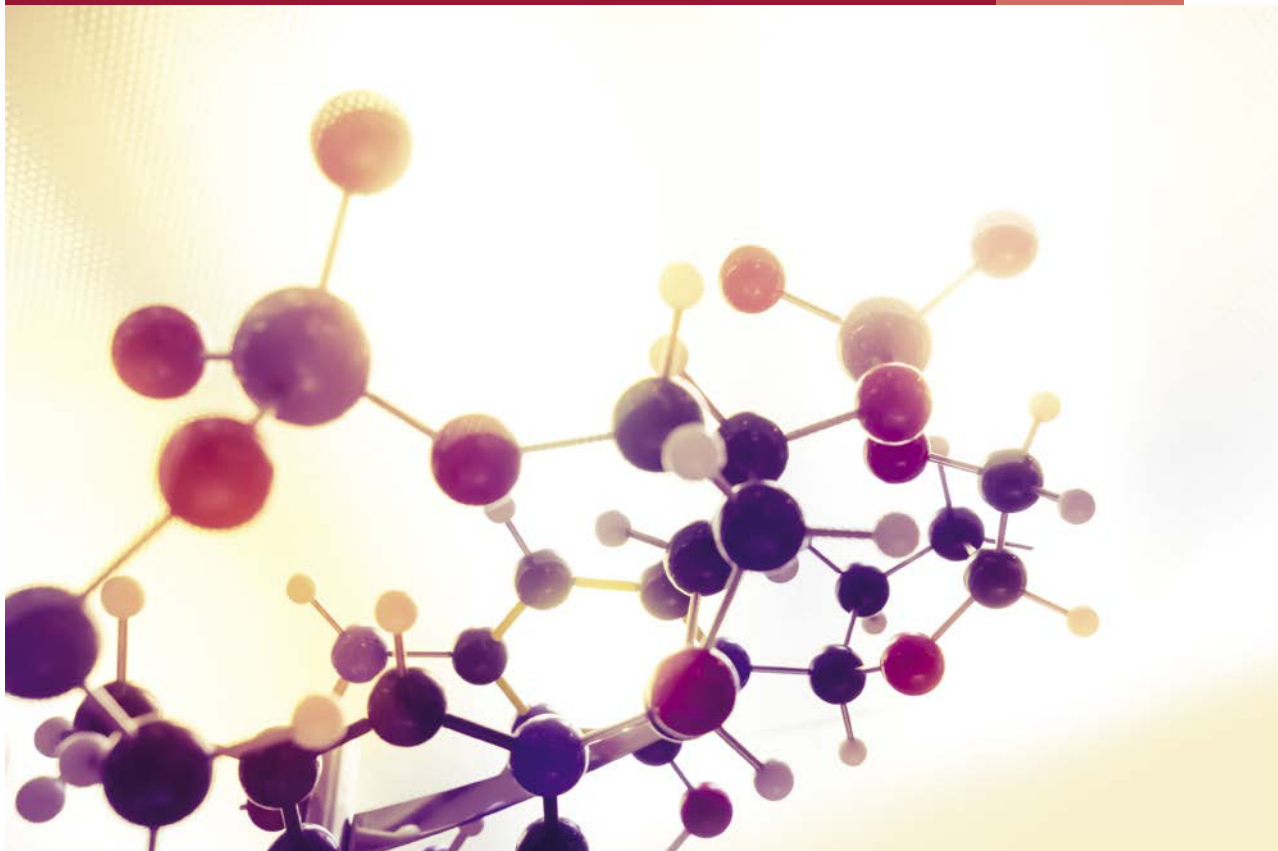


July 2017

ceo

The magazine for decision makers

Life & Science



pwc

When life meets science

A peek through the microscope reveals instantly: nothing is as exciting, colourful and forevermore astounding as life itself. Especially when scientific findings give us new, fascinating answers to the major and minor questions in life.

For that reason, we've dedicated not only the cover photo, but also the entire content of this new issue of *ceo Magazine* to the crossroads between "Life" and "Science".

This time, the articles portray outstanding personalities as well as small and large companies from across Switzerland. Although involved in different industries, they have one thing in common: with their daily work, technological achievements or creativity, each one of them is attempting step-by-step to improve our very existence – be it via different approaches to life or through modern science. Thus the icon at the beginning of each article indicates which of these two themes is being addressed: "Life" or "Science".



Find out more online

Which hidden talent does Gerold Biner, CEO of Air Zermatt, have? And for Lukas Braunschweiler of Sonova, what sound immediately evokes memories of his childhood?

You'll find answers to these and other interesting questions in the online version.

magazine.pwc.ch/en



Publisher: PwC Switzerland,
Birchstrasse 160, 8050 Zurich,
Switzerland

Layout: PwC Switzerland,
Paul G. Kelly, Birchstrasse 160,
8050 Zurich, Switzerland

Graphics processing/print:
Linkgroup AG, Mühlebachstrasse 52,
8008 Zurich, Switzerland

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Title photo: iStock, alice-photo

The opinions expressed by the
interviewees may vary with those
of the publisher.

This issue of our "ceo magazine" is
available in German, French and English.
Circulation: 10,000.

“Life & Science” – a thematic duo known for its countless commonalities and perplexing polarities. Without life, there can be no knowledge. And without technological progress, there can be no prolongation of life nor any enhancement of the quality of life.



Urs Honegger
CEO PwC Switzerland

In our latest edition of *ceo Magazine*, we take a closer look at this topic from both a philosophical and a pragmatic point of view. Be it in terms of pharmaceuticals, heart surgery, robotics or even cinematics – science and progress influence the contribution companies and outstanding personalities make to our everyday life. According to our most recent “Global CEO Survey”, 86 per cent of the CEOs interviewed believe that new technology will cause a radical change in their business over the medium term. And almost two-thirds of them are banking on strategic alliances.

Switzerland is one of the most innovative breeding grounds on the planet for biotechnology, medical technology and pharmaceuticals. It prides itself in having world-class research centres and a highly developed healthcare system. And it goes without saying that innovation is the Number 1 driver of progress. For instance, artificial hearts keep patients alive while they wait for a transplant. And one day, the deployment of drones could revolutionise emergency rescue efforts.

So success remains reserved for those who keep their finger on the pulse of progress, relentlessly pursue the new, and protect their innovations with iron-clad patents. This recipe has produced a panoply of ground-breaking novelties: telemedicine, fitness apps, 24-hour biometric monitoring and mobile check-ups – to name just a few – have become commonplace in today’s world. Not to mention the electronic data and payment transfer systems that boost efficiency for customers, patients, physicians, public authorities and companies alike.

In one point, all our interview partners are of the same mind: behind every innovation lies a clever person. That’s why companies that rely on highly qualified workers are revamping their recruiting and work models. Some of them go to where the talent is; some of them take the digital route and collaborate transcontinentally. The “where” has lost its significance.

In terms of thinking and creativity, man knows no bounds. Science does. Frequently those limits are set, not by the laws of physics, but instead by ethical considerations. Or as in the case of mountain rescue, where the limit emerges when first responders need to consciously accept risks.

We wish you an interesting read.

Urs Honegger

Turning industry dynamics into an opportunity

Innovations are the lifeblood of the life sciences, according to **Dominik Hotz**. Owing to the steady increase in healthcare costs, pharmaceutical companies and hospitals not just in Switzerland but throughout the world are coming under tremendous pressure to reform their practices. For the Pharma and Life Sciences leader at PwC Switzerland, investments in digital technologies as well as collaboration between the various actors in the healthcare industry are a must if Swiss companies want to maintain their global competitive edge also in the years ahead.

Life sciences represent an extremely diverse and interdisciplinary industry. How would you define the term personally?

Essentially, it's all about the health of living organisms; in other words, plants, people and animals. In addressing this issue, the activities of the pharmaceutical industry, hospitals and the healthcare sector all come into play. It's a rapidly growing area, and many companies are elbowing their way in to it – even those from the agriculture industry, for example when it comes to novel seeds.

Why are Swiss companies so successful in this line of business?

By its very nature, Switzerland has always had a tiny domestic market. Already in earlier days, this forced companies to expand beyond the nation's borders both operationally and in terms of acquiring talented scientists from elsewhere. Out of this has come the kind of corporate culture that one can see today at so many large, globally active Swiss companies. Switzerland's outstanding education system, with its technical colleges and renowned universities that foster a constant exchange with foreign schools of higher learning and the industry itself, is without a doubt an ideal seedbed. What's more, the stability of the Swiss economy and hence the ability to plan for the long term are factors that are especially crucial to the pharma industry, given its innovation, production and approval cycles that last on average about ten years.

What influence do population growth, increasing life expectancy and skyrocketing healthcare costs have on the dynamics of the life sciences industry?

Population growth and increasing prosperity lead to greater demand for healthcare services and pharmaceutical products. In the OECD member nations, outlays for healthcare in the broadest sense already account on average for about 13 per cent of gross domestic product. And those expenditures are growing at a significantly faster rate than the economy as a whole. All of

the actors in the healthcare industry are aware that this trend is not sustainable. Drug companies have come under price and margin pressures; primary physicians, specialists and hospitals need to work more efficiently and effectively. We're also seeing an increase in M&A activity, as well as intensified collaboration and partnerships between companies and hospitals.

Which short- and long-term trends and developments can be expected in this cluster of Swiss companies?

On one hand, there's the steady move towards convergence, which I already alluded to. The interests of the players in the healthcare industry are starting to intermingle; greater focus is being placed on the patients. And then comes the digitisation aspect: the exchange of patient data leads to improved treatments, and bio-statistical methods make it possible to conduct efficacy analyses of specific therapies.

Swiss companies' resolute investments in research and development appear to be paying off by international comparison. But where does Switzerland need to catch up?

Political uncertainties can pose a potential threat by detracting from the long-term planning certainty that I mentioned before. Switzerland would do well to mitigate these uncertainties. Over the medium term, we need to find solutions for an OECD-compatible tax regime, as well as for a constitutionally consistent immigration policy which allows us to continue to attract the kind of international talent that reinforces the scientific and economic dynamism of Switzerland. And from a life sciences perspective, Switzerland should also make sure that it maintains its primacy in terms of education, sets uniform standards for medical treatment data, and strives to achieve greater intercantonal collaboration in the healthcare system.

Which three terms come to your mind spontaneously when you reflect on the topic of "Life"?

Laughing – discovering – appreciating.

“The interests of the players in the healthcare industry are starting to intermingle.”



Dominik Hotz

Pharma and Life Sciences leader, PwC Switzerland

Dominik Hotz is Partner and Pharma and Life Sciences leader at PwC Switzerland. Raised in a family of pharmacists, he became acquainted with the issues surrounding the industry already in his youth. Hotz studied philosophy and economics in Munich and at the London School of Economics and Political Sciences. Following various posts in the pharma industry and with biotech companies, he joined PwC's Advisory division 11 years ago. Since 2015, Dominik Hotz heads an interdisciplinary team of specialists who render comprehensive consulting services to the pharma and life sciences sectors.

PwC studies about Life & Science:



20th CEO Survey:
Pharmaceuticals & Life Sciences key findings



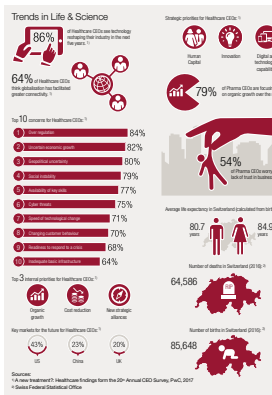
Medical cost trend:
Behind the numbers 2018



**2017 Pharma-
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Ways to manage data, value medical treatments, and engage with patients in the New Health Economy



What doctor?
Why AI and robotics will define New Health



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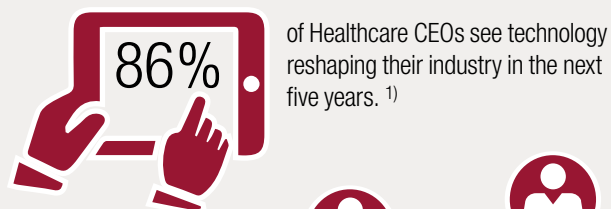


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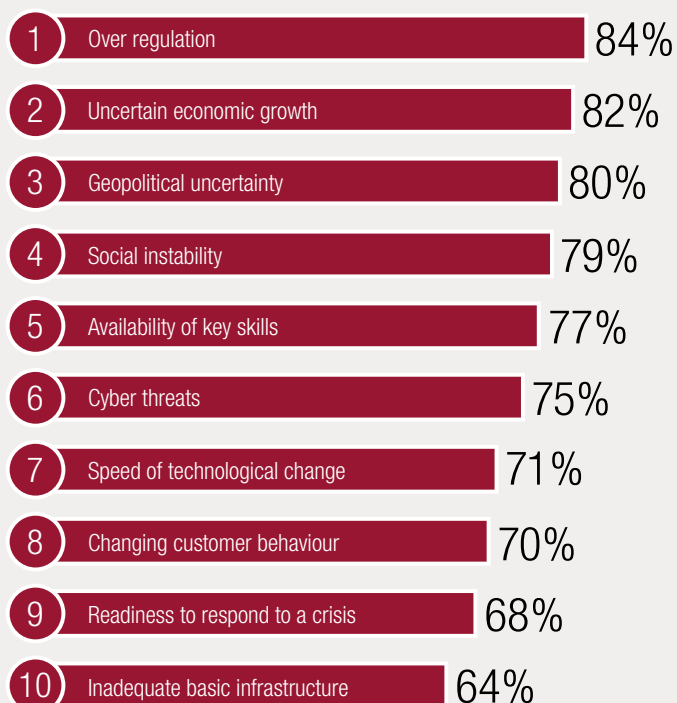
Trends in Life & Science



64% of Healthcare CEOs think globalisation has facilitated greater connectivity. ¹⁾



Top 10 concerns for Healthcare CEOs: ¹⁾



Top 3 internal priorities for Healthcare CEOs: ¹⁾



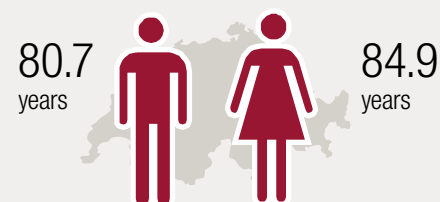
Key markets for the future for Healthcare CEOs: ¹⁾



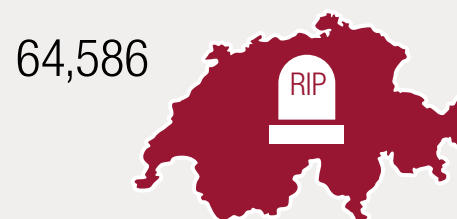
Strategic priorities for Healthcare CEOs: ¹⁾



Average life expectancy in Switzerland (calculated from birth): ²⁾



Number of deaths in Switzerland (2016): ²⁾



Number of births in Switzerland (2016): ²⁾



Sources:

¹⁾ A new treatment?: Healthcare findings from the 20th Annual CEO Survey, PwC, 2017

²⁾ Swiss Federal Statistical Office



Science = success

The cornerstone to Novartis – one of the world’s largest pharmaceuticals makers and one of Switzerland’s largest companies – is technical excellence. CEO **Joe Jimenez** explains how he pursues that, why organic growth is a necessity and where the industry is moving from transactional pricing to success fees.

Text: Eric Johnson

Images: Marc Wetli

Which is most important at Novartis, management or science?

Our business is all about the science. The core of Novartis is research and development, which is why we look for the best scientists around the world, no matter where they are and where they want to live. We go to them, rather than having them come to us, so we have R&D sites in Europe, the USA and Asia. The organising principle at Novartis is to find the best scientists, then let them discover and work their magic. What I want out of our scientists is brilliant science – I care less about their management skills. Still, I expect them to be proficient at managing programmes, people and resources. As for our business people, I expect them to be world-class managers and proficient at science. So on both sides, science and management, we want a combination of brilliance and proficiency.

How do you attract and retain the best people?

We’re in an industry where people come to work because they want to help others. So we’ve engaged our associates by showing them examples of how we accomplish our mission, which is to preserve and to extend life. Three years ago, when we began to go through a major patent expiration, I started

a programme called “Long Live Life”, in which we asked our associates to share personal stories of family, friends and colleagues who had been struck by disease and helped by Novartis. The stories that rolled in were moving – they really helped the associates to see our company’s purpose at an emotional level. This increases their motivation and engagement, especially when the company is going through a difficult time.

Who are your top competitors for talent, and how do you compete with them?

Our talent competition is not against other “big pharma” companies, but against biotechnology companies. Some scientists believe they can have a bigger, faster impact at these small start-ups, because there they believe they can have more freedom. So, we are careful to give scientists the freedom to discover. I believe they have as much freedom here as at a biotech. They are free, because we are not too prescriptive in research – in fact, we keep the marketers away from the researchers. The former shouldn’t discourage the latter with false negatives. We keep our scientists free to discover, because that’s where new opportunities come up.

How do you measure excellence in science?

It’s not easy to measure the progress of science annually, because we work on ten-year product cycles. So to evaluate


scientists, we have developed quantitative markers that indicate advancement along the way to a marketable drug. An important one is “Proof of Concept”, i.e. evidence that a certain molecule can achieve a therapeutic effect in humans. We’re constantly looking for new drug targets and new drug candidates, so every year we set targets for our researchers to deliver a specific number of Proofs of Concepts.

Do you look to develop more drug candidates internally, or buy them externally?

The way to create value in this industry is to discover it yourself. So we expect 75 per cent to 80 per cent of our drug “pipeline” to be developed in-house, and the rest to be acquired or in-licensed. An important reason for this is the pricing of the latter. Pharmaceutical companies have become so big that they are trying to grow from an already high base, and at the same time we’re always fighting the revenue losses of patent expiration. So, everybody is chasing the acquisition candidates that are out there, and that’s created an astronomical increase in prices.

You are renowned for speeding up decisions at Novartis. How did you do that?

The average intelligence of a Novartis associate is off the charts. Sometimes, however, clever people complicate things to a degree that isn’t



“The way to create value in this industry is to discover it yourself.”

Joe Jimenez

Born, raised and educated in California, Joseph Jimenez, Jr., started his career and made a name for himself in fast-moving consumer goods, first at Clorox, next at ConAgra Foods and finally at H. J. Heinz, where he was CEO for North America and Europe, successively. In 2007, he joined Novartis as a Division Head, from whence he was promoted to CEO in 2010. Jimenez was a world-class swimmer in his university days at Stanford, and he still churns the water in his family’s home pool near Basel, but nowadays more for fitness than for competition.

Novartis

Formed from the 1996 merger of two legendary Swiss companies, Ciba-Geigy and Sandoz, Novartis AG has become a legend in its own right. Turnover in 2016 hit nearly USD 50 billion, while the number of employees (or associates, as Jimenez calls them) totalled 120,000 worldwide and 13,000 in Switzerland. Early on, the company divested its considerable interests in chemicals (now mainly held by BASF and Clariant) and agrochemicals (now Syngenta) to focus on pharmaceuticals. Annual revenues of Novartis' four largest-selling pharmaceuticals sum to a bit more than USD 10 billion.

www.novartis.ch

necessary. In my early years here, I remember an Innovation Management meeting where we were trying to decide whether a drug candidate should move to phase III trials, based on phase II results. After a long, astute discussion, the group moved to reconvene and decide in the following month. I said no: we have enough data, let's conclude what they are telling us and make the decision now. So what I've tried to do is to simplify an overly complex set of processes that were put in place by really smart people.

Is there a downside for pharma that the world's population is getting older?

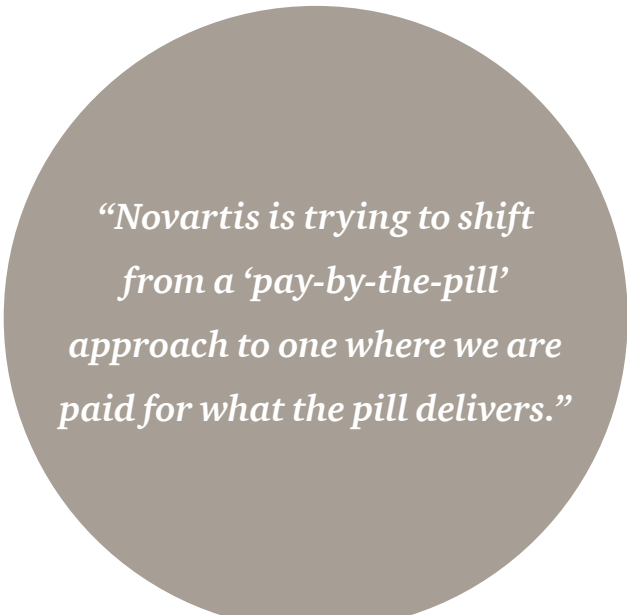
Yes, this is a mixed story. On one hand, pharma is a growth industry, because populations are growing and aging. By 2030, we'll have a billion more people, and one in three will be over 50: demand for healthcare will rise. On the other hand, the world's healthcare

systems can't afford even the costs they have today. So, Novartis is trying to shift from a transactional "pay-by-the-pill" approach to an outcomes approach, where we are paid for what the pill delivers. For instance, our current heart failure drug reduces hospital stays massively. So we are saying to those who pay for hospitalisations: base our payments on that outcome of reducing hospital costs. It's like a success fee. We're trying this in many countries, including Switzerland, and in the long run we think the outcomes approach can take 25 per cent out of the cost of health care.

How long will that take?

A long time. Proving outcomes requires a lot of data that some healthcare systems don't have. Many systems are not yet interested in outcomes payment, because it would cost them more to track the outcome data than

they would save in fees. But this is going to change as big data takes over. The ability to understand what a drug is delivering is getting easier and easier. More and more systems, such as Britain's National Health Service, are collecting and centralising the inputs and outputs to understand what outcomes are and how much they cost and save. This will be the future of pharma.



"Novartis is trying to shift from a 'pay-by-the-pill' approach to one where we are paid for what the pill delivers."

*“Our business
is all about
the science.”*

Steel container holding red pills in manufacturing process.



The guardian angels of Valais

If something goes horribly wrong in Valais, this team is airborne in three minutes flat: the choppers and first responders of Air Zermatt. Over the course of their almost 50-year history, they have constantly applied the latest technologies and in so doing revolutionised the hazardous skill of mountain rescue. But in reality, all they do is transport people – or so says company head **Gerold Biner**.

Text: editorial staff “ceo” Magazine

Images: Markus Bertschi

In the beginning, it was merely a boyhood dream – flying. “The instant I smelled helicopter kerosene for the first time, I was totally hooked,” recalls Gerold Biner, CEO of Air Zermatt. Fetching injured wayfarers and saving lives only came later. “Actually, we’re nothing more than transporters, regardless of how dramatic the situation and circumstances might be,” he notes modestly.

But as unspectacular as the 53-year-old Zermatter prefers to put it, the everyday experiences of this chopper jockey are anything other than those of a taxi driver. With its crew of emergency doctors and mountain rescuers, Air Zermatt constitutes an impressive alpine emergency squadron which, if need be, flies up to 25 sorties per day. When it’s a matter of life or death, a pilot, a paramedic and a doctor are in the air within three minutes’ time. For rescues in difficult-to-access locations off the beaten path or piste – or even in a glacier crevice – a mountaineer is also on board. The team must function in perfect harmony and be able to rely on each other in order to carry out a flawless rescue operation. “My task is to get the medical personnel and equipment to the site as quickly and safely as possible,” Biner explains. Only when he can land right next to the accident is he directly involved in the triage. “Then I assist the doctor or try to calm the uninjured people.”

“My job is to get the medical personnel and equipment to the emergency site as quickly and safely as possible.”



Gerold Biner

53-year-old CEO Gerold Biner has been in the pilot's seat at helicopter and air-rescue company Air Zermatt since 2011. His first deployment for the firm was back in 1989. Prior to that, the baker's son completed his apprenticeship as a mechanic in Sion and later trained as a helicopter pilot in Canada. Gerold Biner is married and lives in Zermatt.

A scenic photograph of a snow-covered mountain range under a clear, bright blue sky. Numerous white snowflakes are captured in motion, falling from the sky, creating a sense of depth and atmosphere. The foreground shows a snow-dusted slope with some dark evergreen trees. The text is centered in the upper half of the image.

“There’s still no technological achievement that enables us to get out there at any time of day or night regardless of the weather.”





Gerold Biner completed his first solo flight in 1987.

Eiger North Face rescue – a worldwide sensation

In its almost 50 years of existence, Air Zermatt has contributed greatly to the advancement of mountain rescue techniques – especially those that accelerate the effort and make it safer for everyone concerned. In this regard, company founder Beat Perren played a pivotal role with his numerous innovations and novel approaches. Above all, the first-ever rescue of mountain climbers on the Eiger North Face with the help of a helicopter and a windlass caused a sensation that reverberated across the globe. “Until then, almost 30 people were needed to climb over the peak and then rappel down to save stranded or injured climbers. That took a long time. With the windlass, the whole exercise can be accomplished today within half an hour,” according to Biner. Air Zermatt also developed a tripod that simplifies the descent into a glacier crevice. This device, too, is now used throughout the world for such purposes.

But despite technological advances like this, there are still limits to mountain rescue operations. “The problems start when you have no other choice than to take a risk,” Biner admits. And it is difficult to determine when that point has been reached. “If you would need to fly underneath an ice overhang in order to get someone off the mountain, then the limit has obviously been exceeded,” offers Biner as an example. In case of doubt, the exfiltration is aborted and an alternative sought. “We’ve already climbed on foot all the way up the Weisshorn as there was no other way of dealing with the situation.” It takes years of experience before risks like this can be assessed prudently. But even then, touchy situations can arise where rescuers are forced to rely on a hefty portion of luck. “Many times, we only realise that fact after the day is done,” says Biner, who can look back on an almost 30-year career as a rescue pilot and himself managed to survive a copter crash.

Keeping pace with innovations

But at times, all help comes to naught – especially when poor weather conditions make deployment impossible. “There’s still no technological achievement that enables us to get out there at any time of day or night regardless of the weather,” Biner states. Switzerland’s Rega air rescue and retrieval organisation, which works closely with Air Zermatt, is pursuing such a vision. But the plans of the Valais heroes are perform more modest. Nonetheless, they could very well push mountain rescue to the next level: for instance, through their co-development of an entirely redesigned, purpose-specific helicopter; or in the area of emergency medicine, where they are involved in project “Null negativ” which aims to treat victims on-site through the transfusion of whole human blood instead of just blood plasma.

And along with techniques and technology, Air Zermatt itself has changed dramatically since its founding. The basic concept – i.e. providing an air rescue service – is still the same. But meanwhile, the company has expanded into the niches of passenger transport and “flightseeing”. Another important revenue source these days is air haulage, where avalanche clearing and mountain restaurant supply come into play. And most recently, a training and education centre for know-how transfer has been added to Air Zermatt’s range of offerings. “We put the money from those activities into our rescue operation, which these days regularly runs a deficit due to its cost-intensiveness,” Biner explains. Thanks to this diversification, the company is in good enough shape to invest in the construction of a new base in Zermatt. In response to the question as to how he imagines the future of air rescue, Biner says: “We don’t know where the journey will be taking us.” But conceivable is the use of drones or alternative drive systems for helicopters. Those technologies are still in their infancy, but “it is of decisive importance that we keep pace with them.”



*“We put the money
from our niche activities
into our rescue
operation, which these
days regularly runs
a deficit.”*

Air Zermatt

Founded in 1968 by Beat H. Perren, Air Zermatt today operates out of three Canton Valais bases in Gampel, Raron and Zermatt and has a permanent workforce of 65 people. With its nine helicopters, the company conducts rescue, air transport and flightseeing activities. Its mountain rescuers are also at times deployed to foreign countries such as Nepal. So that trained experts are available on-site, Air Zermatt collaborates in the maintenance of a rescue station in the Himalayas, which was established already in 2011.

www.air-zermatt.ch



The virtual brain

How do you unravel the secrets of our very own thinking engine, and thus find a way to better treat illnesses of the brain? This is what neurologist Professor **Henry Markram** has been working on for over ten years in the context of his Blue Brain Project. And he is convinced that only relying on experiments and theories will not get us there.

Text: editorial staff “ceo” Magazine

Images: Alain Herzog / EPFL; Blue Brain Project / EPFL

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The human brain is still one of the biggest mysteries of humankind. On its outside, it is not a particularly spectacular, grey-whitish, soft matter of an average of 1.5 kilogrammes in adults. However, what goes on inside is absolutely fascinating: over 100 billion nerve cells or neurons communicate on a constant basis, build networks and synaptic connections, only to change them again if another function is required. And all of this happens in just a few milliseconds. The brain is the organ that controls all body functions, produces thoughts and emotions, and is responsible for the human consciousness. “The brain is a dynamic network of networks, operating in and across many levels at the same time,” Henry Markram explains. He is a professor of neuroscience at the École Polytechnique Fédérale de Lausanne (EPFL), director of the Laboratory of Neural Microcircuitry (LNMC) and the Founder and Director of the Blue Brain Project.

Founded in 2005 within the Brain Mind Institute of the EPFL, the aim of the Blue Brain Project is to build accurate, biologically detailed, digital reconstructions and simulations of the rodent brain and, ultimately, the human brain.

In order to achieve this, the 55-year-old brain researcher follows a very unique approach.

“This requires a new strategy, because by simply relying on experiments, we will never be able to understand the brain and how it works.” He is convinced that in the face of the incalculable number of reactions that take place in the brain, it will be impossible to conduct a sufficient amount of experiments. Added to this, the only time scientists ever get a look at a functioning brain is during an operation. This is why even after decades of research, mankind still knows very little about their own, complex thinking organ.

A billion-piece jigsaw puzzle

South African-born Markram is therefore all about simulations – a strategy that has already been used successfully in other scientific areas. Using a supercomputer, he and his team of scientists, software engineers and developers, technicians and postdoctoral researchers are developing the process of assimilating all the data and knowledge on the brain and constructing a computer model of the brain with which they can simulate the functions of the brain. In the first phase, they have been concentrating on a branched structure of thousands of neurons that measures but a few millimetres; a neocortical column of the cortex of a rat. This minimum unit of the animal’s brain serves as a basis for

developing the entire organ and, in a later phase, an entire human brain.

For this purpose, the researchers rely on already published scientific data and facts on the brain and integrate it in the model. From this, they deduct rules and with them calculate the structure of the brain and the possible reactions of each individual cell. Markram draws a comparison with a jigsaw puzzle of a billion pieces, of which only about 1,000 pieces are known to us. “Normally one can’t build such a puzzle. However, by finding all the rules and interdependences between the pieces, we will be able to complete even such a gigantic puzzle.”

Failure produces insight

Using results from previous experiments, Markram and his team verify the deduced rules for their validity. For this, they consult approximately 100,000 scientific publications that are issued every year. If the assumed rules stand the test of all of these publications, the researchers see it as a confirmation that their assumptions are correct. It is, however, also interesting to encounter failure: “If something doesn’t work as expected, we know we are standing at the frontiers of our knowledge,” says Markram. “When one of our theories is

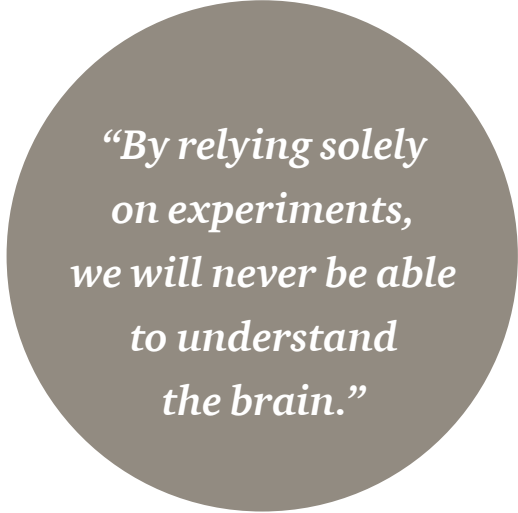


“I want us to understand the brain – preferably in my lifetime, not in that of my grandchildren.”

Photo: Alain Herzog/EPFL

Henry Markram

Henry Markram (55) is the Founder of the Brain Mind Institute, the Blue Brain Project and the EU's Human Brain Project all head quartered at the EPFL. Born in South Africa, he studied medicine and neurophysiology in Cape Town. He immigrated to Israel and completed his PhD at the Weizmann Institute and his postdoctoral work at the National Institute for Health in the US and the Max Planck Institute for Medical Research in Heidelberg. The brain scientist is married and the father of five children. He and his wife are also conducting research on autism and founded Frontiers, which has become one of the largest Open Access publisher of science.



*“By relying solely
on experiments,
we will never be able
to understand
the brain.”*

disproved, we can question our assumptions in a systematic manner. We learn when we fail.”

The Blue Brain Project published nearly 100 papers in the past ten years, culminating in the first draft digital reconstruction of neocortical microcircuitry published in the prestigious journal “Cell” (Markram et al, 2015). It is a detailed copy of a small piece of the rat neocortex, the most evolved part of the brain, that is approximately $\frac{1}{3}$ cubic millimetres with 31,000 brain cells and 40 million connections between them. The researchers have since started building larger areas of the brain. Their next digital copy planned for the end of this year is the brain region responsible for the sense of touch and they are targeting the mouse brain with nearly 600 brain regions by 2023. In parallel that they have started on building a small piece of the human neocortex.

Knowledge is at the forefront

This was his vision, when Henry Markram brought the Blue Brain Project to life in 2005; “I want us to understand the brain – preferably in my lifetime, not in that of my grandchildren,” he says. He is driven by the wish to find out how the brain influences a person’s own sensations and that towards their environment. He also has a personal incentive to understand what drives the brain, being the father of an autistic son. “Even as a neurologist, I feel powerless,” he says. Healing brain illnesses is still very much of a gamble today. “There is a great deal of trying out. If something works, it is going to produce a new enterprise worth billions, or, if it doesn’t, you go back to the drawing board.” The computer model of the brain is intended to provide further fundamental data for this and improve the experiments and trials. For example, the Blue Brain

Project could help locate particularly vulnerable parts of the brain and identify strategically important areas. “Whoever treats illnesses of the brain absolutely has to know how it works,” he says. In the future, Markram hopes that the simulations with the computer model will help reduce the 600 different illnesses of the brain known to us to date.

An advantage for artificial intelligence

The calculations for the model are carried out by supercomputer Blue Brain IV IBM BG/Q. It will soon be replaced by the next generation of supercomputers with even more processing power. The idea that these supercomputers will one day start to think by themselves, however, is purely science fiction for Markram – at least for the next 100 years. However, simplified knowledge gained in the project could find a way into our everyday lives earlier and have a significant influence on the research on artificial intelligence. “The brain works much more efficient, faster and less data-intensive than today’s computer networks,” says Markram. In the next few years, a number of spin-offs in the area of artificial intelligence are expected to emerge from the project.

The fact that this ambitious project is based in Switzerland is, according to Markram, the result of the favourable conditions he is being offered. A particularly important prerequisite in order to launch this long-term

research in Switzerland was the ETH Board’s and the Swiss Federal Council’s backing of the Blue Brain Project and its vision. “Our team is very interdisciplinary. Our members are often required to acquire a considerable amount of knowledge in a field that is partially alien to them in order to understand the entire model,” Markram explains. He is determined that Switzerland should be rewarded for its commitment. “Thanks to its leading role in this project, Switzerland will be in a key position to develop new treatments for the brain,” Markram continues. He also expects positive consequences for information technology and communication technologies.

And it may not be that long until this happens, at least according to the brain researcher. The problems that are still in the way of this are clearly defined and identified. “By the end of our funding period in 2023, we will certainly be able to present a detailed simulation of the brain of a mouse and possibly a lower resolution model of the human brain,” he says. And no doubt on the way there, we will discover a great deal of other amazing facts about the brain.

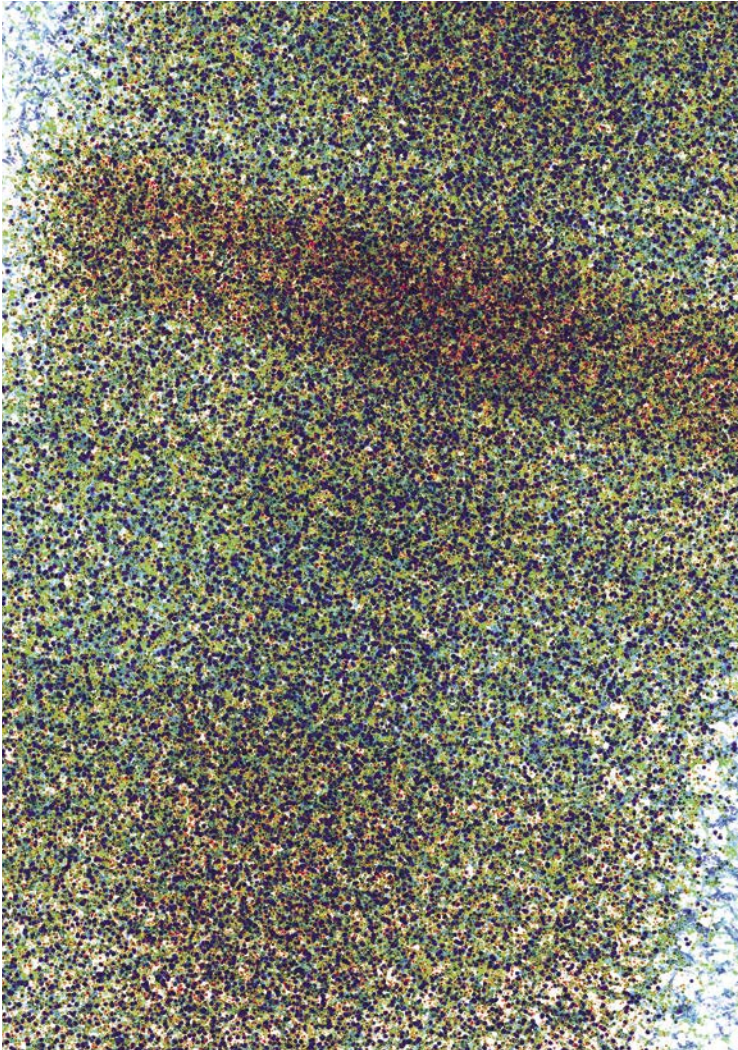


Image: Blue Brain Project/EPFL © 2005–2017. All rights reserved

The complexity of the neocortex. The complexity of the brain is portrayed here showing three major components that interact with each other in the neocortex (the most evolved part of a mammal's brain): blood vessels, astrocytes (supporting cells) and neurons.

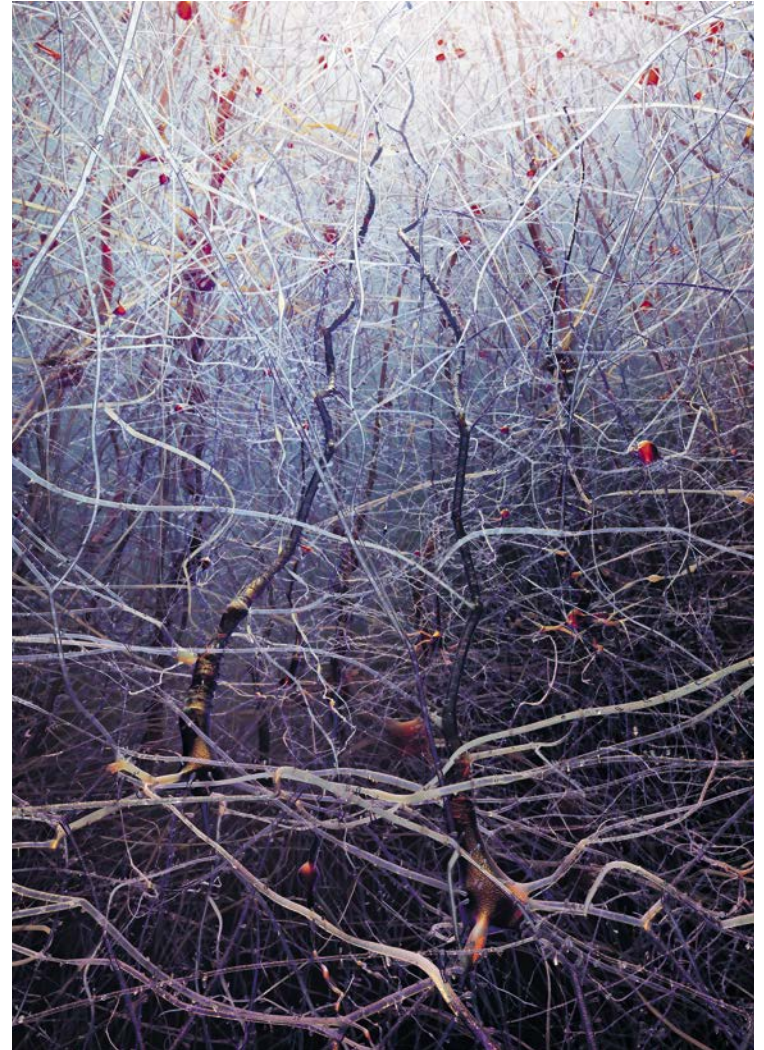


Image: Blue Brain Project/EPFL © 2005–2017. All rights reserved

The neocortical microcircuitry – a view from inside the neocortex of the highly organised network of neurons.

Blue Brain Project

The aim of the Blue Brain Project, a Swiss brain initiative founded and directed by Professor Henry Markram, is to build accurate, biologically detailed digital reconstructions and simulations of the rodent brain, and ultimately, the human brain. The supercomputer-based reconstructions and simulations built by Blue Brain offer a radically new approach for understanding the multilevel structure and function of the brain.

bluebrain.epfl.ch



For better and for worse

Famed heart surgeon **René Prêtre** sees the modernisation of medicine as a combination of pros and cons. Technological progress is huge, but limited by available funding. Medical teams give better care, but can be impersonal. Automation is booming, but there is still need for artisanship.

Text: Eric Johnson

Images: Marc Wetli

Should hospitals and clinics be run as businesses?

No, because we exist to provide a service, not to make a profit. Public hospitals – at least in a country such as Switzerland – are meant to help everyone. At the moment, our society can provide those resources, but I can imagine a day when those resources will be overstretched, simply because the availability of medicine continues to expand rapidly, while at some point, the ability to pay becomes exhausted. Society is not there yet, but at some point it might not allow everyone to have every medical treatment. I have no problem with this limitation, because we already have excellent health care, but the rules of who receives what, which patients have which sorts of treatment, need to be clearly, fairly defined. They should be the same rules for everyone, defined in advance.

So finance is medicine's greatest challenge?

It certainly is a big challenge. A good example is that of artificial hearts, which are getting better and better all the time. Up until two years ago, artificial hearts were used only as a bridge to transplantation, to keep patients going until a human donor heart becomes available for transplant. Only patients who were eligible for a transplantation, yet who might die before one became available, were given the device. Now, as these mechanical hearts have improved – some patients have lived with them for three or four years on the waiting list – we have opened up their availability to some people, that aren't eligible for a transplantation. But these machines are very expensive, as are their installation and maintenance. Only in Switzerland we have 1,000 to 1,500 new heart failure patients every year, who will die from their heart condition. Technically, we could give each of them an artificial

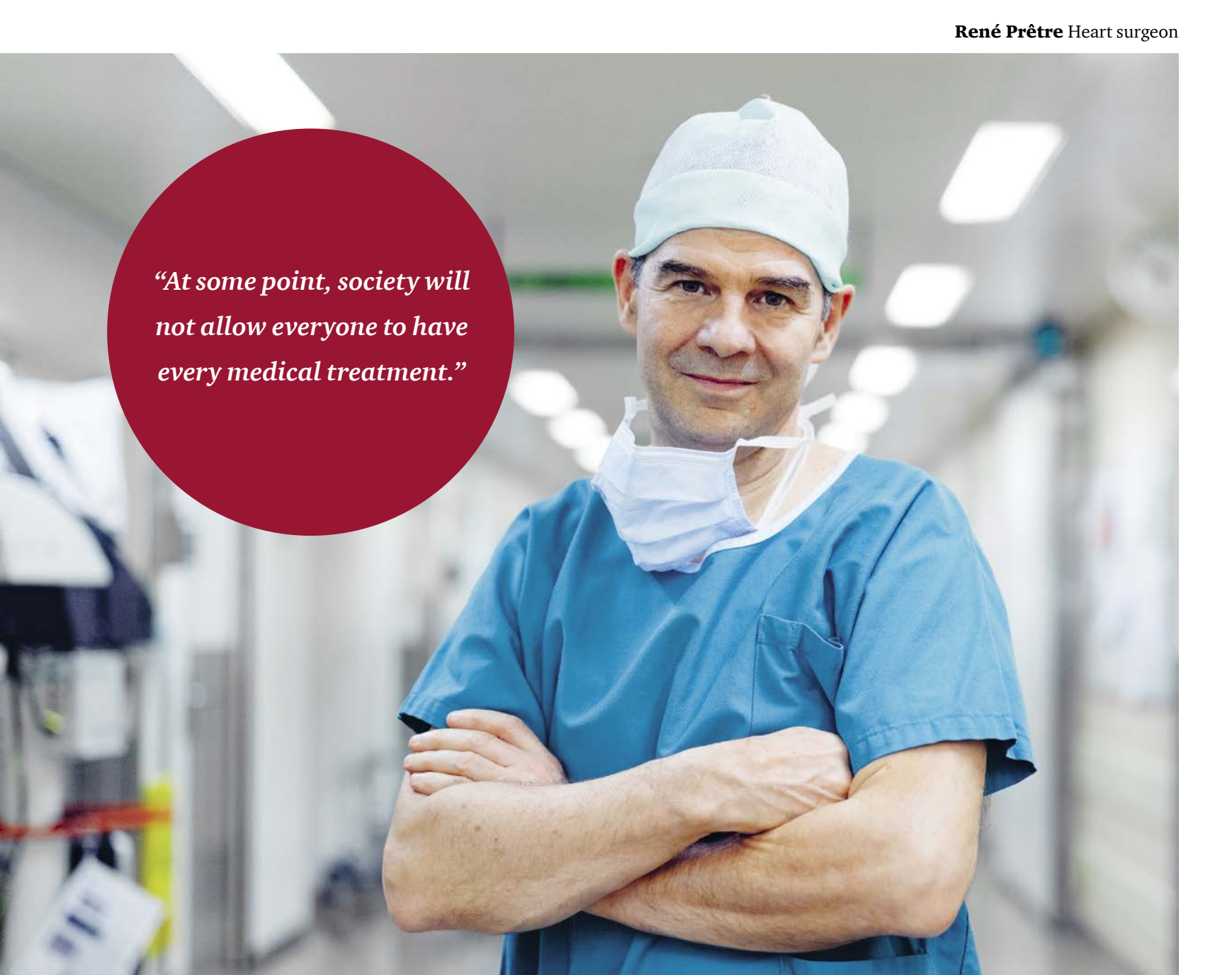
heart, but where would the money come from? This is just to say that potentially medicine can do so many things, but practically it has financial limits.

How do you choose the patients who receive an artificial heart?

At my hospital, we have decided about a global budget – indirectly about how many devices can be installed – and we have also decided on the selecting criteria. Obviously, transplant patients still have first priority. Age is another important criteria.

Contrast that selection process here in Switzerland with that in the developing world.

In developing countries, the patient selection is a process we encounter every day. Triage is a normal part of our missions. In Mozambique and Cambodia, we have 2,000 to 3,000 children in the waiting room, so to speak, and we can operate on only 30 of them in a two-week visit. So our selection



“At some point, society will not allow everyone to have every medical treatment.”

René Prêtre

After growing up on a farm in what is now Switzerland's Canton Jura, René Prêtre studied medicine in Geneva, then practiced surgery in the USA, England and France, before serving as Chief of Paediatric Heart Surgery at the University Childrens Hospital of Zurich until 2012. He then moved to Lausanne, where he was named Professor of Surgery at the University and Director of the Cardiac Surgery Service at the University Hospital. In 2006 he founded “Le Petit Cœur”, a charity that regularly sends Prêtre and his team to Mozambique and Cambodia to give heart surgery to underprivileged children and to train local doctors and nurses. Last year, Prêtre published the bestseller “Et au centre bat le cœur” that tells of the technical, financial, emotional and managerial challenges of pediatric cardiac surgery in the developing and developed world. The German-language version was released in April 2017.

www.le-petit-coeur.ch

criteria are extremely strict. We take relatively easy cases that won't take inordinate hours in surgery, and which will be cured with one operation, i.e. they won't need lifelong special care that, anyway, might not be accessible.

Have you expanded selection over time?

Yes, we have extended it. The local doctors and nurses we've trained now operate the easy cases, and I can take children with more difficult heart conditions that earlier I'd have turned down. We started 12 years ago in Mozambique with cases of severity 1 to 2 (out of 5) only; now we are taking those with a severity of 3 and 4. Severity 5 is still too overstretched, because these cases take excessive time and resources, and often call for an enhanced nursing capacity that we don't have. Intensive care nurses are absolutely critical here: you need somebody to react appropriately in the night when a monitor starts beeping, and with a room full of post-cardiac-op children, there will be a lot of beeping.

Other than money, what does cardiac medicine in the developing world most need?

Social stability. And education. In this respect, as we locally train people, we have indirectly created a small enterprise. A job has been offered to them, and not just for doctors and nurses, but for support staff from administrators to cooks, to gardeners

as well. With steady work and income, they can have stable lives and send their children to school, maybe even university.

Coming back to Switzerland, do patients trust their doctors less than they used to?

Probably, and mostly because practises have changed over time. Years ago, most people saw one general practitioner, whom they knew locally, as both a person and a doctor. Now people go to a hospital, and are seen by ten health professionals – at the end, they hardly know any of them! And we doctors have become principally scientists, who speak in numbers and complicated vocabulary. Once I heard a father complaining that when his son had a serious fever, the doctor no longer would come to their home at night, but recommended the child be sent to hospital. I realise the house call would have been more personal, but in a hospital you can detect a life-threatening condition more rapidly and start sooner with an efficient treatment. You have access to resources not available at home. In the precise event, sending the child to hospital was in fact the best choice! It's true, our care has become more impersonal, but at the same time – and many people do not


see this – it has improved. Those ten hospital professionals handle many more patients and gain much better results than their predecessors did.

What changes in medicine have most surprised you?

Some artificial hearts defy the traditional logic of medicine. If you do an electrocardiogram, you get no signal – just a flat line. With others, the blood pressure does not go up and down with contractions, it remains flat. There is no pulse to take. If you put a stethoscope on the patient's chest, you won't hear a heart beating anymore. But in all these cases, the patient lives! The other thing is that technology has opened up a wide range of possible treatments. It used to be that there were one or two possibilities to handle a problem; now there might be a dozen ways.

Technology is just a fact of life, in medicine as in other areas.

There is no way around it, and automation is increasing as well. Particularly in cardiac treatment and surgery, where there is a lucrative industry of supplying devices, like stents and valves to name a few, and all the other materials used for treatment. That said, in my work of cardiac surgery, there is still a strong demand for artisanship – we still create things with our hands. When it comes to repairing, say, a damaged valve, surgeons who are less gifted will just



“Doctors now are scientists and engineers, not so much the ‘trusted-person’ in their patients’ lives.”

replace it – an easy task – while those with a more artistic trait will reconstruct it. In the short term, there is no difference in results, but longer term the prosthesis will degenerate and will need reoperations. So, surgical artistry and creative thinking still deliver better results. Surgeons have yet, if ever, to reach the standard of “plug-and-play”.

“Automation is increasing in medicine, but in cardiac surgery, we still create things with our hands.”



Maputo (Mozambique), May 2015: the last day of the mission with René Prêtre and a happy team. Every operation had been successful.



Efficiency boost through digitisation

Self-made entrepreneur **Antoine Hubert** founded the second-largest group of private hospitals in Switzerland. As an investor, he is constantly looking out for new promising investments in the life sciences sector. He believes the healthcare system is on the cusp of profound change.

Text: editorial staff “ceo” Magazine

Images: Markus Bertschi

When Antoine Hubert checks his smart watch, he doesn't only read the time or looks up who is calling him. The device on his wrist also monitors his heartbeat and all his fitness activities. It is something like an insurance against health issues for the 51-year-old who has been incorporating, purchasing and selling companies for 30 years and is constantly travelling for his job. However, he also carries it because he sees it as a symbol for the new technologies that are going to change our relationship with medicine and health.

“In the next five to ten years, we will witness two major developments in the healthcare sector that will have far-reaching consequences: digitisation and global service providers,” says Hubert. Already today he sees Google, Apple and Swisscom as future competition. In Switzerland, it is service providers such as Migros that invest in the healthcare sector and envisage new digital activities.

Focusing on an extended lifespan

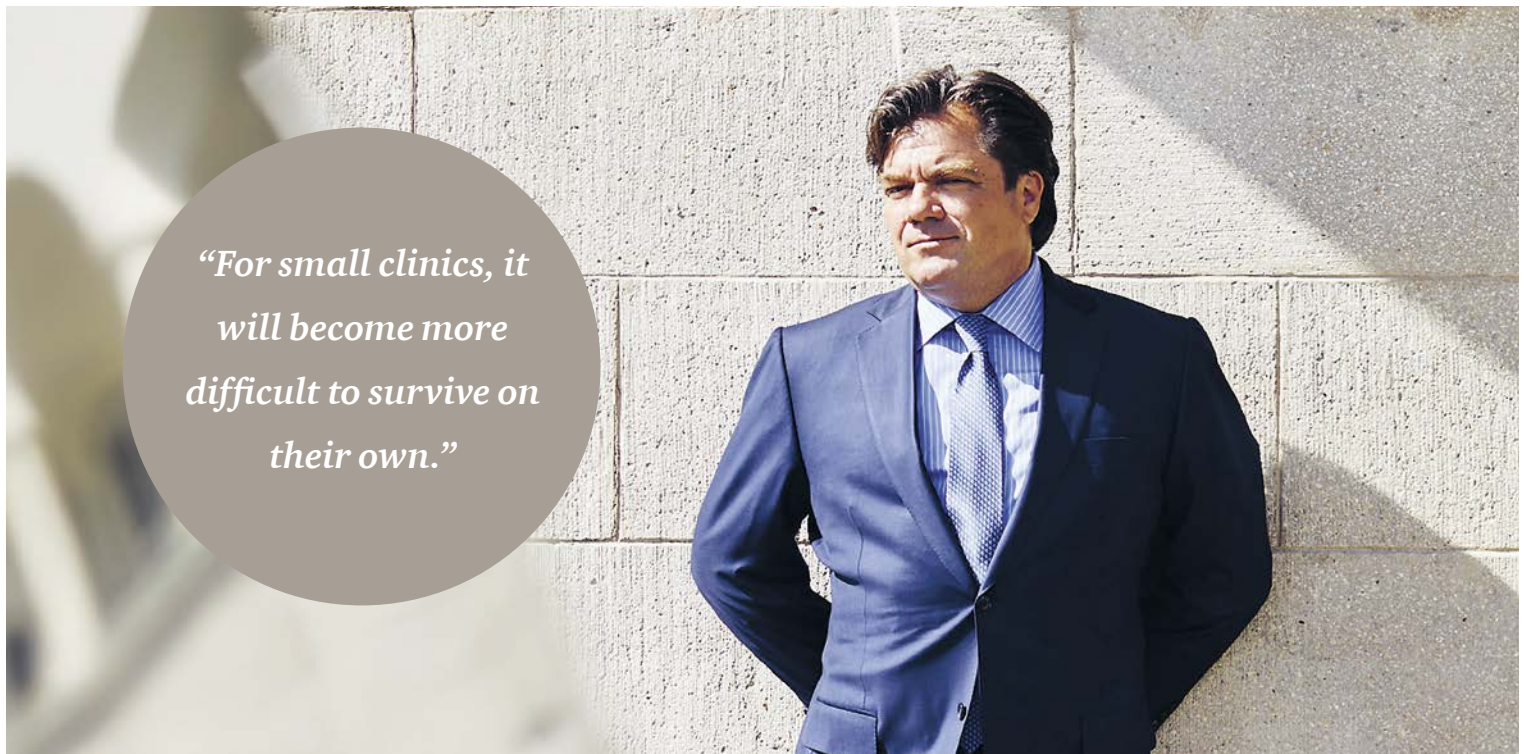
“Algorithms help enhance diagnoses. And digital monitoring, for example in radiology, is much more precise than traditional methods,” says Hubert. This is why financially sound US corporates have already stated entering healthcare markets.

In the 1990s, Hubert acted as a real estate investor and bought a private hospital in the Vaudois viticultural village of Genolier high above Lake Geneva. He restructured it successfully, which was the spark for his interest in this field. From this one venture, he grew Swiss Medical Network, a network of 16 clinics and the second-largest on the market. As an example, the group is involved in the better-aging sector, providing products and services under the brand of Nescens.

Consolidation in the hospital market

“For small clinics, it will become more difficult to survive on their own,” says the delegate of the Swiss Medical Network. According to him, it will be essential to specialise in certain medical areas, also as a regional service provider. He thinks it is likely that in the near future, five to ten additional hospitals will join the group. This would give the network the necessary size to expand internationally.

Introducing new technologies to the medical sector is part of Hubert's mission. He has also reactivated a foundation which supports doctors in applying efficient therapies that have not been accepted into the regulated compensation scheme and thus provide little incentive to use them. “We were the first to use the intraoperative radiation therapy (IORT) for treating breast cancer. Thanks to administering a radiation dosage during operation, this therapy is faster and more efficient than traditional methods,” says Hubert. He is convinced that digitisation will trigger an efficiency boost in the healthcare sector.



“For small clinics, it will become more difficult to survive on their own.”

Creating a comfortable, pleasant environment for regeneration

Electronic patient files, which Swiss Medical Network intends to introduce throughout its entire network, will likely improve patient care considerably. Hubert is mostly concerned with the well-being of the patients: “Why do hospitals have to actually smell of hospital, and why is everything so white and bleak?” he asks. Wherever renovation or conversions are planned for the buildings of Swiss Medical Network’s hospitals, the group endeavours to eliminate the existing, stigmatised reputation that sticks to them. “A pleasant environment is crucial for a speedy recovery.”

Antoine Hubert is planning to use synergies between the private clinics and the luxury hotels of the Victoria-Jungfrau Collection, which form part of the holding company Aevis Victoria. “40 per cent of the work carried out in a hospital is actually a range of hotel services.” While in the hotel sector, companies such as booking.com or Airbnb have already reshuffled the cards with their digital offers, he is convinced that the healthcare sector has yet to face this development and will be going in the same direction. “Revolutions are always brought about by new challengers.”

Antoine Hubert

Antoine Hubert (51) is one of the majority shareholders and delegate of the Board of Directors of Aevis Victoria, domiciled in Fribourg. The holding company is listed on the Swiss stock exchange and invests in the healthcare sector, in life sciences, medical care and lifestyle services. Among its holdings are Switzerland’s second-largest group of private clinics, Swiss Medical Network, as well as Luxury hotel group Victoria-Jungfrau Collection, and telemedicine centre Medgate. At the age of 21, Hubert became self-employed after completing his apprenticeship as an electrician. He has been investing in new projects and enterprises ever since. He lives in Crans-Montana VS with his family.

www.swissmedical.net

“Revolutions are always brought about by new challengers.”



Forging ahead with creativity and new mindsets

A company faced with constant change, and doing likewise. A CEO who gives his teams the freedom they need to come up with solutions for the future: **Grégoire Poux-Guillaume** heads industrial giant Sulzer with a touch of unconventionality and telescopic vision. He wants his people to tackle the topics that mean something.

Text: editorial staff “ceo” Magazine

Images: Marc Wetli

Mr Poux-Guillaume, in a few words, what do you associate with the term “life”?

Let me put it this way: life is fluid. Everything has its flow. We humans and many of the creatures we share this world with are mostly made up of fluid. And almost everything we do at Sulzer is in some way connected with flows and fluids: water, oil, fluid transport, fluid separation, fluid mixing and even make-up – you name it.

What contribution does your company make to the improvement of life?

Our technologies contribute in many ways to making life better and easier for people all around the world. The spectrum includes everything from wastewater treatment to clean water distribution, more efficient power generation, carbon separation and carbon capture, as well as innovative solutions for the beauty and wellness segments. A lot of this you don't see at first glance, but each and every element has its own impact on life.

What is your personal contribution in all of this?

You've got to be very modest about your personal contribution, especially when you're at the helm of a company that's been in existence for more than 180 years and

you've only been around for a year and a half. But the CEO sets the tone. Our teams are less likely to take something seriously if I don't. You have to walk the talk.

Pump systems play an important role in the history of Sulzer. What does this technology mean to you?

Pumps are historically really interesting, not just for Sulzer! Pump technology was known to the ancient Greeks already in the 3rd century BC. But for me, it's fascinating to see how a technology that's been in existence for so long can still be continuously developed and refined. It also fascinates me how many of the processes that are crucial to human life actually involve pumps – everything that has to do with water, almost everything that has to do with energy. The list is long.

What is Sulzer's vision in terms of life and science?

Sulzer is first and foremost a company built on science – a technology company with highly engineered products – and this since almost two centuries now. The vision of Sulzer is to grow in all four of our businesses, and we have the financial means to do so both organically and through acquisitions. That puts us in a really good position, and if we manage to make Sulzer the employer of choice for the talented people we're going after worldwide, then the sky's the limit.

Grégoire Poux-Guillaume

Grégoire Poux-Guillaume is CEO of the Swiss industrial enterprise, Sulzer. A native of France, he assumed his current post in December 2015. Previously, the 46-year-old mechanical engineer with an MBA from Harvard held various positions at General Electric, Alstom, CVC Capital Partners, McKinsey and Total. Greg Poux-Guillaume lives with his family in Canton Zurich. To balance out his work life, he hikes and skis with his children and friends.



*“You’ve got to be
very modest about your
personal contribution.”*



Getting down to the nuts and bolts: a technician overhauling a generator.

“I believe that mankind has virtually no limits when it comes to thinking and creativity.”

What role does research and development play in that vision?

As I mentioned, that’s what we’re built on – highly engineered products, as well as the ability to innovate, develop complex solutions and protect them through intellectual property rights – these are the factors that make Sulzer unique.

How has R&D changed over time?

If I take a look back at the start of my career, the important question at the time was where a company’s R&D department should be located. Today, we have outstanding methods and tools for collaboration, technologies that allow us to work on the very same projects yet across national boundaries and continents. This way, we can bring together the people with the best qualifications. We cooperate closely with our customers and with universities around the world and can attract talents from practically anywhere. So the “Where?” we used to talk about is no longer an issue.

Where do you see the limits of scientific and technological progress?

I believe that mankind has virtually no limits when it comes to thinking and creativity. It’s the ethical questions that set the boundaries. The way I see it, the main objective is to forge ahead with creativity and new mindsets.

Returning for a moment to the topic of air and water: What can Sulzer contribute to the improvement of the environment in a global context?

With pump systems for clean drinking water or by installing the high-performance wastewater treatment plants we offer worldwide, we make a direct contribution to that effort. Also, carbon capture technology has a tremendous potential. The financial crisis has relegated environmental issues to the back seat for now, but the time will come when this technology – which is ready and waiting – will finally see its breakthrough.

How can projects like that be financed these days?

Right now, the investments are going towards pilot projects of a showcase nature. The financing comes from various sources, such as private sector initiatives, government grants and environmental funds.

Is Sulzer – as a Swiss industrial company – not too pricey to be competitive in the realisation of projects like that?

I think you need to differentiate between two things here. We’re proud of our provenance. Swissness is an important element of our identity as a provider of qualitatively superior and essentially represents a seal of approval

in the eyes of our customers. Equally spoken, our production takes place as close as possible to the given markets. An example: we don't manufacture our pumps in Switzerland anymore, but instead in three factories in China and one in India. So the cost of the end products has little to do with the fact that we're a Swiss company.

You alluded to your activities in the fields of healthcare, hygiene and cosmetics. What exactly is involved there?

Sulzer is a broadly diversified enterprise. With our mixing and application technology, we offer solutions for the making of medications, cosmetics and many other products. In fact, there can be a little bit of Sulzer in a lotion or a lipstick, or even in dental bridge or tooth crown you might need. We see growth possibilities in those areas. Ultimately, quite a lot of what we do is driven by population growth and economic developments.

Throughout the long history of Sulzer and to this very day, change has been the constant. The old is abandoned; the new is added. What does this ongoing reinvention mean to you?

We live in a time of constant change – it's the hallmark of our era. So the ability to anticipate change and respond to it rapidly is what makes Sulzer strong. Granted, the company has reinvented itself more often than many others. Even as CEO, who you would normally assume is prescient in his ability to foresee changes in the market, it never ceases to surprise me how fast things actually change. I of course have a view on what lies ahead, but no certainty.

Sulzer

Founded in 1834, Winterthur-based Sulzer specialises in pumps, turbomachinery services, as well as separation, mixing and applications technologies. With a global network of more than 180 production and service sites as well as its workforce of some 14,000 employees, the company addresses the oil and gas, electric power, water and general manufacturing industries. In 2016, Sulzer generated total revenues of CHF 2.9 billion.

www.sulzer.com



“We live in a time of constant change – it’s the hallmark of our era.”

Starting from scratch: a pump platform takes form.



Digital injections boost quality of life

Self-administered medical treatment was the vision that inspired the founding of Ypsomed, a global leader in therapeutic injection and infusion systems. And nothing has changed in this regard, despite the scientific progress that has been achieved in the meantime. Ypsomed CEO **Simon Michel** is convinced: With improved supervision of the self-medication procedure, the efficacy of the treatment can be heightened as well. For that reason, the company is banking on digitisation and cloud-based services.

Text: editorial staff “ceo” Magazine
Images: Markus Bertschi

What comes to mind – let’s say, in three words – when people talk bring up the topic of “life”?

Freedom, family and health. The way I see it, freedom is the most precious commodity. Family, on the other hand, forms the basis for professional and personal success. And good health is a prerequisite for being able to enjoy life in the first place.

Your end users have an especially tough time dealing with the latter. How do you help them?

By making self-treatment a matter of course for them, we improve their quality of life. That applies primarily to diabetics, but also increasingly so for people with other types of diseases. The therapy for all of them should be made just as easy and uncomplicated as brushing your teeth.

How do you achieve that?

We develop products that are not only very easy to use, but also allow no mistakes to be made – plus they should be usable regardless of location and without the help of others. For example, after hospital chemotherapy, many patients are required to inject themselves at home. But because the treatment places a heavy toll on them, they frequently neglect

to adhere to the regimen – with the result that they need to be hospitalised again. This shouldn’t be. So if we can simplify and monitor the follow-up procedure, then the efficacy of the therapy will increase markedly.

How do you address the monitoring aspect?

It takes intelligent products – both in terms of the technology and its actual use. Our injection and infusion systems are easy to understand. That’s why it takes only a short training session instead of an entire day of schooling to come to grips with our insulin pumps. What’s more, several of our products record if, when and how the injections are made. We want to provide that data not just to the users for their own knowledge, but also to their parents and the healthcare system as a whole.

Is it possible to do away entirely with injections?

No, given human physiognomy, that’s not possible. Insulin and many newly developed medications are molecules that are so large they can’t be absorbed in the stomach and therefore simply pass through the gastrointestinal system without effect.

How has the vision of Ypsomed changed over the years?

Actually, it hasn’t changed. Thirty years ago, my father recognised that the complicated use as well as the imprecision of injections were

major hindrances in the successful treatment of diabetes. Insulin pumps simplified the therapy and greatly extended the life expectancy of those affected. Later, injection pens came into being.

What do you consider to be the greatest health challenges of today?

On one hand, we still know too little about the human biological system. Many diseases cannot be vaccinated against, let alone healed. This applies especially to autoimmune diseases like Type 1 diabetes, psoriasis, Morbus Crohn and polyarthritis, to name just a few. Here, only one therapy works. On the other hand, healthcare costs are exploding. So the greatest challenge is to achieve a certain balance between the investments necessary for research and the overall costs involved in medical treatment.

What’s changed over the years in terms of diabetes treatment?

The methods have improved dramatically – in particular, the monitoring of blood sugar levels has become much more precise, and this by means of a mere drop of blood and a test strip. The results allow a calculation to be made of how much insulin needs to be injected. Meanwhile, new technologies have been developed to enable the continuous measurement of blood glucose. However, they do so only after a certain delay, so here, too, there is need for further refinement.

“Medical technology – even after 50 years of R&D – is still in its infancy, at least when it comes to diabetes.”

Simon Michel

Simon Michel (40) has been CEO of medtech company Ypsomed since 1 July 2014. Son of company founder Willy Michel, he came to Ypsomed in 2006 and as of 2008 took over responsibility for the Marketing & Sales division in his capacity as an Executive Committee member. From 2003 to 2006, Michel worked for Orange Communications, where he spearheaded the introduction of the UMTS system. He studied economics at the University of St. Gallen and graduated with a master's degree in media and telecommunications. Simon Michel is married, the father of two children, and a member of the Solothurn Cantonal Council.



Where does science come in, as opposed to medical device engineering?

Science attempts to understand the disease and come up with new forms of therapy. Take the example of Type 2 diabetes: in cases where the pancreas produces too little insulin, today we can delay the start of insulin therapy for a number of years by prescribing a special diet, fitness training and pills that lower blood glucose levels. Other than that, medical technology – even after 50 years of R&D – is still in its infancy, at least when it comes to diabetes.

What is Ypsomed doing about that?

At our facilities, more than 120 engineers devote their every working day to researching and developing new concepts and solutions. Our major thrusts centre on pen systems for diabetics, as well as on so-called autoinjectors for new medications applied in various therapeutic areas. We also aim to achieve a higher degree of automation. To that end, we are designing a way to couple the insulin pump and the blood glucose measurement. The latter reading will then be relayed directly to the pump and trigger an appropriate infusion.

How do you keep pace with market trends so you can translate them into new products?

We're seated on numerous professional boards, travel extensively and stay in close contact with our customers. This enables us to identify the trends at a very early stage. For example, when I joined the company, we were selling R&D projects reactively – in other words, at the behest of the pharma industry. It then took us as many as four years before we could deliver the new product. Today, we have a revised business model: we now go to the pharma companies and analyse their pipeline. Based on our findings, we've already developed more than a dozen injection system platforms that we only have to tweak to the specific requirements when a corresponding request comes in. The entire realisation process lasts only a few months, not to mention that it's considerably less expensive this way and harbours fewer risks for the customer.

How closely tied are you to the pharma giants?

We're more than just married – we're practically joined at the hip, so a divorce is all but out of the question. This by virtue of the fact that when a drug company applies for approval of a new medication, our pen is part and parcel of the dossier. Hence, the device can't be substituted afterwards. At present, we're winning seven to eight out of every ten calls for tender. That's why I'm very confident about the future of our company.

Where will Ypsomed be in ten years' time?

Given the constantly growing number of diabetics across the globe, demand for our products should increase further. There is also the cloud technology factor, which will contribute greatly to the improvement of therapies. For instance, health insurers or doctors could potentially monitor the success of a treatment and remind their individual policyholders when it's time for an injection. The exogenous pressures will lead to medical science's getting a better grip on diabetes.

Will Ypsomed develop its own cloud?

For the insulin pump business, we already offer a mylife cloud and mylife app that are linked with the pump. Cloud services are typically sourced from third parties and adapted for one's own use. As to our pens, we first have to get the business model squared away and demonstrate to the drug companies that therapy can be improved through use of the additional data. In terms of the cloud, we're cultivating a new market here, but I'm convinced that within five years we'll be selling our first products and services in that space.

Fully automated production of autoinjectors:



Barrel elements



Assembly line



Sorting equipment

Ypsomed

Ypsomed is a leading developer and manufacturer of injection and infusion systems for self-medication. The company came into being upon the split-up in 2003 of Burgdorf-based Disetronic Group. The group's co-founder and majority shareholder, Willy Michel, sold the Infusion division to Roche, but retained and continued to manage the Injection division as a stand-alone company. In 2004, Ypsomed launched an initial public offering of its shares on SIX Swiss Exchange. For the 2016/2017 fiscal year ending 31 March 2017, the company recorded a pre-tax profit of roughly CHF 55 million on sales of CHF 390 million. In addition to its headquarters in Burgdorf, Ypsomed has a global network of production sites, subsidiary companies and distribution partners. It employs close to 1,400 workers in 11 countries.

www.ypsomed.ch



Injection moulding machines

“Given the constantly growing number of diabetics across the globe, demand for our products should increase further.”



On the joy of hearing

Lukas Braunschweiler, CEO of the Sonova Group, tells us why hearing well is important on so many levels in our daily lives, how to develop a hearing aid the size of a grain of rice, and why his company is keeping its feet firmly on the ground.

Text: Sandra Willmeroth

Images: Markus Bertschi

There are more than 70 million children and adults around the world who cannot hear. What chances of hearing normally one day does a child born deaf have?

At present, a deaf child can be given an ear implant from its first birthday onwards, and a second can be fitted after two or three years. These children will have no hearing restrictions in later life and will be fully socially integrated. We know of children with two implants who sing in a choir; this would have been inconceivable 20 or 30 years ago.

But that would very much depend on the healthcare system provided by the country in which you were born, wouldn't it?


The huge disparity between developed countries and the emerging economies is something I find particularly troubling. The Swiss healthcare system, for example, is highly efficient and covers the entire population – although disproportionate annual increases in healthcare costs mean it will soon reach its limits. By contrast, the five to six billion people in the emerging economies – a far larger portion of the global population – are chronically underserved, and not just with medical services. I consider this yawning divide an issue of critical importance.

Is this why Sonova founded the “Hear the World Foundation”?

That's certainly one of the reasons. The foundation's goal is to support projects in countries where there is a shortage of medical equipment or where the majority of the population cannot afford devices. Since we founded “Hear the World”, we have been involved in more than 80 projects and are operating in countries where we can achieve sustainable change, for example by supplying children with hearing aids. A child with hearing loss that is able to hear normally, integrate socially and attend school will also have much better chances in later life. In the development of a human being, proper hearing is much more than the mere ability to perceive sound.

How do you mean?

Poor hearing often triggers disease or problems in associated areas of the body. There are at least seven or eight illnesses related to hearing loss – it has been proven that people who suffer from tinnitus invariably have some kind of underlying hearing problem, for example, and we know that ADHD can also be linked to hearing issues. Equally, there are studies showing a correlation between hearing loss and dementia. This isn't particularly surprising, as age-related deterioration in hearing function causes changes in the brain.

A photograph of Lukas Braunschweiler, a middle-aged man with short grey hair, wearing a dark suit and a light blue shirt. He is standing in the center of an anechoic chamber, which is lined with numerous yellow, pyramid-shaped acoustic absorbers. To his right, there is a mannequin head on a stand, wearing a blue lab coat with the 'sonova' logo. A black speaker on a stand is also visible. On the left, there is a vertical metal frame with various electronic components and cables. A large red circle is overlaid on the left side of the image, containing a quote.

*“Hearing is the sense
that requires by far the
most brain activity.”*

Lukas Braunschweiler

Lukas Braunschweiler, a Swiss citizen born in 1956, has been managing the Sonova Group's operations since November 2011. After heading up the Dionex Corporation from 2002 to 2009 and acting in a number of group executive positions for Mettler Toledo's Swiss and US operations, he served as CEO of the Swiss technology group Ruag before joining Sonova. Lukas Braunschweiler holds an MSc in Analytical Chemistry and a PhD in Physical Chemistry from the ETH Zurich. He is married and has two sons.

How?

Hearing loss is a slow, creeping development. People who are losing their hearing will often kid themselves, ignoring or glossing over the fact that they can't hear as well as before. This forces the brain to adapt to deteriorations in hearing ability, which in turn diminishes its processing capacity and makes it sluggish. The ear is a highly complex organ and hearing is the sense that requires by far the most brain activity.

Many people are reluctant to get a hearing aid – what have you done to try to change this?

This is a psychological consideration. Many people still think of a hearing aid as a kind of prosthesis. In Italy and France, they even call it an “audioprothese”, which carries a definite stigma, and we are working hard to break down these negative associations. This situation certainly explains why people with hearing loss wait for an average of seven years before seeking the help of an audiologist. Unfortunately, the link between the brain and the ear may already have suffered substantial damage during this period.

Isn't it more for aesthetic reasons that people are disinclined to use hearing aids?

Design plays a huge role, of course – but today's hearing aids are a very different kettle of fish from the clunky, flesh-coloured devices you used to have to cram behind your ear. We are now capable of manufacturing aids that are so small you can't really see them, as they are placed directly in the ear canal. This is why we think it is only a matter of time before hearing aids are entirely socially acceptable – perhaps not necessarily the ones you have to wear day and night, but certainly the smaller, easy-to-use ones that serve to enhance a specific acoustic experience, such as attending a symphony concert or taking part in a large group conversation around a table.

Which of your company's innovations do you find most exciting?

We have set a number of standards – in binaural hearing, for instance, which enables the left and right hearing aids to communicate in real time and thus imitate the ears' stereo ability. Another example is “Lyric”, our “contact lens” for the ear: this is a hearing aid that is only the size of a grain of rice, and we were the first to bring it to market. Our latest achievement is a rechargeable hearing aid from Phonak – it uses lithium-ion batteries and a completely novel radio technology.

Where do you get your ideas for such innovations?

Interestingly, it is frequently not our company that comes up with the idea, but we are often the ones who realise its implications, and so we end up developing the actual product, bringing it to market and turning it into the industry standard. Rechargeable hearing aids existed before we brought ours onto the market, for example, but they weren't as technically sophisticated and therefore didn't enjoy the same commercial success as our products. We were the first to make that happen.

Through proverbial Swiss perseverance and precision? Or what is your guiding principle?

Maybe! It's no coincidence that we are not that far from the Jura region, and our business has a lot in common with the watch industry. Besides precision, however, I value two things in particular: modesty and determination – and each has to be applied with dedication and care. I strive to live by this principle in both my private and my professional life. It matters to me that we keep our feet on the ground as a company. We owe this to the market we serve, as well; ultimately, our business provides support for human beings whose lives are anything but easy.

How is this reflected in Sonova's vision?

We imagine a world in which there is a solution for every kind of hearing loss, and in which everyone can experience the joy of hearing. Whether they're children or a little older, people who regain their hearing have a completely different sense of what is possible and enjoy access to new social opportunities. They feel they can participate fully in life again – and that is key.

Sonova

Sonova is the leading provider of innovative hearing care solutions. The group operates through its core business brands Phonak, Unitron, Hansaton, Advanced Bionics and AudioNova. Sonova offers its customers one of the most comprehensive product portfolios in the industry – from hearing instruments to cochlear implants to wireless communication solutions. Founded in 1947, the group is currently present in over 100 countries across the globe and has a workforce of over 14,000 dedicated employees. Sonova generated sales of CHF 2.4 billion in the financial year 2016/2017 and a net profit of CHF 356 million. Across all businesses, and by supporting the “Hear the World Foundation”, Sonova pursues its vision of a world where everyone enjoys the delight of hearing and therefore lives a life without limitations.

www.sonova.com



Hearing aid assembly



Fully automated fabrication of the plastic components



Assembly of the microelectronics



Quality control of the electronics

“We think it is only a matter of time before hearing aids are entirely socially acceptable.”



A taste of high tech

Flavour and fragrance drive emotions, but in turn they are driven by science. A case in point is Firmenich, a venerable yet high-tech creator.

Text: Eric Johnson

Images: Markus Bertschi

What is the biggest technical novelty in your industry, flavours and fragrances?

Berger: We've have made a genuine breakthrough in the control of bad smells, thanks to our understanding of olfactory receptors. Over the past 30 years, our Research team has been driving a multi-disciplinary discovery platform to counter malodour from body odour and garbage, all the way to kitchens and toilets. Our recognised research in this area is driven by combining our scientific know-how across a number of fields, including analytical innovation, receptor biology, organic chemistry, sensory and cognitive science, fragrance development and creation, as well as delivery technologies. Our technology counteracts the malodour by blocking the receptors to prevent the smelling of the malodour, as opposed to covering the malodour with scent.

And what good is that?

Ghostine: Malodour is much more than a personal nuisance; it is a major health problem in the developing world. Today there are 2.5 billion people on earth who don't use sanitary toilets, who relieve themselves in the open. This spreads disease and degrades the environment, and it often exposes those same people to danger and attack. Smell is our company's main business: we know that many of these people don't use a toilet, because they cannot bear its stench. This is why we partnered with the Bill & Melinda Gates Foundation to reinvent the toilet experience

for increased hygiene and sanitation. Our vision is to make our breakthrough malodour control technologies reach the populations most in need through affordable and effective toilet cleaning and freshening products. By making the process of cleaning and using toilets more pleasurable and frequent, we can increase toilet usage. This in turn promises to help save the lives of 800,000 children that die each year from diseases caused by lack of hygiene.

So flavours and fragrances are more than luxuries?

Berger: Yes, and they are scientific products, too. Science is our engine of growth, which is why we invest 10 per cent of our turnover in research & development – last year that was CHF 320 million.

How do you attract scientists to work for you?

Berger: That 10 per cent investment is alluring. It gives them access to world-class tools and support. Being in the “engine room” of the company is also appealing. I personally have always been passionate about learning and pushing the boundaries of science to improve people's lives. That's why I am committed to extending the capabilities and deliverables of Firmenich's scientific fields, to develop products that address some of the world's biggest challenges today, such as obesity, malnutrition or access to greater hygiene and sanitation. Today's younger scientists want to do something meaningful for society: this reinvention of toilets, for example, is a chance to do just that.

Top Team

Lebanese-born-and-educated Gilbert Ghostine rose through the ranks at drinks-giant Diageo before becoming CEO of Firmenich in late 2014.

Geneviève Berger has PhDs in physics, human biology and medicine; she was Chief Science Officer at Unilever before joining Firmenich as Chief Research Officer in early 2015.



“Smell is our company's main business.”



*“Nature is the
world’s greatest
chemistry lab.”*



Are there other examples?

Ghostine: As a private company, I can’t tell you what’s in the pipeline, but one technology what I can mention is “taste modulation”. We have developed flavours that allow foods to keep their same deliciousness yet with less sugar, salt or fat. Just last year we removed 100,000 metric tonnes of sugar from our customers’ food and beverages, some 500 billion calories, without forfeiting taste or mouth feel. A collateral benefit of this, from an environmental perspective, is that it took 3,000 40-ton trucks off the roads. Also to ensure the world will have enough protein sources to feed everyone healthily going forward, we are exploring alternative sources of protein ranging from lentils and pulses to insects. What’s key for us is to make them taste great so the consumer can enjoy healthy proteins in a more sustainable way.

Firmenich does a lot of natural products. Is there a future for synthetics?

Ghostine: Synthetic, natural and biotech ingredients all have their purpose and role to play if we are to meet consumers’ demands sustainably. Nature is the world’s greatest chemistry lab. Everything we do in our labs is mimicking nature. We copy nature to preserve it, which is why there is a place for synthetics and “white” biotechnology to complement our natural ingredients. We’ll have plenty of scientific work and challenges in these areas for years to come.

Where do you see your company in ten years?

Ghostine: We’re family owned, and always take a long-term view. At the heart of our success for the past 121 years are three main principles:

1. Our constant pursuit of world-class research.
2. Partnerships and collaboration with like-minded experts to scale up our impact.
3. Our deep sense of social responsibility. Business cannot thrive if society or the environment fails around it. That’s why we lead our business in the most responsible way possible.

To answer your question, I cannot say exactly what we will be doing in ten year’s time. What I can say is that we will be operating according to our core values and these three principles.

Firmenich

In 1900, Geneva-based Fred Firmenich bought a majority in his brother-in-law’s five-year-old fragrances firm and retitled it with his surname. The company later branched out into flavours; today it turns over CHF 3.2 billion and employs 6,500 people in a supply chain that stretches around the world.

www.firmenich.com



Stories of life, death and virtual reality

On big screens and small, film-director **Marc Forster** tells tales both entertaining and meaningful. Technology hugely influences cinema and television, he says, but there is still a major role played by artistry.

Text: Eric Johnson

Images: made available

In Hollywood, a place at times smothered by overinflated egos, Marc Forster is refreshingly free of self-importance. No, films are not central to life, he says, most humans who ever lived never saw a moving picture. “Actually, people can survive with very little, and certainly without films.” But deep inside most everyone, he adds, there is an urge to tell or listen to stories. “Even in prehistory, people painted on the walls of their caves. We have an innate desire for storytelling, and our urge for narrative comes alive in pictures – that has never left us.”

The classic narrative themes of life and death haven’t gone away either, especially in films made by Forster. Mortality is central to many of his movies, and not by accident. Already in his early 20s, the now 48-year-old director had lost his father, a brother and several friends. “I encountered a lot of death as I grew up,” he recalls, “so dealing with that became part of who I am.”

Not dealing with it, by contrast, has become part of modern society. Forster says that Western cultures have lost what he calls their “deathright”. Instead of recognising and accepting the inevitability – not to mention the fear and the grief – of human passing,

*“The worlds
of cinematic
storytelling and
virtual reality are
starting to blend.”*

they hide it away or act as if it doesn’t exist. “Death is an inevitable step in our journey, but is something that people don’t want to think about.” This, he contends, denies humanity. He argues that society at large “needs to embrace death. We need to accept the come and go, the transience of our own existence.”

Without irony, he points out that by appreciating death for what it is, people enhance their lives. “If we realise that death could come at any time, we allow ourselves to live in the now, to take every moment as a gift – which is one of the hardest things for people to do. If you never experience sadness, through pain, through death, how can you truly appreciate the best in life? Saying ‘we never have any problems’ is a sterile approach to life.”

Audience participation

Heavy themes, these, yet they come off with a light touch in his films. A moral is always delivered, but through a story rather than a speech. Forster says he aims to entertain as much as to send a message. “A film without an audience is not alive. Only an audience can give a film life. So I always want to entertain and bring the audience into the story, but at the same time I want to deliver a subtext, a philosophy of the way I see the world.”

This is so critical to Forster, he takes on only projects that he can markedly shape. “Off-the-shelf” direction of franchised cinema is not his thing, and he has turned down gigs to prove it. “I have to make stories that breathe my identity,” he says. “I have to be able to find my own voice in a project to incorporate my own DNA – that’s very important.”

The message is the medium?

The means of spreading that DNA are of course changing. Traditional lines between film, television and video gaming are beginning to blur, thanks to myriad delivery forms (from cinema to broadcast to streaming) and to the rise of special effects and virtual reality (VR). “The worlds of cinematic storytelling and VR are starting to blend,” Forster says. “Audiences are increasingly being drawn into the centre



Marc Forster

Is he a) German, b) Swiss, c) American or d) all of the above? Born in 1969 to a German mother and Swiss father in Germany, Marc Forster moved with his family to Switzerland's Davos when he was nine, after which he earned his "Matura" from the boarding-school Institut Montana Zugerberg near Zug. He went on to attend New York University's film school in the USA, where he's mostly lived and worked ever since, directing a dozen major films and one television series. Thanks to this life experience and his accentless mastery of German, Swiss German and English, Forster can go native and feel at home in all three countries. Personally, he is perceived by colleagues in the moviemaking industry as European, but professionally he is very much an American – most of his work is conceived, financed and made in the USA.

Top 5 box office hits

- | | | |
|---|--|--|
| <div>1</div> <div><i>Quantum of Solace</i></div> <div>Studio:
Sony</div> <div>Box office worldwide:
\$586.1m</div> <div>Release:
14.11.2008</div> | <div>2</div> <div><i>World War Z</i></div> <div>Studio:
Paramount</div> <div>Box office worldwide:
\$540.0m</div> <div>Release:
21.6.2013</div> | <div>3</div> <div><i>Finding Neverland</i></div> <div>Studio:
Miramar</div> <div>Box office worldwide:
\$116.8m</div> <div>Release:
12.11.2004</div> |
| <div>4</div> <div><i>The Kite Runner</i></div> <div>Studio:
ParV</div> <div>Box office worldwide:
\$73.3m</div> <div>Release:
14.12.2007</div> | <div>5</div> <div><i>Stranger Than Fiction</i></div> <div>Studio:
Sony</div> <div>Box office worldwide:
\$53.7m</div> <div>Release:
10.11.2006</div> | |

Source: www.boxofficemojo.com/people/chart/?id=marcforster.htm

Chameleon of the big screen, 20+ years of film success

Aside from its excellence acclaimed by critics, industry prizes such as the Oscars or Golden Globes and massive audiences worldwide, Marc Forster's oeuvre as a film director is hard to categorise, because it is so broad. His work ranges from quirky fantasies such as "Finding Neverland", to personal explorations such as "All I See Is You" or "Monster's Ball", to action-blockbusters like "World War Z" or one of the James Bond movies, "Quantum of Solace", and even to a comedy, "Stranger Than Fiction". Currently, he's directing a live-action movie about how someone who had a magical childhood come to terms with a less-than-magical adulthood. Based on characters conceived by novelist A. A. Milne and popularised by Disney in "Winnie the Pooh", the film "Christopher Robin" is expected to debut in 2018.

“Death is an inevitable step in our journey, but is something that people don’t want to think about.”

of the story, not just emotionally but physically as well.”

New technologies such as Oculus “goggles”, Google’s retina scanning and Snapchat’s “Spectacles” are still in unfinished beta mode, but they clearly are the face of film’s future. “There are so many emerging technologies that we’re in a stage of experimentation right now. We’re not just exploring new implications for film, but a new medium of storytelling. There is constant change, and every challenge becomes an opportunity for creativity,” he comments. “What is certain is a breakthrough for the next frontier of storytelling that will bring a new perspective in how we see ourselves and the world.”

While the technology of presenting stories is changing rapidly, that of making them is surprisingly similar in film and TV. In the recent recording of his first television series, “Hand of God”, Forster found the process and equipment almost identical to that for film-making.

Where the two media still diverge sharply is in their approach. “For TV,” he observes, “the shoot is done in ten days and the cut finished in two weeks. In film, there is much more time to do the work, change it, test it with audiences and then make changes again. Television is continuous, so we are required to deliver an experience that is ongoing for the audience. There is a greater investment in film, since we have just one opportunity to deliver the experience.” Moreover, the dramatic demands of the media are still quite different. Audience-testing shows that viewers usually want films to end with a resolution: boy gets girl, family solves problem or whatever. TV watchers, by contrast, often are tantalised by indefinite non-endings. Intentionally so – to keep ratings rolling, the broadcaster wants them to watch next week as well.

Innovation survives

And even these distinctions are beginning to blur, Forster says, as cinema, television and gaming continue to morph into new forms. What doubtless will remain are the “story” format plus the serendipitous dosing of artistry that distinguishes the great from the good from the mediocre.

Apropos his non-inflated ego, Forster is modest about his own muse. (Critics are less inhibited, calling him one of the great directors of his generation.) Still, he is unequivocal about the need for creativity. “Film-making is a very collaborative art. There’s an incredible amount of creativity demanded and shared in this kind of storytelling.” Ingenuity, inventiveness, vision – whatever it’s called – it’ll always be a mainstay of storytelling, which will always be central to human life.



The RoboProf

Autonomous robots are wending their way into our daily life and changing it in lasting ways. At the fore in the development of these new technologies is the Autonomous Systems Lab at the ETH Zurich.

Roland Siegwart, who heads the laboratory, is convinced that – despite the progress being made – it will still take a number of years before cars can navigate their way through cities all on their own. This is because up to now, robots have had a rough map of the world in their heads, but don't exactly know how to read it yet.

Text: editorial staff “ceo” Magazine

Images: Markus Bertschi

Roland Siegwart whips out his smartphone and waves it through the air a couple of times. “We’re currently working on a project that will make it possible to do this – you see, just a few swings of your arm – and digitally map an entire room,” explains the professor and head of the Autonomous Systems Lab at Zurich’s Federal Institute of Technology (ETH). We stand in a corridor of the research centre. On one wall hangs an illustration that describes the technology to a tee. “The key is our new sensor. It’s the further evolution of the kind of receptors that are already built in to today’s electronic devices and enable the display to pan along with the direction the device is pointed in,” says Siegwart. In future, the interior of an entire home could be digitally mapped this way. The ETH is working closely with US tech giant Google in this effort.

A combination of several fields of research

The so-called Tango Project is just one of many that are being pursued in the ETH lab. Students tinker on new autonomous machines which in the not too distant future will be deployed on land, sea or in the air. Here, new ideas are taking form – from beetle-like robots, to solar aircraft, to droning drones. One room looks like a workshop, another is outfitted with wrestling mats, safety nets and cameras in order to flight test, but not destroy, the self-thinking drones. “Our research realm here is fabulous – it combines mechanical engineering with electrotechnology, informatics, sensor technology, artificial intelligence, and of course man,” gushes the robotics professor.

In the service of mankind

The overarching objective of the work being done at the Autonomous Systems Lab: to create devices which take the burden off people

wherever a job could be physically taxing or damaging to their health, or those that can otherwise be of greatest benefit to the general populace. Siegwart points up examples, such as their applicability in the underground mining of raw materials, in deep-freeze warehouses and even in the agriculture area. “One of the most pressing problems mankind faces is the food supply.” Here, Siegwart can envision a combination of autonomous drones and agricultural robots as means to achieving a marked increase in farm output. The idea: drones overhead would monitor the soil moisture level and seed growth, as well as keep an eye out for pests, while a robot in the field mechanically destroys weeds and provides water and fertiliser as necessary. “The robots relieve the farmer of a cumbersome task and contribute to increased agricultural yield,” Siegwart summarises.

Robots fail to understand the world

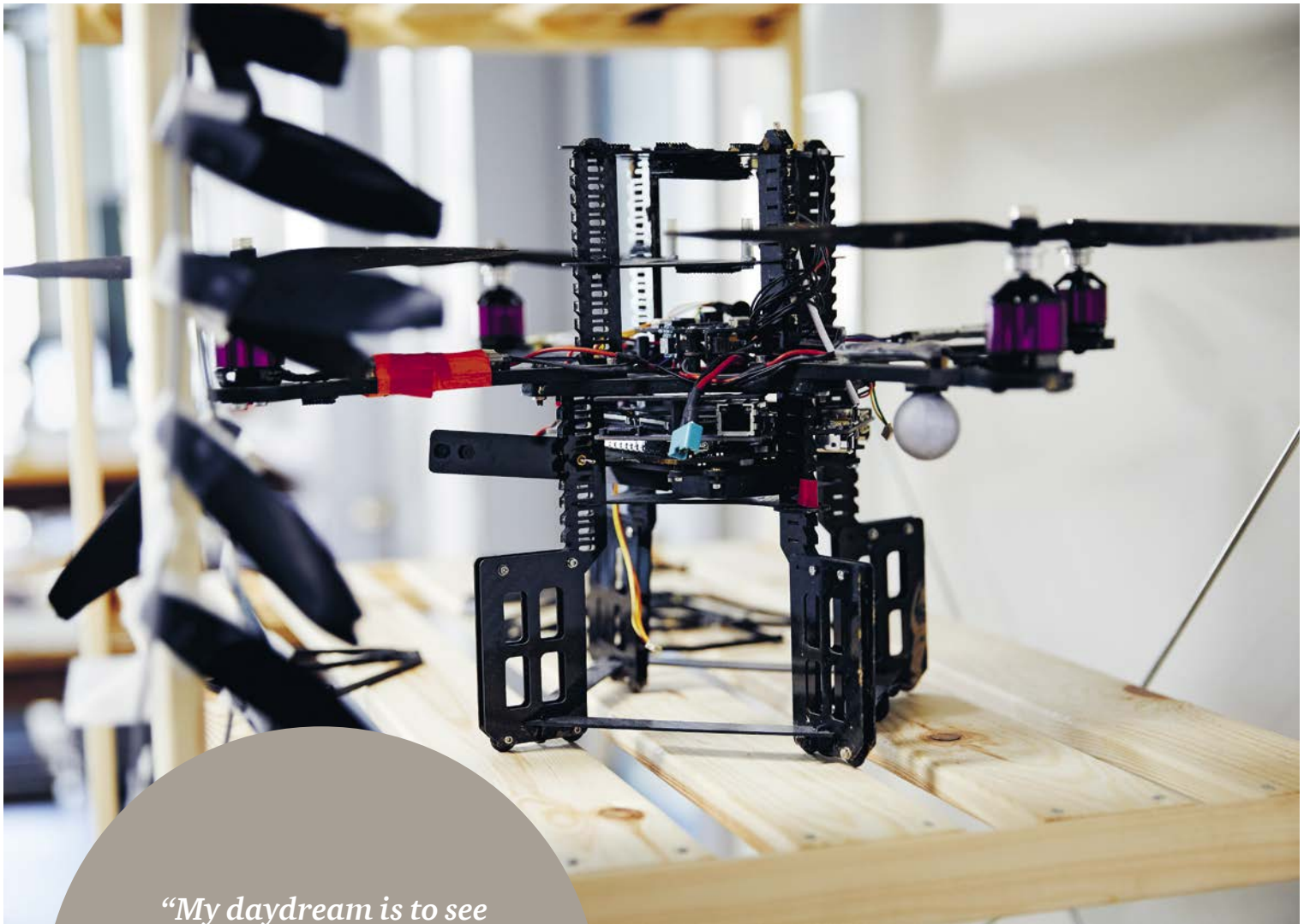
Today, the broad public experience autonomous systems mainly in the area of mobility. Automobiles already have an array of pre-installed support systems that make driving easier: there are cars that can steer themselves into tight parking slots or even stay on cruise control in the same lane while travelling on the motorway. “Autonomous vehicles will fundamentally change the way we go from point A to point B,” says Siegwart. And this is not just a matter of comfort and convenience – the environment will also benefit, as the technology enables vehicles as well as the existing infrastructure to be utilised more efficiently. Not to mention the older generation, who can remain mobile for years to come. “My parents would be pleased as punch if they could use an autonomous vehicle for visits to their grandchildren,” muses the 58-year-old.

“The robots need a plan, since they don’t understand our world.”



Prof Dr Roland Siegwart

Roland Siegwart (58) studied mechanical engineering at the ETH in Zurich and earned his doctorate in 1989. Siegwart is director of the Autonomous Systems Lab (ASL) at the ETH's Institute for Robotics and Intelligent Systems (IRIS). He has been a board member of the NZZ Media Group since 2016 and lives with his family in Schwyz.



“My daydream is to see Switzerland become the first country on the planet where autonomous vehicles actually take over certain tasks.”

But it will take a number of years before the first autonomous automobiles come into daily use. Although those cars have no problem getting around already today in a structured and not all too complex setting, “the robots need a plan, since they don’t understand our world,” explains Siegwart. And precisely that is a prerequisite if one day they are to master the ins and outs of a jammed, multi-lane traffic crossing. In such instances, interaction is called for – it takes eye contact and gestures or signals. Moreover, the systems must be able to recognise unknown objects rapidly and figure out how to deal with them. “In this regard, man is clearly superior to machine,” admits Siegwart.

Ethics workshops with the Vatican

Other hurdles for self-driving cars in their fast lane to everyday life take the form of the hefty costs of sensors and cameras for navigation, as well as the roadway rules that have yet to be written. “Who should matriculate these vehicles? Who knows how they react in a difficult situation? Here, regulations are necessary,” observes Siegwart. That applies in particular to the case of an unavoidable accident where a system has to make a split-second decision on who or what will be impacted by the collision. Siegwart is confident that the technology will help people even in such instances. “Like airbag systems of today, it will ensure that passengers walk away with as few injuries as possible, if any at all.”

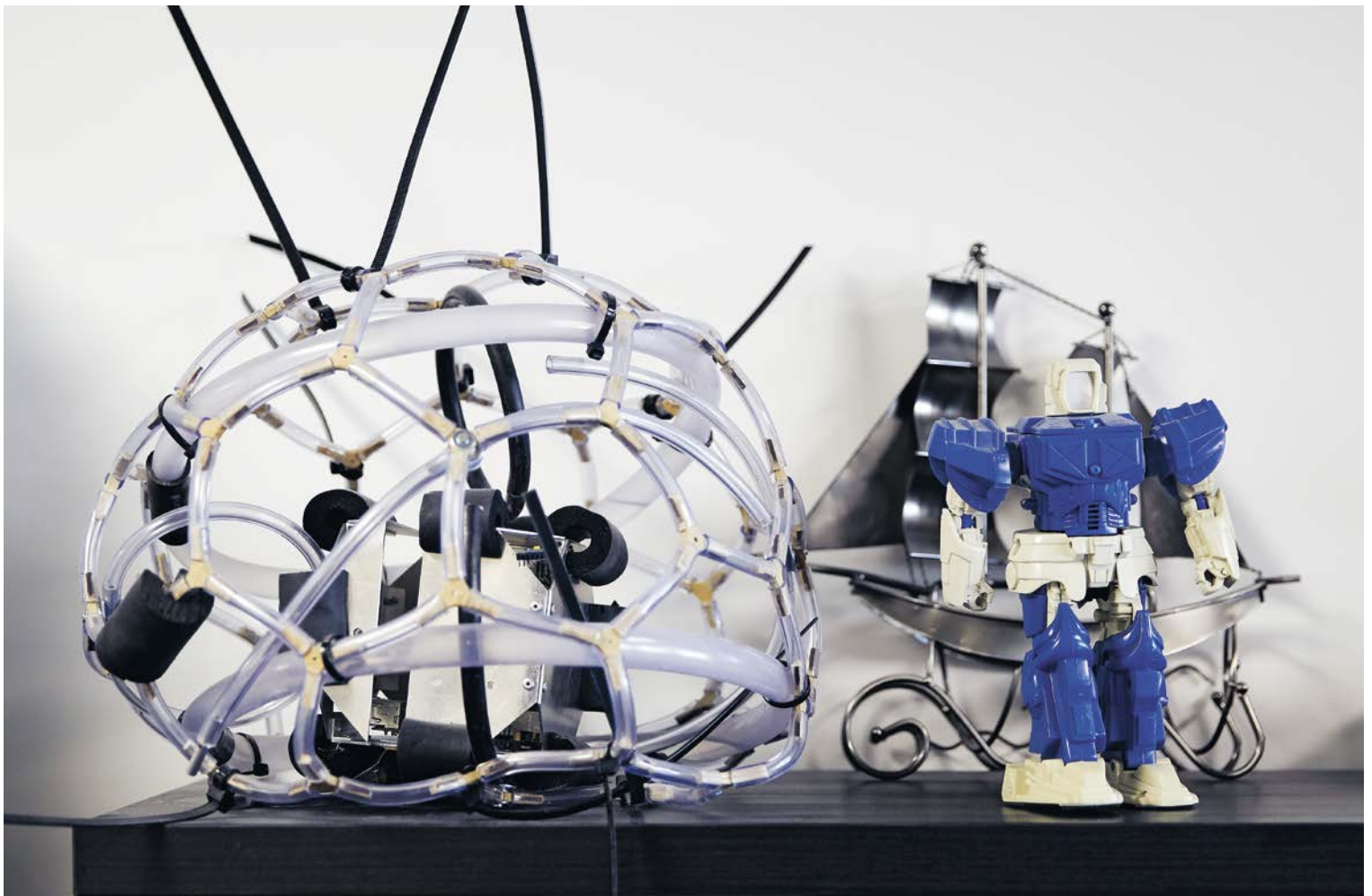
Equally spoken, the robotics field is strewn with questions concerning the ethical aspects. Even the Vatican has taken part in workshops where the limits of the technology were discussed. From a purely scientific standpoint, Siegwart is of the opinion that there are no limits, at least in terms of fundamental research. In fact already today applications are being tested that seem like they came from some science fiction novel: cameras that transmit images to the brain and replace the eye function; or neural impulses that steer autonomous systems.

Switzerland, a world leader

For companies as well as the overall economy, autonomous systems are a decisive success factor. Yet it need not be that they operate totally on their own. “Especially in Switzerland, which is a global leader in the machine tool industry, these systems are enormously important due to the automation wave that is under way,” says Siegwart. Ever more frequently, robots and humans are working side-by-side on the factory floors.

But in some cases, the machines are in fact supplanting the workers entirely. As was the case in the industrial age, increasing automation leads to a fundamental change in the labour world. There will be losers, of course – but not from one day to the next.

“Robotics is a very complex technology. So its evolution will take place very gradually, thereby giving the affected workers enough time to react to the new circumstances,” Siegwart posits. In any case, he is convinced that autonomous systems will be a win-win for Switzerland and generate many more new jobs than those that go by the wayside. It therefore should come as no surprise that a lively transfer of knowledge is taking place with businesses, a trend that will ultimately benefit the entire country. Siegwart maintains that, already today, Switzerland is one of the three leading robotics nexuses in the world. “My daydream is to see Switzerland become the first country on the planet where autonomous vehicles actually take over certain tasks.”



Autonomous Systems Lab

The Zurich ETH's Autonomous Systems Lab (ASL) is a global leader in the research and development of autonomous robots, including drones, aircraft and beetle- or human-like “droids” that can independently carry out complex tasks. The laboratory was founded in 1996 at the EPFL in Lausanne and since 2006 has been part of the Institute of Robotics and Intelligent Systems (IRIS) at the ETH where, almost a decade ago, the very first autonomous drones took flight.



Partake in life

Hans Peter Gmünder heads the Swiss Paraplegic Centre in Nottwil LU. With a reputation that extends far beyond the bounds of Switzerland, this centre of expertise provides acute medical treatment, rehabilitation and lifelong accompaniment for people with spinal paralysis. Its physicians accord the highest priority to the comprehensive care of people stricken with paraplegia and their return to daily life.

Text: editorial staff “ceo” Magazine

Images: Markus Bertschi

Time proverbially heals all wounds. When patients at the Swiss Paraplegic Centre (SPC) in Nottwil become restless or give way to despair as a result of their paralysis and immobility, it takes the kind of empathy and encouragement that instils in them hope and a can-do attitude. “Give us time,” Hans Peter Gmünder says at that point. As director of this renowned institution situated on the shores of Lake Sempach, where 1,100 clinicians care for people with vertebral and spinal cord injuries, he knows how precious life is and the tremendous value that is placed on the ability to function efficiently within one’s environment.

And indeed, it takes time to get SPC patients back to their daily routine and environs after an accident or severe disease. For Gmünder, the key objective of rehabilitation is not just to restore the physical and psychological viability of the patient, but also to reintegrate that person into social and business life to the greatest extent possible.

Keeping an eye on the priorities

When asked what he associates with the notion of “life”, the 58-year-old physician’s response is quick: “Gratefulness and fascination; respect and responsibility.” It was more than 25 years ago when the

*“With each other
and for each
other, not at the
expense of
others.”*

founder of the Swiss Paraplegic Foundation (SPF), Dr. Guido A. Zäch, convinced Gmünder to come to Nottwil. And even though he can’t personally attend to each and every patient, he makes sure “that we as a team never lose sight of the overarching goals of our quest.” Patients’ functional capacity as human beings and hence their ability to participate in family, professional and social life are factors that are very close to his heart.

Through the bright entry hall of SPC roll many patients on wheelchairs adapted to their specific needs in the Nottwil workshops. Gmünder greets colleagues and family members who have come for a visit. With

the aid of a wooden model, he shows the new wings of the facility that are currently under construction. Opened in 1990 and, as a clinic, the cornerstone of the Swiss Paraplegic Foundation, the SPC is growing constantly – not least of all due to the highly promising holistic approach to treatment and social reintegration that has been practised here since day 1.

Highly specialised know-how in the various medical and paramedical disciplines is crucial. “But it also requires elements that link those disciplines so we can take the right approaches in the right way at the right time,” says Gmünder. Amongst them are things like psychological counselling and vocational guidance for the patient. The healing process is a dynamic, constantly changing interplay of factors. For the SPC CEO, this is a matter of recognising and appreciating the individual contribution as an integral part of the greater whole. And that requires a special mindset: “With each other and for each other, not at the expense of others; joy in interaction and engagement – with and on behalf of our patients” is Gmünder’s leitmotif, and he imbues it in his team.



“Society, of course, also needs to be capable of bearing the cost of medical progress.”

Hans Peter Gmünder

The internist, rehab physician and geriatrician Hans Peter Gmünder (58), who also completed studies in economics on the side, has headed the SPC clinic as CEO since 2011. Gmünder, who grew up in Allgäu not far from the Swiss border, came to Nottwil for the first time in 1991 after having completed his medical studies and initial professional activities in Berlin. His extensive career has included posts as senior or chief physician at the Bürgerspital in Solothurn, the Suva Clinic in Bellikon, as well as several geriatrics clinics in Germany.



For a partially paralysed individual, strength training of the leg musculature is important. During physiotherapy, the Motion Maker (Swortec) sees to it that those muscles are exercised by means of functional electrostimulation.



At Orthotec AG, a subsidiary of the Swiss Paraplegic Foundation, close to 500 custom wheelchairs are sold each year. Pictured here: an electric wheelchair is the basis for mobility of a tetraplegic.

Putting scientific findings into actual practice

Aside from supervising SPC's acute medical treatment and rehabilitation activities, Gmünder also maintains a link with science by fostering clinical research and collaboration with domestic and foreign university hospitals. For him, it's not only important to provide researchers access to patients and the compendium of therapeutic know-how, but also subsequently apply the scientific findings in practical day-to-day work. But, he points out with a sigh, society – both domestic and international – also needs to be capable of bearing the cost of medical progress.

His primary interest is in the benefit realised by patients. Together with them, so-called participation goals are defined: What is accomplishable within a given time frame, assisted or unassisted? Which path will be taken on the grand tour of life? "We may not

offer just functional assistance; rather, as part of this process we must take into account the handicapped persons' entirety and accompany them step-by-step back into their daily life," emphasises Gmünder. That takes patience and willpower – and, of course, time.

Swiss Paraplegic Centre

The Swiss Paraplegic Centre in Nottwil LU is the acute treatment and rehab facility of the Swiss Paraplegic Foundation's service network. It conducts some 1,000 stationary medical procedures each year. This fully integrated network renders services that range from first responder care at the scene of an accident, to stationary medical treatment and rehabilitation, through to the lifelong support and counselling of para- and tetraplegics. It gets financed by its 1.8 million members in the Benefactor's Association.

www.paraplegie.ch

*“We learn when
we fail.”*

Henry Markram

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