

When decency meets temptation

When you get down to it, the concept of a digital twin is relatively simple. The advantage of a one-to-one virtual representation of a product that reflects its here and now is largely undisputed. But what about when we successively create complete virtual representations of people? The vast majority of us would like to be consulted, at least. An examination of what people can do today and what they will soon be able to do.



COPY — Thomas van Zütphen

By 2021, the global business value of artificial intelligence (AI) will reach an unfathomable 2.9 trillion dollars. At the same time according to Gartner Research Director D'Onn Griffin in this year's July issue of the magazine *Computerwoche*, AI will save around 6.2 billion hours of worker productivity. It goes without saying that this productivity will still be generated, just not by us humans.

Sounds alarming, but in the face of such prognostications and the estimate that, with two million new jobs in artificial intelligence by 2025, significantly more jobs will have been created than lost, it is hardly surprising that enterprise and industry are working intensely on ways to take their value creation chains to the extreme with AI. For example, by using digital twins: virtual representations of specific products, systems or machines that accompany their physical counterparts analogous to the real product lifecycle (PLC) – over their entire life (see page 9 ff.). The energy industry is already talking about "plant health" when discussing the "fitness of their generator fleet" in lifespan calculations. Or, to put it another way: their energy-supplying power plants. Their welfare and proper functioning are at once a cost and benefit factor. Capex and opex. Profit and income.

Take Uniper: for a long time now, according to CIO Damian Bunyan, sensors and networks, IoT and, AI have made it possible for the operator of over 100 power plants worldwide "to use its own maintenance resources in a much smarter way than 10 years ago, thanks to predictive analytics" (see page 30 of the CIO Talk). But if this makes it possible to keep equipment, things, and technical infrastructures functional throughout their lifecycle and increase the earnings from their lifespan – why not, just as a first step, look after the health of us humans in the same way?

BETWEEN EASY AND FRIVOLOUS

As equally business-critical as socially fascinating is one point above all: are we handling the challenges that will soon be posed to us in building a relationship between man and technology that is profitable not just in terms of healthcare easily? Or rather frivolously? The fine line in between zeroes is on the question of how we're dealing with it. The more adept we become at exploiting everything technology can do, the more age-old virtues will turn into real soft skills. Responsibility, ethics, decency, morality will not only experience a renaissance, they will need to be imbued with immense significance, for this is a matter of data and transparency. Then, in the next phase, nanobots and man-machine interfaces. Even the limits of the gray area between what people can do and what they should do. And whether humans – literally in their essence – approximate machines and robots or

vice-versa. For this, what experts call unavoidable type of metamorphosis – either of the one or of the other – the virtual space is only the neutral ground. No longer as a training area. Or even more so?

This leads not just to legal questions, theological considerations, and medical reflections. On the spectrum of personal, transpersonal, and cultural identity down to the illusion of the self, computer philosophers are already posing questions about the ethics of machines and mechanical morality. Regarded ad hoc, a single mountain of questions that beg to be answered piles up. At the summit, as it were, are those about the fusion of personal identity with the dataspace of a virtual world.

For Dr. Wolfgang Schinagl, director of the Digital Content Research & Development Center at the Styrian Economic Chamber, one thing is certain: "The current age of digitization is followed by the era of virtualization, where algorithms render digital objects into complex, networked process systems. The step is parallelization, where the virtual and real world each involve strong, mutual interaction. And if the blending of real and virtual technologies results in personal identity getting sucked more and more into the dataspace of the virtual world, a virtualization of the self is inevitable." Yet, as no-nonsense as the lawyer's lecture was at the 21st International Legal Informatics Symposium at the University of Salzburg, the idea will not so dryly lose its strangeness. Getting used to it will be gradual – as the concept of cyborgs, for example.

THE APPEAL OF THE FEASIBLE

In principle, anyone whose body has a permanent, non-human part – such as a pacemaker or prosthetic arm – is already a cyborg. And in the rehabilitation of those injured in an accident or wounded in combat, there is no more than one connection between prosthetics and robotics. People around the world are currently working on refining what are called brain-computer interfaces (BCIs), which convert brain activity into signals for controlling things like computers, robots, or prostheses. The electrical brain signals are recorded using electroencephalography (EEG) or implanted sensors, analyzed by a computer and then translated into specific instructions. And each time life is made easier, it is not only those who are sick or handicapped who look at the interconnecting of man and machine with more and more positivity. And the rate of the relevant development possibly less vexing. For example, the founder of Tesla, Elon Musk, started the medical research company Neuralink in 2016 to work on the development of what is called "neural lace" technology. The goal is to fuse biological and digital intelligence. How far along research has come on BCI in particular became apparent in 2016 at the first "Cybathlon" in Kloten, Switzerland: people with only the power of their

Snappy investments

Company	Total R&D Spending (\$m)	R&D Spending as % of Sales
Alphabet	13.948	15.5%
Apple	12.3	14.6%
Microsoft	11.988	14.2%
Facebook	5.853	21.2%
Twitter	698	27.6%

Source: FactSet

thoughts left used their brain waves to control an avatar in a virtual world. Yet to do this, computers need access. Personal progress, including with regard to health, is increasingly depending on how much we give up what is originally ours. This is already beginning in healthcare.

Turning back the clock to the present, companies like Alacris Theranostics GmbH are pursuing the goal of developing functioning, personalized healthcare and disease prevention based on “virtual patient” strategies (see article “A crash test dummy for medicine”, page 22). Specifically, the spin-off of the Max Planck Institute for Molecular Genetics in Berlin, soon to be part of the multi-disciplinary EU project “DigiTwins,” is optimizing treatment and prevention strategies using computers. In this approach, a “virtual twin” is used that can be treated at next to no cost and does not have to suffer any negative effects of treatments. According to Dr. Bodo Lange, the heart of this is the vision of “a truly personalized health and disease prevention system. A vision that will trigger a paradigm shift in healthcare by using the most advanced omics, sensor, computer and communications technologies to make possible truly personalized and preventive medicine.”

INFORMATION AS PRICE, DATA AS CURRENCY

What did I eat and drink today, how much did I smoke? How far did I go on my bicycle, in my car or on foot? When did I even move and in what environment? How far we are willing to pay the price for subjective benefits and objective gains in quality of life with information has been apparent for years in how we interact with Amazon, Facebook, Google, Apple, and Microsoft. Anyone who claims these companies have a laissez-faire attitude about data protection that is similar to a large portion of their users would in no way run the risk of sounding unrealistic. The “Big Five” – so called in the US because, as an industry, they are so large they can exert political pressure on society – represent 40 percent of the shareholder value of all companies listed in the NASDAQ 100, at \$3.3 trillion. At the same time, the top five global tech giants invested \$76 billion last year in research, such as in the areas of big data analytics, AI, and cloud technologies.

Research on linking the neural nets of humans as much as possible with artificial neural nets is proceeding not just in the US. For scientists such as Nick Bostrom, director of the Future of Humanity Institute at the University of Oxford, it could (only) be another 300 years before humans have the chance to fully live in a parallel digital world. An artificial neural net will keep a copy of their brains up to date regardless of whether their physical bodies are still alive. Scientists call this world the Metaverse. And they call themselves transhumanists.

The most important question of all to be answered is: Do we want this? For whatever it is to which we pimp any type of our current nets: the fabric of relations between AI, IoT, BCI, digital twins and algorithms on the one hand, and prosperity and objective progress on the other, remains symbiotic. But for that result, for what we make of it, man is uniquely and solely responsible. Still.

MIRROR IMAGE WITH POTENTIAL

They help represent physical products and processes, predict their behavior and optimize their continued development: Digital twins promise much opportunity yet are barely being utilized.

COPY — Heinz-Jürgen Köhler

Silverstone on the last Sunday of August of this year – the Grand Prix of Great Britain: The bright orange Formula 1 car from the McLaren team takes the curve tightly, brakes at the peak, then accelerates mightily once again. What you do not see: a digital twin accompanies the real-world racer. The English team has created digital representations of their vehicles.