over some of the brain's functions in a patient who suffered brain damage. For a blind person, you might link it to a small video camera and send signals to the brain to allow the patient to see. This technology can be used for everything that we already use our own brain for."

Companies such as Facebook and Google are also working on such applications, because these new computers require less energy and can efficiently process massive quantities of big data. "Many universities and corporations are active in neuromorphic engineering. Processing large quantities of big data is becoming increasingly important. The efficiency and energy requirements of today's computer systems will ultimately become bottlenecks."

At the University of Twente, mathematicians, physicists, neurophysiologists and computer scientists collaborate on this research. The University has also joined hands with the Radboud University. The first breakthrough, a chip that can learn to perform simple tasks through artificial evolution, has already been made. Developing an entire brain-like computer system will require years of additional research, however. Van der Wiel is highly motivated: "This is both socially relevant and scientifically challenging. We learn more every day, from each other as well."

On 20 October, the Student Union (SU) gave the annual More than a Degree Awards to students who do more than just study. Elise de Groote (20) was selected as the most active student of the 2016-2017 academic year. “I want to learn things that aren’t described in any book,” says the student of Advanced Technology.

BY **Marieke Vroom** PHOTOGRAPHY **Arjan Reef**

IT IS IMPORTANT THAT TECHNICIANS ENGAGE IN POLITICS

When Elise first started her student career at the UT, she was not planning on doing very much in addition to her studies. “I didn’t think I would have time for that. I did well in my studies, however, and I was eager to acquire more experience outside the programme itself, so I became active anyway.” And how. She was part of several committees at the Astatine study association, she joined the faculty council of the Applied Physics programme, she researched sustainable alternatives to fossil fuels, she joined the Xoun student association, she organised a Model United Nations (MUN) at the UT and in between she even passed every subject of her second year.

Model United Nations

Elise is most proud of the MUN, a simulation of the United Nations during which students debate each other on global issues. This was the first time that a MUN was held at a technical university. Together with two fellow students, she got the idea to combine technology and politics in a MUN. “Originally, the event was just for our own Advanced Technology programme. Of course, the entire UT is all about technology, so we decided to go bigger.” The students presented their plans to the Student Union, who were on board immediately. “Everyone was very excited and eager to help us realise the event. We were given an office, we built our team and we received financial support from the Executive Board and from Marketing & Communication.”The first UT MUN kicked off in May. In total, 120 students spent an entire weekend debating about such topics as the storage of nuclear waste and the use of drones by the military. “It is important that technicians engage in politics more,” Elise says. “Technology is the future and politicians decide on that future. Creating good policies requires collaboration.”

A step back?

After the event, she needed some time to recover, so she joined her programme’s Europe trip. “It was a great way to get away from it all. I do not regret anything about last year, but it was not always easy to move from one activity to the next.” That is why she is now taking things a bit easier. At least, she is trying to. “I am not taking any subjects this year, but I am a board member at Astatine, which requires me to be in six committees. I am part of two more committees at my student association Xoun. Oh, and I am also working on my research.”

ROBOT ETHICS AT A GLOBAL SCALE

What ethical challenges do robots present in our society? Will they cause the unemployment rate to rise? Should we leave the care for our elderly to robots? Will they teach our children? What about autonomous weapon systems? Several weeks ago, UNESCO published a report on the ethics of robots, which covered themes such as these. The report was drawn up by the World Commission on the Ethics of Science and Technology (COMEST), which I became a part of eighteen months ago.

Without exaggeration, I can state that the commission is one of the most inspirational environments I know. UNESCO is basically the “world ministry” of education, culture and science. The organisation strives to inspire the policies of all member states regarding those fields. Most people will know UNESCO from its World Heritage List, which contains material and immaterial matters that cannot be lost. The organisation does much more than that, though, such as examine the ethics of science and technology.

Co-writing a recommendation about the ethics of robots is a remarkable experience. UNESCO’s core philosophy is that the whole world sits around the same table and we are all trying to find common ground. The composition of a commission like this truly makes you realise how limited your own point of view is. I thought I knew virtually all active technology philosophers and ethicists, yet in this – carefully selected – commission, I knew just a few. Such mistakes arise when you limit your circle to just the people who speak English. UNESCO offers simultaneous translation into several world languages, which expands everyone’s world. Suddenly, you find yourself not only discussing the effects of robots on employment opportunities, but also the importance of humanitarian robots that can provide aid during disasters and the value of drones for precision agriculture. Instead of yet another talk about the privacy concerns involved in using robots in our private lives, we are also considering the effects of sex robots on relationship values. When talking about healthcare robots, the discussions are not only about liability, but also about dignified ageing, respect for the elderly and the extent to which that respect can be made an integral part of the design and use of healthcare robots.

A theme that got universal support was the line between man and robot – or rather, the importance of carefully considering that line. When a robot’s algorithms allow it to learn, its actions can ultimately no longer be traced back to the choices made by its designers. In that sense, it is like a child that starts to live a life of its own. Furthermore, robots are better at some things than people: making diagnoses, for example, or issuing verdicts in a court of law while taking all prior jurisprudence into account. How can we make sure that certain major decisions, e.g. those pertaining to life and death, are made in a justified and responsible manner? What roles can we assign to robots and which must be reserved for humans?

More often than not, we deal with questions rather than answers. Questions are the foundation of ethics, however, especially when you are sitting at a table with the entire world. In a world that is changing faster as a result of technological developments than we can keep up with in an ethical sense, such discussions are absolutely needed.

“ROBOTS ARE BETTER AT SOME THINGS THAN PEOPLE: WHAT ROLES CAN WE ASSIGN TO ROBOTS AND WHICH MUST BE RESERVED FOR HUMANS?”

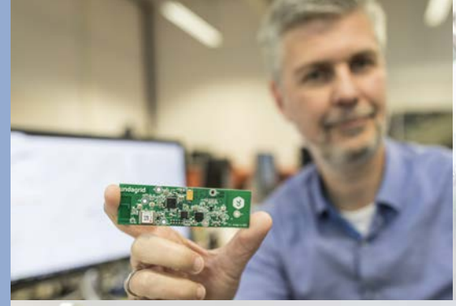
PROF. DR. IR. P.P.C.C. (PETER-PAUL) VERBEEK (1970) IS UNIVERSITY OF TWENTE PROFESSOR OF PHILOSOPHY OF MAN AND TECHNOLOGY.

TRACK & TRACE SYSTEM FROM ENSCHEDE CONQUERS AIRPORTS ALL OVER THE WORLD

UNDAGRID SPREAD ITS WINGS

At times, an airport can look like an anthill. Not just because of the thousands of passengers and all the airplanes, but also because of the logistics involved. From moveable stairs to pallet dollies and from push backs that take airplanes to the taxi lanes to luggage carts. With its unique sensor and location information system, UT spin-off Undagrid makes it easier to track all that materiel. The start-up of four years ago is now ready to take over the world.

BY **Frederike Krommendijk** PHOTOGRAPHY **Rikkert Harink**



MARCUS' TIPS FOR SCALE-UPS:

- Focus on one or a very limited number of sectors with your technical product. This will make you a serious conversational partner who can really think along about custom solutions. If you only offer generic technical solutions, you are more easily replaceable.
- Technology is wonderful, but do not forget about the importance of proper marketing and business development to promote your product.
- Experience with business development is a real advantage. If you do not have it yourself, hire someone who does.
- If you need investments, find someone on your team who has experience in this area and allow them to focus on that specific task. The rest of the team can then devote its time and energy to the development of your product and your organisation. Be sure to also make use of the wealth of knowhow and contacts that the Kennispark can offer in this regard.
- Do not fret in the face of competition. If you are properly ingrained in your chosen sector, you will not be replaced overnight.

Schiphol, Frankfurt, Heathrow, Dubai: Undagrid's innovation is already being used at some of the largest airports in the world. In the years to come, the company will expand to airports in Asia, Africa, North America and Australia. The only thing currently holding the organisation back is its shortage of staff, such as engineers: Undagrid employs 18 people and has seven vacancies at the moment.

"Schiphol called after just two weeks and told us that everything worked fine and we could start our implementation"

How do you deal with the tumultuous growth from start-up to global player? According to Marcus Breekweg, UT alumnus and Business Development director and co-founder of Undagrid, maintaining a clear focus is vital. "After we developed our sensor network based on the first client case at Schiphol, we could have offered it in a generic form to all kinds of sectors. You can imagine that there is also a need for more insight into the location and status of materiel in the agrarian sector, in ports and in hospitals. We chose a different path, however, and focused entirely on airport logistics. If you meddle in all kinds of sectors, you cannot gain extensive knowledge of any one domain. Clients then tend to see you as a technology supplier, rather than a business partner. By acquiring in-depth domain knowledge, we managed to become a leading organisation in collecting, processing and analysing information from sensors on objects in the aviation sector."

A clear overview

Undagrid's sensor system creates an overview of the location and status of every piece of materiel found in an airport, from dollies to stairs and push bars for airplanes. That eliminates a lot of searching, prevents errors and disruptions and therefore saves money. "An airplane is only profitable once it is in the air. The aviation sector is therefore constantly looking to optimise its efficiency. Clients can save between ten and twenty percent by digitising their logistical processes and eliminating surplus materiel. Everything is registered: location, fuel level, maintenance status. Our systems easily pay for themselves."

Undagrid started in April of 2014 after its first successful pilot project. Breekweg, who has a degree in electrical engineering from the UT, worked together with Rolf van de Velde, who has an excellent track record in corporate life, Christiaan Willemsen, who possesses a wealth of technical expertise, and Lennart Schroer, who is the organisation's marketing specialist. That mix of knowledge and experience allowed the company to grow as fast as it did. "Many start-ups fresh out of university focus on the technology or the product. Even if you have the best equipment in the world, you are nowhere without true entrepreneurs on your team; people who can foresee both technical developments and the way the market will move. The UT offers so many areas of expertise, such as business administration. It is important to collaborate with those fields."

The four entrepreneurs really stuck their necks out for the pilot project at Schiphol. "The test was to take six weeks. We told ourselves that it would be a real risk if our system did not work. We got a call after just two weeks in which they told us that everything worked fine and we could start our implementation. Everything moved fast from then on. The aviation sector is a small world and news spreads fast."

Investing their own money, as they did in the beginning, is no longer possible now that Undagrid has grown so much. "My advice to start-ups looking to make major investments is to make sure they have the right expertise. Besides having technical product knowledge and management expertise, you should also have one experienced individual on your team whom you can send out to negotiate with investors."

Maintaining focus is important, then; on your sector, on your business operations and on other sectors similar to your own that might present new growth opportunities. "We are currently exploring possibilities in the Norwegian off-shore industry. That sector is quite similar to how airports operate, in terms of the handling of freight to and from drilling platforms. Although the two sectors are similar, the latter also requires specific domain knowledge. We are looking for the right industry partner to provide that. You cannot know everything about everything. You shouldn't even want to."

"Our systems easily pay for themselves"

Name	**Sarthak Misra**
Age	**41**
Position	**Professor**
Education	**Mechanical Engineering McGill University (Montreal, Canada) and John Hopkins University (Baltimore, US)**
Lab	**Surgical Robotics Laboratory**

BY **Marco Krijnsen**
PHOTOGRAPHY **Gijs van Ouwerkerk**

In the 1966 film Fantastic Voyage, a team of special agents enters the body of an important scientist aboard a miniaturised atomic submarine to remove a blood clot from the scientist's brain. Science fiction? Not for researcher Sarthak Misra. "I expect to live to see something like that." In Misra's case, he is talking about flexible robot-controlled needles that move through the human body like snakes. They avoid obstacles like organs or tissues and reach their target with an exceptional degree of accuracy. They can be used to e.g. conduct a biopsy, the removal of a piece of tumour in a vulnerable location such as the patient's brain, prostate, lung or liver.

Misra came to Twente from Canada in 2009 to realise his dream. "We want to avoid the trauma of major surgery with the help of robotics and make a correct diagnosis as early as possible. If we succeed, we can increase patients' survival rate." Misra, who established the Surgical Robotics Lab in Twente and also spends one day a week at the University Medical Center in Groningen, has reached an advanced stage of development with the robot-controlled needles. "We have successfully completed preclinical studies with biological tissues and cadavers. I think we are about three years away from the first tests on real patients."

"We want to avoid the trauma of major surgery with the help of robotics"

Sarthak Misra works on flexible robot-controlled needles in the Surgical Robotics Lab.

WOODEN CRATE WORLD LEADER

Apple, Volkswagen and Tesla, they are all doing it: 3D printing. The rising popularity of this technology is partly due to Ultimaker, a Dutch manufacturer of 3D printers that made three-dimensional printing possible for consumers. The company was founded by UT alumnus Siert Wijnia (44). He explains the journey that took him from studying mechanical engineering in Twente to becoming a global leader in 3D printing.

BY **Marco Krijnsen** PHOTOGRAPHY **Maarten Hartman**

"By sharing technology, we can reach our goal of making 3D printing available to as large an audience as possible much faster"

Investment company NPM Capital recently acquired a share in Ultimaker. This was a welcome injection of capital used for the ongoing development of the organisation's 3D printing technology. The complicated deal with the investor brought back memories of his student years for Siert Wijnia. "I was a member of the Ius Sanctus fellowship, which stands for Sacred Law. We debated legal and ethical limits. How do we correct ourselves? What rules do we need in society? How do you deal with power and crisis situations? What is and isn't acceptable? Those were lively discussions between students from various programmes. I learned a lot there. We faced similar questions when we had to draw up the agreement with NPM Capital. It was like the discussions of old, just without the students and all the beer."

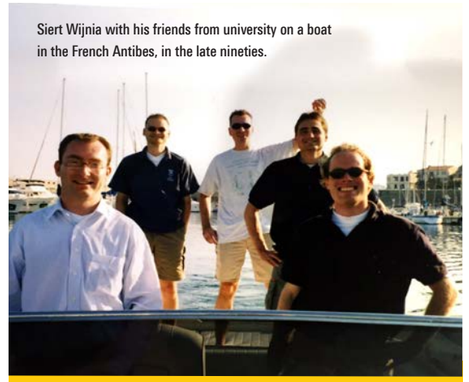
Speakers and mushrooms

Wijnia was a typical mechanical engineer. He loved Lego Technic and tinkering around with speakers and amps. Studying mechanical engineering at the UT was a logical choice for him, although he also had a significant interest in philosophy. That was reason enough to join the Panta Rhei society. "We studied Spinoza, debated the concept of time and had someone from the smartshop explain mushrooms to us. As a first-year student, I was interviewed for the campus magazine and said that I came to Twente for more than the study programme alone. I wanted to see, experience and learn everything. I wanted to understand the way the world works. I didn't quite pull that off. To be honest, I still don't understand it today."

McDonald's

His lack of understanding of the world and his desire to make that world a little bit better are both reflected in his entrepreneurial spirit. "My life's goal is to realise fully decentralised production, instead of hauling everything all over the world. It is absurd that the plastic toys inside my children's Happy Meals at McDonald's come all the way from China. Surely we are able to make something like that at home?"

Wijnia once calculated – on a paper tissue – how much CO_2 we pumped into the atmosphere over the past century. The result was a half-metre-thick layer of CO_2 that covers the entire planet. He is not sure if his calculations were entirely correct, but it is the principle that counts: we have to treat our environment better. The calculations on the tissue inspired him to make his own windmill using a 3D printer in the FabLab in Utrecht, where he worked at the time. The windmill functioned for two years, which proves that you can change the world on a



Siert Wijnia with his friends from university on a boat in the French Antibes, in the late nineties.

SIERT WIJNIA

(1973) studied mechanical engineering at the University of Twente between 1992 and 2000. Next, he worked as a control systems engineer at Fluor, an engineering firm based in Haarlem, and as a lab manager in ProtoSpace's FabLab in Utrecht. In 2011, he founded Ultimaker together with Erik de Bruijn and Martijn Elserman. The company's head office is based in Geldermalsen and it has a secondary location in the United States. Ultimaker employs three hundred people with thirty different nationalities all over the world. Wijnia acts as the company's CTO.

small scale using 3D printing technology.

De Wereld Draait Door

This would eventually lead to the foundation of Ultimaker in 2011, together with Erik de Bruijn and Martijn Elserman. The company got off to a great start after an appearance on the TV show *De Wereld Draait Door*. "Our 3D printer produced a whistle during the show. Suddenly, the entire country knew what 3D printing was."

The Ultimaker 1 required some assembly. "We called it our wooden crate," says Wijnia. His partners and he visited national and international tradeshows with their product. Their printer proved to be more stable, more accurate and far cheaper (€1,200 excluding VAT, ed.) that those of their competitors. "Many attendees bought the Ultimaker for themselves, so they could produce things at home. That is how our 3D printer ended up in organisations where people discovered they could use it to make a modified prototype in 48 hours, instead of two weeks."

"You have to do more than release a nice 3D printer. It is all about quality, sales channels and service"

That speed is one of the strong suits of the Ultimaker, even now that the third generation has launched. Volkswagen Autoeuropa, for example, uses it to print components for the machines that produce car parts. As a result, the car manufacturer is less reliant on external suppliers and can save a lot of time and money. "Another advantage is that the engagement on the work floor increases. Employees are more involved in the process," Wijnia explains.

PUNISHMENT FOR VAN VUGHT

During his time as a member of the Ius Sanctus fellowship in Twente, Siert Wijnia witnessed a remarkable lawsuit. "We had our own penal system with alternative punishments for those who broke the rules. At the stroke of midnight, we sang the national anthem while facing a portrait of the Queen on the wall. One evening, Frans van Vught, who was the rector of the University at the time, was with us. He was engaged in conversation with one of our members. Both of them forgot to sing the anthem and were ordered to appear in our improvised court of law that same night. The verdict was to apologise and drink orange liqueur. Later, Van Vught became an honorary member of our fellowship. This was all in good fun, of course, but the proceedings had a serious undertone: it was about respecting mutual agreements."

More than a hundred countries

Ultimaker became the biggest organisation in 3D printing in the world: a global player that multinationals like to do business with. The company has a location in the US and exports its products to more than a hundred countries – all in a time when many competitors collapsed. "There is a shake-out going on. We are regularly contacted by businesses that want to be taken over. If you want to survive, you have to do more than release a nice 3D printer. It is all about quality, sales channels and service."

What is even more remarkable is that Ultimaker makes no secret of its technology, which is shared via open source. The community has circa one million users. The Research & Development department, with a staff of seventy, sometimes struggles with that fact, Wijnia acknowledges. "Using open source gave Ultimaker an advantage in terms of the development of software and firmware. The quality of the printer improved by making the firmware better. When people encountered problems with their printer, they could try to find a solution themselves. We learned to listen closely to our end users and their needs. That allowed us to improve our products, so we can reach our goal of making 3D printing available to as large an audience as possible much faster."

"Realising smart societies is a complex affair. You must continuously ask yourself whether you are doing the right things"

MASTER CLASS

Do you want to know more about managing digital transformation processes in the public sector? The Digital Transformation in the Public Sector master class gives you all the information you need and covers practical cases. Take a look at utwente.nl/pld for more details. The master class will start in March of 2018.

SMART CITIES AND THE ROLE OF OFFICIALS

They worked together on a few occasions in the past. Two passionate men; one a scientist, the other a government official. From their respective backgrounds, both advocate the use of digital information streams for government policies. Dick Laan, programme manager Information Provision Social Domain at the municipality of Enschede and UT professor Maarten van Steen of the Centre of Telematics and Information Technology (CTIT).

BY **redactiebureau Ravestein & Zwart**

The municipality of Enschede was one of the first to start digitally assisting jobseekers, e.g. using their personal data. The initiative falls under the category of smart societies, in which digital information is used for government policies. The success of such projects depends on the degree of participation from citizens, Van Steen argues. "It is important to involve citizens in what you want as a municipal government from day one. The municipality of Enschede sticks its neck out, experiments and pushes boundaries. It has to, because one party alone does not have all the answers. That is why it is good to interact with other parties, such as knowledge institutes, corporations and citizens. Smart societies cannot be approached from one angle alone. There is so much more involved than just the technical aspects. Think of the ethical, legal and social factors. Realising smart societies is so complex that you, together with everyone involved, must continuously ask yourself whether you are doing the right things."

Laan: "Digital information exchange and innovation are a must. Nevertheless, many municipalities tend to overlook the importance of IT. Many officials do not realise that investing in digital information exchange actually leads to cost reductions, because it results in a more effective deployment of assets. More importantly: citizens get better and faster help and they have more control over their own affairs." He continues: "In Enschede, we have joined forces with Zwolle, Deventer and Groningen to determine how we can change the mindset of municipal governments. That is a major challenge; how can a programme manager and proponent of digital information exchange bring their colleagues at city hall on board?"

Van Steen notices a discrepancy between private and professional attitudes towards digital information exchange. "Apparently, there is a world of difference between home and work. Officials who are opposed to digital information exchange in the workplace use their smartphones at home to share the latest news with friends and family. Back at city hall, they revert back to their outdated systems thinking. It will be quite a task to get officials to realise the importance of digital information exchange. I think that is one of the biggest hurdles to overcome in order to successfully realise a smart society."

IN **BRIEF**

SOCIAL ATTACKS

When it comes to the security of online systems, people continue to be the weakest link. PhD candidate Jan-Willem Bullee therefore executed several “social attacks” at the University of Twente and studied the effectiveness of countermeasures. Some of his findings: a personalised phishing email is fifty percent more effective than a similar message that is not addressed to the recipient.

Forty percent of the UT’s staff members installed malicious software after receiving a fake phone call. After being chatted up, 59% of the staff members gave their office keys to an unknown individual. Good information helps to prevent such attacks, but mostly when too much time hasn’t passed between one receiving the information and the attack itself.

BEST TECHNICAL UNIVERSITY

The University of Twente has significantly improved its overall ranking in the Higher Education Guide. Every year, this publication compares the quality of the bachelor’s programmes of all Dutch universities. The average score of the UT’s twenty bachelor’s programmes increased from 60 to 67 points, which took the UT from the eighth to the third position in the overall ranking. The Higher Education Guide has therefore selected the UT as the best technical university. Rector magnificus Thom Palstra is thrilled about the “excellent ratings.” “This demonstrates that our staff’s hard work actually leads to tangible results that our students experience and appreciate.” Four UT programmes earned the “Top Programme” hallmark, which is reserved for programmes that achieve a score of 75 points or higher. The programmes in question are Applied Physics, Chemical Engineering, Technical Computer Science and the comprehensive honours bachelor’s programme ATLAS of the University College Twente.

FIFTH PLACE

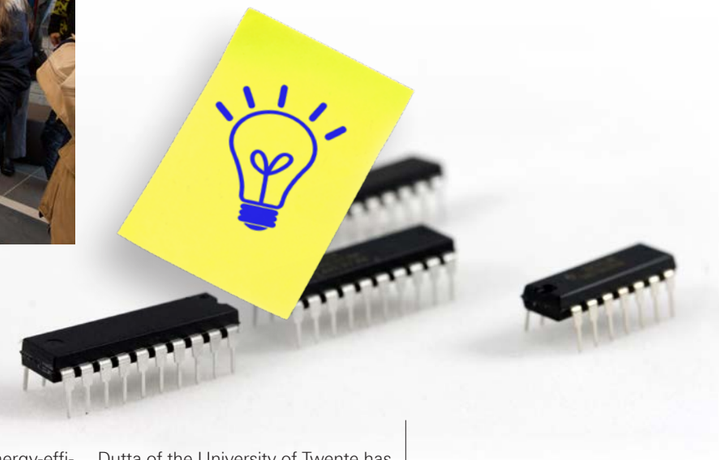
This past October, Solar Team Twente finished fifth during the World Solar Challenge, a 3,000-kilometre race through Australia in a solar-powered car. The students from Twente barely missed out on a podium position due to a time penalty. Nevertheless, team leader Olivier Berghuis is tremendously proud of “his team.” “We faced setbacks and are proud of our performance. We started in twentieth position and finished in fifth. We left more than twenty-five teams behind us. That proves we built an amazing solar car. We pushed the boundaries of technology and our team.”

ED BRINKSMA

Ed Brinksma, UT professor and former rector magnificus of the UT, will be the new chairman of the Presidium of the Hamburg University of Technology. At the UT, Brinksma was integral to the development and implementation of the Twents Educational Model and the foundation of University College ATLAS. He was also closely involved in the foundation of the DesignLab and jointly responsible for the introduction of the tenure track model for scientific staff. Brinksma: “I am sorry to leave the UT, where I spent most of my academic career and to which I owe more than I can say.”

3D-PRINTED SHIP PROPELLER

A cooperative alliance that included the University of Twente won the Computable Award 2017 in the category “SME IT Project of the Year” with the largest 3D-printed ship propeller in the world. The four-hundred-kilo propeller, made of an alloy of copper, nickel, aluminium and bronze, was printed at RAMLAB, an experimental workshop with 3D metal printers based in the port of Rotterdam. UT researcher Wei Ya was in charge of the project.

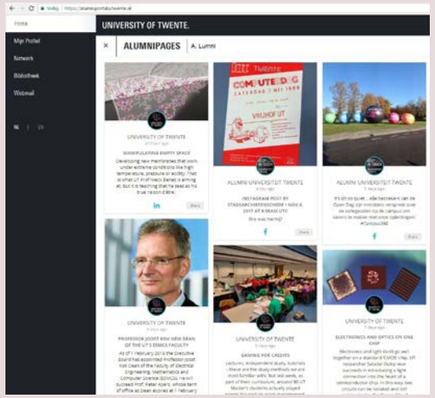


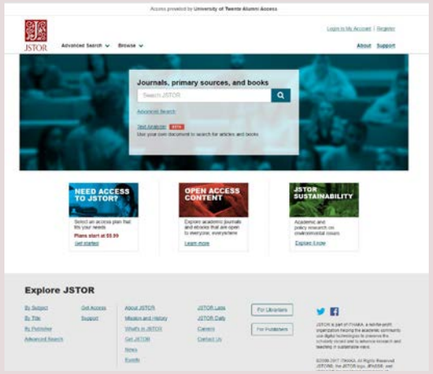
PHOTONICS

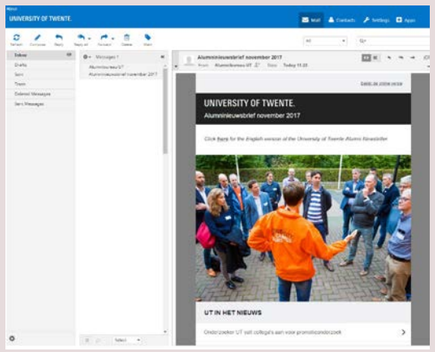
In order to develop more energy-efficient, better and faster equipment, we have to store and send our data using photons (light particles) instead of electrons: photonics instead of electronics. However, electronics and light do not work well together on a chip in the standard production process. PhD candidate Satadal Dutta of the University of Twente has managed to create a light-based connection in the heart of a chip. As part of the transition to circuits that only use light – “photons instead of electrons” – it is also possible to develop hybrid designs that operate both optically and electronically. Dutta’s invention can bring both worlds together.

More information about these items can be found at: www.utwente.nl/en

NEW ONLINE PLATFORM ALUMNIPAGES AVAILABLE







Are you curious about what your friends from back then are doing now? Are there people you used to work out, drink, live or study with and whom you would like to reconnect to? Now is your chance to log in to the entirely new online platform AlumniPages. More than 45,000 alumni have already made an account.
BY **the Alumnioffice**

What does the platform have to offer?

* Easily find your friends of old, discover what they are doing now and keep in touch.
* Set up your life-long alumnus email address on any device.
* Log in to AlumniPages with your Facebook account.
* Use the links to Facebook and Twitter; show your public posts in the portal to let your fellow alumni know what you are doing.
* Gain access to the online JSTOR database. This database gives alumni access to tens of thousands of articles and more than two thousand renowned scientific journals.

Discover the possibilities yourself and take a look around the platform. Log in with your student number and password at alumniportal.utwente.nl. If you have lost your password, you can request new login details via email or text message on the website.

You can create a profile on the AlumniPages platform where you can publish personal, study- and work-related information. We maintain high privacy standards, which means that all fields are set to 'invisible' by default. Your information cannot be accessed or looked up without your explicit permission.However, the higher the quality of your profile information, the easier it will be for other alumni to find you and the more successful a reunion can become.

We are constantly improving the AlumniPages for you and your fellow alumni. If you encounter a bug or have any tips on how to further optimise your user experience, let us know in an email to alumni@utwente.nl.

SPECIAL ALUMNI SELECTION FOR PROUD ALUMNI

The UT's new and improved web shop went live last month. The Alumni Office has made a special 'alumni selection' out of the articles listed above. This selection offers you everything you need to show the world that you are a proud UT alumnus! If you place your order before 31 December 2017, you can use the discount code 'ProudUTalumnus2017' to get a 20% discount on the alumni selection!

FIRST EDITION OF ALUMNI TALKS IN A PACKED AMPHITHEATRE

The Alumni Office kicked off the inaugural edition of Alumni Talks on Friday 13 October in a packed Amphitheatre. Alumni of all ages from all over the country listened to four successful UT alumni: Peter-Paul Verbeek (professor of Philosophy of Technology), Guus Rijnders (professor of Nano Electronics), Bram Nauta (professor of Integrated Circuit Design) and Marco Jansen (co-founder of Catawiki). The speakers reflected on their student years and presented their views on future developments in their fields of expertise. The next edition of Alumni Talks is scheduled for 5 October 2018.

ALUMNI ON THE MOVE

Ank Bijleveld (BSK '86) was elected as Minister of Defence in October of 2017 after several previous political positions. She served as the King's Commissioner in Overijssel from 2011 until 2017.

Per October 2017, **Matthijs van Bloem (CS '11 / BA '12)** works as an Online Marketer at Aldi Nederland. He previously worked at Canon, Saxion and Oad Reizen, among other places.

Willem Bonekamp (BSK '05) works as Manager Corporate Communication at KPMG Nederland since October 2017. Before this, he worked at Burson-Marsteller as director of Public Affairs & Corporate Communication.

In September of 2017, **Johannes Braams (EL '86)** started his work as Senior advisor cybersecurity at Royal HaskoningDHV. He left KPN, where he worked for more than 25 years as a Senior IT project manager, among other things.

Theo Camps (PhD '95) is the independent chairman of the board of the Rabobank Pension Fund. Camps is a professor of organisational behaviour and public administration at TIAS School. Until 1 June, he served as chairman of the board at Berenschot.

Since September 2017, **Ben Hekster (EL '92)** works as Principal Staff Engineer at FogHorn Systems, Inc. Before this, he worked as Principal Software Engineer at BlueKai/Oracle.

Wouter Huijgen (CT '01) started his work as a Senior Process Technologist Biomass Technology at Royal Cosun R&D in October of 2017. After obtaining his doctoral degree from Wageningen University, he worked at the ECN (Energy research Centre of the Netherlands) for ten years before moving on to Royal Cosun R&D.

Per October 2017, **Koen klein Tank (BIT '11)** works as an Associate Director Data & Analytics at KPMG Hong Kong. He made a career for himself at KPMG after doing his final thesis project with the organisation in 2010/2011.

Geert-Henk Koops (CT '88 / PhD '92) joined SUEZ – Water Technologies & Solutions as Global Technology Leader ES Products in October 2017. Previously, he managed several R&D departments, for example at GE.

After completing the public administration programme, **Willem Korevaar (PA '10)** worked at Royal Haskoning DHV for more than a decade. Since October of 2017, he joined Tebodin as a Business Developer Foods.

After obtaining his PhD in Computational Optics, **Milan Maksimovic (PhD '08)** held various Optics research positions at MECAL Focal BV and DEMCON Focal. Since September 2017, he works at Apple as a Senior Optical Systems Scientist.

After earning his PhD in Computer Science, **Joost Noppen (INF '02 / PhD '07)** worked at several British universities. Per September 2017, he works as a Senior Researcher Software at British Telecommunication (BT).

Constant Putman (TN '89 / PhD '94) started his work as Manager Supplier Management at Friesland-Campina in September of 2017. Before this, he worked in a variety of positions at Shell for more than a decade.

Per September 2017, **Harry Sanders (TBK '95)** works as Manager Business Intelligence at ProRail. Prior to this job, he held several management positions at e.g. VGZ, Accenture, Atos Origin and ING.

Mischa Strating-Veth (TCW '04) started her work as Senior Adviser Internal Communication at KPN in September 2017. She previously worked at Boskalis as Manager Learning & Development.

Since October 2017, **Mingming Sun (MEEM '08)** works as Senior Solution Delivery Analyst at McKinsey. He has worked in China for several years now and previously held positions at e.g. WWF and Southpole Carbon Assets Management.

Since October 2017, **Erms Suripatty (BSK '97)** works as Project Manager at Yamaha Europe N.V., where he focuses on CRM. Previously, he held several CRM management positions at PwC Nederland, CRM Partners and ING, among other places.

René Tonn (CT '05) works as Front Line Leader at Abbott in Zwolle since October 2017. Before this, he worked in various departments at DSM for more than ten years.

Per October 2017, **Joris Uilenreef (BIT '90)** works as Strategic Adviser CIO at the Municipality of Utrecht. Before this, he spent a long time at Accenture as a Manager (Managing Consultant) Digital, among other things.

Rene Veltman (WB '00) works as a Senior Structural Composite Design Engineer at The Spaceship Company since August of 2017. He previously worked at several aviation and aerospace companies, such as Stork Fokker, UTC Aerospace Systems and Bombardier Aerospace.

After working at Rabobank for more than a decade, **Annelyn te Wierik - de Gooij (PA '06)** started a new job as a Senior Financial Adviser at the Municipality of Hengelo in October of 2017.

The most recent updates can be found on **twitter.com/alumniUTwente**. If you have a new job yourself or know someone who did something noteworthy or won an award, you can submit your tips via **alumni@utwente.nl**

COLOPHON ALUMNI NEWS

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PROFESSOR DE WINTER AWARD FOR AINARA GARDE

During the Dies Natalis on 24 November, Ainara Garde, assistant professor in the Biomedical Signals and Systems department, received the Professor De Winter Award from Wilma van Ingen.

Garde received the award for her article *Respiratory rate and pulse oximetry derived information as predictors of hospital admission in young children in Bangladesh*, which was published in BMJ, an open-access medical journal. Garde, who is active in the field of biomedical engineering and technical medicine, conducted research into earlier and more accurate diagnoses for children with serious illnesses in developing countries. Garde developed a predictive algorithm for oxygen deficiency, which is a general symptom of the most treatable illnesses in children. It correlates to the severity of the disease and is also a recognised risk factor. With the help of a finger sensor linked to an app, she collected data on the oxygen saturation of the patients' blood and their heartrate. Based on this data and a measurement of the patients' respiratory rate, the algorithm offers an early and faster diagnosis, which means treatment can start earlier and patients' lives could be saved. Ainara Garde's career is promising. She has extensive international experience, already published more than fifty peer-reviewed articles and received various grants and awards.

Professor De Winterprijs
The Professor De Winter Award, named after the professor who passed in 2005, is an international publication award for female top talent. The award, which consists of a sum of €2,500, is funded with the Professor De Winter Fund, a "named fund" set up with the Twente University Fund by the late Mrs De Winter and perpetuated by the heirs Hoving and Van Reijn. This year marks the eleventh time that the award was given out.


Left to right: Elling de Lange, Wilma van Ingen, Herman Hazewinkel and Wilma Toering

WILMA VAN INGEN CHAIR OF THE TWENTE UNIVERSITY FUND

Since 9 September, Wilma van Ingen is the new chair of the Twente University Fund Foundation.

Van Ingen serves as chair of the Board of Directors at Nysingh Advocaten & Notarissen. She also holds positions in various directorates and supervisory bodies, for example at ROC Twente. In the past, she worked as General Director of the Chamber of Commerce for the eastern Netherlands, among other things.
The new chair has an extensive network and feels strongly connected to the education in the region of Twente. She strives to develop a good relationship between educational institutions and corporations, for example. In the past, she already served on the University Fund's board for a number of years. Van Ingen wants to enhance the fund's profile, strengthen its ties to corporate life and expand the fundraising activities.

Elling de Lange new treasurer
In addition to Wilma van Ingen, Elling de Lange also joins the fund's board as its new treasurer. De Lange is a member of the Board of Directors and the CFO of the technology conglomerate TKH Group in Haaksbergen. Previously, he held final responsibility for the Kabelproductiegroep Netherlands-China and had an international career at Ballast Nedam.

DEPARTURE OF HERMAN HAZEWINKEL AND WILMA TOERING

Herman Hazewinkel and Wilma Toering stepped down as, respectively, chair and treasurer of the Twente University Fund Foundation on 9 September.

Herman Hazewinkel, former CEO of VolkersWessels, served as a board member between 1995 and 2008 and as chair from 2010 until 2017. Alumna Wilma Toering acted as treasurer for more than nine years. Under their guidance, the fund significantly expanded its fundraising and crowdfunding activities in recent years. Successfully so, as the number of annual donations increased from 250 to 700.

Badge of honour from the University
During the opening ceremony of the University of Twente's academic year, Herman Hazewinkel received a badge of honour from the University. Victor van der Chijs, chair of the UT's Executive Board, thanked Hazewinkel for his hard work: "The University benefitted from his knowledge, experience and network for more than twenty years, for which we are all extremely grateful." Hazewinkel will continue his relationship with the UT as a member of the UT Ambassadors Network and the Fundraising Committee.

ALEMBIC STUDY TOUR JAPAN

Japan was the destination of the study tour organised by the Alembix study association. During a summer that was hot even by Japanese standards, twenty students visited chemical companies over a period of three weeks to be inspired and witness first-hand how chemical science is being put into practice on the other side of the world. Of course, there was also plenty of time for cultural activities, such as a visit to Mount Fuji and various Japanese castles. The students also attended a Japanese tea ceremony. Finally, a bicycle tour through Kyoto had to be included on the itinerary of a bunch of Dutchmen far from home. All in all, this was an amazing experience, made possible by donations to the Twente University Fund.

START ANNUAL CAMPAIGN ANNIVERSARY YEAR

A growing number of alumni and relations show their involvement with the University of Twente by making a donation to the University Fund's annual campaign. In this manner, they support our active students and brilliant researchers. Since 2014, the number of donations has steadily grown from 250 to nearly 800 in 2017. The University Fund will celebrate its 70th anniversary in 2018. Over the course of this anniversary year, we hope to reach 1,000 donations. With your help, we can reach that milestone!

YOUR CONTRIBUTION MATTERS, EVERY SINGLE YEAR

If we have your contact information, we will send you another personal donation request in December. This year, you can support the following four projects:

You can find more information about these projects in the letter or at www.utwente.nl/maakhetverschil

CONTRIBUTORS' RECEPTION 2018

More and more contributors attend the annual contributors' reception, where students and researchers report on their projects and demonstrate that your contribution was well spent. We hope to welcome you during the contributors' reception in 2018. Be sure to mark the date on your calendar: Friday 5 October. After the reception, you can attend the Alumni Talks.

MAKE A DONATION? If you want to make a donation visit www.utwente.nl/maakhetverschil or transfer your donation to IBAN NL 09 ABNA 0592 7191 89 in name of the Twente University Fund. Be sure to reference the annual campaign and the project you wish to contribute to.

JESUS CHRIST SUPERSTAR UTWENTE

Under the direction of the cultural organisation Apollo, this famous rock opera was performed by UT students on 24 and 25 April. The actors and musicians were all students. Members of e.g. SHOT, MSO, STuBiBa, Pro Deo, Nest, Musilon, Chasse, Arabesque, 4 happy feet, several bands, Artez AKI and the conservatory spent many months organising and rehearsing this rock opera in the Rabotheater in Hengelo. This event was sponsored by the Twente University Fund.

EUROPEAN UNIVERSITIES ROWING CHAMPIONSHIP IN SUBOTICA

The European Universities Rowing Championship was held in the town of Subotica in the north of Serbia this summer. The Dutch delegation included two teams from the Drienerlose Roeivereniging Euros: the men's straight four and the women's double. After a remarkably successful season, both teams got ready for the final tournament. Each team proved its worth and made it to the A finals. Unfortunately, the men were unable to continue their streak in Serbia and finished in fifth place. The women's team, on the other hand, gradually climbed the ranking and finished in second place. We want to congratulate Helen Harmsen and Minke Holleboom with their silver medal. The Twente University Fund is proud to sponsor the teams.

WOULD YOU LIKE TO ENDOW A NAMED FUND?

You can support the University of Twente by making a one-off donation, a regular contribution or by naming the University Fund as a beneficiary in your will. It is also possible to endow a 'named fund', provided its purpose is in keeping with the general objectives of the University Fund. You decide the fund's name and how its resources are to be spent. The minimum donation required to establish a named fund is € 10.000,-.

More information
See www.utwente.nl/ufonds or contact Maurice Essers on +31 53 489 3993, email m.l.g.essers@utwente.nl

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ALUMNI TALKS

Alumni Talks is an annual event for UT alumni. The inaugural edition with the theme “See the Future” was held on Friday 13 October. In a sold-out Amphitheatre, attendees were presented with a substantive programme that included lectures from alumnus Marco Jansen, co-founder of Catawiki, and three leading professors and UT alumni: Peter-Paul Verbeek, Bram Nauta and Guus Reinders.

Wilfred Finkers

DIES NATALIS

The dies natalis was celebrated on Friday 24 November in the Waaier. Rector Thom Palstra presented five defining themes of the UT:

- ‘Improving healthcare by personalized technologies’,
- ‘Creating intelligent manufacturing systems’,
- ‘Shaping our world with smart materials’,
- ‘Engineering our digital society’ and
- ‘Engineering for a resilient world’.

Suzanne Hulscher, UT professor of Water Engineering and Management, gave the dies speech. UT researcher Dong Nguyen won the Overijssel PhD Award, while the Professor de Winter Award was given to Ainara Garde.

TWENTE SCIENCE NIGHT

A new edition of the Twente Science Night was held in the centre of Enschede on Saturday 7 October. The theme was ‘World of Tomorrow.’ Visitors got to enjoy an interactive game of pinball which was projected onto the Grote Kerk, in addition to robot soccer, a pub quiz and a scientific exposition.

SLIDING AROUND TOGETHER

You find yourself at the starting line. Through the trees, you catch fleeting glimpses of the groups that came before you. They are soaked and covered in mud. You hear the shouted commands: "Come on, crawl. Faster!" You have a strange feeling in the pit of your stomach. Excitement, or was last night's final beer one too many? Then the signal: you are next. Together with your group, you sprint to the first obstacle. The storming of the Bastille has begun.

BY **Marieke Vroom – bron U-Today** PHOTOGRAPHY **Gijs van Ouwerkerk**

A new period

The storming of the Bastille marks the real start of your time as a student, says UT student Annemarie Smid of the introduction committee of 2017. "Just like the French Revolution started with the storming of the Bastille in Paris, the storming on campus symbolises the start of a new period in the lives of future UT students."

For decades, the obstacle course has been one of the most popular components of the Kick-In. That was also true when alumna Jolande Baudet-Kors organised the introduction in 1996. "The storming of the Bastille is an integral part of the programme. As an introduction committee, you do not even consider leaving it out."

Fun, challenge and teambuilding

Baudet-Kors believes the success of the event is easy to explain. "Sliding around together will get anyone excited. The competitive element certainly helps. Which team can get to the Bastille building the fastest? That creates a strong bond with the rest of your group." Smid agrees. "The storming looks like a lot of fun, so everyone gets excited about their turn. It is a challenging event and a great teambuilding activity."

Over time, a lot has changed. In 1996, the course consisted of a large slide, some set pieces and rope ladders to climb the Bastille. This year, the groups covered a course that was hundreds of metres long and included a wide range of obstacles, including a toboggan run, a balance beam, a net to crawl under, a pool and a slip 'n slide course. One thing is for sure: no one got away clean.

"The storming of the Bastille is an integral part of the programme"

What can a lecturer do? You feel like you explained everything well, yet most students still fail their test. When UT lecturer of academic skills Sandor Löwik (UT alumnus TBK) experienced this himself, he was so intrigued by this "learning threshold" that he decided to research it. His work earned him the Brinksma Innovation Grant for innovative education. "It is extremely useful for a lecturer to ask themselves what they are not covering in their classes?"

BY **Frederike Krommendijk** PHOTOGRAPHY **Rikkert Harink**

YOU CAN LEARN TO LEARN

SANDOR LÖWIK STUDIES WHY A LECTURER'S KNOWLEDGE IS NOT TRANSFERRED PROPERLY

Löwik is certainly not the only lecturer who expected his students to know more than they actually did. Studies show that when an expert explains something, they only transfer around thirty percent of their knowledge. The other seventy percent are overlooked. "They are not doing that on purpose. It is just that the majority of the material is so basic for the expert that they do not explicitly mention it. Most lecturers do not even realise they do this. They only wonder why their students fail to grasp something that seems so obvious to them. Students, however, must first cross a threshold of not knowing. Once they do, they will barely comprehend how they could fail to understand something before."

Not one earned a passing grade

The lecturer encountered this problem himself last year, when he asked third-year students to pick four final thesis projects and determine how these graduates put theory into practice. The assignment was to result in a five-page essay. Out of sixty essays, not one earned a passing grade. "As a lecturer, it is easy to think that students simply failed to understand everything you told them. On the other hand, I asked myself what I failed to explain to them. Once I gave them more instruction and individual feedback, they were able to complete the assignment. Did they really learn anything from that, or had I made the entire thing far too easy for them? Were they learning or simply repeating a trick?"

Threshold theory

To answer that question, Löwik read up on scientific literature and came into contact with the threshold theory: the barrier that everyone encounters before they "get it." "I wanted to know where those thresholds are. As a lecturer, you have to think carefully about how you solve a problem in your own head. It is like someone's first driving lesson. The instructor tells you every little thing: how to use the clutch and the gas pedal, for example. For someone with years of driving experience, the whole process is so obvious that it can actually be hard for them to explain how it works. The same goes for teaching. It is all too easy to stand on top of a mountain and tell your students to climb. If someone has never done anything like that, it is up to you to give them the right tools and allow the student to discover what method of reaching the summit works best for them."

Of course, a lecturer has far more (life) experience and therefore more tools and knowledge. "We are talking about university students, though. It is fair to expect some basic skills. The problem is that lecturers do so many things automatically that it can be hard for them to imagine how someone else can struggle with the same material. It would be good to realise that. If you are talking to a French person who cannot understand you, it will do you no good to start yelling louder and louder. You will have to find more inventive ways of getting your message across."
Löwik does not want to join the people who complain about "students these days." "Of course, I hear those arguments: students are not really learning anything anymore, they lack a solid foundation of knowledge. Nevertheless, it is your job as a lecturer to connect to your students and guide them across the threshold of not knowing. We must transfer our knowledge and expertise more effectively and we should expect students to actively participate in their process of understanding. They have to find out what works best for them."
He is now using his new teaching method on 35 students. Before and after the course, they were asked to fill out a questionnaire and their knowledge was evaluated in the interim. Not everyone was equally excited. "It also leads to more uncertainty and I ask for more effort and initiative. I have to think about how I transfer knowledge, but they have to gain insight into their own learning process as well. That requires far more effort than passively consuming lectures and thinking that a subject 'just isn't for them' when they fail."

> "It is your job as a lecturer to guide students across the threshold of not knowing"

Löwik spends one day a week on his research and expects to implement elements of his teaching 2.0 method halfway through this academic year. He will start with his own lectures first, before trying to get other lecturers on board. "It would be great if this method was applied on a larger scale. I believe that students will benefit from this for the rest of their lives, once they get it. Only once you truly understand something can you also apply it in other contexts."

Maarten van Beek, UT alumnus of industrial engineering and management, works as director of human resources (HR) at ING. In his eyes, his work is about expertise. "We have the responsibility to develop the expertise of everyone in an organisation," says Van Beek. BY **Hans van Eerden** PHOTOGRAPHY **ING**

ING'S HR DIRECTOR CONDUCTS DOCTORAL RESEARCH

After finishing the organisational psychology programme, Maarten van Beek followed professor Joseph Kessels van Leiden to Twente. Kessels founded the Human Resource Development chair at the UT and dedicated himself to the research and design of learning environments. "He taught me how to develop a curriculum for adult education and how you can invest in people's training in a way that also has a positive impact on the organisation. For Kessels, that involved theory, research and practice. It was great to see everything come together."

Proof

"The field of human resources is developing. It is increasingly driven by analyses," Van Beek notes. "We have to demonstrate that interventions, e.g. training programmes and rewards, bring out the best in employees. Kessels taught me how to prove that."

This forms the core of Van Beek's career. Since 1999, he has held a variety of positions in the field of HR – from recruitment to talent management all over the globe at Unilever. He rose to the position of executive vice president HR at Mölnlycke Health Care. Since 2015, he works as HR director at ING Nederland. "I want to elevate this field to the next level and work with proof: measure how people's expertise develops when you invest in them."

Agile

The foundation for this proof was partially laid in Twente. "I valued the fact that the programme offers both an academical foundation and practical applicability. That combination is rare." He still has ties to the UT. Van Beek collaborates with Celeste Wilderom, UT professor of Change Management and Organisational Behaviour. He hopes to obtain his doctoral degree with his research into the effectiveness of leadership in an agile context.

"In the Netherlands, ING is the largest organisation to have adopted the agile method. Everyone works on client-oriented projects as part of an independent, multidisciplinary team. With this method, ING strives to be more efficient and flexible, innovate faster and be more appealing to its people by giving them much more freedom and responsibility than they would get in a more traditional organisation."

He continues: "There are not many studies concerning the leadership characteristics that are most effective in such an environment. It is one of my ambitions to identify what makes the agile method such a success at ING."

Message

Van Beek's doctoral research is "a long-term hobby." Nevertheless, he could not wait to convey his message, so he started writing his own book. Its title will be hr-impact, de kracht van vakmanschap (HR impact, the power of expertise). In this book, he once again strives to bring theory and practice together. "I feel an obligation to help the new generation of HR managers develop themselves and their field."

Powered by that same drive, Van Beek holds positions at various other organisations, e.g. Cordaid (development cooperation), BASF (digital advisory board) and the Kessler Foundation (social care). "It is important to me that HR is represented in the supervisory boards of such organisations." This characterises Maarten van Beek's pioneering mindset and the enthusiasm with which he executes the HR profession.

HUIZE SCHILDPATIO

In a large pond, situated in the middle of the courtyard at Matenweg 30, there lives a tortoise. The animal probably doesn't notice the barbeques and parties that go on around it. Nevertheless, it is extremely important to the residents. They have even named their house after it: Schildpatio. BY **Marieke Vroom** PHOTOGRAPHY **Arjan Reef**

SEVENTEEN RESIDENTS FORM A CLOSE-KNIT GROUP OF HOUSEMATES

It is a Wednesday, just before dinnertime. Eleven students and two domesticated rats sit in the shared living room. The room is filled with sofas, a long bar, refrigerators and an elaborate construction made of around forty crates of beer, the residents' monthly supply. Large plates of pie sit on the table. Nina Poth, one of the residents, is celebrating her birthday. The housemates had a big party in the Vestingbar last night, as they always do on birthdays. Today, they are taking it easy with soda and tea.

Out in the cold

In total, this house is home to seventeen students: five women and twelve men. Their rooms are located in a square around the patio. Everyone has to go around the outside to reach the common area. "New residents often need to get used to that," says Vito Böke (master ME). "Especially in the winter." This design also has advantages, he says. "Once you get to the living room, you are less likely to head back out into the cold to go to your own room. That is why we spend so much time together. Despite our large number, we form a close-knit group of housemates."

National heritage site

Architect Herman Haan designed the patio residences on the campus on 1965. He was inspired by the cave dwellings of a Tunisian Berber tribe, where tribesmen could access the various rooms of their dwelling from a central, closed-off courtyard. That design is reflected in the patio complex. From the closed-off patios, one can access the students' rooms, the living rooms and the kitchens. Two years ago, the campus residences were designated as a national heritage site. "That is great, of course, although we were afraid that there would be stricter rules about what we can and cannot do in our house," says senior resident Rowan van der Moezel. "Fortunately, nothing has changed except for the plaque on the wall outside."

That means the house could continue to host its annual flat party. It attracts around four hundred students, among them some former residents. The preparations for the party take weeks. "We always try to start on time, so we can avoid most of the stress. That has never worked, though," Nina Poth (bachelor PSY) laughs. Together, the residents turn Schildpatio into a party location with two stages: one for DJs and one for bands. The residents often climb onstage themselves to perform. Partygoers buy a plastic beer mug for ten euros, which they can then refill for free all night long. Unlimited access to alcohol combined with a pond in the middle of the dance floor; that is a recipe for disaster, right? The residents nod. Every year without fail, at least one student ends up joining the tortoise for a swim – intentionally or not.

Always someone home

"People often feel sentimental about their student years. I know I am when I think back on my time at Schildpatio," says former resident Wessel Reijers (alumnus PSTS'2014). "It was great that there was always someone home to have a drink with, make some music with or just hang out with in the living room after a party. It felt like one big family." He now lives in Dublin, where he is working on a PhD in philosophy of technology. Like many other former residents, however, he regularly comes back for a visit.

> "Frying snacks together made this place feel like home"
> - former resident Wessel Reijers

The house contains many reminders of former generations of residents. One example is the flat book with old documents, memorable quotes, grocery lists from the 90s and the crown jewel: a fine of six hundred guilders for "illegally removing and appropriating two Christmas trees." "It is traditional for the newest residents in the house to get us a Christmas tree every year when we celebrate the holidays," current resident David Versteegen (bachelor BMT) explains. "They manage to get one every year, but not always without consequences. In 1999, three residents were caught after sawing down two trees on campus and dragging them home."

Daily traditions

For Wessel, the most important traditions were not the annual parties and events, but rather the smaller day-to-day stuff. "Eating dinner together, then drinking a cup of coffee and spending evenings in the living room drinking beer and frying some snacks. There were times when we did this every single day. It truly made you feel like a part of Schildpatio. After spending a weekend with your parents, it felt like you were coming home in Enschede."

Want to add a profile of your student house (current or former) on facebook.com/AlumniUT?Get in touch via alumni@utwente.nl

TRAFFIC IS LIKE A PUZZLE

Marthe Uenk-Telgen (32) brings her two degrees – in civil engineering and applied mathematics – together to solve the puzzles of transport studies. As a senior traffic consultant at the National Data Warehouse for Traffic Information (NDW), she studies big data concerning our traffic. BY **Hans van Eerden** PHOTOGRAPHY **Maarten Hartman**

The NDW collects and distributes traffic data. Governments use this data for their traffic policies and management and to conduct traffic analyses. Think of e.g. monitoring the annual growth of our traffic, gaining insight into where and when traffic jams are most likely to arise, where noise problems occur and when the best times are to schedule maintenance. Big data also helps to determine the best strategy for driving in a traffic jam. Can the data reflect events such as a major football match or a strike by elementary school teachers? Marthe Uenk-Telgen lives for those kinds of questions. "It is like a puzzle. How can we get all those cars through the network effectively? What do we have to do to achieve that and how can we affect people's behaviour?"

Big data

As soon as she graduated in 2010, Uenk-Telgen found work in this sector. She started out at Arane, a traffic and transport consultancy firm where she e.g. advised the previous Minister of Infrastructure and Public Works on the feasibility of the 130 km/h speed limit on highways. "Realising 130 km/h zones everywhere was impossible, because of legislation pertaining to noise pollution, air quality, nature and road safety. No one at the ministry had access to the complete picture, however. I mapped out every area that was ineligible and made sure that the remaining sections of road were not too fragmented."

In 2012, she moved on to the larger organisation NDW, where she is now part of the Strategy & Innovation team and works with the big data that our traffic system generates. "What new types of data can we collect, which enrichment techniques can we use on it and how can all this benefit our clients?"

Predicting traffic

Machine learning is a relatively new development: artificial intelligence that can e.g. draw up traffic predictions. "If the road authority knows how the traffic stream will develop in fifteen minutes' time, they can take appropriate measures right now and control traffic more effectively. Information on the volume of traffic and its average speed, combined with historical data, can be used to predict the risk of incidents." Furthermore, Uenk-Telgen says there is a strong demand for data on bicycle traffic. "You can gather this data anonymously from cyclists' smartphones. Mobile data from motorists also has a lot more insights to offer, such as information on their point of origin and destination." These are all pieces of a massive puzzle that Marthe Uenk-Telgen is eager to solve.

AGENDA

Wednesday 24 January
Conference Twents Meesterschap

Wednesday 14 - thursday 15 February
Career Fair, Bedrijvendagen Twente

Saturday 21 April
Batavierenrace

Thursday 21 June
Entrepreneurial Day

Sunday 12 - tuesday 21 August
Summer School CuriousU

Monday 3 September
Opening Academic Year

Friday 5 October
Alumni Talks

Further information:
www.utwente.nl/en/events

THE UNIVERSITY OF TWENTE is a young, entrepreneurial research university. Our scientists, lecturers and students are pioneers in the field of combining technology and social sciences. We call this "High Tech Human Touch." With our active, curious outlook on the world, we detect major social challenges. Our top-of-the-line research and education lead to change, progress and innovation to resolve today's challenges all over the world: "intelligent manufacturing systems," "digital society," resilient world, personalized healthcare technologies and "smart materials." Our university is characterised by our unique cross-disciplinary approach and our excellence in such research domains as biomedical and nanotechnology, IT, robotics and geo-information sciences. The University of Twente has more than 10,000 students, over 40,000 alumni and 2,600 employees and it has already contributed to more than 1,000 successful start-ups and spin-offs.

COLOPHON
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A SMALL WINDMILL REVOLUTION

BY **Hans van Eerden** Photography **Antoinette Borchert**

Using small windmills, EAZ Wind wants to make a major difference in the transition to sustainable energy. That is the dream of UT alumni Bart Claessen, Aard Duivenvoorden, Timo Spijkerboer and IJssebrand Ziel and Saxion alumnus Sjouke Ritsema. After their graduation, they started building windmills in the shed of Ritsema's father and they installed the first one on his neighbour's property.

A steel mast and wooden blades with excellent fatigue characteristics create an attractive appearance. They design the windmills themselves, Ziel explains. "Although it is great that you can tap into an entire pool of knowledge at the UT from time to time." Alumnus Tom Jansen, who achieved success with the UT spin-off Distimo, acts as the team's mentor and they learn about most of the ins and outs of entrepreneurship in practice.

EAZ (Enschede Aan Zee) was founded in 2014 and currently has more than thirty employees. Eighty wind turbines have already been installed in Groningen's countryside. Another hundred windmills have been ordered for next year. EAZ's next step will take the organisation across the border into Germany and, perhaps, later to Ireland and Canada. Besides farmers, village communities can also decide to install a wind turbine. Since a year and a half ago, production takes place locally in Hoogezand with a focus on simple logistics and social support. "We want to take the next major step in 2019. We continue to develop the turbine in order to further reduce the cost price and significantly increase our production numbers.

"We have to further reduce the cost price, so we can significantly increase our production"

For more information:
www.eazwind.com