

# Pulse. Magazine

#1 - 2022



## The unexpected *impact of art* on health

COLLEGE TOUR WITH  
BLANCA SPEE AND BAS BLOEM

### PAVING THE WAY

3 Women in health &  
high tech tell *their story*

### PHOTONICS

*The next Delta Works*  
of the Netherlands?

### WILHELM HUCK

*Big Data robot lab will*  
shape the chemistry of  
the 21st century



# COLOPHON



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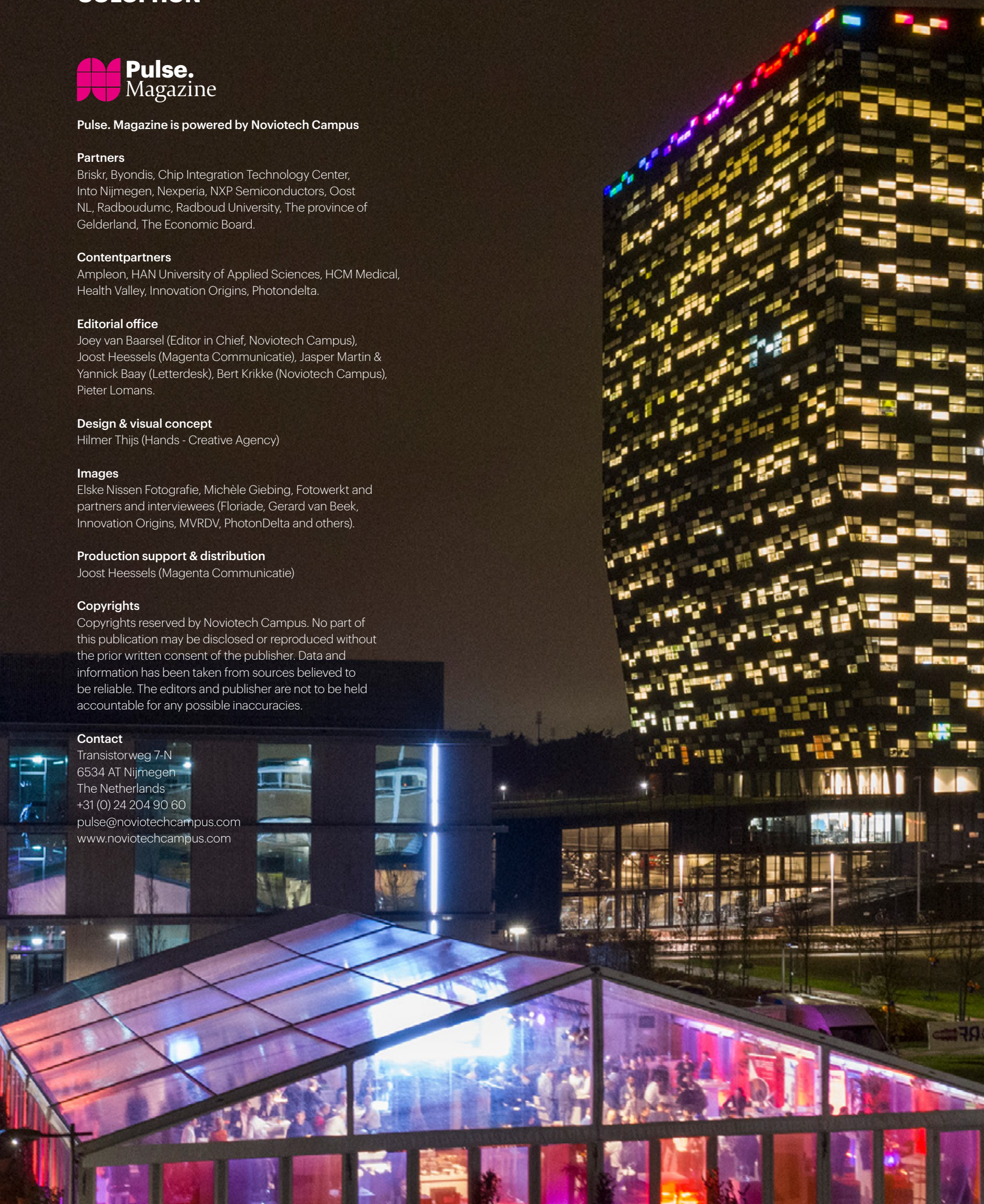
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# Pulse. Magazine

## #1: The Vibe of the Future

**To most of us, the future remains a mystery. Yet, there are some who dare to look far beyond what is known, seen as normal or generally accepted as common thinking. People who dare to look deep into the depths of the unknown, balance at its edge, and take the leap. Because they want to be the change our future needs. People who start something.**

You don't need to be a special kind of person to do, create, move, change or just shake things up. No matter what you do, no matter where you are. And even though it can obviously be helpful, you don't necessarily need a specific background or academical record. As long as you have your mind and your heart set, and the drive to make it. Whether it's today or tomorrow. Right here, right now: you can start something.

That's why we started Pulse. A magazine where we share the stories of people who are on a mission to make positive impact, pushing themselves and our society forward, day by day. An ode to entrepreneurship in its broadest sense and purest form. We explore, view and highlight innovation and research from different perspectives. By sharing the knowledge and experiences of innovators in health & high tech, and creating new connections between them, we hope to give another impulse to innovation. And together, we discover what innovation actually means: to ourselves, each other and the world around us.

This edition is themed 'The Vibe of the Future'. For obvious reasons, we hope you enjoy having and reading this magazine, as it continues to surprise you, makes you wonder and smile from time to time. Our future, however, is both exciting and alarming at the same time. No reason to be scared, quite the opposite actually. Because with great challenges, come even greater opportunities. A unique momentum and you're up to it: our future needs you.

I hope this magazine will inspire you to be a part of this movement. To start something yourself, or continue on the exciting and entrepreneurial journey you already started. Because one day, who knows, one thing might just lead to another – and together we will spark the pulse our future needs.



– Joey van Baarsel, Editor In Chief

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# Open up again: unlocking our society's potential



**For quite a while we were convinced that the economy is a globally shared phenomenon, a worldwide understanding that, in order to move forward, we have to work together. However, over the past few years, we started to see tendencies of an isolating trend. Both countries and companies choose to work behind closed doors and prefer to do things on their own, instead of innovating together. But in order to face the challenges of the future, we will have to open up again and find each other on innovation campuses and science parks.**

Joining forces through open innovation is the way to go if we want to face the challenges of the future. We will have to work together if we want to create a more sustainable economy, an inclusive society, and a safe and healthy environment for everybody. This requires companies to share their knowledge and experiences and learn from each other. Of course, with the caveat that intellectual property rights need to be respected. Together with knowledge institutes and governments, we will have to invest a lot of time, energy, and resources to make all of this possible and affordable. But most of all, it will require all of us to share information, openly exchange knowledge, and work together.

The good news is: this open innovation attitude is rooted deep in the DNA of the Dutch. Our country has a tradition of sharing information

and working together. Some might refer to this as 'Polderen', and it is all about connection, collaboration, and especially trust. These are the values that enabled the innovations which shape our everyday lives and will continue to do, if not more so, in the future. If we embrace these values once again, we've got a huge opportunity for the Netherlands to take the lead and show the way forward.

The key to reversing this trend of isolation, is to keep bringing bright minds together. I'm convinced that the beating heart of this effort, lies in innovation campuses and science parks. These fertile grounds nourish meaningful entrepreneurship – especially in the health and high-tech industries. They are innovative ecosystems and communities where ambitious, creative, and talented people from all over the world meet. Safe, healthy, and happy environments, sparking the collision moments and collaborations which eventually lead to the innovations that will shape a future-proof society.

All of the possibilities are already right here under our noses. But we can only unlock this potential if we share, connect and collaborate. Because if we want to stay ahead, we will have to work together.

**Charles Smit – Senior Vice President & Head Corporate Affairs Nexperia**



A close-up portrait of Wang Long Li, founder and CEO of Tinybots. He is a young man with dark hair, looking directly at the camera with a slight smile. He is wearing a light blue button-down shirt over a white t-shirt. The background is a dark, textured grey.

GOING GRIT

# Tinybots: “We’re here to make history, not a quick buck.”

What is the key to success? Is it about personal traits, like talent, intelligence or creativity – and what about your resources, like money, a vast network and power? Some think it has everything to do with grit: the passion and perseverance one dedicates to reaching long-term and meaningful goals. In Going Grit we explore the stories of innovators in health & high tech. We dive into their inspirations and motivations as we try to understand their leitmotiv. Will we get a glimpse of their grit factor? This edition: Wang Long Li, founder and CEO of health innovation company Tinybots.



At a very young age, Wang became an informal caregiver. Together with his mother, he had to take care of his father, who became seriously ill when he was just 16 years old. "That made me really want to improve healthcare. I became particularly interested in patient behaviour. If you pay attention to behaviour early in the process of an illness, you can truly impact your clients' health." This motivated Wang to do doctoral research on new technologies in healthcare, and that is where his journey in making a meaningful change to healthcare really took flight.

### **Tessa: the robot that cares**

"During my PhD research, I studied new technologies in healthcare and how to use them meaningfully. We focused on the elderly and people with cognitive impairment. Based on this research and contact with clients I found that, in addition to physical needs, people also have psychological needs. People really want to be involved with others, remain competent in their actions and retain autonomy over their lives."

It was during that time that the idea for Tinybots started to take form. "I designed a new robot based on these needs. A robot which provides guidance in crucial situations, but in a homely and warm manner. Clients very much want to maintain their autonomy, so our robot will never give out commands. The robot will ask a question or might give a suggestion at the right moment, in such a way that the client is encouraged to take the right decision themselves." Their first care robot was born, named: Tessa.

### **A sticky note away**

Wang explains that Tinybots is more than a robot company. "In the end, it's all about understanding our patients. Only a few weeks ago we met this elderly man who was 'running away'. Yet, once we understood that he was not running away at all, but he was actually running towards something, it changed everything. From his perspective, he was looking for his wife who had just gone grocery shopping. So we

put up a sticky note on the fridge, saying: "I'm out for groceries, be back in a minute, have a cup of coffee" - and the man didn't leave the house any longer. It's about this switch in perspective, that allows you to interact with your patients and actually help them. Technology enables us to provide this help."

Wang recognises some of these situations from his own experience as an informal caregiver. "When I was 16 years old, my dad got seriously ill and I was one of the only Dutch-speaking members of my family. I supported the medical trajectories with my father, performing administrative tasks and helping with basically all less physical needs. This experience confronted me early on with the impact a disease has on the people surrounding a patient. For example, if you have to be the one who brings bad news to a relative, in this case, my father. This really takes its toll, both on the patient and his or her (informal) caregivers. Tinybots aims to make things a bit easier for those people too."

### **"GRIT IS ABOUT SHOWING COURAGE AND DETERMINATION DESPITE DIFFICULTIES"**

#### **Driven from the inside out**

Wang's personal history and experience launched his mission to make a difference in healthcare and are still affecting him and his business day after day. "My personal drive particularly affects the way I make decisions. Imagine if I had not felt connected to our mission: I'd have to look elsewhere for guidance. Like in our metrics, the sheer growth of the business." Wang says there are many ways to fulfil this goal. "And there are many ways that dilute your original mission. At difficult moments, my purpose helped me to make up my mind. So that now, looking back, I am proud of my choices." And it allows him to lead with authenticity. "Because I use my own mission to make decisions, I know that I am consistent."

### **"IN THE END, IT'S ALL ABOUT UNDERSTANDING OUR PATIENTS"**

Next to this, his drive is also a way to survive with his company in a highly challenging and competitive market. "We operate in an industry where innovation is in full swing. So as a new company, you really have to earn your place. In the first few years, we were just working on making our business viable. That means working hard. In healthcare, you'll meet a lot of resistance. When facing these types of hurdles, it's crucial to be internally driven, so you won't give up. As a matter of fact, and I'm sorry if I'm being cliché here, but to us, turnover is just a means to an end."

### **A winning team**

In building and growing his team, Wang is always looking for people who fit the philosophy and core values of Tinybots: improving healthcare. What is driving someone, how deeply are they motivated to make a change and what will they do to actually make that happen? "A shared internal motivation, in a trusted and safe environment, creates connectedness. And it's this connectedness that makes us stay together and drag each other through it when the going gets tough. To me, that's what Grit is all about: to keep moving forward and showing courage and determination, despite difficulties and struggles."

Wang's pride echoes through his story: "There are many companies out there trying to use robots for people with dementia. We just do it and help those people. We're here to make history, not to make a quick buck." Tinybots once started with the dream of one PhD student. "Now, we look towards the future together, with a close-knit team that shares a vision. Our drive is what brought us together and I'm convinced that this is what will keep us together and bring us even further on our journey of making a difference in the world of healthcare."



WOMEN IN HEALTH AND HIGH TECH

# Paving the way



The health and high tech industries are still seen as predominantly male, but in fact women are paving the way for the future. We spoke with three women about working in these industries - both the fun parts and downsides - and their tips and best practices for future female talent.





## Christelle Le Cam: From engineering to people management

*Christelle is Technology & Quality Support Senior Director at NXP and working hard to help engineers reach their full potential.*

### The Netherlands as home base

More than 20 years ago, Christelle moved from France to the Netherlands to work at Philips in Eindhoven. She also worked a few years in Belgium and France but in the last 14 years, she has been working at NXP in Nijmegen. She has always had a knack for physics and math. And as an engineer in micro-electronics, she did what she enjoys most: "Chips are fascinating! In my work I get to work on the technologies to manufacture future chips." Part of what makes working in health and high tech valuable to Christelle, is the application of her work in people's everyday lives. "For instance, working on chips that are used in phones and cars is great: you help to advance technology that many people use."

As an expat, there are always challenges when you first start to work in a different country. Christelle chose to try and adapt quickly when she first arrived in the Netherlands. "The first year in Eindhoven was a cultural

shock. I took a course in Dutch culture, which was a real eye-opener," she says. The Dutch directness was one of the biggest differences compared to France. However, she quickly understood that this was not a sign of rudeness, but simply the Dutch way of working.

### Helping engineers reach their potential

Throughout the years, transistors have become smaller and smaller. Christelle has been responsible for an entire technology platform. "The challenge was to make sure the necessary technology is available and ready to use in the production of chips." Now, she is managing a few teams which are, for example, aiming at developing simulation models. This enables chip designers to better predict how chips will behave once they are taken into production and used in cars, phones, and many other products.

She used to work as an engineer, but her current position in management requires different skills. It took a while before she accepted the management position, even though she had received offers before. "For a long time, I was too passionate about working on the technology itself, to move into a management position. Now, I enjoy using my people management skills to make my engineers reach their full potential." Even though it has only been a little over a year, she enjoys her new role.

"I look forward to getting to know the organisation even better and having the best possible impact on NXP as a whole." Her teams seem satisfied, which to her, is the most important indicator that she is off to a good start.

### Traveling the world online

She works in a very international team. This is inherent to the nature of her work, as she is in charge of teams located on different continents. "I work with teams in the Netherlands,

the United States and China", she says. These international contacts are part of the chip industry: "My work enabled me to travel a lot, like going to conferences in the United States or going to Asia to visit manufacturing sites."

Working with teams all over the world requires more than just management skills. As an engineer, Christelle experienced what it's like to be part of one of those teams. She can use these insights in her current role. "I enjoyed working as an engineer. My focus is now on helping engineers grow," she says.

### Leading the way

Helping others find ways to improve and reach their full potential is nothing new to Christelle. Christelle is helping other expats, particularly women, find work. She is contributing to a programme in Eindhoven called 'Women for Women'. "There are many talented women who move to the Netherlands with their partners. They need to find their path as well. And I am happy to help them do so." Christelle continues to lead the way, now guiding female talent more specifically in health and high tech..

Within NXP, Christelle is part of the 'Women in NXP'-board. There are similar boards in all countries where NXP is located. "We aim at empowering female talent, for instance, to reach their career path within the company." Christelle sees positive signs within the company regarding the action that is being taken to the benefit of women. She encourages other companies to follow NXP's initiatives. The 'Women in NXP' board contributes by organising workshops and mentoring. In doing so, Christelle shows that a career within health and high tech like hers is within arm's reach.





## Kasia Nowak: It's about making the right choices

*As a Technical Director at Nexperia, Kasia helps the company realise its ambitious plans.*

Kasia started her academic education in Poland but moved to the Netherlands for her master's degree. She received a scholarship and studied at Delft University. Fast forward 25 years and she is now technical director at Nexperia. "After doing a PhD, I started working in Eindhoven where I was in Philips' Research department. Early on in my career, I got to choose between the 'management'- or 'technical' track. I consciously chose the latter, which has always been my biggest passion."

### A high tech architect

Nexperia is keen to become a big player in chip technology and aims to not only rise to the level of its competitors, but exceed it with new technologies. When Kasia joined, she was hesitant at first, but quickly understood that Nexperia and herself had similar ambitions. She took the challenge. "I didn't want to work on 'simple' chip technology, but at Nexperia I get to work on innovative technologies. This is critical to differentiate from com-

petitors. I also get to expand my expertise and shape the multidisciplinary teams that have to deliver the actual technology. Also, being involved in the complete product development cycle: from a concept, through its realisation, to the final product, I face lots of challenges and a steep learning curve. It's very exciting."

Chips can have different implementations and applications. In the initial stages of her career, Kasia's efforts were focused on boosting chip performance. And after having worked as a "chip architect" for quite some time, she now gets to do even more meaningful work as Technical Director. "One of my key challenges is to come up with innovative and at the same time cost-effective solutions. But it's not just about the technical aspect anymore. I now have to use different skills to manage stakeholders' expectations."

### Adding a sense of direction

The most important task that lies ahead, is giving direction to the technical choices made at Nexperia. "I basically receive product ideas from our product management department. I then judge them in terms of relevance and whether it's realistic that we can turn the idea into actual technology." This also means she has to work together with many people from different domains and across business groups within the organisation. "Marketing, project leaders, designers. All of them have to come together to create something special. It's up to me to fit the pieces together. Clear communication and making the right choices are equally critical."

In the future, Kasia plans to make an even bigger impact at Nexperia. "Not only by sharing as much of my technical expertise as possible with our management but with new employees as well. I see a lot of junior engineers who come straight out of university and still have to adapt to working in our industry. I like helping them find their place."

### Enjoying the journey

By sharing her story, expertise and network, Kasia hopes to inspire other women to pursue a career in health and high tech. She would like to be a role model for them. "Some women might think it's too difficult, or that they need to choose soft-skill oriented careers. I believe it is just as fascinating to work in high tech, where your efforts can have an impact on every single person in the world. Nobody should be forced into a certain career, but I hope to show them how interesting my work is."

Kasia is positive about the chances for women in health and high tech. "Back when I first started working after my studies, I felt like I was pretty much the only woman in this field of work. When working in teams, it could sometimes feel intimidating to work with only men. But I knew there was no other way. Through dedication, commitment, hard work, and perseverance I have managed to push my career forward. But this was never the goal in itself for me. Everything you learn along the way is more important. It's great to see that more and more women are finding their way into our industry too."



### **Anna Walesieniuk: Meaningful work in exciting times**

*As product marketing director at Ampleon, Anna is at the forefront of exciting developments in broadband and communications technology.*

#### **Amazing people from all over the world**

When Anna was finishing her studies back in Poland, where she grew up, a delegation from Philips visited her university. They offered her an internship, which brought her to the Netherlands. As a designer of power amplifiers, Anna travelled the world, working in several countries before returning to Nijmegen, where she now works at Ampleon. “The semiconductor world is very international. As part of my work, I met amazing people and was exposed to many cultures all over the world.”

Ampleon’s technology is an important part of the infrastructure needed to make phone calls or establish an internet connection. “Macro base stations are my portfolio. I am basically advertising the work Ampleon designers do; my former job. It is important for us to maintain close connections with big companies in the phone industry, like Nokia. Our products are reliable, and that’s what I convey to our partners.”

#### **It’s like Star Wars**

Anna is clearly excited about the developments in her field of work. “The developments in 5G technology are like something out of Star Wars.” The result of the groundbreaking work in high tech will be noticeable within our lifetime, she says. “Most likely, autonomous vehicles, or self-driving cars, are something you and I will experience. There is no doubt that our children will grow up thinking this is normal. But the technology is developing at such a pace that it is realistic to expect that we will see it happen as well.” Anna is delighted to be a part of these kinds of technological advances: “It’s great to see from up close how we are turning the seemingly impossible into something real.”

#### **Important industries**

Working in an international setting requires an understanding of many cultures. “I was lucky enough to spend a lot of time abroad, for instance in Shanghai. Part of our team is based there, and having spent time there, I can reflect on why they do things a certain way. That way, I can understand them instead of judging and trying to fix how they work.” After a long spell of working from home, Anna enjoys working at their office again, on the Novitech Campus in Nijmegen. “Being on a campus has advantages beyond the presence of other companies that work on

health and high tech solutions,” she says. “It’s a pleasant place to work and, with all these other companies here, it shows the importance of our industry. I consider this to be healthy competition!”

#### **Big expectations, big impact**

Like most companies in the semiconductor industry, Ampleon has had its challenges with the current shortage of chips. “The automotive and mobile communications industries are definitely suffering.” Still, the biggest challenge in Anna’s work lies in customers’ high expectations. “When the first mobile phone was released, we were all excited to be able to send and receive messages. Customers have raised their expectations, and you have to be on your toes to keep up with all the technological developments.” So making smart decisions is an absolute must in order to stay on top of customers’ needs. Looking ahead, Anna hopes her work will positively impact our society and the planet. “Our technology is part of a system in which energy plays a central role. If we do well, those processes become more efficient. That way we contribute to a positive impact on the environment.” Ampleon is the perfect place for her to achieve this goal: “It’s great to work in an international team of great people. All of different ages and backgrounds – an eclectic mix that does great things!”

#### **Role It Out: female role model agency**

Women working in technology are still a minority. This inspired six women, all working in tech themselves, to do something about it. After winning the Nimma Hacks hackathon in 2021, they officially launched Role It Out: an agency enabling women working in tech to become role models, share their story and experiences and inspire others. Role models are key factors in decision-making related to study and future jobs. With their platform they support women who want their company to become more gender diverse and to inspire young women to choose a career in tech.

Are you working for a tech company that would like to hire more women? Or are you a woman in tech that would like to become a role model? **Get in touch with Role It Out via:** [www.roleitout.com](http://www.roleitout.com), [info@roleitout.com](mailto:info@roleitout.com), LinkedIn or Instagram (@roleitout).



INTERVIEW – WILHELM HUCK

# Big Data robot lab will shape the chemistry of the 21<sup>st</sup> century



**The most complex system in the world around us is life itself, with each cell in your body containing a complex network of molecules and chemical reactions. Chemists have now almost come to the point where they can study and even reconstruct these systems, yet current technology can't fully comprehend its vast complexity. We need a new approach.**

According to Radboud University professor Wilhelm Huck, the chemistry of the 21st century is Big Chemistry. He was granted 97 million euros by the Dutch National Growth Fund to shape the Big Chemistry research programme of the Netherlands. We spoke to him about his ground-breaking plans to build a new world-class infrastructure for research into complex molecular systems.

The Netherlands is one of the leading countries when it comes to research into complex molecular systems. It is a direction within chemistry for which Ben Feringa received the Nobel Prize for Chemistry in 2016. The Netherlands considers this an important topic, as evidenced by, among other things, the 30 million euros previously invested in it through a gravity programme. With the Big Chemistry programme, Wilhelm wants to continue in this direction. "The programme will apply artificial intelligence (AI) to learn from the enormous torrent of data that a revolutionary robotic chemistry lab on the Novitech Campus in Nijmegen will generate. In collaboration with companies and knowledge institutions, such as the Max Planck Institute, we will create a new ecosystem – openly using and sharing data, technologies and knowledge."

**To be honest, we never realised there is a connection between data and chemistry.**

"What's more: the field of chemistry I'm working in has become so complicated and complex that you can't really get anywhere without the use of AI. Many chemical systems become so complex, that at a certain point humans can no longer put their finger on where exactly a certain characteristic of the system comes from. In a sense, the complexity is getting too much for us. That's where AI comes in as a necessary condition for moving forward."

**Why do you need a robot lab to make this happen?**

"In order to apply AI, you need enormous amounts of data to feed the self-learning AI programmes. The more data, the better. This means that we have to organise chemistry in such a way that data is produced and stored properly and reliably. The robot lab we're planning to build at the Novitech Campus in Nijmegen aims to do exactly that. The robot lab will be full of automated, high-throughput systems to provide the torrent of data we use to train the AI systems that can deal with such complex chemical systems."

**"WE EXPECT THIS ECOSYSTEM TO CONTRIBUTE ABOUT 400 TO 750 MILLION EUROS TO THE DUTCH GROSS DOMESTIC PRODUCT"**

"You have to see the robot lab as one big scientific instrument that all kinds of companies and knowledge institutions can start using. It is an infrastructure that we will make widely available. It is not our intention to, for example, make paint; other companies are better at that. We can help them to make new, better, faster formulations that meet requirements such as sustainability. We might also be working together with scientists who, for example, see possibilities to build a computer with DNA and biomolecules."

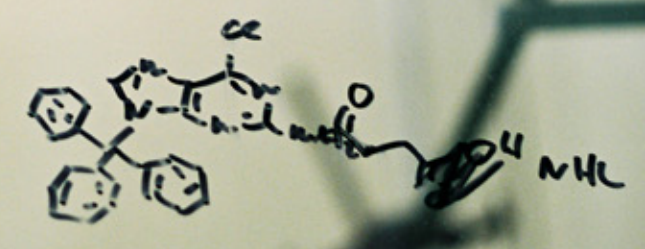
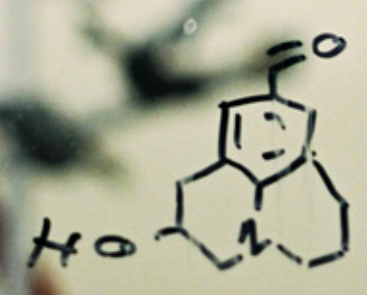
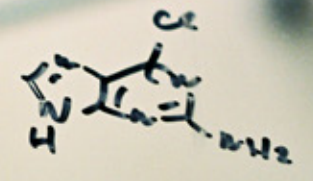
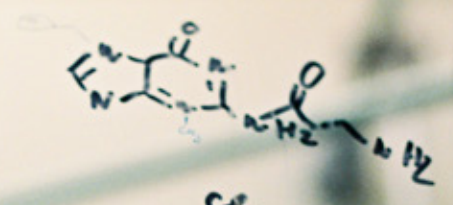
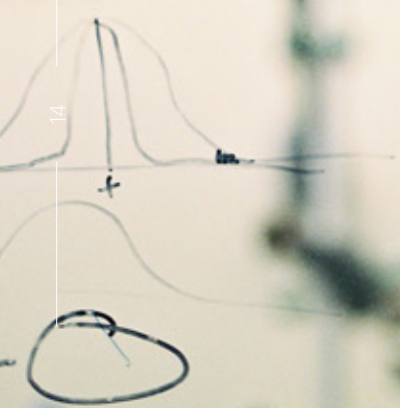
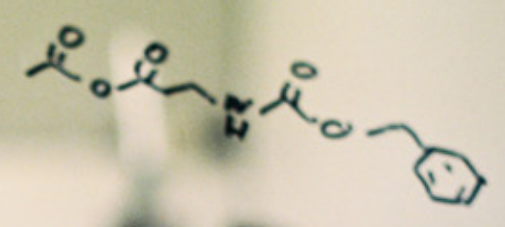
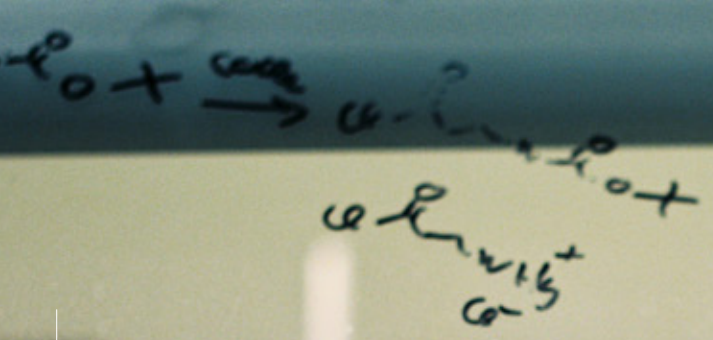
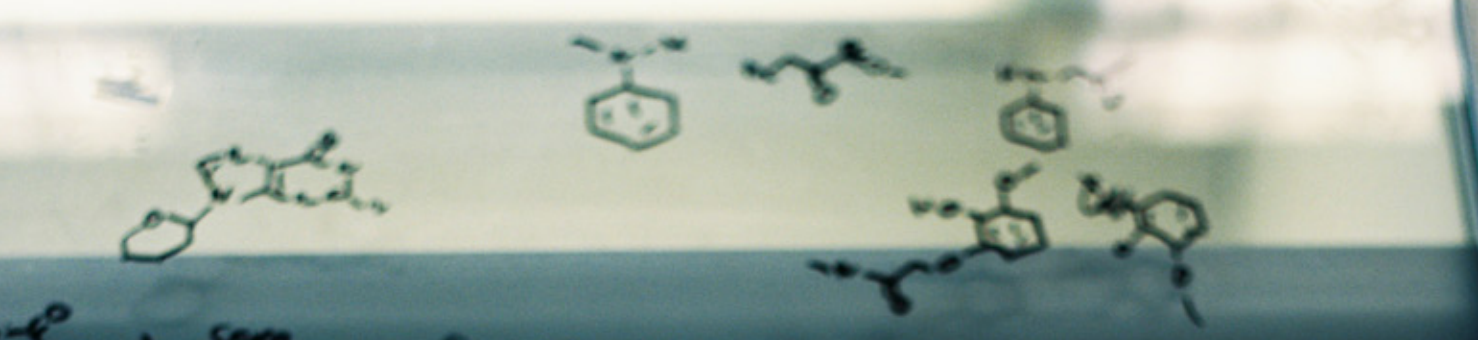
**A lot of opportunities then, but where are you going to start?**

"Well, first things first. We will use the funding we received from the Dutch National Growth Fund. For setting up and building the robot lab. Finding out how you do it, integrating all the components and developing and training the AI. Making sure the AI starts to understand what chemistry actually is, will already be difficult and time-consuming. The next step will be to get together with industrial partners and see which things we can tackle first. We already have contact with companies that specialise in food, soft drinks, medicines, paints and coatings. They all make products based on complicated formulations and processes with many components."

**How do companies benefit from the robot lab?**

"The companies have a lot of expertise, but they often arrive at new products only through a cumbersome process of trial and error. Right now,





formulating those products is still an art, but we want to turn that into a science-based technology! In most cases, that specific taste is the result of a complex combination of parameters. The AI system can use this knowledge to develop new products faster, better and more reliably. In this way, art becomes a skill.

## **“THE COMPLEXITY OF CHEMICAL SYSTEMS IS GETTING TOO MUCH FOR US HUMANS, THAT’S WHERE AI COMES IN”**

But again, it’s important to start simple and develop from there. With the successes, you move on as the basis for new generations of ideas. A robot lab for coatings, a robot lab for formulating shampoo. Modular, by connecting two or three devices per topic first and not twenty right away. With such a simple start – which is already complex enough – you can set up several robot labs for various subjects at the same time, and possibly connect them together later if they prove to be successful.”

### **Connecting several robot labs to each other... How does that work?**

“The underlying value, the hidden treasure trove, is the data that is going into the system faster and on a larger scale. The idea is very strong because – like Facebook and Google – anyone can use it. And the more it is used, the better the algorithm is trained, and the more valuable the database becomes. That is actually the core idea: to bundle everything in a central, physical robot lab in Nijmegen.

## **“WE WILL TRAIN AI TO KNOW WHY BEER TASTES THE WAY IT DOES”**

We also want to combine that robot lab with an absolute top scientific institute that can handle such high throughput, AI and complex chemistry. To do so, we want to bring a Max Planck Institute to Nijmegen. The city already has a Max Planck Institute for Psycholinguistics, which might make the arrival of a second institute a little easier.”

### **Are there similar initiatives globally?**

“Some academic labs and pharmaceutical companies are also pushing for this approach. Consortia in Canada, the U.S. and China want to move toward automated labs, but they’re not that far along yet. So, it’s important that we take the lead quickly. The Netherlands has very good prospects of playing a leading role in this field.

If we do it right, this will become a flourishing ecosystem, and in a few years’ time you will really have to be in Nijmegen if you want to take part in chemical robotics. A boom of new companies could emerge, not only in chemical analysis and synthesis, but also in building equipment, in training people, in AI, and so on. Once it is up and running, such an ecosystem has a strong pull on all kinds of other sub-activities.”

### **What could be the economic impact of such an ecosystem?**

“We expect this ecosystem to contribute about 400 to 750 million euros to the Dutch gross domestic product in the long term. Also, I think the robot lab as a system will already generate money. We have a sort of imec model in mind for this. Imec arose from the University of Leuven with the idea that everything is becoming miniaturised, that electronics are becoming smaller and smaller. That they couldn’t do all this themselves and realised that an open system, a network, was needed for this. Eventually, imec developed into a non-profit organisation, where a lot of money is involved. Where industry and science meet, and which has grown into a major global player from which they still benefit enormously in Leuven. That’s the model we have in mind as well.”

### **Could this ecosystem and the robot lab eventually help to find the origins of the most complex system we know, life itself?**

“We’re not working directly on core questions in science like ‘how did life come to be’. But what we are setting up now is definitely going to contribute to that in the long run. And more than that. Self-learning AI, with Big Data from the robot lab, will eventually provide answers to problems we can’t even think of at the moment. With the money from the Growth Fund, we will establish a brand-new infrastructure for complex molecular systems that is actually impossible to achieve in any other way, and necessary for a different way of doing chemistry. And in the longer term we will also be using this infrastructure for a greener economy, more sustainable production, the fight against environmental problems and scientific issues that we are now only just beginning to scratch.”



**Video robot lab:  
the revolution of self-thinking  
molecular systems**



MAKING WAVES

# Tracking tuberculosis: pinkRF knows precisely *how, when and where*

Viral diseases can radically change the world as we know it, with a huge impact on society. If anything, the COVID-19 pandemic taught us that. Yet there are several infectious diseases that still require better treatments and procedures for diagnosis. One of them is tuberculosis: in 2020 the second leading infectious killer after COVID-19, according to the World Health Organization (WHO). Even though we can already treat the symptoms of tuberculosis with antibiotics, there are still challenges when it comes to preventing it from spreading. Klaus Werner however, CEO and co-founder of pinkRF, plans on changing that.



Klaus Werner  
CEO and co-founder of pinkRF



“One of the reasons why we don’t have effective techniques for diagnosing yet, is the lack of urgency,” says Klaus. “With covid, we witnessed how an enormous effort to speed up testing and the development of diagnostics and treatments made a difference. Tuberculosis is a very stable bacterial disease that’s hard to eradicate once and for all. It’s prevalent in developing countries, where people often work and live in poorly ventilated and overcrowded conditions. In Western countries, the disease is less common, making it difficult to get attention and resources to fight the disease.”

It’s not all bad, though; the covid pandemic did illustrate the benefits of testing and tracking diseases. A process with a lot of potential for improvement, especially when emerging technologies like pinkRF’s are applied.

### **A cough is all it takes**

The current process of diagnosing tuberculosis has its flaws. Currently, skin and blood tests are used to determine whether a patient has tuberculosis. With this method, it can take up to a day to get a definitive result. “People living in developing countries, where the disease is prevalent, often have to travel quite far to reach a testing facility. When they are done testing, they go home, as they don’t want or can’t wait a full day for the results. In addition to that, they often don’t have a cell phone or signal when they get back home.”

People going home to wait for their test results is a serious issue, says Werner. “When it turns out a patient has tuberculosis, they need to go into isolation to prevent spreading the disease. But if they go back to their families and engage in social activities while waiting, they can infect others by just coughing.”

### **Let’s heat things up**

PinkRF takes part in developing new methods of diagnoses, mainly because of this urgency to speed up the process. “A company that develops a new type of tuberculosis test reached out to us. The basic principle is quite similar to a covid test. You use a cotton swab to extract saliva and mix this with a solvent.” The key difference with covid tests, says Werner, is that the solvent that is mixed with saliva has to be heated, to break down the cells and extract the DNA from which a diagnosis can be made. A process that requires quick heating in specific places.”

PinkRF’s technology does precisely that. It can be compared to the heat generated by a microwave. But Werner explains it’s much more effective at its job. “Regular radio frequency is not very subtle. We needed a lot more precision than a microwave to heat.” They achieved this by using solid-state generated RF power. Its biggest advantages? Precision and speed. “A microwave spills a lot of heat or overheats certain parts. If you have all the

time in the world, you can ‘slow-cook’ almost anything to the desired temperature. But there are many instances where you don’t have that time. With our technology, we can heat up to higher temperatures, which means it takes less time to warm something.” As long waiting times to get test results are problematic with tuberculosis, this newfound speed is of incredible value.

### **Let’s speed things up**

“Saving an extra minute means saving extra lives,” Klaus emphasises. “The significance of diagnosing more quickly is truly a big deal. With this technology, we can diagnose accurately within half an hour. People won’t go home and infect others but quickly enter isolation when necessary.” It’s the aspect of fighting tuberculosis that has long been the biggest issue. Treating the symptoms can be done effectively using antibiotics, but diagnosing quickly has been a hard nut to crack. PinkRF’s technology is already integrated into prototype tests that work.

## **SAVING AN EXTRA MINUTE MEANS SAVING EXTRA LIVES**

The next step towards applying this innovative solution, is clinical testing. “Independent parties have to assess its effectiveness. What’s exciting, is that these tests will be performed side to side with current testing methods, in developing countries. If it proves to do what we claim it does – and we’re sure it will – authorities like the Food and Drug Administration (FDA) in the United States still have to approve its use.” The path from coming up with a new technology to the point of it being approved and applied, is long. “The medical world is brimming with rules and regulations. There’s a lot of testing and paperwork involved, which means developing a new treatment often takes years.”

### **Diseases unravelled**

Despite its potential, Werner believes it will take another one to two years before their product will be rolled out worldwide. And that’s not the end of the story, as the fight against other diseases may also benefit from the technology that is now being developed. “Think of what this can do trying to prevent and fight other diseases. The prospect of applying this to more diseases is fascinating.” This may require some patience as well, according to Werner. “We can’t just apply the same recipe to other diseases. Apart from having to go through the whole testing and approving cycle, each disease has its secrets that we’ll have to unravel before applying our technology.”



# Innovation Originals

**Our newsroom publishes articles and news items weekly about the latest innovations in health & high tech – written by our content-partner Innovation Origins.**

**The editorial office selected four articles from the past year we don't want you to miss out on, presenting: the *Innovation Originals*.**



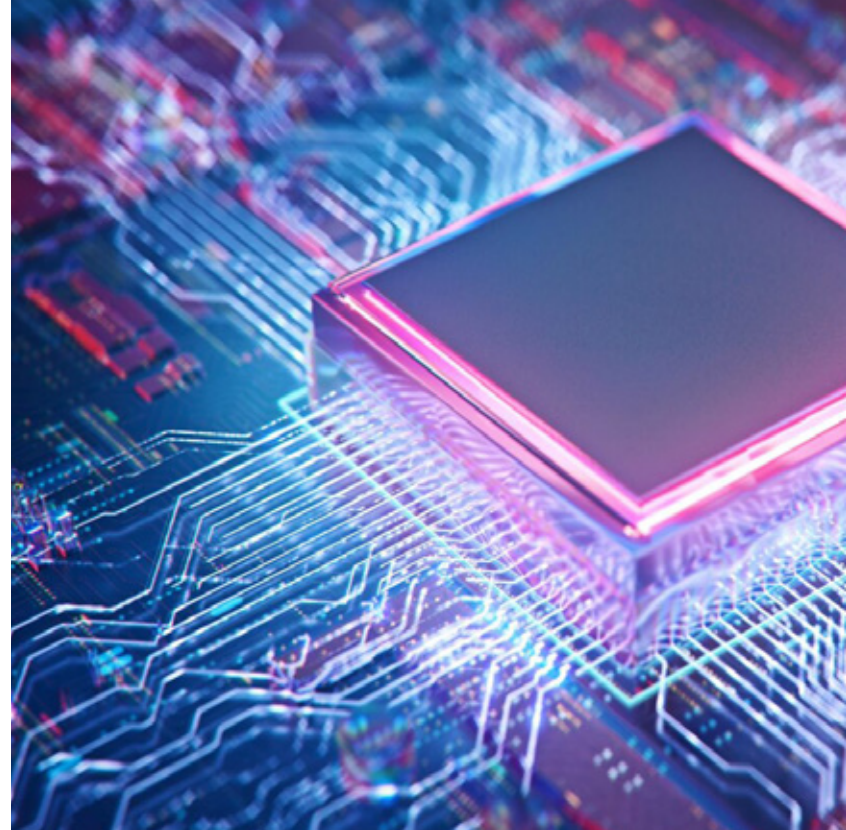
## Breast cancer drug on its way to approval

It probably won't be long before a new treatment for metastatic breast cancer becomes available to patients. That is good news for patients. Although unfortunately, women affected with metastatic breast cancer will not be cured, the new treatment option can prolong their lives

while maintaining a tolerable quality of life. The therapy was developed by the Dutch pharmaceutical company Byondis, which now holds the Dutch premiere of being the first to complete a successful registration study with a treatment that uses an antibody drug conjugate (ADC).



**Scan for the full article or find it on [www.innovationorigins.com](http://www.innovationorigins.com)**



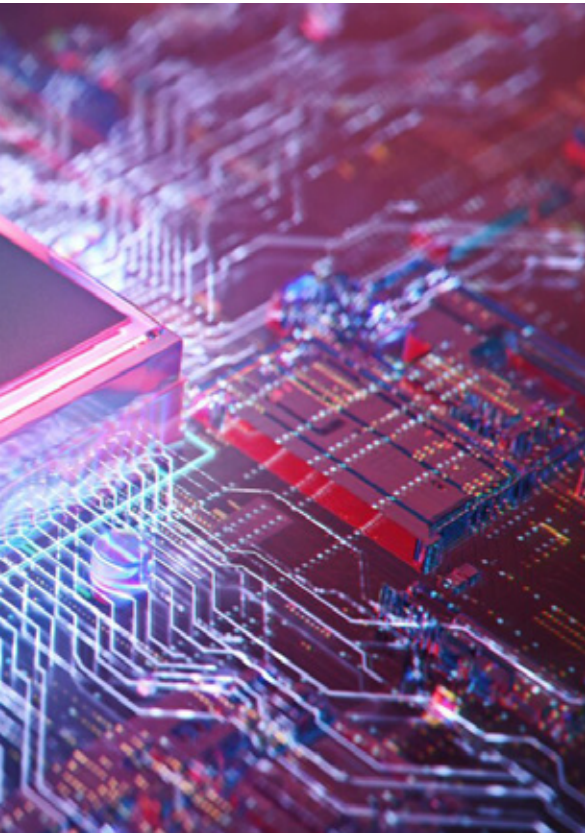
## Sustainable chips: wiring from gold to copper to ... nothing?

In the chips of today, gold wiring has been almost completely replaced by copper. At NXP, work is now also underway on the next step: a chip without wires.

The development around making chips more sustainable has been going on for years. In 2005, NXP was one of the first semiconductor manufacturers to switch from gold to copper. "The notion was always that gold wire was by far the most suitable

material for making the connections. But from a cost-saving perspective and with an eye on sustainability, we wanted to look for a different solution", explains Pascal Oberndorff, Research & Development packaging manager at NXP.

NXP Semiconductors is now working on a new generation of chips in which precious metals are no longer needed to make connections. Producing a chip without connecting wires is cheaper and more



sustainable. “In fact, the wires interfere with the signal. If you don’t use wires but solder the connections with tin instead, then the signal becomes stronger and faster”, Oberndorff says. “At the same time, this kind of connection is more sensitive, so once again, it requires a lot of research into how to make the chip extremely reliable.”



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or find it on  
[innovationorigins.com](http://innovationorigins.com)**

## Innovative anti-bleeding bandage

It is, of course, very stressful and risky for both surgeons and patients if bleeding occurs during surgery. In many cases, this bleeding is serious and must be stopped effectively and quickly. A new innovative bandage can stem heavy bleeding during surgery and prevent a patient from bleeding after surgery. The blood-stopping bandage, the GATT Patch, can prevent many unpleasant complications. The first patient already received the patch during a liver operation in the Radboudumc.



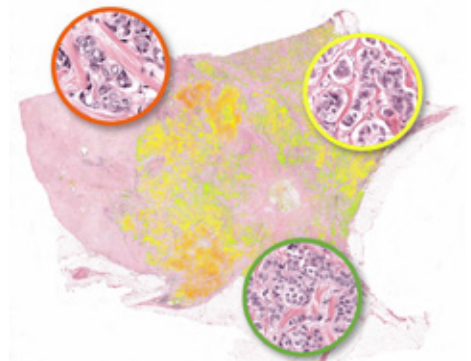
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## World’s largest pathology database launches in Nijmegen

Pathologists and their microscopes are essential for the detection of diseases such as cancer and autoimmune disorders. Tissues and cells are examined in detail and analysed, after which a diagnosis and treatment plan can then be drawn up. It is specialised work that requires a trained eye. At least, up until now. “We can improve diagnoses and treatment plans for patients by making as much data as possible available to clever minds”, says Jeroen van der Laak, computer scientist and associate professor of pathology at the Radboudumc and since recently, coordinator of Bigpicture as well. There is a lack of a broad collection of digital photos and medical information that is needed to interpret the data. That’s where Bigpicture should be bringing significant change. The



European consortium undertaking the Bigpicture project comprises 46 leading European research centers, hospitals and pharmaceutical companies. This opens up a whole new world for AI applications within pathology.



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or find it on  
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# When your world turns dark

Joyce de Ruiter  
Ambassador of the  
Usher Syndrome Foundation

Joyce de Ruiter was sixteen years old when her parents had to tell her that she'd been diagnosed with Usher syndrome: an inherited disorder which deteriorates hearing and especially vision during life, often resulting in people becoming deaf and blind. "Finally, the puzzle pieces of hearing loss and night blindness had been named, but at the same time your whole future outlook wavers." Joyce tells us about the impact this diagnosis had on her life and how it gradually turned into something she now draws strength and courage from.

Joyce and her brother were hearing impaired from birth and started to experience initial symptoms of night blindness around puberty, which was strange, as it didn't run in the family. A diagnosis was lacking until her then 18-year-old brother's vision deteriorated even further and an ophthalmologist diagnosed Usher syndrome. Joyce was diagnosed with the same disorder when she was just sixteen years old, radically changing her life and future plans. "I wanted to study, work, get married, and have a family. Would that still be possible? When I discovered the study Visual Marketing the fire started burning again, even though the name of the study didn't sound very useful when you have a visual handicap. But I always kept making choices that made me happy and I'm convinced this enables me to do the things I want to do - despite all the limitations."

## Rushing life no longer

Joyce has worked in HR, Communications, and Events. "I crossed my own limits for too long, because I felt like I had to cram a whole life into half. After my third burnout at age 30, I was declared incapacitated, also because my vision kept deteriorating. It was another one of those moments: what can I still do, what do I want? My eyes and ears didn't work so well anymore, but there was nothing wrong with my brain."

## INVESTING IN A POSSIBLE TREATMENT IS CHEAPER THAN LIVING WITH THE LIMITATIONS

She decides to tell her personal story in the newspaper, on radio, and on TV as an ambassador for the Dutch Usher Syndrome Foundation, in order to underline the importance of scientific research and development of treatments. This is how the speaking profession came on her path and she has been working hard on her business for 6 years, with success: "As an independent entrepreneur, I now speak at conferences and events about change and agility. Usher constantly confronts you with problems and changes that you have to learn to deal with. I link my personal story to insights in psychology about how to develop an agile mindset. With that, I try to be of value to other people. I think that is the most meaningful thing you can do in a human life."


## Tunnel vision, literally

Joyce is now 38. Her hearing loss is 70 decibels, but with advanced hearing aids she can still function reasonably well. Her vision is greatly reduced, though. "Last year I still had 18 degrees of vision, which is less than a toilet roll I can see through. My orientation on the street is becoming more and more difficult, I haven't been able to ride a bicycle for years and I feel unsafe in crowded environments; all because of my reduced vision. This is why scientific research is so important. Investing in a possible treatment is ultimately cheaper than living with the limitations. It would be fantastic if a treatment can be found that stops the deterioration and that children do not have to experience any hearing or sight restrictions at all. Of course, we hope that all patients with Ushers syndrome will recover. That is why the volunteers of the Usher Syndrome Foundation are putting their heart and soul into continuing to make research into a treatment such as that at the Radboud university medical center possible."



Learn more:  
[ushersyndroom.nl](https://ushersyndroom.nl)





# Bringing light to the dark

**Erwin van Wijk**  
researcher at Radboud  
university medical center

**From discovering the gene to, hopefully, developing a therapy which will give patients a positive outlook. Erwin Van Wijk has been involved with Usher syndrome research from start to finish, which is quite unique in this field of work as it shows how rapidly developments are following up on each other. “In the most severe form of Usher, children are born deaf and slowly start to lose their vision before puberty. We developed a genetic patch that may be able to limit the damage to vision, our data and the results of the trials look positive.”**

“The hearing problems in Usher are not easy to treat because the underlying cause already arose during development in utero”, says Erwin. “With my research group, I have focused mainly on the visual problems. These arise during life, so there are more opportunities to do something about them at an early stage. The goal of the research was therefore to slow down or even prevent the deterioration of vision. First of all, we need to know which and how genetic defects lead to problems. Mutations in the USH2A gene are the most common, so we took that gene as the primary starting point for developing a therapy.”

## **Restoring the function of light-sensitive cells**

Usher syndrome arises from a genetic mutation which causes the loss or malfunctioning of the corresponding protein usherin. Slowly but surely, the light-sensitive cells in the eye progressively die as a result, and people become vision impaired or at a later stage even completely blind. The question is: How can this disease process be stopped? Erwin: “Replacing the mutated gene was technically almost impossible because the USH2A gene is extremely large. Instead, we taped the region of the gene with the mutation with a genetic patch. As a result, a slightly shorter protein is produced, lacking the mutation. When carefully selecting the region to skip, the resulting ‘shortened protein’ could work almost as well

as the original protein. In principle, this would then solve the problem. In cells we saw that the genetic patch indeed masked the region of the hereditary error. Next, we had to demonstrate that the shortened protein is also functional in the eye.”

## **Zebrafish as part of the solution**

Erwin stumbled upon an unexpected animal to establish whether the genetic patch could preserve visual function. “Zebrafish happen to have an USH2A gene and protein that’s very similar to those of humans. If a mutation is introduced into this gene, the visual function of the zebrafish is also significantly reduced. They are an excellent model for studying USH2A-related visual dysfunction and for determining the effect of a therapeutic intervention. Indeed, visual function of USH2A mutant zebrafish treated with the genetic patch was highly improved.”

## **INITIAL RESULTS FROM A CLINICAL STUDY IN PATIENTS ARE HIGHLY PROMISING**

After this, the first careful steps towards the translation of the results into a use in humans could be taken. First tests in Usher patients with a mutation in the specific region of the USH2A gene showed promising outcomes, resulting in the design of a large multicenter follow-up study in which the results of the initial clinical trial will hopefully be corroborated in a large cohort of patients. If results hold up, a request for market introduction can be submitted to the American FDA and the European EMA.”



# Telling stories of innovation through architecture



**What is happening here? And why? For more than 30 years, architect and urban planner Winy Maas has been putting up buildings and designing cities that amaze people and make them think. Urban planning, architecture and landscape architecture are his instruments, which he uses to tell a story and make a difference. Together with his agency MVRDV, he works on the cities of the future all around the world. A look into the future city and the bottlenecks it faces.**





A 'rock star architect', 'the Willy Wonka of architecture', who 'like an alchemist for a project in Seoul, turned concrete into gold fabric', when draped around a building like a robe. Clearly, Winy stands out in the world of architecture. Someone who does not shy away from controversy who challenges clients and policymakers to think further, sometimes in provocative ways.

It is also clear that the international community has embraced the Schijndel son of a horticulturist and florist. In his career, he has left an innovative mark on the design of the urban environment worldwide. "I started doing hands-on work. Through my parents' profession and through my education at the Rijks Hogere School voor Tuinen Landschapsinrichting in Boskoop, I learned about plants and animals. Afterwards, I wanted to broaden my vision, so I studied urban planning and architecture in Delft. It is this combination that has made my signature recognisable", he said in a recent interview.

### Artistic architecture

Architecture is his medium, his way of expressing himself, says Winy. "I'm not an artist, nor a painter or a writer, although I don't shy away from verbal pressure. I can paint futures with my architecture, set up an argument or cause a manifesto."

He draws much of his inspiration from art, especially literature. Hence, he says, his firm's projects are characterised by trying to be readable. "Even if you are not a connoisseur of architecture, you should walk past it and wonder - what is happening here and why is this happening? The argumentative aspect of architecture becomes more accessible this way. Like when we designed Valley, a tower complex on the Amsterdam Zuidas with a lab, a 'grotto', offices and 198 apartments with balconies and loggias that stick out differently. People saw with their own eyes that plants could be placed on towers and that it becomes a vertical village when you do it right. And that, if you fall, you would only tumble down one floor. It looks a little daring, which is why it shifts the bar of what we thought was possible."



***"I advocate denser, greener, more attractive and liveable cities. An approach to design that centres around user-defined, innovative, and sustainable ideas for the built environment, regardless of typology or scale."***

Winy on this quote: "In that sentence, there is a whole shopping list of desires that future cities need to meet. The only thing that stands out is the word 'city'. Given that the worldwide population will grow with another three billion people over the next 50 years, the role that cities play will change. Most of those 3 billion people will be living in cities. With it, we can improve and green cities."

In any case, it shows that the future city cannot be described in one word, Winy argues. "It consists of many elements, grouped around three themes; social, economic, and ecological goals. Within those, there is still a world to go. If I look at the ecological goals, then I am faced with the task of changing all the materials, holding water, and cooling despite the huge heat shields that cities build. I also have to give animals more room. Then I have to cough up the energy issues locally and not plop them all on pastures. It's all incredibly complex."

"For the social task, the same applies", he continues. "You want to preach freedom and diversity. That means that you have to be able to influence buildings, that you have to be able to have a say as a citizen. Sometimes even collectively as a community. The Almere Oosterwold experiment is a great example, where people are allowed to do what they want as long as it doesn't become a hindrance to neighbours. You can clearly see the contradiction between freedom and responsibility looming."

### Industry in the city

Winy is also an advocate of bringing industry back into the city. He looks with horror at the desolate industrial estates on the outskirts of cities, asphalt plains with buildings that are ecological disasters. "You wouldn't want to be found dead in these areas, but they make up a total of 4 per cent of the Netherlands. If any urban planning typology has helped to make cities worse, ecologically and climate-wise, it's these industrial estates."

Environmental requirements can be a hindrance. "We will have to work hard to alter industrial processes so we can live close to where they take place. We can't risk nuisance from noise, waste



materials or explosion hazards. The Noviotech Campus in Nijmegen is a great example of how to do that.”

### ***Is there any city that is already well on its way?***

“Many cities have grown through the industrial revolution. They are struggling with that task. I think Munich is an example of a city where they try to incorporate the car industry a little bit. Although it is not very clever to put the Bayern Munich stadium on the edge of the city. What idiot came up with that idea?

Almere springs to mind, but it has a huge task. 45 percent of all its residents do not work in Almere. The aldermen are trying to bring companies there, which in turn has led to the selling out of the zoning they still had. That’s another huge task. It could be done there, though.”

### ***And in a conurbation like Nijmegen, would that be possible there?***

“Yes and no. That certainly applies to Arnhem-Nijmegen as a combination. There is also a lot of relocation in the area between the two cities. On the southwest side of Nijmegen, there is a number of industrial estates that I don’t quite like. Both cities are pleasant to live in. In Nijmegen, with its east and south-east side, there is a beauty to it that a lot of cities in the rest of the Netherlands lack. In new projects, I notice that their goal is always to radiate that same feeling, and the necessary knowledge is present. The Waalsprong created space for the river, as well as for the green areas that surround it. There is potential to create even more greenery. And if the area would be a bit more expressive, they might be able to position themselves as the two greenest cities in the Netherlands.”

### ***In 100 years’ time***

But in the slightly longer term, say over 100 years, he doesn’t rule out a ‘thinning’ process, where we no longer live with large numbers in high-rise buildings in cities, but much more among the greenery and the animals. “If we build everything ecologically, we’d be able to spread the greenery across the planet much more. We’ll need places where people can meet and live close together, but we’ll have to combine those with spaces for greenery. In this scenario, we build biologically – using elements that break down and recover themselves. The result is flexible buildings. Think of them like Barbamamma houses – they can turn into whatever they want. Or compare them to the root of a tree, a kind of

Ranunculus of Hamelin, which grows around you and then disappears again in no time. Of course, this will have to develop quite a bit before we can apply it. These ‘thin’ structures have their advantages; they feel less claustrophobic, you are closer to nature, to your food, and they provide peace in social communities. But we can’t build houses like that yet, and it certainly presents a lot of disadvantages in the short term.”

The tendency to continue striving for denser components will therefore remain for the time being, says Winy. “Even more densification or still closer to nature, that’s a question for the future. That depends on our techniques. Let’s have this interview again in 50 years”, he says in conclusion.



### **About Winy Maas**

Winy Maas (62) is an internationally renowned architect and urban planner. Soon after completing his studies in landscape architecture at the Rijks Hogere School voor Tuin- en Landschapsinrichting and then in Architecture and Urban Design at Delft University of Technology, he founded MVRDV in 1991, together with Jacob van Rijs and Nathalie de Vries. With his organisation, Winy is responsible for many award-winning projects, including the Markthal in Rotterdam, the Crystal Houses in Amsterdam, the Boekenberg in Spijkenisse, and the Depot Boijmans Van Beuningen. In addition, he has developed several master plans, including for Greater Paris, the Left Bank in Bordeaux and the waterfront of Oslo and he Almere Floriade.

Winy is also a professor of Urban Planning and Architecture at TU Delft. That’s where he founded The Why Factory, which explores the possibilities for the development of our future cities by focusing on the production of models and visualisations for cities of the future. He is also (co-)author of a dozen books on architecture and urbanism.

## Examples



Tainan Spring is a public space design that includes the transformation of a former city-centre shopping mall in the Taiwanese city of Tainan into an urban lagoon surrounded by young plants that will develop into a lush jungle, reconnecting the city with nature and its waterfront. In addition to the new public square and urban pool, the plan includes improved public pathways, a reduction in traffic, and the addition of local plants.



MVRDV's masterplan proposal to transform 35ha of former barracks and railyards in the centre of Bordeaux is an unprecedented opportunity to contribute to European urbanism. The design answers the question of how to create a vibrant neighbourhood that is in the tradition of the European city, but at the same time an update of it: historic, mixed and intimate - light, green, and dense. With the realisation of MVRDV's masterplan, Bastide Niel will become a lively extension of the city centre with a mixed programme of 3,400 homes; 27,500m<sup>2</sup> of retail; 25,000m<sup>2</sup> of offices; 13,500m<sup>2</sup> of small premises for such uses as clinics, workshops, and studios; and 54,000m<sup>2</sup> of public facilities like a university building, the municipal archives, a cultural building, a community centre, schools, daycare centres, and sports facilities.



Free design and construction will transform an area of 43km<sup>2</sup> at Almere Oosterwold. Limits are set to ensure the rural character of the area is maintained: 18% construction, 8% roads, 13% public green, 2% water and 59% urban agriculture. Freeland in Almere Oosterwold is proposed as a radically liberated place where you have the right to define your own living space. By not only developing your own plot but also all the necessary components around it, like energy supply and public parks, you do not only build your own home, but you also contribute to the development of your neighbourhood and your part of town.



"The green valley that breaks through is the Zuidas of the future", says Winy. With its landscape of jagged stone terraces, bay windows and balconies, covered in dense planting the valley brings much-needed greening to Amsterdam's Zuidas business district. The 75,000m<sup>2</sup> mixed-use project contains apartments, shops, offices, cultural institutes, and a creative centre, highlighted by a publicly accessible "valley floor" located on the building's podium, on the 4th and 5th floors.



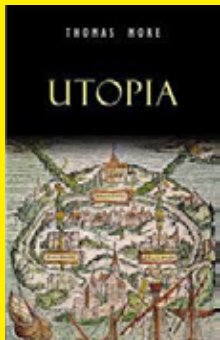
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## Back 2 the Future: Innovator's Classics



### Utopia

Thomas More

A 16th century masterpiece, painting the image of a world and society where there's no gap between the poor and the rich, and without any inequality or injustice.



### Limits to growth

Dennis Meadows, Donella Meadows, Jorgen Randers

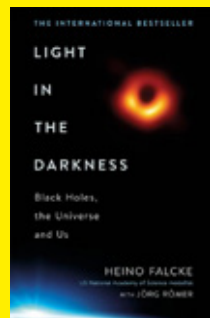
A 1972 report, discussing the possibility of exponential growth of the worldwide economy and population, with finite resources.

## The Bigger Picture

### Light in the Darkness

Heino Falcke

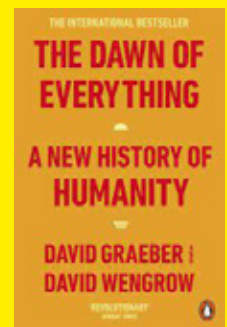
About taking the first picture of a black hole, his search for god and the place of humanity in the universe.



### The dawn of everything – A new history of humanity

David Graeber and David Wengrow

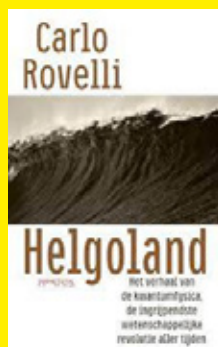
Transforming the way we see the human past might open up a path towards imagining new ways of organising society.



### The Web of Meaning

Jeremy Lent

Shaping a new worldview by integrating the latest scientific developments with knowledge and insights from traditional wisdoms.



### Helgoland

By Carlo Rovelli

A story about the most revolutionising scientific development of the past decades: quantum theory.

What inspires you? Send it to [pulse@noviotechcampus.com](mailto:pulse@noviotechcampus.com)!

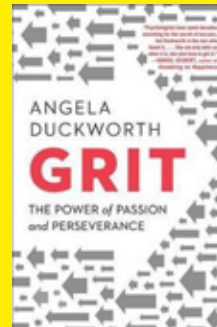
# Reads for the 21st century changemakers in health & high tech



## Collaborate or die

James Veenhoff, Martijn Pater

The challenges we're facing today are too big to tackle alone. More than ever before, companies and organisations can and must join forces.



## GRIT

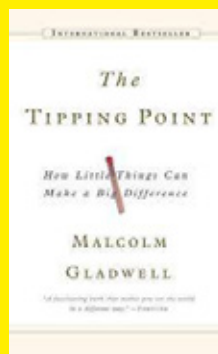
Angela Duckworth

What is the key to success? According to Duckworth, it is a combination of passion and perseverance, also called: grit.

## The Tipping Point

Malcolm Gladwell

The moment when an idea, product or message reaches a critical mass, setting off sociological changes at a rapid pace.



## Innovation Origins

News and media platform on innovation, science and technology in Europe.  
[www.innovationorigins.com](http://www.innovationorigins.com)



## Bits & Chips

News and trends about the influence of technology, especially regarding embedded systems, electronics, mechatronics and semiconductors.  
[www.bits-chips.nl](http://www.bits-chips.nl)



## Issues

Media-platform initiated by Arizona State University, for discussion of the ways that societies seek to advance knowledge, technology and innovation to achieve social impact.  
[www.issues.org](http://www.issues.org)

## Listen:



### Radboud Reflects

A Radboud University podcast, challenging you to think further on a variety of scientific themes, beyond the issues of the day.



### AI for Life

A podcast by Briskr about how Artificial Intelligence is becoming ever more visible in today's life, and especially healthcare. (Dutch).



### The Huberman Lab

Andrew Huberman, neuroscientist at Stanford University, discusses the impact of the brain and its connections to our perceptions, behaviours and health.

## Watch:



### The Night of the Universe

Have a closer look into space during the 'De Nacht van de Ruimte' event organised by INNOVATE (Dutch).



### Abstract

A Netflix series about designing solutions for future challenges.



### TEDtalk – Bill Gates

The next outbreak? We're not ready.



CROSSING BORDERS

# Carol Stewart: “Think globally, right from the start.”

28

**“Look around the world and allocate your opportunities: where is your niche, where is your workforce?” – according to Tech Parks Arizona Vice President Carol Stewart, these are the questions you should ask when determining where to start or grow your business. Don’t pin it down locally, but focus on finding a community and place where you’re valued.**

**We’re meeting Carol at the Meervaat Theatre in Amsterdam, where she visits the University, Industry, Innovation and Network Conference (UIIN). She tells us about creating FOMO, turning cornfields into startup incubators and the sexy part of tech parks.**



Carol Stewart,  
Vice President Tech Parks Arizona,  
University of Arizona



A long way from her house and tech park, in Arizona, Carol still seems right at home here at the UIIN Conference in Amsterdam. Openly sharing all of her knowledge and experiences and, above all, meeting up with science, business and tech innovators from all over the world – she herself seems to be the very embodiment of the tech park industry. As we take a seat in the lobby, Carol takes us along on her impressive journey of pioneering in the world of tech parks and innovation ecosystems.

***You're inspiring people to look around the world for opportunities, but where did your own journey start?***

"As a matter of fact, it was the world of tech parks that found me. Nobody really goes to school to become a leading figure within a tech park or a science park. Somebody actually submitted my resume – which was pretty bizarre – and I ended up going to the University of Waterloo. I became a founding director here and they asked me to build a tech park within their science park. And so we did: in a few years' time, the place went from a cornfield to an innovation ecosystem of 100 tech companies. Nowadays, the Waterloo accelerator is ranked #4 of the world, known as the home of BlackBerry, with four unicorns on its account and an IPO."

***When did you realise: this is it for me?***

"It's that incubator component, or startup component, that is really the cornerstone to any innovation hub, science park or tech park. That's the heartbeat, that's what brings the excitement: the sexy part of tech parks. And it becomes magical when you bring together both startups and corporates. In this role and area of expertise that's exactly what I'm allowed to do: working with companies, accelerate them and facilitate connections between them. Together they create collision moments and have this amazing synergy. When I was a part of this at Waterloo it didn't take me too long to realise: this is the vibe I'm looking for."

***Do you feel like the startup hype and vibe are still going strong, or is it cooling down a bit?***

"No way, it's not cooling down at all! I think covid has been a really interesting exercise. People were really disillusioned or had a moment to exhale, which eventually led to new insights and made people wonder: is this really what I want to do in life? To put things in perspective: at any given time in the past there had been 5 to 10 companies in the startup programme at Tech Parks Arizona, today we have 78 – which is incredible. I really think covid played a role in this, because people had the time to self-reflect and made a conscious choice to start taking action upon their purpose. And I don't think that's going to slow down."

***Speaking of covid, how did the worldwide pandemic affect your park?***

"Well, I think we're currently all feeling a lot of uncertainty about what the future hybrid workplace will and should look like. Tech parks and science hubs are all about people, places and programs. We're bringing together industry, academia and government, creating those collision moments we talked about earlier. If you want to create these moments, where contact and collaboration are key, then what should a hybrid workplace look like and what is its impact? We notice both companies and their employees struggling with that question, which is not that strange actually, as it's the first time we all have to think about it."

***It seems quite a challenge getting people to work at the office again. How do you?***

"We're creating a little bit of a sense of FOMO, fear of missing out. Our community director focuses on creating really interesting moments in the park. Again those collision moments, but also networking among themselves. There is so much value in that! This ranges from volleyball leagues to food trucks and pop-up parties in the park. People who are working from home are missing out on that. But in the end, it's really all about listening

to the people at our park. We want to understand their needs and, from this perspective, create that sense of community we're all looking for."

***Are all entrepreneurs looking for the same thing then?***

"Obviously not, we treat each startup and every company individually. Because everybody comes in with different knowledge and a different skillset, so naturally they're going to have a different path. With a corporate it might be about the workforce and plugging them into the right connections, whereas a startup has to deal with different challenges, like funding or finding their first office spaces. It's our job to guide them in the best way we can along this path, by bringing them in touch with the right person and providing them with a soft landing in the next step of their business or in life – but always with a personal touch and from a human point of view."

***What would you advise to entrepreneurs currently checking out tech parks worldwide?***

"Be very thoughtful on where to land your business. It's so important to find a community where you're valued, a location where you have a support system that's certified, with a soft landing programme. Land into a system that's going to support you, whether that's in Tucson, Boston or Silicon Valley: just make sure you do it smartly. Tap into the networks you have, find the right people, but don't lose a lot of time and money trying to navigate it on your own."

This is what we do as tech parks on a daily basis: connecting people, providing them with the right resources and network and, hopefully, giving these entrepreneurs a head start. Not only to startups, but also to scaleups and corporates. Entrepreneurship is a global language and often the person who will understand you is just one call away – especially when you're at a tech park."



# 4 young professionals about the race for talent in health and high tech

**As the labour market is tightening, many health and high tech companies and organisations are looking for new talents to join their team. However, what is it like to be a talented, young person at this moment in time? What has been their journey so far and what are they dreaming about or struggling with when it comes to their future? We asked four young professionals how they expect their future in health and high tech to look like.**



**"YOUNG PEOPLE WANT A LOT MORE THAN JUST A GOOD SALARY"**

**ANKITA JADON, PRODUCT ENGINEER AT NEXPERIA**

**What did your journey to the health and high tech sector look like?**

"My journey had quite the detour, actually. Originally, I'm from India. In 2013 I moved to France to study nuclear engineering. After my studies, I started a PhD, which I finished in 2018. In 2020, I moved to the Netherlands, but the political climate here is not pro-nuclear energy. So, I had to change direction in my career. Luckily, I also have a background in electronics, so that is how I ended up at Nexperia."

**What do you think matters most to young professionals these days?**

"Young people want a lot more than just a good salary. A company needs to have values that match with the individual. I would never work for a polluting company because I value sustainability, for example. At Nexperia, we organise a lot to ensure that younger employees have a sense of belonging to the company. From social activities to opportunities to meet the management team. We have a running team, a yoga team, a boxing team, and much more. They are engaging young culture by removing hierarchy wherever possible. And there are a lot of team-building activities. Our CEO is based in China but frequently comes to Nijmegen to answer questions."

**How can employers distinguish themselves in the race for talent?**

I believe by having gender parity in the workplace. Look at women studying in this sector. At universities, there is almost a 50/50 split. And in the workplace? Absolutely not; less than 20% of the workforce is female. So, where is the female talent? Why are women not joining the industry? Research has repeatedly stated that a diverse workplace is more effective. Now the ball is in the company's courts if they use this information to bring out the best in everybody."



**"AS A START-UP, WE DO NOT HAVE A LOT OF MONEY TO OFFER, BUT WE DO HAVE A UNIQUE PROPOSITION"**

**EEF LAMERS, START-UP ENTREPRENEUR**

**How did you come up with the idea for your start-up?**

"I did a bachelor's and master's in physics and astronomy. You are prepped for research, but most students go a different route. The faculty organised a business fair every year, and students were in great demand. Everyone was looking for new employees, from the ministry of Defence to ASML. I chose a different route. During a health hackathon, the idea was born to create a secure environment without stimuli for patients in hospitals. I asked permission to work out this idea. That was the kick-off for my own business, Micro Cosmos."

### **What is it like, growing a start-up in this sector?**

“Both very fulfilling and very challenging. By working in healthcare, you have a direct impact on the well-being of people. That is very nice. It is also a tough sector, and change takes time. It can take months to arrange something, so you have to do things in parallel. That can be a challenge in our schedule. Healthcare is also pretty conservative. There are lots of laws and regulations you have to be wary of, and there is little time to innovate. The nurses and doctors who work with us do this besides their busy daily routines. That is not easy. And as a start-up, it is even more challenging to get the right people around the table.”

### **What do you notice about the race for talent?**

“As a matter of fact, students like to work for a start-up, and now that we have created a name for ourselves, we get a lot of applications. As a start-up, we do not have much money to offer, but we do have a unique proposition. Therefore, we also work a lot with interns, just like the rest of the sector. During our first years, it wasn't easy to find interns. Now, we have an excellent relationship with Avans Hogescholen and the HAN University of Applied Sciences – a great support to finding and attracting the talent that will help us to take the next step with Micro Cosmos.”



**“I HAD JUST FINISHED AN INTERNSHIP AND I DIDN'T KNOW WHAT I WANTED”**

**JOSEPHINE DODEMONT,  
MEDICAL PRODUCT  
DEVELOPER AT  
HCM MEDICAL**

### **Did you immediately know what to do after graduating?**

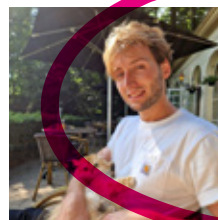
“It's funny actually, because after studying biomedical sciences with a specialisation in regenerative medicine, I decided not to work in this field. For half a year, I worked with Geldersch Landschap en Kastelen. I had just finished an internship and didn't know what I wanted. After a while, HCM Medical crossed my path again. I did the first internship in my bachelor's at HCM Medical, which had stimulated me to continue studying regenerative medicine.”

### **What is it like, looking for a job in your field of work?**

“The regenerative medicine track is highly specialised. If I had chosen immunology, there would be a lot of jobs. Biomedical science is a very popular field, but many of my university friends still don't have jobs. Because it is such a specialised field, choosing your specialisation significantly impacts your job chances. Also, the biomedical field differs from computer science. Big companies in my line of work, do not snatch up students. When I notified my LinkedIn network I was open for work, multiple ICT traineeships approached me; not the biomedical company I was looking for.”

### **What do you think the future of your work will look like?**

“My specialisation feels like a booming field. There is a lot of progress, and although not many companies are working in this field, lots of research is being done at universities. And we need new people; we are moving towards a staff shortage. So, a race for talent is definitely going on here, even in my small and specialised field. I still notice the race for talent, even after finding a job.”



**“WHAT SURPRISED ME THE MOST, IS THE FREEDOM AND FLEXIBILITY”**  
**MICHAEL GEURTSSEN,  
RESEARCHER AT  
TU EINDHOVEN AND NEXPERIA**

### **How did your career in health and high tech start?**

“I did a bachelor's and master's in mechanical engineering at TU Eindhoven, but in my master's, I chose a new specialisation that combined it with technical business administration. Manufacturing Systems and Engineering, it was called. During my studies, I have already worked in this field. I did my internship and graduation research at Nexperia about optimising the maintenance of the machines used to produce computer chips. First, I did the research. During my internship, I implemented the theory.”

### **What fascinates you the most about this industry?**

“The tech sector is vast, and I'm working in the sector of semiconductors. The beauty of this field is that most of the innovation is created here. Many complex steps are required to go from raw materials to a finalised chip. It can be hundreds of steps, so there is a constant search for innovation. I enjoy that a lot. So after graduating, I asked Nexperia for a PhD position where I could still do my research and implement all my findings. They created that position, especially for me.”

### **Does that happen more often, companies creating a position just for you?**

“You notice that employees are now in a luxury position. In this sector, every company is struggling to find people. It is tough to find talented and trained staff. I receive messages from recruiters at least once a week. However, creating a dream job is one thing, as a company you also have to live up to it. What surprised me the most about my job at Nexperia is the freedom and flexibility. The way I do my research is not possible in every industry. I get to choose which subjects I would like to work on and how that fits the academic world. Of course, Nexperia gives me a direction for my research, but within that direction, there is a lot of freedom.”




# The unexpected impact of art on health

Art enchants, inspires, surprises and makes you think. But what are the values of art if the mind is failing? Research into Parkinson's disease shows that art has a potentially great impact on many areas of health. Art improves the analysis of Parkinson's and might enable an earlier diagnosis of the disease, it can help patients to express themselves and even positively influence the medical process in general. We dive into the complexity of our mind, and the sometimes unexpected contribution of art when the brain is failing us.

Figure 1: "A Silver Lining", painted by Mr. Robin Broadhead, a retired paediatrician who lives with Parkinson's disease. Mr. Broadhead: "I painted this sitting on the verge of the Blantyre to Mulanje Road on Tuesday 9th of february. Mulanje Mountain is the highest mountain in Malawi and rises 10,000 feet from the Phalombe plain as the last gasp of the Great Rift Valley. I have for many years climbed and admired the mountain and seen it in its many moods. I have seen Mulanje after storms and when it is dramatically illuminated from behind by the break of dawn and has glowed warmly facing the setting sun in the West. The Mountain defiantly crouches below a dark and forbidding storm cloud and yet the sun behind the cloud remains blazing and the silver of light surrounds it as a silver lining. This is our rainy season and is a time of green growth and hope. Hope for a good harvest in the future weeks." This painting serves to illustrate a novel therapeutic concept in the field of Parkinson's disease, namely that of silver linings: potential upsides that may sometimes come with this otherwise devastating diagnosis, and which may serve as a new way to support people living with Parkinson's.





The painting you're seeing in the background serves to illustrate a novel therapeutic concept in the field of Parkinson's disease, namely that of silver linings: potential upsides that may sometimes come with this otherwise devastating diagnosis, and which may serve as a new way to support people living with Parkinson's. In this edition of College Tour, Radboudumc researchers Bas Bloem and Blanca Spee share with us four lessons on the fascinating and multi-faceted relationship between art and Parkinson's disease.

### Lesson 1; The unexpected values of art

One of the eternally discussed topics in human society is the search for the values of art, and indeed, the question of whether art has any value at all. While art obviously has monetary, personal, and aesthetic value, most arguments and affections for these artefacts go beyond the values that are directly addressed to these objects. Connected to any work of art are, among others, three essential aspects: creation, experience, and impact. All these aspects, when put innovatively into a medical viewpoint and pragmatic perspectives on health, might open up the truly hidden treasure trove of unexpected values of art. The first aspect connected to art involves the creation of a work of art or, more generally, an innovative product. This genesis comprises the development of a new, inspired, and useful production in various domains, but also the state of its creator. This state reflects socio-economic context, lifetime experiences, and, most importantly, the individual physiological condition and current brain functions of the creator. the painter and graphic artist Paul Klee in 1920: "Art does not reproduce the visible; rather it makes visible." The issue at stake here is; how can we transfer this idea into practical medical issues? We know that a creative process is a complex interplay between sensory, cognitive, and motor activity enabling artistic skills. In addition to these skills (which are partially learnable), the creative process requires a specific mindset, such as openness to diversity, curiosity about new experiences, and motivation to express. Likewise, neurologists see the consequences of how artists change their art production when brain functions change due to disease or lesion. The spectrum of changes doctors notice reaches from total loss of ability to make art to sudden emerging or intensified creative drive and productivity. Such phenomena are prominently visible in people with, e.g., Parkinson's disease.

### Lesson 2; Where art and Parkinson's meet

Parkinson's is a common neurodegenerative disease, representing the world's fastest growing neurological condition. A hallmark component of the underlying pathophysiology is a progressive loss of dopamine in the brain, a key neurotransmitter that is also essential for coordinating creative brain processes and which is replaced in these people via medication, and sometimes via neurosurgical procedures. In an epidemiological study in the region of Nijmegen, 36% of the 903 questioned people with Parkinson's reported that since onset of the disease, they had experienced changes in their creativity, showing ups and downs, sudden emergence, drive, or loss of being creative.

Professor Bas Bloem uses these changes to evaluate the people he treats and says: "The potential of using art expressions as a mirror of state and individuals' conditions—or rather as a diagnostic tool—is amazingly nuanced. It can provide information about current health state, and changes in perceptive and motoric abilities. It can be used to optimise pharmacotherapy, and even raises awareness of psychological states, social situations, and personal feelings, which might be more difficult to express during the usual doctor-patient conversation. To my mind, addressing art in the examination room is a wonderful way to implement a personalised 'precision medicine' approach: addressing issues that matter most to individuals affected by a neurological condition, and seeing that person not as a patient, but as an individual with a unique background."

Doctors being aware of these unexpected values of art, that is, seeing the strength of art using analogies and expression as a medium of communication from the patient to the doctor, enable the potential to show more profound empathy while optimising and personalising treatment. Using art as an expression of inner state also allows a deeper understanding of, for example, describing the experience of pain or problems which are hard to put into ordinary language.

Some doctors that are open to this approach note that they save time during medical consultations, or even potentially avoid patient hospitalisations by seeing issues earlier. They also create the space for giving patients a voice and room for self-empowerment. Speaking about empowerment, such artists sometimes make doctors aware of processes relevant to research. For example, an acoustic



analysis of the violin play of an elite violinist with Parkinson's alerted researchers to the possibility that parkinsonian signs may be easier to hear than see, thereby opening up new possibilities for early and reliable diagnostic approaches.

### Lesson 3; The impact of art on Parkinson patients

This has brought us to the effects of art on the one who experiences it. One of the fascinating features of art is its ambiguity and versatility. These features stimulate people to re-evaluate, change perspectives and opinions, accumulate novel knowledge, and even diversify strategies for gaining knowledge. Why? Because art shows us how something can be done, displayed, viewed, played, experienced, or lived differently. This departure from rigid patterns to diversity lets people innovate with profound influences of art on culture, knowledge, and questioning outdated, rigid paradigms.

Indeed, healthcare paradigms and medical education themselves are in urgent need of change. The Radboudumc, in a project led by Dr. Jur Koksma, has already pioneered by developing innovative art-based educational approaches. Medical students were asked to recognise the diseases of people in artworks. In addition to that, photographs are being used to train professionals to improve their diagnostic skills by taking a more open-minded perspective, and with their patients to optimise treatment behaviour, but also to make them aware of their relationships with the ones they care for.

Using art to deepen medical understanding and reporting state is nothing new; instead, this skill appears to have gotten lost over time, partially due to digitalisation and generalisation of medical systems. Jean-Martin Charcot, physician and founder of modern neurology, for example, was known for using

his artistic talent to represent the mental states of his patients in artistic representations. Leonardo da Vinci, as an artist and anatomist, brought a deeper dimension to the workings of human physiology and functional dynamics through his masterpieces.

Some professional organisations, such as the Radboudumc Health Academy, which is developing medical curricula in Nijmegen, became aware of the profound potential benefits of the holistic view artists cherish. They realised that the past artistic skills of doctors shall and can be merged with modern technology. Thus, once again, art can transform healthcare systems and medical education by helping to 'zoom-out' and make visible that 'health' and 'care' are, actually, two nouns that shall—in all their facets—be fostered.

Another element is to use art as part of the therapeutic armamentarium. Using Parkinson's disease as an example again, music and dance have now become evidence-based interventions to support and treat affected individuals. They promote mobility, are a palatable way of exercising, and stimulate social contacts. Together with wonderful dance groups in Friesland (the "Dansen op recept" programme), a carefully controlled clinical trial was performed, the results of which show that dancing helps to maintain a good quality of life.



Figure 2. A painting entitled "Kopzorg: Hoofdzaak" (liberally translated as: Mind matters: Key matters), created by mister Sibolt Hulsbergen, a 56-year old man who has lived with Parkinson's disease since 2011, with apparent symptoms since 2007. In 2013 Sibolt received a neurosurgical procedure called deep brain stimulation. Sibolt: "Headache? Brainwaves! is a painting of the brain's functions, visualised in the right shape and place on the canvas. Together they form a complete set of brains."



The making of this painting is outlined in a compelling YouTube video:



And have a look at the monthly online broadcast of ParkinsonTV:





## Lesson 4: When a patient becomes a creator

The final aspect is everything that surrounds the work of art as the artefact itself and its impact. Even though we maintain here the opinion that a work of art is not existing as an isolated thing but is what semiotician and writer Umberto Eco once called an act of co-geniality. According to him, every piece of art is experienced as a medium with the intention of the artist, the context, and the recipient's evaluation and interpretation. Nonetheless, people usually ascribe values to these objects of art. These values contain aesthetic and non-aesthetic (also irritating) appeals that can be used to, for example, enhance experiences among the observers. For this reason, more and more hospitals around the world are portraying art in public spaces, in corridors and in examination rooms, to ease the process of hospitalisation. Art as a salient object provides optimal stimulation, either in a calming or distracting manner, and can improve patient experiences in current healthcare. One of the newest programmes that is currently being developed in Nijmegen is a person-centred, art-based intervention programme as part of an Austrian-Dutch collaboration project called "Unlocking the Muse: Transdisciplinary Approaches to Understanding and Applying the Intersection of Artistic Creativity and Parkinson's Disease". Together with a team of neurologists, art researchers, transformative learning researchers, creative therapists, artists, and patient researchers, this programme aims to identify, engage, train, and retain the experience of being creative in people with Parkinson's. In this programme, the team intends to identify individual daily challenges that need meaningful creative solutions—might they be the wish to experience and enjoy playing a musical instrument, or finding practical solutions to lift a cup of tea on their own, which sometimes might be a challenge for these people due to physiological restrictions.

Dr. Blanca Spee, one of the leading project researchers in Nijmegen: "By working together in a co-creating manner, we want to address these challenges. The primary goal is to distil the active ingredients of creativity of each of them, train the skills, work on their mindsets, and let them become creators. Hereby, we hope to provide individually tailored, flexible, innovative, and improvisational solutions; solutions inspired by the beauty of the artistic realm and with a direct impact on health by improving quality of life in a self-empowered manner."

*This essay is written by:*

*Mag. Dr. Blanca T. M. Spee (University of Vienna) & Prof. Bastiaan R. Bloem, MD, PhD, FRCPE (Radboud University Medical Centre)*





# Photonics: the next Delta Works of the Netherlands?

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Transfer information, make cars drive themselves and precisely measure and detect diseases - all in the blink of an eye. Photonics technology sounds like something from a sci-fi movie, yet it's already here, and it's here to stay. The Dutch government has recognised photonics as a key enabling technology and is investing billions of euros in expanding this emerging industry.

Is it worth the hype and, if so, what will be its impact on our lives – now and in the future? We wanted to find out and spoke to three leading experts on photonics technology in the Netherlands: René Penning de Vries (PhotonDelta), Peter Harmsma (CITC) and Waander van Heerde (Enzyre).

In a sense, photonics is similar to electronics. Except electronics use electrons to transfer information – bits and pulses of electricity – where photonics uses photons, light. Light is weightless, travelling almost without any resistance. Electricity on the contrary, is heavier and encounters more bumps in the road as it travels through our cable-network. This makes photonics way more energy efficient and faster. Does that mean photonics is taking over from electronics? “No,” says René Penning de Vries, “but there is massive potential for the photonics industry.”



**René Penning de Vries,  
Chairman of the supervisory  
board at PhotonDelta**

As with every emerging technology, photonics needs a driving force to feed its growth. One of those forces is PhotonDelta, an industry accelerator for integrated photonics. René is Chairman of the supervisory board, dedicated to building and nourishing an ecosystem capable of pushing photonics forward.

*Why photonics?*

“Developing better photonics is not just about improving existing technology. It’s about preparing for the future. The world is changing, and industries come and go. We already see jobs in the fossil fuel and steel industry disappearing as climate change becomes a more pressing issue. Photonics technology could

enable the industrial innovations we need to face the challenges of the future and to further boost a more advanced and sustainable economy.”

*What opportunities and challenges do you see for the industry?*

“The growth potential is enormous. This means there is a big pie, and everyone is coming for a piece. There used to be companies with all the expertise to develop new technologies in-house. Those days are gone. Even big companies like Philips need others to keep up. New companies often focus on making a living for themselves and staying afloat in a competitive market. To innovate at a higher pace, cooperation is more fruitful. Skilled personnel, in particular, is something everyone is looking for. If the industry is to move forward, nourishing a healthy ecosystem is a must. Companies will have to make compromises and cooperate. On the other hand, funding will do much good for the sector.”

*What’s there to win for the Netherlands?*

“Several contenders worldwide are looking to become top-dog in the photonics industry. With this kind of technology, it’s basically - ‘the winner takes all’ - you have to be part of the top countries in the world to generate enough revenue to turn it into a profitable business. There’s a lot of knowledge and the right infrastructure in the Netherlands. The Dutch government recently invested 1.1 billion euros, actively helping innovative photonics companies. The province of Gelderland and other high-tech organisations are also involved, with a common goal: strengthening the Dutch high-tech industry’s position. So, we have the companies, the knowledge, and the people to create a worldwide impression. Now let’s make it happen!”



**Peter Harmsma,  
photonic packaging  
at TNO and CITC**

Moving from the bigger picture of photonics and its possibilities, one step closer towards its application. Peter Harmsma has over 20 years of experience in the world of photonic packaging. “The packaging makes up about 60 to 80 percent of all production costs of chips. By applying photonics technology in this process, we enable a massive saving potential and open up a world of possibilities to apply the technology on a larger scale and make innovative solutions more affordable to everyone.”

*What is packaging about?*

“Most importantly: you can’t do anything with just a chip. Regardless of the amount of photonic technology used for a chip, you need to integrate it into a box that is ready for use, including all the necessary wiring. That’s what packaging is – making sure companies that need chips for their products, are actually able to use them.”

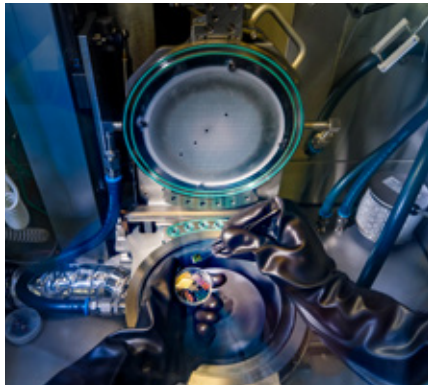
*And why is that relevant for the application of photonics?*

“If you use photonics in chips, light needs to go in and out. That’s much more complicated than when you only use electronics, where you can use simple wires to move electricity in and out. On top of that, the placement tolerances for photonic chips are on a micro level – which is complicated. But that’s not all, because the most important challenge is making all of this affordable.”



*How can we make that happen?*

“Standardisation is key. If we can produce in greater volumes, the unit price will decrease. At the same time, demand will only grow if the price goes down. It’s like a ‘chicken or the egg’-debate. How can we realise standardisation? The European Union opts for ‘the chicken’, in other words, demanding that companies apply the same standards. This can be difficult sometimes, as photonic technology has many different flavours. Each flavour has its specific requirements, and combining flavours for a specific application is possible. That’s why there’s enough work to be done on improving the packaging. Because it comes down to this: photonics has massive potential, but its true potential will only be unlocked if we can lower the cost of packaging!”



## 21<sup>st</sup> century smoke signals

*Photonic technology detects, generates, transports and processes light to transfer information and data. How? The easiest way to understand photonics is by comparing it to smoke signals invented by the native Americans. Those smoke signals were made by covering a fire with a blanket and taking it off again, thus releasing one or more puffs of smoke. Each puff contains a bit of information; together, these puffs construct a message. Nowadays, we can do the same with light. There are massive transatlantic optic cables through which information is exchanged, but instead of puffs of smoke, it’s flashing light signals.*



## Waander van Heerde, Chief Scientific Officer at Enzyre

One of the companies that’s hopeful about the possibilities of photonics, is Enzyre. As Chief Scientific Officer, Waander looks for ways to make their near-patient diagnostics, focused on blood coagulation, even cheaper and with smaller margins of error. “Photonics may hold the key to finding a solution which will improve the lives of many haemophilia patients in the future.”

*Why is Enzyre working on the application of photonic technology?*

“First and foremost: it’s a bright prospect for the future. There’s a mutual interest between research groups focused on photonics and us at Enzyre. That’s because we have a product that requires sensor technology. It’s an actual application for researchers and it’s promising because of the possible benefits of applying photonics.”

*How could photonics improve your innovation?*

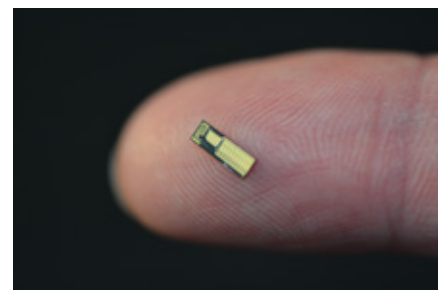
“We measure biomarkers in blood cells for haemophilia patients. They use our product to monitor whether they’re at risk of bleeding wherever they are. We make use of sensor technology that requires a lot of energy. As we want to make it as easy as possible for patients to carry the product around, it’s crucial to ensure it’s small enough. That’s where we can use photonics. Firstly, electronics require more energy than photonics. Secondly, a lot of heat is released when you use electronics. If we can replace that

with photonics, we can create an even smaller product.”

*What do you expect from photonic technology in the future?*

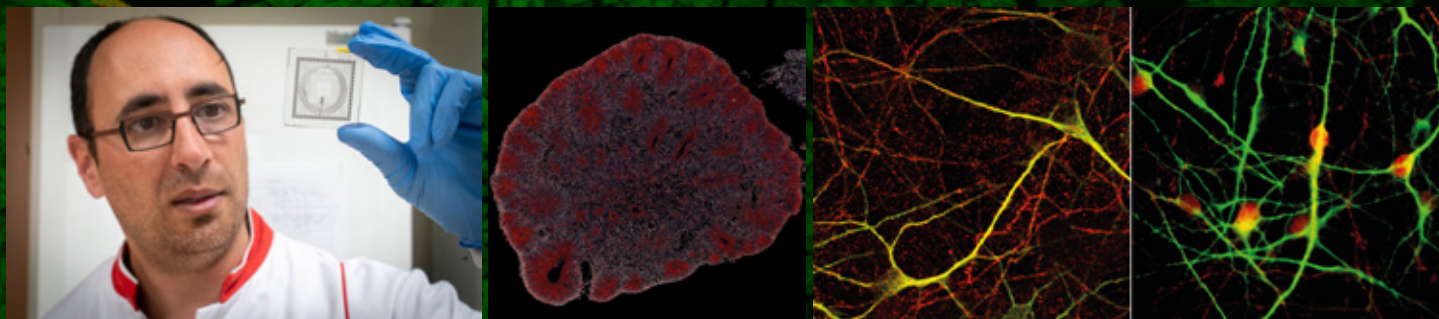
“We expect photonics to enable us to improve our product in many ways. More energy-efficient and smaller. Heat is one of our primary concerns at the moment, as we have to diagnose at 37 degrees Celsius. Currently, our product is a bit larger than we ideally would like, because it has to be able to deal with the heat exerted in the process. For this and many other applications, photonics has the potential to make a real difference.”

The experts agree that photonics is a big fish, ready to be caught. But for the photonics industry in The Netherlands to grow into something like the Delta Works – an innovation that has changed the course of the Dutch technological and societal history - circumstances need to be just right. And it looks like all the necessary boxes are ticked. “We should look at our country as one big campus, housing all relevant players,” René Penning de Vries concludes. “Only through sharing knowledge, working together, growing and nurturing a healthy ecosystem, will we see photonics become one of the key industries in the Netherlands very soon.”





# Personal healthcare through brain cells on a chip



It's alive! Professor Nael Nadif Kasri has found a way to turn skin or blood cells into brain cells. "Twenty years ago, we thought that what we are doing right now, was absolutely impossible."

Nael is a professor of Medical Neuroscience at the Radboud University in Nijmegen. He researches the electrical activity from brain cells, to understand neuronal communication and unravel its underlying mechanisms. With his research group in Nijmegen, he took huge steps in the further development and application of a technology to grow brain cells, on a chip! First, he takes skin cells and turns them into stem cells. With those stem cells he can then make any kind of body cell he wants. The advantage of this brain-on-a-chip technique? Nael: "The cultured brain cells contain exactly the same DNA as that of the patient. In such a culture dish we can see exactly what goes wrong in that individual patient. It is even possible to test a certain drug with these brain cells to see if they work against the condition of the individual patient. This allows us to provide better, faster and more efficient healthcare."

## Human-on-a-chip

In recent years, the technology has undergone explosive growth. Heart, liver, muscle, intestines, cancer, eyes, blood vessels; they are all already being cultured on a chip. Not only in a Petri dish but also in miniature organs that are artificially grown. Nael: "Thanks to new techniques, individual chips can now also be linked together, making increasingly complex networks possible, such as gut-brain-on-a-chip or eye-brain-on-a-chip. We are already on our way from organ-on-a-chip to human-on-a-chip."

## WE ARE ALREADY ON OUR WAY FROM ORGAN-ON-A-CHIP TO HUMAN-ON-A-CHIP

### Healthcare of the future

In the Netherlands almost all research groups work together in the Institute for human Organ and Disease Model Technologies (hDMT), where Nael himself coordinates all brain-related initiatives. In one of the projects, he is investigating Dravet syndrome, a severe form of epilepsy that occurs in young children and is difficult to treat. Often, finding the right drug is a matter of trial and error, which means that a lot of time is lost before the right drug is found. "By culturing brain cells, we can test the twenty or so available drugs at once", says Nael, "So we can find the optimal drug much faster."

### Finding the right combination

The initial results look good, but Nael also points out an important issue. "Is what we find in our cultures also reliably translatable to the patient? Human brains are made up of about 100 billion cells, some of which are quite different from each other. Neurons, astrocytes, microglia, for example, are brain cells that not only look different, but also function differently. So, in the culture for Dravet syndrome, we have to grow the right combination of brain cells that are involved in the disease in the patient. Otherwise, we will not get useful data. Luckily, we have mastered the cultivation of a brain-on-a-chip that contains many different brain cells and the results are becoming more and more reliable."



DESIGN, ART & TECHNOLOGY

# Exposed

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Sometimes art shines a new light upon something we consider to be 'normal', changing our experience from an unexpected perspective. Graduation students at ArtEZ University of the Arts worked on artistic interpretations and expressions of technology, research and innovation. We visited the exposition at ArtEZ in Arnhem, where the students exhibited the final works of their study 'Design, Art & Technology'.





## Chip Chatter

Artists: Marieke Leene and Francisco Vizentin for NXP

Chips are everywhere. They arrived in the 60s, and since then they got smaller, faster and stronger. For everything we do, we need them. We might even say that chips are our eyes, ears and hands. This work contains several chips that produce sound, chattering to people who pass by and 'to each other', about the functions they have, who they are and what they're doing. Through this work the chips, and their value and impact, become more visible – giving the chips a voice.



## Https: Localhost

Artist: Aafje Bep van Grieken

While browsing a website, chatting with friends or streaming a movie, you connect to a server somewhere on this planet. However, while chasing the fastest connections, we produce a lot of heat and use a lot of power. Mycelium is one nature's networks. It is the communication between plants, the exchange of knowledge, food and resources. This work explores the resemblance between these natural networks in plants, and specifically mushrooms, and the networks we use today in our technology. By using the excess energy to cultivate mushrooms and grow mycelium, an environment was created in which the natural and the digital worlds exist in symbiosis.





### Micro Macro

Artist: Aafje Bep van Grieken

There are fascinating things going on at a multitude of scales, in the world of bacteria, micro-organisms and on a cellular level. Although it feels not tangible and like something distant, it is all around us and often even within us. This work connects us to this invisible world, by zooming in on the microscopic scale and projecting it on a scale that's comprehensible to our experience – a portal between micro and macro.



### A most Enchanting Machine

Artist: Maria Pérez-Lozao Humanes

We welcomed electrical gadgets in our houses and committed to share our lives with them. Sometimes these electrical devices almost become alive, and our lives interweave. During the day, we use these machines to share knowledge, travel or relax. But what is its role at night, in our unconscious imagination when we're sleeping? This work is a play that starts at day and ends at night. Throughout the cycle, each device tells a story, all together forming a performative landscape that explores and frames the magic of electricity and its devices.





## Clean Air

Artist: Maria Pérez-Lozao Humanes

Chemicals are everywhere around us. In its habitual presence, we use them for cleaning our homes. But chemicals also have a very different function, e.g. in laboratories, where they are used for research and experiments. This work is an experiment on its own: a laboratory research unit that was built into an analogue computer, keeping itself clean through household chemicals. A meaningful clash between household chemicals and laboratory chemistry.



## Silicon Sculptures

Artist: Kseniia Anokhina

Although being the most ubiquitous material in the world, sand is at the same time the fundamental base ingredient in all the devices that power our modern lives. Fascinated by this juxtaposition, the artist designed a playful system with which children can emulate computer logic in an analog way. By recreating existing hardware through sandbox toys, the result both celebrates and critiques our modern life in an ephemeral sculpture that is in constant flux.



## Not just another repair company

Artist: Jochem van der Hoek

Odyssey RF is specialised in repairing radiofrequency equipment. The way they repair and reuse technological equipment is fascinating – especially in contrast with the market of consumer electronics. This work is a merchandise line, based on the same principle: reusing materials from the Odyssey workshop and use it as inspiration for the design of clothing. This way, even the parts at the end of the line get a new destination.



THE REBRANDING OF BYONDIS

# Corina Ramers-Verhoeven: Above and Beyond

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Smart.  
Determined.  
Bold.  
Dutch.  
If Corina Ramers-Verhoeven was a brand, you could easily envision a brainstorm where these descriptors wind up on a whiteboard.



As a healthcare communications specialist, Corina has devoted the last 25 years to strategic storytelling – on behalf of global pharmaceutical corporations such as Organon, Janssen Pharmaceuticals and Eli Lilly and Company, as well as governments, national health agencies and media outlets.

Straddling two continents and four languages, she has led professional and consumer public relations campaigns for health products in a wide range of life cycle stages. She also worked on issues management and media relations in support of brand and corporate reputation. All the while, Corina has advocated for diversity, equity, and inclusion, including the development of women in healthcare.

Corina is Vice President, Corporate Communications at Byondis, a Nijmegen-based, independent, clinical-stage biopharmaceutical company creating precision medicines to outsmart cancers and autoimmune diseases. She joined in January of 2020, just as the company was rebranding and relaunching itself after separating from its parent company, Synthon.

Today, we turn the tables and let Corina tell her story. It all starts with a chance meeting at a local restaurant that leads to the role of a lifetime and an opportunity to put a Dutch company on the map and make a difference in the field of oncology.

### **How did you end up working at Byondis?**

“I was in the right place at the right time. First, I was ready for a new job where I could challenge myself. My work for global corporations gave me a large canvas from which to work and the right resources to get things done. I thought, ‘If I could work for a smaller company, I could put those skills to work at a faster, more concentrated pace.’ In other words, I could make a greater impact. One night, I went to dinner with my husband and ran into an old friend, one of the owners of Synthon. He told me they’d sold the generics pharmaceutical business and

refocused their efforts on the biopharmaceutical business with Synthon Biopharmaceuticals, the predecessor to Byondis. We started discussing their plans, and I asked him if he had an in-house corporate communications lead. The rest, as they say, is history. The fact that the company is located in Nijmegen, only about a half-hour drive from my home, was a bonus.”

### **What was your role in the rebranding of Byondis?**

“I started in January 2020, arriving on the heels of the first steps of the rebranding process. Perfect timing! There was a short list of potential new names for the company and the first strokes of different designs for the new branding. It was my job to complete the final selection of the new name and logo design. With that, and a new slogan and messaging, we relaunched the new brand, including an entirely new website, on the 16th of April.

I recall doing many things simultaneously: constructing the relaunch plan, building my team, and creating a branding guide while keeping the leadership team up to date. I also started a regular internal and external communications cycle around the most critical company developments. During all this, the world was besieged by a global pandemic that made everything more challenging.”

### **Who is Byondis?**

“Byondis is the realisation of Founder and Chairman Jacques Lemmens’ dream: ‘make hope real’ for patients. The company originates from the company Synthon, which Jacques founded with Huub Sanders and other partners in 1991. In 2007, Synthon started its biopharmaceutical activities, and in 2012, it established a new biopharmaceutical subsidiary called Synthon Biopharmaceuticals. Following the acquisition of parent company Synthon by BC Partners in 2019, Synthon Biopharmaceuticals became the independent company that is Byondis today.

Byondis, pronounced ‘beyond this’, stands for going beyond the standard of care to make hope a reality for



## **“BYONDIS GOES BEYOND THE STANDARD OF CARE TO MAKE HOPE REAL FOR PATIENTS.”**

patients. And while Byondis is probably still the best-kept secret of Nijmegen, our future ambitions are driven by the continued development of our promising pipeline of preclinical and clinical programmes in oncology and autoimmune diseases, including targeted and immuno-oncology (IO) therapies.

With the development of our next-generation antibody-drug conjugates (ADCs), we aim to target cancers directly with potent medicines with fewer side effects. Our IO programme focuses on therapies that activate the immune system to recognise cancer cells and destroy them. Our most advanced ADC is being reviewed by the U.S. Food & Drug Administration and the European Medicines Agency as a potential treatment for patients with metastatic breast cancer.”

### **Byondis’ campus is integral to its success. Why is that?**

“Our campus includes state-of-the-art R&D and Good Manufacturing Practice (GMP) production facilities. This allows us to take our innovative portfolio beyond the laboratory – from discovery to clinical drug development, all the way to pivotal clinical



studies. This is an unusual and appealing attribute for a mid-sized biopharmaceutical company.

In addition, we strive for a green campus. Our facilities are designed to ensure less environmental impact. We also ensure that everything is safe for our employees and stakeholders, including customers, suppliers, and neighbours. Working on this impressive site is a joy and a privilege."

### **What do you like most about working at Byondis?**

"There are three things that I like about working at Byondis. First, it gives me the chance to work on my passion. My father died of lung cancer when I was just nine years old. I later lost a close cousin and a dear friend to cancer. So, on a personal level, I want to do my part to fight cancer. On a professional level, the field is challenging, stimulating, and constantly evolving. We know much more about cancer and have many more options for patients today. I'm honoured to continue to be a part of this journey.

Two, I believe in what Byondis stands for: transforming patients' hope into reality by creating precision medicines that improve treatment outcomes. As I said, this was Jacques Lemmens' plan all along. We are beginning to see the fruits of this labour, with one therapy in the regulatory review phase and three others preparing to enter clinical trials.

Three, I like working with like-minded individuals who are passionate and caring. Every one of our nearly 400 employees, from the C-suite to the laboratory to the production facility and beyond, comes to work with a mission of making hope real for patients."

### **What are some of your proudest accomplishments since your start at Byondis and the rebranding?**

"First, it's a team effort, and I'm grateful to have some of the best in the industry supporting me. Together, I believe we have established a strong communications foundation for Byondis and

have reaped some excellent results since our rebranding.

Our goal was to establish Byondis' presence and voice in the biopharmaceutical and cancer arenas. We wanted to engage with audiences who could help us in our mission or benefit from what we had to say.

Externally, we accomplished this through a broad mix of communications vehicles and channels, such as presentations at targeted meetings, a refreshed website, news releases, social media posts, articles, advertisements, videos, and blogs. I am especially proud of our blog series, highlighting our work, people, and passion.

Internally, beyond sharing timely news on our intranet, quarterly newsletters, and CEO letters, we created a magazine called *b·* that provides more in-depth coverage around specific themes, such as our recent science issue. We produce and host a television show to mark special occasions, such as our 10th anniversary, and started *Heart of Oncology*, an opportunity for employees to share their feelings about cancer through art."

### **Besides your commitment to oncology, what in your background prepared you for this role?**

"I am my mother's daughter. She was married in the '50s, when many women quit their jobs to become full-time wives and mothers. But she was determined that I, her only daughter, would create her own destiny. She said, 'If you want something and set your mind and heart to it, you can achieve it. The sky is the limit.'

I think this thought drives me to this day, and it inspires me to help other young women who aspire to a career in healthcare."

**"IF YOU WANT SOMETHING AND SET YOUR MIND AND HEART TO IT, YOU CAN ACHIEVE IT"**



**Corina Ramers-Verhoeven, MSc**  
**Vice President, Corporate Communications**

*Corina joined Byondis in January 2020 as Vice President, Corporate Communications.*

*Corina is a senior healthcare corporate affairs, government affairs and communications professional with more than 25 years' experience working for global pharmaceutical corporations and governments, as well as national health agencies and media outlets.*

*Prior to joining Byondis, Corina was the Global Therapeutic Area Communications Leader for Janssen Vaccines & Prevention B.V. Before that, she worked for nine years in various leadership positions at Eli Lilly and Company where she led the Lilly PACE (Patient Access to Cancer-care Excellence) initiative, which elevated Lilly's role in shaping public policy and public opinion on oncology innovation and cancer care. Before joining Lilly, Corina was Director, Global Communications, Gynecology and R&D at Organon BioSciences and Schering-Plough.*

*Corina holds a BSc in Health Promotion and Health Education, Communications Science from the HAN University of Applied Sciences, Nijmegen, the Netherlands, as well as an Executive MSc in Corporate Communications from the Rotterdam School of Management at Erasmus University, the Netherlands.*





# Floriade: the livable city of the future starts with education

**Currently more than 50 percent of all people worldwide live in cities; by 2050 this is expected to be almost 70 percent. Creative green solutions are needed to make and keep cities safe, sustainable and attractive – often by applying the latest technology and healthcare innovations.**

**With the theme Growing Green Cities, Floriade Expo 2022 Amsterdam-Almere aims to make cities more sustainable and livable. One of the cornerstones of their programme: educating young people and involving them in shaping the future of cities. What can innovative ecosystems learn from this approach?**

Yoël Schuller, deputy director of the Floriade, was involved almost from the start. Among other things, he was responsible for setting up the Floriade Academy in 2018 and in recent years, as a member of the board of directors, he has helped steer the final phase of the Floriade Park's preparations, operations, exploitation and commerce. "Involving young people and in particular students in the horticultural work field is absolutely essential if we are to keep qualified and motivated staff in the future."

## Unlocking the future

"A mega event like Floriade releases a lot of energy", Yoël kicks off the interview. "It creates a wonderful window of opportunity in the city for young people, and that releases a contagious enthusiasm. I also noticed that our organisation would not automatically connect with young

people. Accompanying young people takes time and the experts and project managers in a project organisation such as Floriade are often under a lot of pressure and therefore often have a full agenda. I think you can only make a Floriade for young people with young people. That's where the spark was initiated, we couldn't wait to work out the concept and plan, and to get started with Floriade Academy."

Meanwhile, the Floriade Academy is in full swing. "1750 students have done a project, internship, or graduation assignment in recent years between 2018 and 2022, and about 100 students are currently doing internships. We just finished the first half of Floriade Expo 2022, in which 100 students also did internships. We expect this number again for the second half, during summer and autumn. The scope is gigantic: from studies of



## GROWING GREEN

business processes to innovative waste concepts, and from free publicity to facility management - in the full breadth of the horticultural sector.”

Although now the Floriade Academy is a cornerstone item within the event, at the beginning, certainly not everyone understood its importance. “After all, guiding young people takes time and why would an educational institution partner up with the Floriade Academy, if they have already taken care of these matters in their own network? At that moment I decided to take on a group of about 50 students for all kinds of internships, projects and graduation assignments and to just start. Everyone was amazed and quickly convinced by the incredible energy the young people brought with them.”

### Generation Green

Yoël notices a lot of enthusiasm of the next generation for a sustainable future of our world – which still continues to surprise and inspire him day after day. “When asking young people what they think of Floriade, the answer is often ‘flowers and plants’. And then some mumbling about dull, boring and old-fashioned. The contrast with the reaction to the Growing Green Cities theme and the combination of Floriade with the development of future neighborhood Almere Hortus is enormous. Especially when young people themselves experience what the theme entails and what Floriade is about, a wonderfully and unstoppable enthusiasm arises.”

Floriade Academy also aspired to be a valuable and reliable place for young people and the local and regional partners like AERES, ROC van Flevoland and Amsterdam, Windesheim and numerous other educational institutes, especially during COVID-19 lockdowns. “It is hard for me to imagine how difficult it must be to study hard and stay motivated from your room or your parents’ house with only your online environment. And this also reinforced our awareness that there are also a lot of young people, who are not able to fully reach or even fit in the education system and always be successful in it. We tried to really be creative here and think along with their situation. E.g. by launching an impact generator programme for 36 young people in Almere – which will offer people concrete opportunities on the job market.”

**On the Floriade site there are numerous examples, best practices, that illustrate this story to the visitor. The aim is to inspire and encourage the visitor to do things just a little differently tomorrow.**



**WZC Flora** - At the Flora residential care center, you can learn what it's like to live with dementia through VR. These innovations contribute to better healthcare.



**Greenhouse** - In the Technical Innovation Center, visitors will gain insight into future cultivation methods such as a robotic vertical farm, drones and other types of robots. What is the future of the Gerbera and Paprika?



**AERES** – the most circular building of Floriade 2022, which is already in use during this year's Expo to educate young talents on growing green, livable and sustainable cities.





**Food Forum** - This pavillion was created to illustrate the special and innovative history of the province of Flevoland. Here people dare to make innovative choices, because at the bottom of a former sea anything is possible!



**Save Plastics** - This beach house was built using 7400 kg of plastic waste which is equivalent to 5 million sandwich bags! Plastic is indestructible, and therefore very sustainable in some applications.

### A renewed design

No one can ignore the fact that the number of visitors is disappointing at the moment. “This is extremely unpleasant for all the people who have worked very hard on this in recent years and who continue to work hard to this day, to the municipality of Almere and its residents. However, we shouldn’t forget how special it is, both that the Netherlands is the only country in the world with the right to organise a world expo every 10 years, and that with all the challenges since the outbreak of the COVID-19 pandemic, the Netherlands is able to organise Floriade Expo 2022.”

“And let’s also not forget about the nitrogen crisis and the impact on the built environment and mobility. In other countries, this kind of Expo is seen as an investment in the development of a neighbourhood, a city, a country. The infrastructure, employment, the international networks

and the image of the organiser are important reasons for countries and cities to organise this type of Expo. That story is currently getting snowed under in the Netherlands and it is precisely the story that can be the basis of a renewed design for a Dutch World Horticultural Expo.”

### From the making of to next steps

The Floriade has a lot going on to look forward to a bright future, Yoël thinks. “This years’ edition already had a successful making of. The station area was renovated, the train connection on the Amsterdam-Lelystad route was intensified and the A6 freeway was deepened and widened more quickly, with a huge positive impact on the flow of traffic. Currently, we’re in the middle of the exhibition, the Floriade Park is looking really beautiful and the vast majority of visitors are very satisfied with the experience of Floriade Expo 2022.”

“We’re also looking forward to the legacy of this exhibition, where we combined the Floriade with the development and realisation of a sustainable green urban district called ‘Hortus’. A truly unique district, where students enjoy their education, elderly people with mild dementia are housed and nine innovative bridges have been built as part of the bridge campus – literally building bridges, by reusing and sustainable use of materials.”

Yoël himself hopes to inspire and support other organisations to also keep moving forward in this trend. “Harness the energy of large-scale trajectories, events and other initiatives. This generates a contagious enthusiasm among education and among young people. Here lies the basis for a valuable and long-term cooperation between governments, businesses, entrepreneurs, education, research and a lot of young people. At Floriade, we hope to successfully complete Floriade Academy and transition it well into Growing Green Cities Academy for Almere, Flevoland and the Metropolitan Region of Amsterdam. Then discuss the entire process again with a number of people and draw lessons from it.”

“At the same time there are other places where Academies are being created (again), like SAIL Amsterdam 2025 where a wonderful hybrid learning environment is now being set up. And I’m just going to say it: I would love to set up a youth programme at the Novitech Campus in Nijmegen. The environment, The Vibe of the Future, the companies and the place seem to be a perfect fit for young people and are totally ready for it!”



OPINION - JEAN SCHREURS

# “The European Union needs a technological balance of power.”

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**The worldwide chip industry has grown explosively over the last years and won't stop growing in the coming years. The European Union wants to respond to this growth with the European Chips Act.**

**Jean Schreurs, Executive Director of NXP Semiconductors Netherlands, shares his opinion on the act and what it means to the worldwide industry of chips and semiconductors.**



Jean Schreurs, Executive Director of NXP Semiconductors Netherlands



“Chips are the new oil, the driving force in this century,” Jean kicks off. “Without chips, the world would come to a standstill. No cars, no trains, not even coffee from your machine.” The influence chips have on our technology has consequences for everyone.

Therefore, Jean is pleased that Europe understands that they have a role to play in these developments. “The worldwide market was worth 555 billion euros in 2021 and is expected to increase to approximately \$1 trillion of annual revenues by the end of the decade. Because of that, a technological balance of power is essential.”

However, according to Jean, the Chips Act will not fully solve this problem. “The chip industry is and will remain part of a global ecosystem. The global semiconductor industry is based on a collaborative system of mutual dependencies. No single region possesses end-to-end capabilities for semiconductor design and manufacturing. Around the world, semiconductor chip designers use intellectual property licenses and design verification to design wafer fabricators, which use raw materials, photomasks and equipment to create chips. It’s a truly global process, with suppliers around the world.

### **Snowball effect**

“The Chips Act aims to support an increase in semiconductor R&D and production across Europe in response to rising demand, to build on existing strengths and to reduce dependency on suppliers outside Europe. We now represent about 10% of the market. The European Union wants to double that in 2030.”

Jean says that we have to be realistic. “It sounds like a lot, billions of euros to boost the industry. But in the semiconductor industry, substantial investments are needed to remain competitive. For example, NXP invests about 16% of its revenue each year in R&D - in 2021 this was approximately EUR 1,8 billion. And other companies won’t stop investing.” Jean hopes the European investment will cause a snowball effect.

“Imagine that Europe plays a leading role in developing 6G technology. That would give us a powerful position within the industry. It would make Europe a vital partner for other players.”

### **A stronger position**

The European plans will have a direct effect on NXP. “We are strongly present in Europe as a company, with plants and research labs in the Netherlands, Germany, France, Austria, Belgium and Hungary. These EU investment plans enable us to do more in Europe. We are a multinational, so we usually go where the knowledge and talent are for new developments. Through the EU Chips Act, Europe will strengthen its position in the global semiconductor ecosystem by supporting the leading capabilities and performance of European products and technologies that others rely on, incentivising

R&D and manufacturing in the EU and encouraging the development of new technologies and innovation. This also will attract more talent in Europe, and thus will be an extra reason for us to work on new developments in Europe. The development of radar chips, for example, is something we are already doing in Europe. Knowledge about 5G and 6G is also potentially available at universities here.”

Jean explains that businesses in this industry are dependent on bringing in knowledge and new people. “Universities get more opportunities to create courses. That is perfect for the long term because a lot more knowledge will become available.”

### **Chips are everywhere**

The Chip Act sets out measures to prevent, prepare, anticipate and respond to future supply chain disruption. How did the current chip shortage arise? Jean explains:

“There are actually a couple of reasons. First and foremost: global megatrends (like increasing use of the cloud, deployment of 5G, artificial intelligence applications, and compute capability) are shaping the intelligent, connected world that we live in and are fueling a significantly increasing demand for microchips. Almost all modern products use chips, which means that we cannot keep up with the demand. Another reason is related to the corona pandemic.”

“During the first lockdowns in the second quarter of 2020, manufacturing plants worldwide, and also of our customers, closed. Especially the demand from the car industry suddenly fell away. But other industries, such as computer and communications companies, took their place. The problem is, making chips takes a long time. About three to six months.”

“In the second half of 2020, the demand for chips accelerated at a very rapid rate. As the auto and industrial markets began to rebound in the second half of 2020, the available foundry capacity was already sold out. As a result, we and others in the industry were experiencing significant increases in lead times. The semiconductor industry is still struggling with that imbalance today, and that will not be solved overnight.” Building additional factories is also not a simple matter. “Factories in which chips are built are complex and very hightech. Building a new factory takes at least 4 to 5 years, and maybe an investment of over 7 billion euros. Several companies have plans to build new, but it will take some time.”



*Pictured is NXP Semiconductors in Nijmegen, The Netherlands.*

# Unpacked

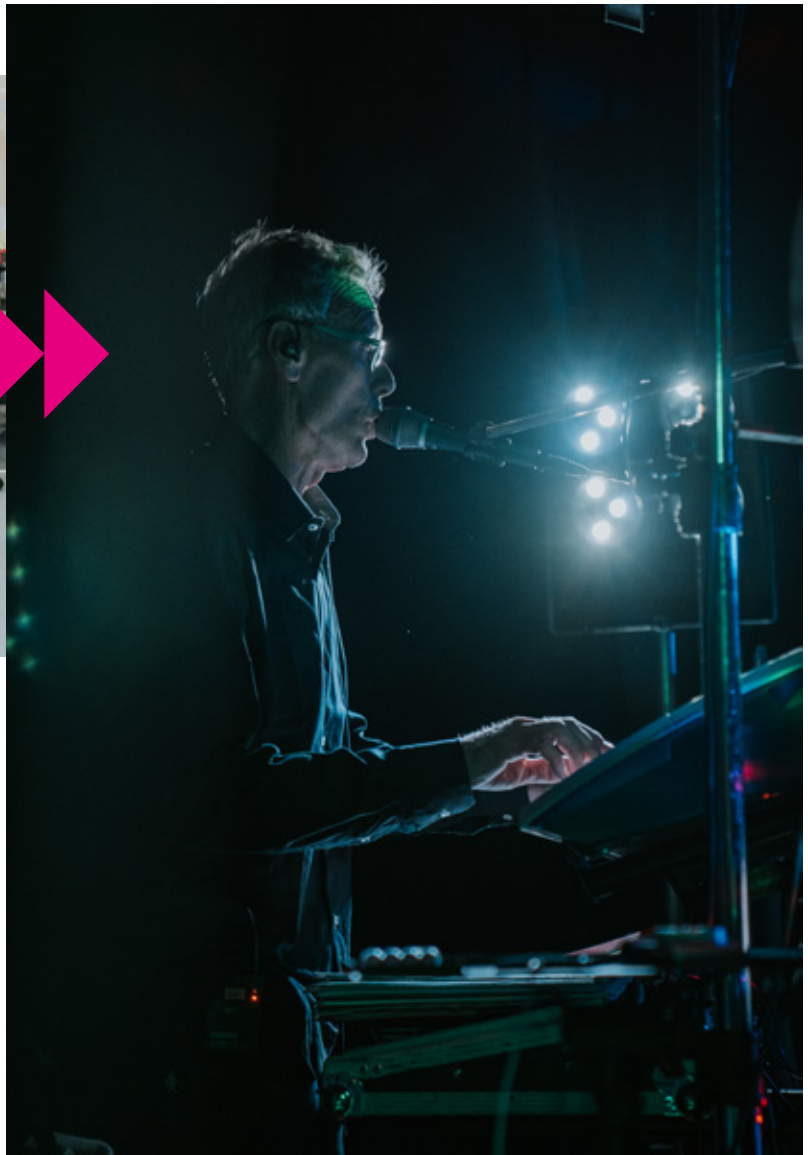
There is a lot going on behind the (sometimes) closed doors of laboratories and cleanrooms in the world of health and high tech. In Unpacked, we meet the people behind innovations, research and technology. We take pictures of them in both their work environment and in their free time, as they share their story – showing what the face of innovation looks like.

## Berry Langen



### Engineer by day..

“Since 1987 I have been working at NXP Semiconductors, which was part of Philips until 2006. As a defectivity operator, I detect minuscule defects on chips using advanced measuring equipment. The work takes place in a clean room where dust particles are kept to a minimum. Hence you are completely wrapped up for the product and for the environment.”



### ..entertainer by night!

“In the weekends, I unwrap myself. For more than 30 years I have been getting on the stage together with a good friend of mine, as ‘Duo Decibel’. On the stage, I feel free, and after every performance I return home satisfied and full of new energy. I have to admit, after the weekend, I’m happy to be wrapped up again in my blue suit, although my colleagues never fail to recognise me by looking at the only part that remains visible despite the suit: my eyes.”





### Going where the wind may take me

"It all started with my father, whose windsurf board I used when I was just 12 years old. I immediately fell in love with windsurfing: the water, wind, and freedom. And I also really enjoy the technical process it involves: always looking for new ways to go faster, more accurately and efficiently. It's all about refining small things and finding the optimal settings to move through the water and work with the wind."



"Currently, I'm contracted by NTS in Nijmegen for several projects, mostly to build first series of products. I perform checks, make adjustments and finetune prototypes, to make sure that they are ready to be taken into production. I enjoy the challenge to make things work and get the most out of their technical features. And being an independent entrepreneur, I have the freedom to go windsurfing more frequently, these days often together with my own son."

## THE FACE OF INNOVATION

**Tania Perneel & Arjan Stunnenberg**

**A high tech lovestory**



T: It all started with a picture of me and my dog on social media, this is where we started chatting. One thing led to another and we both sensed pretty soon, even online there was a match.

A: It was such a coincidence, but we happened to have a lot in common. However, I lived in Heteren, the Netherlands, and Tania in Izegem, Belgium. After dating for a while, things became more serious and a long-distance relationship wasn't working for us. So, we decided to go live together in Heteren.

T: Obviously, this was really exciting and a huge step. I had all my friends and family close by, and really enjoyed my job at the time. And things were tougher than expected. It was in the middle of the financial crisis and finding a job here was quite a challenge. After working at a warehouse for 1.5 years, I was stoked to get the job at EPR. It was, and still is, a dream job to me. At EPR, I get to do what I like most, working with electronics - and the colleagues here are just my kind of people.

A: Meanwhile I was starting to look around for opportunities in electronics again. I had an educational background and work experience in this sector and, after having worked for a couple of years in the logistics industry, I realised that the electronics sector is where my heart truly lies.

T: One day, one of my colleagues at EPR left the company. I knew the job and immediately knew this could be something for Arjan. So, I told him about it and he was excited right away.

A: Eventually, EPR offered me the chance to apply for the job, together with five other candidates. This is where my journey at EPR started. To this day, I'm grateful for this opportunity and also proud of myself, for taking up the challenge. Of course, it has been hard work, from the job interview even to this day on, but I enjoy every second of it.

T: Often I have to knock on the window of his office and drag him home. Which is, by the way, one of the few moments of the day I see him. The rest of the day we're pretty much 'minding our own business', literally, haha. This is what works best for us; doing things together, yet at our own pace and space. It's actually quite the same with another passion we share: photography.

A: I used to do this as a little boy already, when my dad gave me an old-school analogue camera. Throughout the years I became more engaged and started expanding my set of cameras, lenses and tools. I even experience a bit of FOMO, fear of missing out, when going on a photography trip - which equipment should I take with me?!

T: Arjan was the one who introduced me to photography. I started taking pictures with my smartphone but, as hobby's go, it got more serious and professional. Nowadays, I even do commercial shoots and sell work online.

A: I upload my work online as well. One of the greatest challenges these days is to stay authentic, and make work that's really yours and maybe even has your signature on it. But in the end, what matters most to me, is that we're doing this together, because that's always more fun.

**Have a look at  
Tania & Arjan's work:**



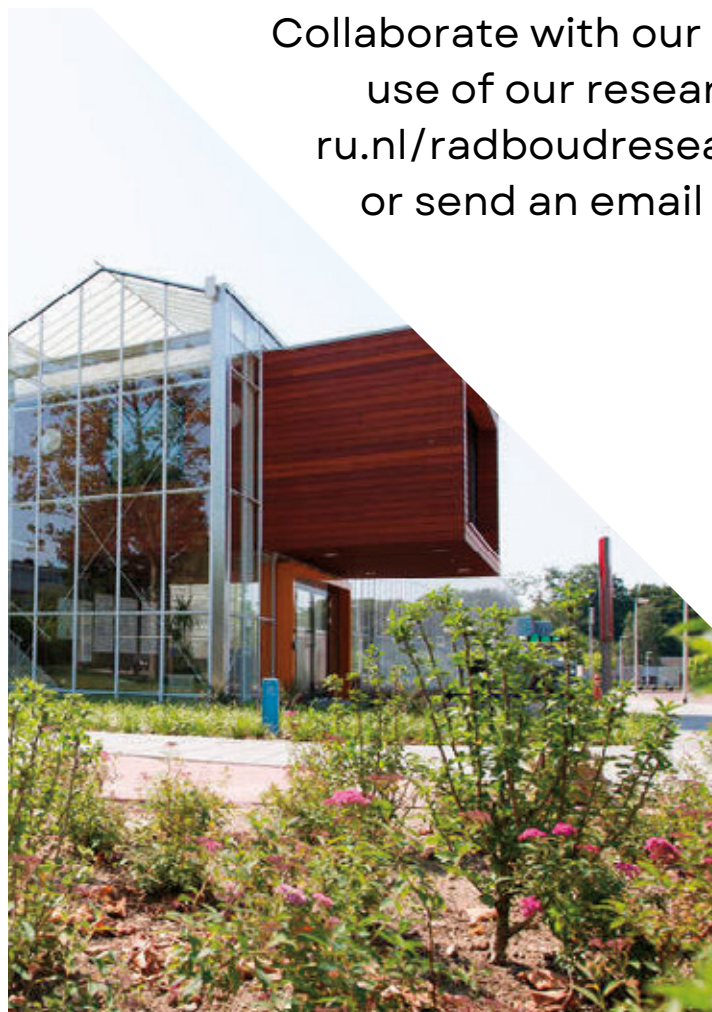




## **RADBOUD RESEARCH FACILITIES**

*Innovate by working together with science!*

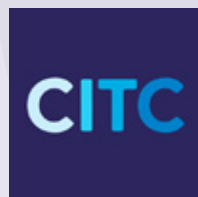
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