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# Perspective.

# Annual and Sustainability Report of Porsche AG 2017

PORSCHE

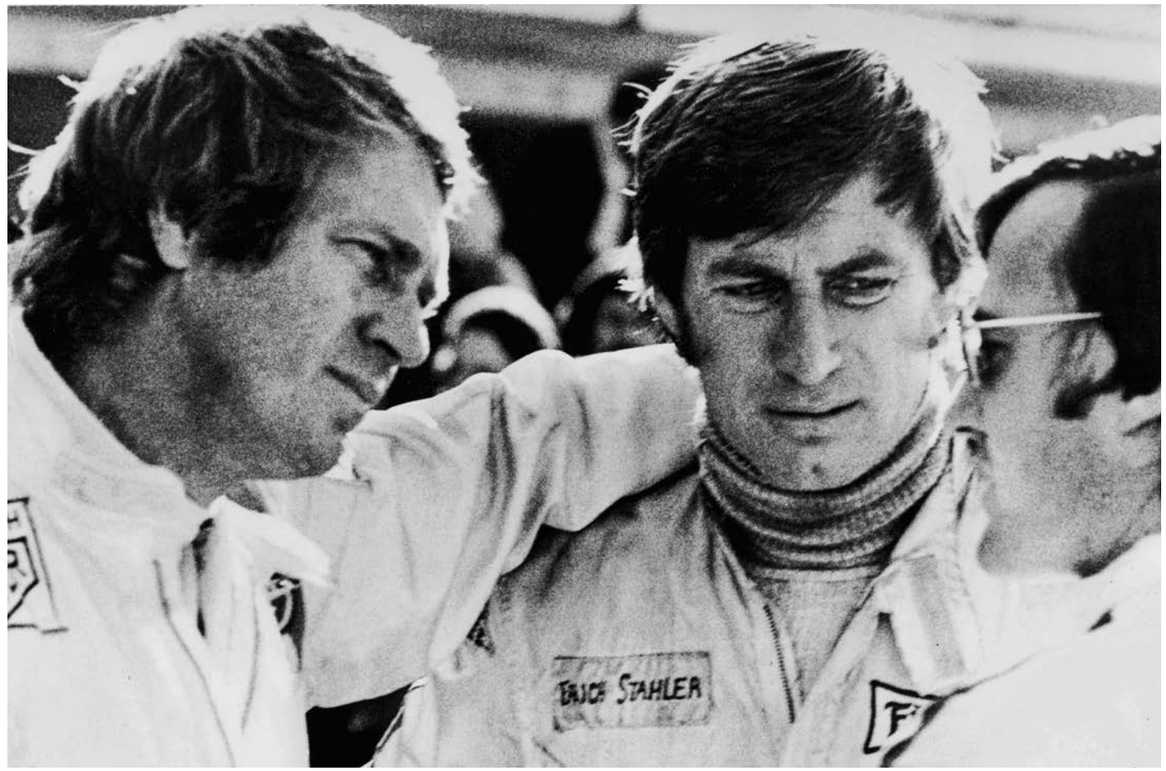
**Seventy years ago:**
**the first Porsche “356”.**
**The number 1.**
**Maximisation of minimalism.**
**Devotion to design.**
**Elegance.**

**One: rebel, cult figure, eternally young, alone.**
**The other: magician, legend steeped in contradiction, never without her.**
**Conjunction of opposites, united in passion.**
**The number 130 on the bonnet of James Dean's Porsche 550 Spyder:**
**symbol of a movement that transcends death.**
**In Salzburg people could tell when Herbert von Karajan was there**
**by the car parked at the offices of its famous festival hall:**
**"God drives a Porsche."**


**Furrows and flat surfaces, curves and corners, aggression and graciousness, strength and elegance, speed and solidity, focussed concentration and casual playfulness: seemingly disparate forces in precisely calibrated balance.**

**Breaking free of the confluence of automated currents, setting one's own course, experiencing the pleasure of authenticity beyond efficiency.**
**Refuge for individualists, nonconformists, the avant-garde.**
**Exclusive, yet right in the middle of it all.**

**Targa Florio, Le Mans: dream-like places,**
**built out of triumph and tragedy.**
**One: a victorious hero. The other: still a hero in defeat.**
**To give everything, to lose everything, to win everything.**
**Superiority without pomp.**
**Reserve that overcomes everything in its path.**

**Play of light and darkness, lines pointing far beyond the present day: honest, functional, timeless. Credo of a characteristic language of form. Harmony of composition. Unity of design and function.**

**Racing: not an end in itself. Three victories at Le Mans and six world championship titles in succession: superiority – not the aim but simply the result. Advancing by conviction. Setting the pace from the start. Benefitting customers in the process.**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**The dawn of an era. The seventy-first year will be 2019: tradition will continue. The Mission E is coming.**

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## Perspective.

Living sustainably is an overarching strategic target for Porsche. For us, economic success, ecological awareness and social responsibility are not contradictions. On the contrary, when combined, they form a whole which defines the company's attitude

Economic success distinguishes Porsche – as does social compatibility. Precisely as a manufacturer of exclusive, high-performance sports cars, Porsche regards itself as being obliged to enhance the acceptance of the company and its products worldwide by means of socially and ecologically responsible action. Responsible action which benefits not only the company but also the environment and society is not just in line with the expectations of customers, business associates or investors; it also has great significance for ensuring competitiveness.

That's why Porsche is combining the Financial and Sustainability Report. We are sending out a message by doing this – namely that the two topics are inseparably connected.

Economic power, innovative vehicles, customer orientation, environmental protection and employee responsibility – Porsche sets the highest standards, and aims at continual and long-term improvement in all these areas.

You have before you two volumes: Perspective is intended to inspire, stimulate and motivate you – to confront, challenge and familiarise you with the topics and theories that an automotive company like Porsche must address in times of industrial system upheaval.

What will identity mean in future? This is the overriding question which Porsche already has to consider today. Alongside inspiration is information – about Porsche's philosophy in the interplay between digitalisation, connectivity and electrification.

Volume Two is entitled Performance. It contains all the events of the 2017 financial year. Here, you can find developments, summaries, explanations, key figures – and the documentation of Porsche's overarching sustainability commitment in all its aspects.

As different as the two volumes are, they have one thing in common: communication on various levels. In keeping with this, some articles offer the possibility of augmented reality. You can find references to this on the relevant pages – as well as some surprises.

# Determining whether identity is static or dynamic is one of the central principals of the modern age. Digital transformation is putting keen pressure on us in relation to the dynamic aspects of identity: only by constantly reinventing ourselves will we still remain ourselves in tomorrow's world.

**CORE IDENTITY**



# A strong brand – a clear identity


**Digitalisation, connectivity, electromobility. What will the future bring? And how will these megatrends change companies? Porsche Chairman of the Executive Board Oliver Blume talks about Strategy 2025 and the brand's identity.**

**Interview with Oliver Blume**

**Mr Blume, let's look into our crystal ball for a moment. When will we see the last Porsche with a combustion engine?**
I would venture to predict that, by 2030, the sportiest Porsche will have an electric drive. Who knows – maybe by then even our iconic sports car, the 911, will be electric.

**Does this mean that you have already decided to leave behind conventional drive concepts completely?**
On the contrary! It would be absurd to think that we could do without the combustion engine completely in the foreseeable future. But, equally, we cannot miss the opportunity to invest heavily in electromobility. Before we leave petrol or diesel behind, the next decade will see an increase in the parallel use of combustion engines and alternative drives. A clear trend is developing, and we will deliver. I am not going to do anything hasty, however.

**Would a decision to abandon diesel engines at Porsche be hasty?**
At Porsche, diesel engines have traditionally taken a back seat. Diesel's share among our vehicles worldwide is currently 14 per cent. Porsche does not develop or manufacture its own diesel engines, and there are no plans to change that in the future. All the same, there's no reason to just suddenly abandon diesel. If we rushed into dropping diesel, we would not be able to completely make up the difference with petrol and hybrid engines. Furthermore, diesel makes an important contribution to achieving our $CO_2$ targets. There are many markets, such as in Southern Europe, where people really don't understand Germany's current discussion about the future of diesel. There, 80 per cent of customers buy a diesel car. That is why a mixture of combustion engines, hybrids and electric cars is the right strategic response from Porsche for about the next ten years.

**Why can the transition to electromobility not happen faster?**
There are technical and structural reasons for it, but also purely economic ones. To begin with, the everyday usability of electric cars needs to continue to improve – particularly in terms of range and charging time. There is also quite a bit to be done when it comes to infrastructure. The pan-European high-power charging network IONITY by Porsche, Audi, BMW, Daimler and Ford is now charting a course towards the establishment of the most powerful fast-charging network for electric vehicles in Europe. But even this can only be one part of a larger solution. The second reason for the delay is connected to doubts regarding whether the current electricity mix is really better for the climate than combustion engines. Thirdly, people often fail to realise the Herculean task faced by our industry, which is, after all, the backbone of our economy and our welfare state.

**Increasingly strict emission regulations within the EU, which will mean that new cars in 2030 will have to have 30 per cent lower emissions than those in 2021, will force you to continue to invest a lot of money in existing technologies and their advancement…**
… Investments across the entire industry are enormous. The Volkswagen Group, to which Porsche belongs, is ramping up its investments in new, electric-drive models to 20 billion euros by 2030. By 2025, the Group's brands expect to put more than 80 new car models with e-motors on the market, including 50 pure e-cars and 30 plug-in hybrids. Porsche alone will invest more than six billion euros in plug-in hybrids and purely electric vehicle over the next five years. For a company of our size, that is a considerable expenditure. At Porsche's headquarters in Zuffenhausen, we are spending a billion euros on building a new plant for electric vehicles. This is probably the most ambitious and risky project we have ever undertaken. A factory within the factory with 1,200 new jobs.

911 Turbo S: Fuel consumption combined: 9.1 l/100 km; urban: 11.8 l/100 km; extra-urban: 7.5 l/100 km; $CO_2$-emissions: 212 g/km

**Will costs of that magnitude pay off?**
They are investments in the future. But, one thing is sure: our customers, too, are price-sensitive, even if they are ready to pay a premium price for a Porsche. Even Porsche cannot simply pass on the costs of electrification of its vehicles if, as expected, the competition is stiff. We have to be able to earn the added value. This may – as one would expect – have a short- or medium-term effect on our profitability, but it need not do so if we manage to compensate for it with other measures. We see various approaches and are looking forward to the challenge.

**In 2019, the Mission E will roll off the assembly line in Zuffenhausen. You intend this battery-only vehicle to be not only the first emission-free Porsche, but also one produced with an entirely $CO_2$-neutral footprint.**
And we'll achieve that goal, too. Well over a year ago, we switched all our plants to 100% natural electricity sources, which underlines how seriously we take sustainability. The Mission E will not only redefine the high-performance e-vehicle segment, it will also give a boost to Germany as a technology producer and thus to possibilities offered by electromobility in general. The vehicle will be a trailblazer for the mass appeal of e-vehicles. It will set standards and will represent motion in more than one sense. The only things that the Mission E will not offer are boredom and forbearance.

**Porsche as the pacesetter of a new automobile era?**
Why not? Porsche invented the hybrid drive. And, over the last three years, we have dominated the Endurance World Championship from a technological standpoint like no other brand ever before, thanks to our hybrid and battery technology and our visions of downsizing and increased efficiency. Take, for example, our 19th overall victory in Le Mans. Mediocrity doesn't win the race. Top performance and pushing the boundaries are what is needed to unleash forces and captivate others.

911 GT2 RS: Fuel consumption combined: 11.8 l/100 km; urban: 18.1 l/100 km; extra-urban: 8.2 l/100 km; $CO_2$-emissions: 269 g/km

**Despite all the pressure created by this change, Porsche seems to speed from one record year to the next – more cars, higher turnover, higher profits, more employees and a return that can be counted among the best in the industry. Did you reach your peak in 2017?**
Let's wait and see. Inspiring products are what drives us forward; figures are merely the result.

**Your current figures have set a record, however.**
We are pleased about the record turnover and top numbers for car deliveries, but they are not our top priority. Satisfied customers are the only yardstick for our success. Naturally we are proud of what we have achieved. Naturally it's nice that our customers are reminded of the 911 whether they are in a Macan, a Cayenne or a Panamera. And of course we benefit from new growth spurts such as those in China. But all that is a positive snapshot. We think of success differently.

**In what way?**
We focus on growth that creates value. This growth is oriented towards four primary goals. Firstly, inspiring customers with a unique product and brand experience. Secondly, excellent earning power. Thirdly, innovation and sustainable actions. And, fourthly, attractiveness as an employer and an economic partner. Customers want inspiring automobiles. We need capital for investments and innovations. The success of our company depends on whether we can retain enough talent. If you want to create sustainable value in the long term, you not only need to understand the connection between economic returns and value creation for humans and the environment, you also need to be seen to live these values as part of a society that has increasingly ecologically and socially minded attitudes.

**What does a chairman of the board need to have to be able to push forward ideas that fundamentally change a company?**
Personally, I am convinced that you cannot achieve the type of change that we are currently putting into place either on one's own or with individual measures. You need a good deal more – a persuasive team, ideas, courage, passion and a well-thought-out and flexible strategy. The important thing is to recognise what needs to be done, and then to tackle it, show others the lead by your own actions, and take responsibility. This starts with myself. Only someone who has a sense of responsibility will be able to change things and drive forward that change. And that is precisely our aim: we want to change Porsche without neglecting the things that made us strong.

**Which means what, exactly?**
To take one example, one of Porsche's roots is motor racing. We are currently transferring our experience and lessons learned from decades of motor racing and thousands of victories from our sports-car prototypes to Formula E. We are thus taking on a new challenge but remaining true to our past: for us, motor racing exists to help us build better cars for road use. Formula E is exactly the same – it is the ultimate laboratory for our electrification strategy. The future of the sports car combines our tradition and values with new, sustainable technologies and a very emotional driving experience. I can promise that the Mission E will be the sportiest and the most technologically advanced vehicle in its class. E-mobility, Porsche performance and driving enjoyment are not mutually exclusive; for us, they all belong together.

**You are in your third year as Chairman of the Executive Board at Porsche AG. What exactly has changed?**
We are moving at high speed through a time of huge technological advances. The path for the sports car of the future has been laid. Creativity is considered very important. We know where we're coming from but we also know where we want to go. We have been able to build on the very good foundation laid by my predecessor Matthias Müller and have moved Porsche forward strategically, technically and culturally. Organisation, team spirit and processes play an important role. Our tradition is something we live out daily. But we also combine it with the future in order to develop further and create new things.

**Porsche's Strategy 2025 is the watchword of the future. The product range is an important foundation stone. How far have you come?**
The product is at the centre of our strategy, and our strategy rests on four pillars. To begin with, we will stay true to our roots: purist, road-ready sports cars, as one would expect from Porsche, with advanced combustion engines. One such vehicle is the 911 GT2 RS, the most powerful road Porsche of all time: uncompromising, minimalist, pure. We will then expand our existing model range by adding expedient and emotional derivatives and will continue to pursue the transitional technology of plug-in hybrids. Porsche was the first premium manufacturer to have three models of that type in its range. There are even two versions of the new Panamera. In Europe, approximately one in two Panamera buyers decides on a hybrid model. That is higher than our expectations, and shows us that people are excited by the prospect of driving a Porsche 50 kilometres comfortably and with only electric drive through city traffic and then to put the pedal to the metal and experience some real driving enjoyment on a country road or, for some genuine excitement, to race around a track. Our third pillar is pure electromobility, exemplified by the Mission E. Fourthly, we offer models with a strong lifestyle character, such as the limited 911 Turbo S Exclusive Series. As different as the segments may be from one another, the same applies to all of them: Porsche remains Porsche. Everything we make is a Porsche – sporty, dynamic and with an attractive design.

**You have said that Porsche Digital GmbH is your pathfinder into the digital world. It detects trends; enters into partnerships and shareholdings; founds bases in places such as Berlin, Silicon Valley or Tel Aviv; develops prototypes for digital applications and is intended to promote a culture of innovation across all departments at Porsche AG. Is that Porsche's future?**
Our customers' demands for individual mobility are changing considerably. It therefore makes sense for us to aim to be a leading provider of digital mobility services in the premium sector of automobile manufacture. In the medium term, these offerings are certain to make a double-digit contribution to our profits. To this end, we promote digital training among our employees. They will become drivers of our digital transformation. It is a waste of time and money not to make use of ideas. This enables us to create a culture of ideas and innovation that will allow us to fulfil our customers' wishes for highly individual mobility.

**Is the Mark Webber app one of these offerings?**
Hopefully one of many, and certainly a very attractive one: your Porsche drives around the track just like the former Formula 1 star and Porsche brand ambassador would do in his heyday. Then, the customer takes over the wheel. You can use this virtual coach to improve your skills as a driver. I consider it to be a very interesting development and one that fits well with our brand.

**Digitalisation is breaking up existing business models. Classic product philosophies no longer work; networked cars, autonomous driving and electrification are creating new forms of individual mobility. There is increasing demand for new forms of usage and flexible transport solutions. The way we currently manufacture, distribute, buy and maintain cars will soon be a thing of the past. New competitors are knocking on the door. Have I forgotten anything?**
The fact that customers are better informed, have tougher requirements with regard to environmental friendliness and resource consumption and are able to interactively rate and influence companies and their products.

**How can Porsche remain Porsche given these circumstances?**
Since our beginnings 70 years ago, we have created a strong brand with which people – customers and employees – can fully identify. In times of great change, this means not only breaking with tradition, but also maintaining it where expedient. Our success in the past can speak for itself. It just needs to be reinterpreted within a different framework.

**What makes for a strong brand?**
Strong brands have a strong identity.

**How can carmakers retain separate identities if combustion engines, once the top tier of German engineering, are being replaced by e-motors that can be built by almost anyone, and if cars feel like smartphones that one no longer even has to own oneself?**
I really doubt that motors of the future will no longer be a distinguishing characteristic. A Porsche e-motor will be unique. In addition, there will be features such as design, driving experience, performance, long-distance usability and charging times. But the faster the world turns, the greater our desire for a fixed value structure that we can cling to. The great challenge remains being able to update brand values that have been formed by certain technologies once new technologies come along.

**There are various ways to interpret "identity": sociologists define it as a bundle of typical roles held by an individual. Philosophy believes that identity arises out of a set of personal values and ethical principles that remain relatively stable over time. Psychology claims that identity is the "self", the inner unit that a person experiences. What does identity mean to you?**
Knowledge of one's own uniqueness. Identity, to me, is the answer to three questions. Who have I been? Who am I? Who do I want to be? Or, as applied to Porsche: Why do we exist? Why do customers buy our cars? What fascination do our cars hold? What drives us forward? What do we want to achieve? Once that is all clear and consistent, we will be perceived as differentiated, unique. Only then will we find inspired customers and responsible, passionate and motivated employees.

**There is a rule of thumb that says that a company ought to be able to explain its brand identity in seven words, give or take two. The clock is ticking!**
Porsche stands for exclusive sports cars.

**As simple as that?**
As simple as that! That's all you need to know. In the future, there are bound to be more digital offerings, more services connected with mobility – but, at its core, it's as simple as that.

**Can an identity change?**
Of course. In fact, you have to let your identity continue to evolve. We are experiencing that at the moment. We are currently in the middle of a massive technological upheaval. Our model range has never been so varied; we have never before experienced such a cultural break in our thinking. It is important not to lose sight of the core. That is how I understand it.

**Is design an expression of identity?**
Yes, in fact – after the performance of our products – it's the strongest expression. According to Michael Mauer, our design chief, Porsche's design philosophy is fairly simple. There is both brand identity and



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911 Turbo S Exclusive Series: Fuel consumption combined: 9.1 l/100 km; urban: 11.8 l/100 km; extra-urban: 7.5 l/100 km; $CO_2$-emissions: 212 g/km

product identity. Brand identity means that I recognise that it's a Porsche. Product identity means that I recognise which Porsche it is. We refer to this as a hierarchy of values. Every element is a product identity characteristic. An element may remain as such or it may be elevated to the next level of the Olympus of brand identity. All our cars, for example, have an air intake instead of a radiator grille. The contour of the headlamps, meanwhile, is different on each car; it gives each car its character. The designers used to only make the outer contour of the headlamps, whereas now the interior is also an integral component of the design. The headlamps are little works of art! And this is an idea that we are now transferring to the rear. All new models will, in future, have a light strip in a varying design. This will make a Porsche unmistakeable even at night.

**You are often confronted with the accusation that Porsche is no longer a classic sports carmaker, but, with its Macan and Cayenne series, is instead really an SUV specialist or, with regard to the four-door Panamera, is almost an all-rounder. What do you dislike about hearing that?**
Porsche represents sports cars – whether they have two doors or four.

**Are you sick of hearing about this?**
I am, to the extent that I don't even understand why someone would say that. Anyone who has sat in a Macan GTS, a Cayenne Turbo or the 700 hp Panamera Hybrid and has the skill needed to push the car to its limit, will find a lot to impress them. They will not, however, be impressed by the argument that the car is not a uniquely Porsche sports car.

**The reason might be that the classic 911 and 718 two-door sports cars no longer have the importance they used to have among the overall mix of model range you offer. Two-thirds of all Porsches that come off the assembly line are SUVs.**
And that means that Porsche is no longer Porsche?

**You tell me.**
In 2017, at our management conference, Wolfgang Porsche cited an interesting comparison drawn by the dramatist Kristof Magnusson. It was about the Ship of Theseus…

**… the paradox surrounding the question as to whether an object loses its identity once many or even all of its components have been replaced.**
Correct. The background was the millionth 911, which had just rolled off the assembly line and was being celebrated around the world. Wolfgang Porsche asked us which one we thought was the real 911. The one from 1963? Or the one from 2017? Or neither, because we couldn't decide?

**And what was his answer?**
There is no clear answer. If there were, it wouldn't be a paradox. But there is one thing you can say: I doubt that there is another car that has so frequently and consistently been adapted to match the requirements of a modern sports car and yet remained so unmistakeably true to its inner and outer values as the 911. In principle, the Porsche 911 is always the same sports car despite our uncompromising commitment to progress. Our company works in exactly the same way.

**Renewal is possible without losing identity?**
Yes, if there is a principle of order or structure behind it. The Porsche 911 philosophy is a structuring principle of this nature. The essence of our brand, which can be found in every Porsche, regardless of whether it has two doors or four, regardless of whether it has an electric drive or not, regardless of whether it is purist or luxurious. This principle has made Porsche what it is and what it will continue to be.

**The new 911 will soon be here.**
Evolution instead of revolution. Always one step ahead. That is how we have always done it. Renew everything while retaining an irreplaceable identity.

718 Cayman GTS: Fuel consumption combined: 9.0 – 8.2 l/100 km; urban: 12.3 – 10.9 l/100 km; extra-urban: 7.0 – 6.6 l/100 km; $CO_2$-emissions: 205 – 186 g/km
Cayenne S: Fuel consumption combined: 9.4 – 9.2 l*/100 km; urban: 11.8 – 11.3 l*/100 km; extra-urban: 8.4 – 8.0 l*/100 km; $CO_2$-emissions: 213 – 209 g/km (*Range depending on the tyre set used)

Macan GTS: Fuel consumption combined: 9.2 – 8.8 l*/100 km; urban: 11.8 – 11.4 l*/100; extra-urban: 7.8 – 7.4 l*/100 km; $CO_2$-emissions: 215 – 207 g/km
Cayenne Turbo: Fuel consumption combined: 11.9 – 11.7 l*/100 km; urban: 16.4 – 16.2 l*/100 km; extra-urban: 9.5 – 9.3 l*/100 km; $CO_2$-emissions: 272 – 267 g*/km (*Range depending on the tyre set used)

# A rose is a rose is a rose

## Identity in the age of digital transformation

by Kristof Magnusson

Digital compositions question the limits of human perception with untold vehemence. Physical reality seems like a relic of past times, when a still life could once freeze the essence of an epoch in space and time. Anny Wang's post-digital aesthetic distils signs of a revised system of reference, in which categories such as original and imitation have imploded. Processes create their own worlds here out of independent modular forms.

**Few terms are as versatile as the term *identity*. On the one hand, it can mean a person's own, personally experienced existence in the world: my identity is what I am. But it has long since ceased to be that easy. Identity can be retained and yet change, identities can be ascribed and adopted – but this does not happen at random. How, then, does it happen?**

Ideas about identity are always characterised by two opposing concepts: on the one hand, the acceptance of an unchangeable being – an essence – as the core of identity, which was already familiar to the ancient world; and on the other hand, the modern assumption that identity is a dynamic process, that identity can be made. These opposing concepts have been sustained into the 21st century. The latter model of identity was already gaining significance at the beginning of the modern era and is now more fluid, dynamic and changeable than ever. However, this does not mean that absolutely anything is possible. Particularly in our own era, the essential and the authentic take on particular importance, which requires such flexibility.

The preservation of identity is increasingly the focus of attention. Digitalisation is radically changing industries; the automobile is experiencing the most significant redefinition since its invention. Mobility no longer means simply travelling from A to B. But how does one talk about one's identity without resorting to abstract terms and commonplaces? Are products which are launched with the aim of emphasising the traditional aspects of a brand really always connected with the historical values they are supposed to represent? Doesn't the name of a product that includes the word "original" promise, rather, that it is precisely *not* the original? Of course, goods can no longer be produced in the same way as in the 1980s, 1970s or 1960s: our society's product safety requirements have changed as have the political, economic and ethical conditions affecting industrial manufacture. Any claim to be the exact same brand and produce exactly the same product as before must be revealed, on closer inspection, to be a fiction.

Ideally, a single object or product represents the identity of an entire brand in a particular way. The more identity becomes a dynamic construct in the digital age, the more everything seems possible; and the faster the circulation of images, trends and hype in digital communication, the more enduring objects become carriers of identity. Their historical continuity goes hand in hand with a certain credibility.

It is here that Porsche's 70-year-old history shows itself to be an astonishing special case in the current landscape of brands and companies which seem to be collapsing under the pressure to change. Porsche, as a brand, is in possession of a product, a value and a principle that does not need an epithet such as "original", because it already *is* the original: the Porsche 911.

In the history of the Porsche 911 lies a narrative with a certain resilience and persistence. There is probably no other automobile which, since its introduction in 1963, has been adapted, time and again, so consistently to the demands of a modern sports car and which has remained so unmistakably true to its inner and outer values, its identity. There is enormous value in possessing a product which, in such a special way, not only retains the credibility of its tradition and continuity but also carries further development and progress within the core of its identity. If one were to attempt a conscious separation of design-related aspects from technical refinement, turning the construction into a kind of museum, one would achieve the exact opposite: namely changing its identity.

But how can such a strong brand identity be carried into the future? To answer this question, we need to identify the factors currently influencing our understanding of identity: each era produces new identities. Every industrial

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upheaval had a strong effect on people's way of life, on the character of objects and on the significance of cultural heritage. The various developmental stages of modern industrial society have in fact produced different forms of identity.

For centuries, our society has been developing away from obedience to rulers and towards self-determination. This phenomenon, known as governmentality, on the one hand reaches far back into the past but, on the other hand, applies particularly to the current digital age – and, above all, to the question of identity. The question of whether identity is given or made, whether it is static or dynamic, whether it is essential or constructed, is one of the central thought motifs of modernity.

On the one hand, great hopes are attached to the self-determined constructability of identity, since the possibility of freeing oneself from chains imposed by others and of reinventing oneself is one of the great, important achievements of the modern world. Whether it involves migration, gender identity or social class affiliation, being able to determine one's own identity is a very fortunate thing! On the other hand, many places have a critical scepticism towards a culture with such free concepts. Might it not result in a certain arbitrariness? Doesn't identity lose something if it is freely constructible?

When American author Gertrude Stein, in the 1913 poem *Sacred Emily*, wrote the famous sentence "A rose is a rose is a rose is a rose", she was conjuring up the essence of the rose without providing any further descriptions or attributions. It was an attempt to evoke a pre-modern form of identity which does not require any construction or derivation. At that time, Stein was already convinced that the true identity of the rose had been lost amidst modern scientific explanations and lyrical paraphrasing. Stubbornly, she braced herself against a modernity which has, however, increasingly gained speed up to the present day.

Constructability – and deconstructability – of identity may have been a thorn in Gertrude Stein's side, but for us, it has long since become part of our everyday experience. In the age of digital transformation, the dynamic aspects of identity are even more important, which is due above all to two things which have particular significance for our identity today: access to information and communication. The explosive power which underlies the democratisation of information can be demonstrated by many historical cases. Access to education and information has, time and again, set radical social change in motion. And with the availability of information on the Internet, the digital age represents possibly the most radical change in access to knowledge.

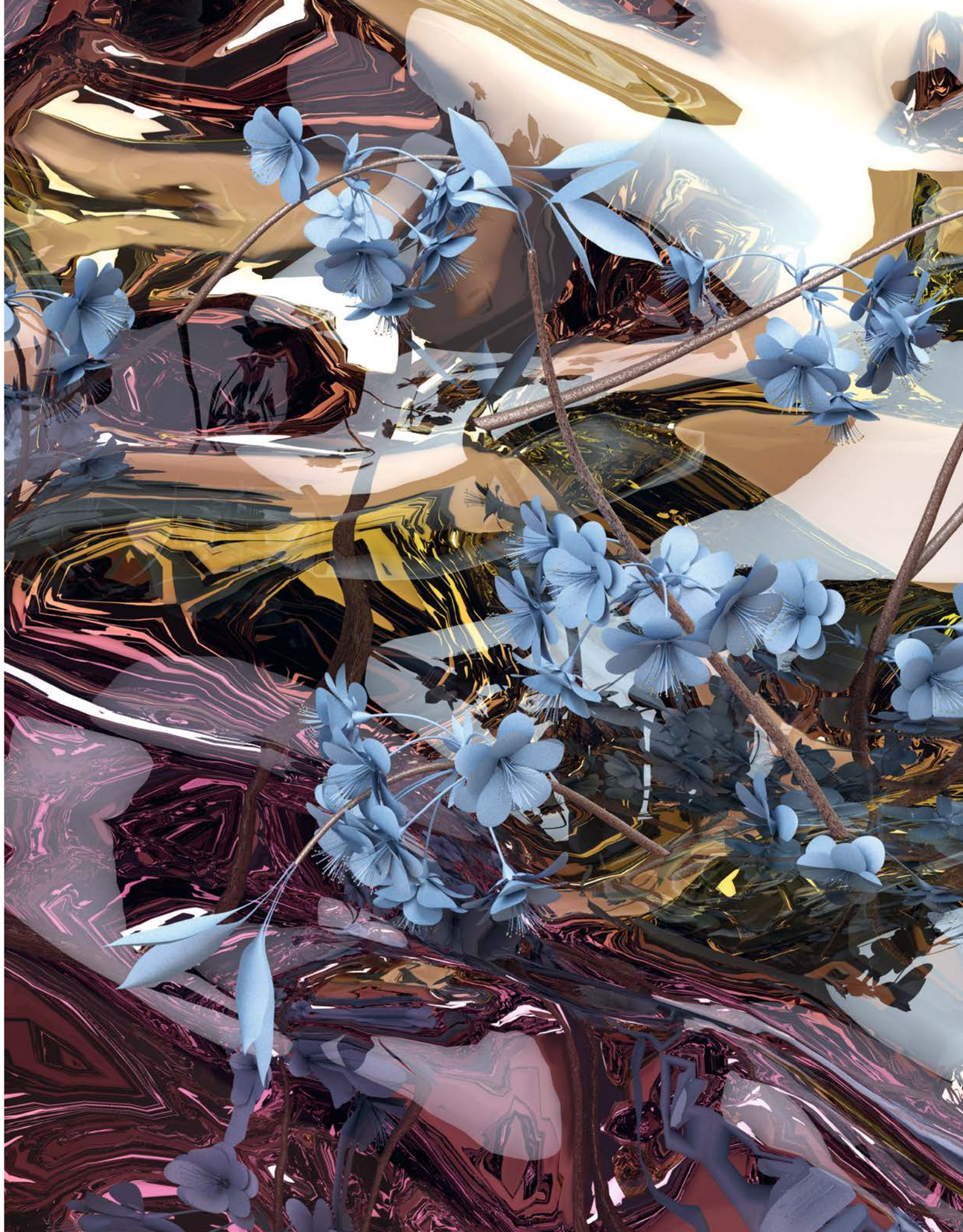
In the pre-digital world, in order to be able to identify with a scene or subculture, it was necessary to have a certain knowledge which was only available to the initiated. Does such secret knowledge even exist today? Can it still help to form identity? What is its position in the digital age, in which all access to information is democratised? Perhaps it is no longer knowledge itself which is now important for identity, but rather knowledge about knowledge. The procurement of information is becoming more important than the information itself, and *information literacy* – the ability to handle information – is becoming the most important cultural technology of all. But with the democratisation of information, the relationship between information and identity also changes. If potentially all knowledge is now freely available to everyone, how is someone who really *is* someone to be distinguished from someone who *seems* to be someone on the basis of his knowledge?

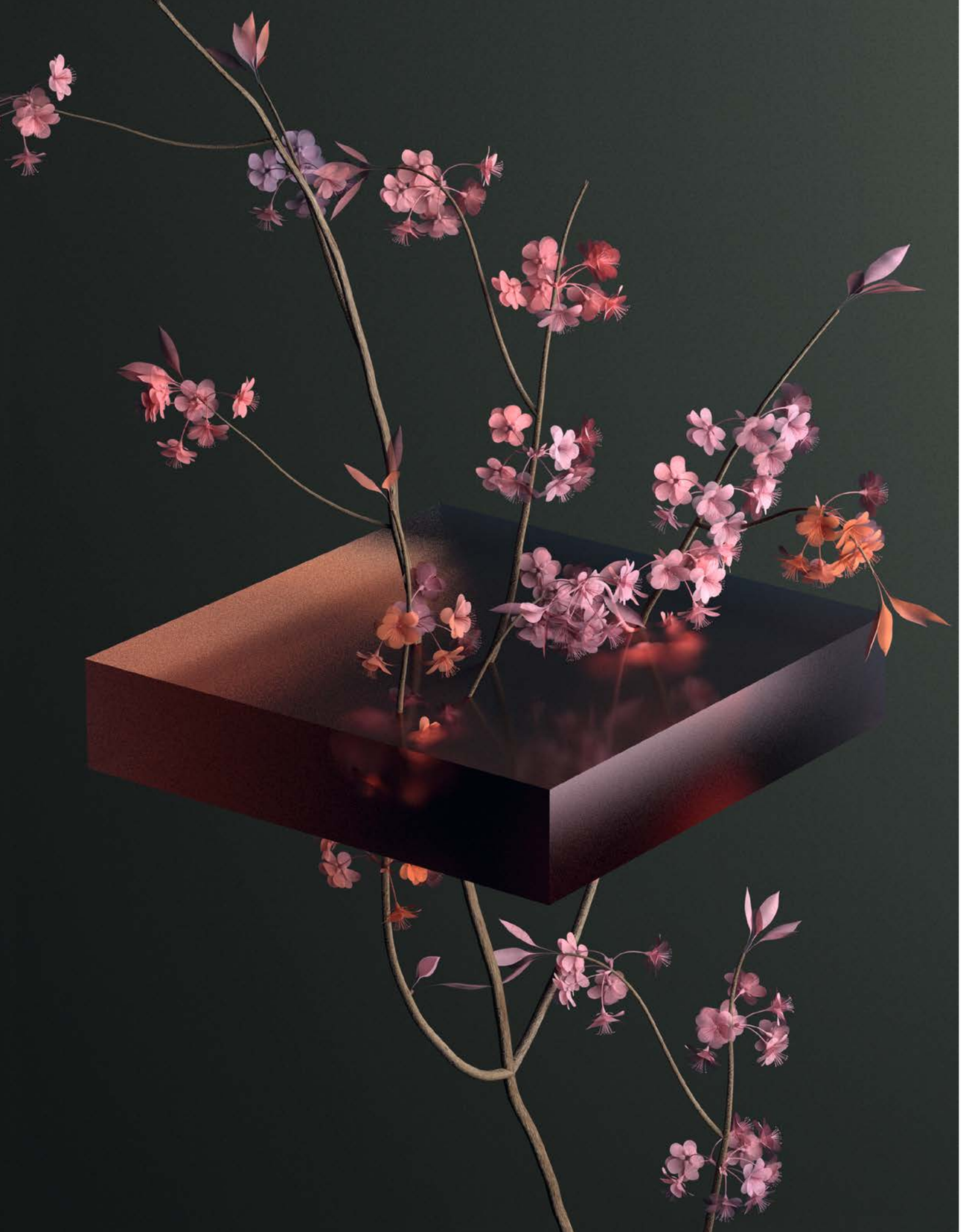
In a radical constructivist conception of society, identity does not exist without communication. One's own identity is formed only through interaction with other people. But how is an identity formed when the possibilities of communication have become so diverse, thanks to digital transformation?

A glance at social media platforms reveals clearly that the discrepancy between essence and appearance is part and parcel of the digital age. "On the Internet, nobody knows you're a dog" is a pertinent quotation on this subject, taken from a cartoon drawn in 1993. But that is only half the truth. Since it is so easy to present oneself on the Internet as a person with a particular identity, the possibility of deception is also known to the potential public. The questioning of all authenticity is the flip side of the dynamic identity concepts of the digital age. If my music streaming service can predict my next favourite song for me, which part of my taste in music still comes from myself? What part of me is *myself*, and what part has been added to me by artificial intelligence?

Narratives about who or what one is are always part of identity construction. As long as this narrative remains credible and plausible, changes and ruptures can also find their place in a biography in creating an identity.

**The procurement of information is becoming more important than the information itself, and information literacy – the ability to handle information – is becoming the most important cultural technology of all. But with the democratisation of information, the relationship between information and identity also changes.**





To the same degree that identities are becoming more fluid and dynamic, the essential aspects of identity become increasingly significant. As an individual, I create a narrative of myself which mediates between these different identity concepts and explains to me who I am. In this respect, every person is an author who retells the story of his or her own life to him- or herself every day. But things, brands and products also possess their own narratives. And in their case, too, narratives connect the constructible with the essential parts of identity, whereby the greatest challenge for a brand in the age of digital transformation is to retain its identity without lapsing into a kind of standstill or backwardness.

On the question of identity, the Porsche 911 is a particularly interesting case because it is something which is very durable and yet constantly changing. On the one hand, one might claim that it is the same car as ever – a sports car which has existed in this form since 1963. On the other hand, one could claim that every new version of the Porsche 911 is a completely new object. A glance at the silhouette, however, immediately reveals that it is a Porsche 911; the basic shape is unmistakeable and universally known. Despite this, it is made with completely different engineering skills from those of 20 or 40 years ago. Is the Porsche 911, then, particularly tradition-conscious and consistent, or is it particularly adaptable and innovative?

To clarify this, we can now use all the aspects discussed so far in this essay. The scenario of a completely free and arbitrarily constructible identity would mean that, when developing the next 911, Porsche could theoretically throw all technological continuity overboard and quite simply *call* any arbitrary product a 911. In a radical interpretation of constructivist theories, this would be possible; it should not require any explanation as to why this is not the case in reality.

Another scenario would be museumisation, the suspension of technological progress. But in this case, too, an essential conceptional and ideal aspect of the identity of the Porsche 911 would be lost. Since identity is a complex matter, it cannot be explained either by strict interpretations or by simple truths. The narrative which belongs to the identity of the Porsche 911 is a narrative of a particular kind of renewal. The renewal does not consist of repackaging old, familiar things and renaming them. The innovation is rather in retaining the essential, basic characteristics of the car – shape, configuration and name – while repeatedly and radically calling everything else into question. Thus, the Porsche 911 remains the same sports car in principle, although it uncompromisingly aligns itself with technological progress.

In the case of a car, its identity can certainly be pinned down in part to the shape, function, construction and name. A Porsche 911 is a sports car with four seats, with the engine at the rear and with a characteristic silhouette. But there are also facets of an identity which cannot be pinned down to construction features. They include the narrative which is connected with the Porsche 911. Thus, Porsche removed the difficulties that were inherent in the construction over the last few decades, not by rejecting the entire model but by continually improving the 911.

In addition, a not inconsiderable part of the narrative – and identity – of the 911 is that it can develop in different directions. With the right modifications, it became a successful race car. With other modifications, it became an incunabulum of modern luxury. This narrative of persistence and changeability complementing each other puts the identity of the Porsche 911 on a solid basis: an identity whose essence does not depend on this or that technical detail. Instead, the narrative of the 911 enables a versatile handling of its identity.

As mentioned above, owning such a powerfully identity-forming product as the 911 has enormous value. But it also presents Porsche with the considerable challenge of handling this product responsibly. This creates a number of questions for the future: how does the product that represents a brand identity stand in relation to the other products of the brand? How can the narrative of the core product be translated to the entire brand? Of course, other cars cannot be built with the same configuration as a Porsche 911. An estate, SUV or crossover requires different constructional techniques. Instead, it makes sense to build on the integrability of the 911 narrative. The fact that a piece of the 911 can now be found in every car produced by Porsche is less a question of technical details or product names and more the consequence of a fine sense of what a contemporary, future-orientated identity needs: the right mixture of essence and changeability. And the self-confident handling of the narratives which connect these two extremes.

**The innovation is rather in retaining the essential, basic characteristics of the car – shape, configuration and name – while repeatedly and radically calling everything else into question. Thus, the Porsche 911 remains the same sports car in principle, although it uncompromisingly aligns itself with technological progress.**

**Kristof Magnusson,** a German-Icelandic author, is best known for his comedy "Männerhort", which has been one of the most frequently performed plays in German theatre for years. It was also made into a film starring prominent actors Christoph Maria Herbst, Detlev Buck and Elyas M'Barek. Magnusson's novels, "Das war ich nicht" and "Arztroman", made it into the best-seller lists. He was Writer in Residence at the Massachusetts Institute of Technology (MIT) and Queen Mary University of London. He is currently a guest lecturer at the German Literature Institute at the University of Leipzig.

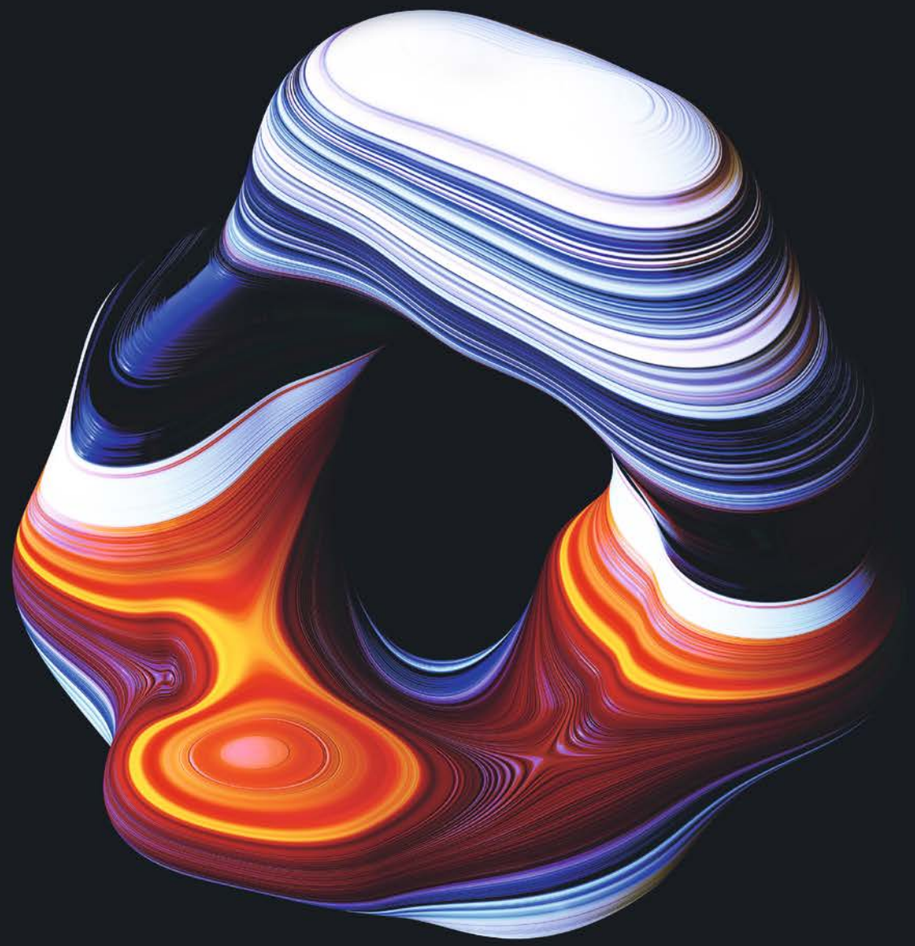
**Wang & Söderström** is an art and design practice with a focus on digital/physical explorations and fabrication. They strive to create mind-tickling and unexpected experiences through materiality and technology. Wang & Söderström is comprised of spatial/furniture designer Anny Wang and architect Tim Söderström. Soon after the pair began collaborating, their experience with 3D software grew into an artistic practice that broke the boundaries of their respective disciplines and extended across the borders of art and design.

The unexpected experiences the duo strive to create can be found in the experiences of something ostensibly well known, something one recognises from the real world that suddenly feels warped, and where a small detail makes you question what you are seeing and by extension, how you are perceiving the world.

# Independent thinking

## If artificial intelligence is running the company – what happens to the people?

by Thomas Ramge



Algorithmic art operates at the interface of two spheres of human knowledge. One is logic, which defines problems in advance and solves them in linear progressions. The other is the practice of aesthetics, in which problems can be defined only after they are solved. Human intelligence commands both modes. This can be seen in Christiaan Endeman's abstract hovering forms. Drawing on multiple sources (photographs, colour spectra), they crystallise in endless permutations of coloured layers.

**Artificial intelligence can be utilised to automate company decision-making processes. At the moment, it is first and foremost being used successfully for routine tasks. However, the future could also see robo-advisors playing an active role in product development, human resource matters or strategic decisions. AI systems will not replace human managers in the foreseeable future. Yet managers who use artificial intelligence as a decision-making tool will ultimately outlast those who don't. In tomorrow's world, the core skills of people in management will include the ability to make intelligent decisions on when to utilise machine-based assistance.**

David Ferrucci is not a well-known name, and it was a computer system that took all the credit for his work: IBM Watson. It made headlines around the world in 2011 when it defeated the reigning champions in the American cult quiz show, Jeopardy! Computer scientist Ferrucci was the human architect of the artificial intelligence system (AI) that can deal with human language so well. Today, Watson is one of the most successful platforms that companies and organisations are using to automate knowledge work – and the world's biggest hedge fund, Bridgewater Associates, has pinned its hopes on its creator. By 2022, three quarters of all the fund's management decisions – from promotions to strategic company matters – will be made by artificial intelligence. And Ferrucci is meant to make sure that this really happens.

Every procedure in the company, every decision-making process has been comprehensively datafied. The company has been logging all meetings for years in order to find out later who contributed what to which decision. The employees constantly evaluate each other in an app. All data flows into Ferrucci's learning system, which is called PriOS. It is not intended to replace humans completely, but to lead to more evidence-based, rational decisions that are less subject to cognitive distortion.

Initial experiments in developing fully-automated companies in which decentralized autonomous organization, DAO for short, replaces human intelligence fully, exist in all aspects connected to blockchain technology in the fast-growing start-up communities. Company goals, business models and processes are written in code. An invisible software controls the destinies of the company, from purchasing to warehousing and pricing to customer management, by means of statistical analysis, algorithmic decision routines and so-called smart contracts. DAO is not as far from practicability as it might seem at first glance. A nearly fully-automated online shop with a specialized range of products and robotised package delivery is more reality than science fiction; an app store already works fully automatically to a large extent today. Decentralised, autonomous organisations would simply be the logical consequence.

There are good reasons to think of a fully automatic company devoid of people as an economic dystopia. It wouldn't be compatible with the social dimension of a sustainable economy. And yet artificial intelligence is currently experiencing something of a Kitty Hawk moment. Humankind tried to learn to fly for centuries, but only met with success with the Wright Brothers' breakthrough in 1903. Two decades later there was a booming aviation industry. There could be a similar phenomenon with artificial intelligence, yet with a substantially bigger change effect. AI is a cross-sectional technology that will be pervasive through all industries. It will alter decision-making for health care service providers just as much as for retailers, energy suppliers, logistics companies, agriculture and all manufacturing companies. The automobile industry is doubly affected, as AI also transforms the product in fundamental ways.

Those who want artificial intelligence to change the world in general, and the business world specifically, for the good and not for the worse, have to ask themselves a series of questions. What does algorithmic decision-making mean for the company from an economic, ecological and social perspective? A systematic view shows that data-learning systems open up enormous opportunities in each of the three sustainability dimensions.

Artificial intelligence today is already extremely good at recognising deviations from norms or desired results. Credit card providers use this ability to unmask fraud attempts early and block payments automatically. With regard to cars, AI-supported image recognition systems

recognise the smallest flaws in the paint jobs and decide whether or not a vehicle should be repainted. In both cases, AI enhances the product's quality and streamlines the processes. There are similar examples in nearly every step of a company's value-creation chain. Data learning systems increasingly support product development, production, human resources development and knowledge management. They help with administrative processes, logistics, marketing, sales, not to mention retention processes once a customer has decided for a company.

From an economic point of view, the AI applications essentially always come down to one aim: improving competitive standing. Since AI systems also in generally don't produce economic miracles overnight, innovative companies introduce them with longer-term development in mind. They are intended to organise a company more efficiently over the long run, raise quality and assist management in making better decisions. In short, the big economic opportunity presented by the use of artificial intelligence in companies lies in boosting competitiveness systematically. Conversely, it means that forgoing AI to improve decisions on every level would be the opposite of sustainable in economic terms.

In addition, companies putting artificial intelligence to wise use can achieve a great deal with respect to ecology – thereby also benefitting the planet. AI dispatchers can help logistics companies drastically reduce their empty truck runs by around 30 per cent nowadays. Thanks to better forecasting, energy providers can anticipate their customers' demands better and manage energy production more efficiently, which is to the advantage of the environment. The same applies to production planning in manufacturing processes, where AI will shrink overcapacity and rejects. Viewed abstractly, AI will help recognise and reduce inefficiencies in value creation processes. In the final analysis, this signifies the possibility of improved economising with limited resources, thus bolstering the balance between economic and ecological sustainability. Artificial intelligence will also continue to gain significance in a field that up until now has been the exclusive domain of humans, namely innovation. Humans pre-define the construction goals, and the computer searches and tests solutions that no one has ever thought of at lightning speed. When humans prescribe objectives during construction, the intelligent design machine optimises the drafts in terms of green materials, energy savings, recyclability, etc.

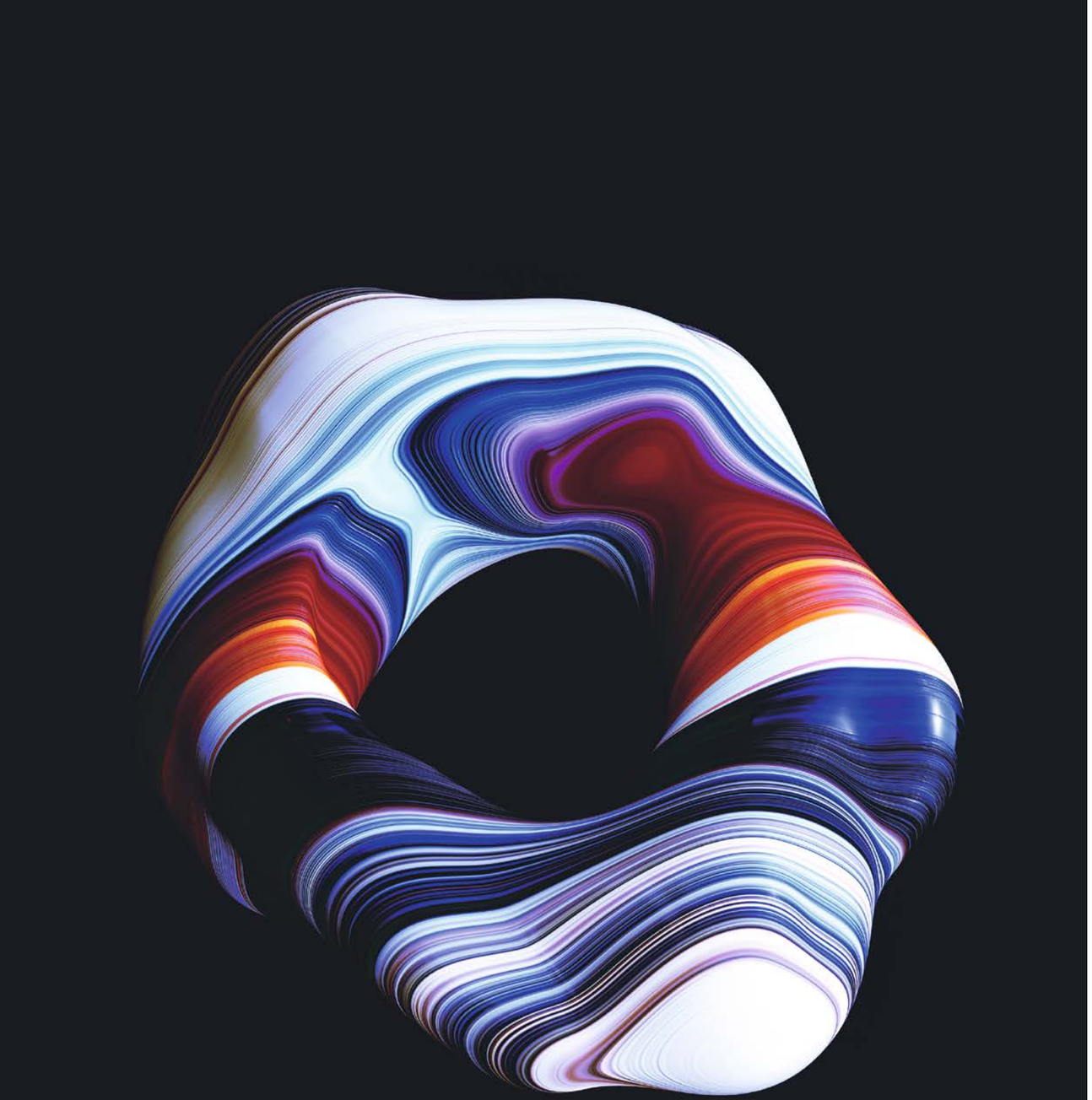
The probability that artificial intelligence has more of a positive than negative impact with regard to economic feasibility and the environment is high. Yet the fears remain. They concern the subsequent social cost of a rapid spread. Systems that learn from data relieve people of annoying routines and create space for those tasks that are really important and make work fulfilling: creativity, interaction, responsibility, innovation. AI becomes a tool that enables people to work better. The optimism is realistic, but raises the following question: how does a new technology succeed in creating better jobs in the medium and long term than it destroys through automation in the short term? The obvious follow-up question is, then, who shoulders the social cost that emerges from a technological revolution in employment? Social partners will not be able to escape the responsibility of providing solutions to social problems which arise from technology any more than government can. Yet all that is no reason to view the culture of an AI-assisted future pessimistically, because the good news is: digital transformation remains a human design task even when machines that learn from data turbocharge digitalisation.

It is up to humans to determine whether or not intelligent machines become their assistants in a digital social market economy where creative and responsible companies continue to derive their identity from sustainable created value. Intelligent machines can do more good work, make the planet greener and at the end of the day even generate more prosperity. Intelligent managers will use artificial intelligence to manage their companies sustainably. Additionally, they will constantly question where AI systems actually lead to better decisions in the process – and where the systems' vendors simply claim it to be so.

The overarching question in this context is then: who programs the learning systems with which goals in mind? Developers and vendors of AI systems like to suggest that algorithm-based decisions are more objective than human ones. The magic word here is "evidence-based", the argument behind it is that data doesn't lie and the algorithm – as opposed to humans – is free of prejudice and incorruptible. At the same time, algorithmic decision-making is never neutral and – exactly like humans – susceptible to mistakes.

Algorithms interpret man-made interpretation models. These interpretation models, however, are programmed with their developers' goals and values in the literal sense, even if they make an effort to be objective and neutral. In

**It is up to humans to determine whether or not intelligent machines become their assistant in a digital social market economy where creative and responsible companies continue to derive their identity from sustainable created value.**



**We must always question everything. For what purpose were the systems developed, with which data were they trained, and which interests do the people or organisations who use them pursue?**

the case of data-learning systems – especially with so-called deep learning procedures in ever more powerful artificial neural networks – the selection of training data is already a subjective or random decision. Systems trained with deep learning tend to have biases that result implicitly from the training data.

Critics of algorithm-based decision-making have been demanding that companies disclose their algorithms for several years now. A transparency requirement quickly comes up against legal, economic and even technical limits.

The learning processes in artificial neural networks are the result of millions and millions of connections, each of which has a tiny influence on the result. Decision-making is therefore so complicated that the machine cannot explain or show humans which conclusion it reached. Furthermore, algorithms continuously change independently. Transparency is hard to establish, because the system doesn't evaluate clear, straightforward criteria that are comprehensible to humans. It recognises patterns in a complexity that are beyond the human brain's capability.

Two approaches to a solution are being discussed in this context. One says: algorithms that decide about people must be subject to the control of an independent entity. It should have insights into the machine-based decision-making processes and ensure that these operate on a solid statistical foundation and lead to fair results. The examiners may certainly not then communicate their knowledge to the competition. The other: artificial neural networks explain how (other) artificial neural networks arrive at their decisions. In other words, a software tool explains to humans – algorithm-testers, for example – how an extremely complex software system operates. The combination of both approaches to a solution could help to actually make machines do what they should from the perspective of an ethically responsible developer: be an aid to improve human decisions.

The human answer to decisions in a mechanical black box can only be the return to the point of departure for clarification: we must always question everything. For what purpose were the systems developed, with which data were they trained, and which interests do the people or organisations who use them pursue?

We must understand when mechanical assistance is beneficial to us and in which context it hampers us in our thinking. The automation of decision-making provides great opportunities for the individual, organisations and for communities that we call societies. Yet the better machines can make decisions, the more deeply we humans have to think about which decisions we – as private users, companies and as a society – want to delegate to artificial intelligence. The advances in artificial intelligence present us with a new intellectual challenge. Humans should not place their complete faith in machines. The solution is an old one and takes effort. We must think for ourselves. And decide ourselves.

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**Thomas Ramge** is the technology correspondent for *brand eins* and writes for *The Economist*. He also supports the German-American analytics company QuantCo as Chief Explaining Officer. Ramge has published twelve non-fiction books and a novel. His next book will soon be published by Reclam: "Man and Machine. How Artificial Intelligence and Robots are Changing our Lives."

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**Christiaan Endeman** is a 23-year-old graphic designer from the south part of The Netherlands with a main focus on 3D art and motion graphics. Having recently graduated, he is investing every moment he gets into his business, TheManDesigns, which he started during his studies. With a creative vision and passion for his work, he targets new heights with every project and leaves a lasting impression with his visuals.

## Tribute to tomorrow

**With Mission E, Porsche is not simply building the sports car of the future. The Mission E is a clear statement of commitment – to sustainability, to performance and to Germany as a technological base.**

In 2019, the first purely electric Porsche will come onto the roads. Clear, puristic, with pioneering, practical Porsche e-performance. The Mission E is a true Porsche: output of over 600 hp, zero to 100 km/h in less than 3.5 seconds, and a range of 500 kilometres. Its charging time: 15 minutes for 80 per cent electrical charge.

With Mission E, Porsche provides convincing answers to the challenges of e-mobility. Sustainability, electromobility, performance and driving pleasure are not contradictions. Porsche and electromobility fit together perfectly.

After seven decades of Porsche sports-car history, a new era of individual mobility is beginning. And yet the Porsche principle works in the same way today as it has always done. And as it will tomorrow. Maximisation of minimalism. Restraint which beats all the competition. Unending dreams of perfection. A phenomenon and an apparent paradox at the same time, seamlessly merged: tradition and innovation, performance and practicality, design and functionality, exclusivity and social acceptance.

The result: a production vehicle which combines 70 years of tradition, new technologies and a highly emotional driving experience in an exclusive sports car which sets new standards as the sportiest and, at the same time, most technologically sophisticated car of its class. And an impetus for a new driving culture without sacrifice.

Porsche is actively contributing to the future of e-mobility. Knowledge and passion become reality. From the racetrack onto the road. Typical Porsche.

Photography: Ramon Haindl

**Still a skeleton,** but the classical lines of the Mission E already call to mind Porsche legends such as the 911 or 918 Spyder. The future of the sports car is excitingly different, but strikingly familiar.

**Dawn:** Around a billion euros are flowing into the most ambitious project in Porsche's company history, a new plant for electric vehicles at the company headquarters in Zuffenhausen – a new age with new technologies for 1,200 jobs.

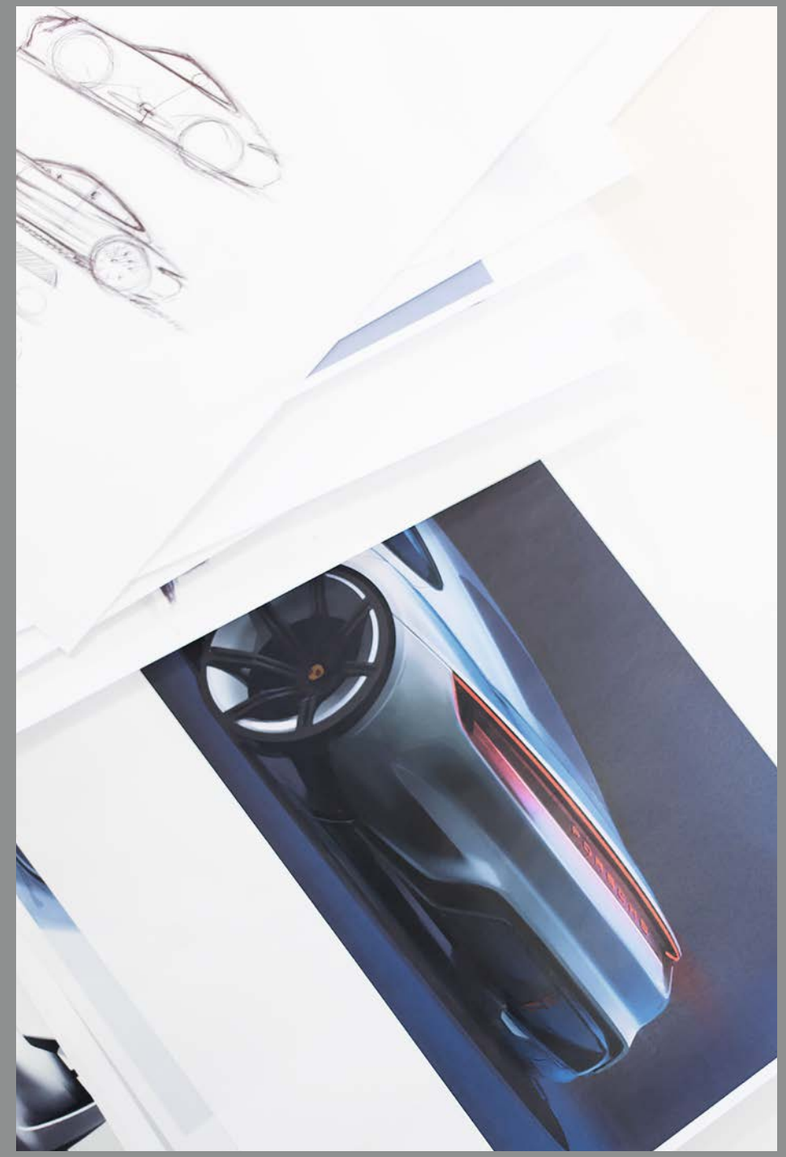
**At home** in the analogue world, breaking out into the digital world. Transformation to new thinking, action and production with the same passionate values – Factory 4.0 raises new questions. Porsche aims to give the best answers.

**Looking ahead –** with the awareness of 70 years of company history. Tradition meets innovation. The qualification employees need to have is changing, but our aspiration towards precision and quality remains.

# Design shapes the relationship between people and objects – and creates identity-forming moments. But what does this mean for a world that is now, more than ever, expected to give form to the future?

IDENTITY DESIGN

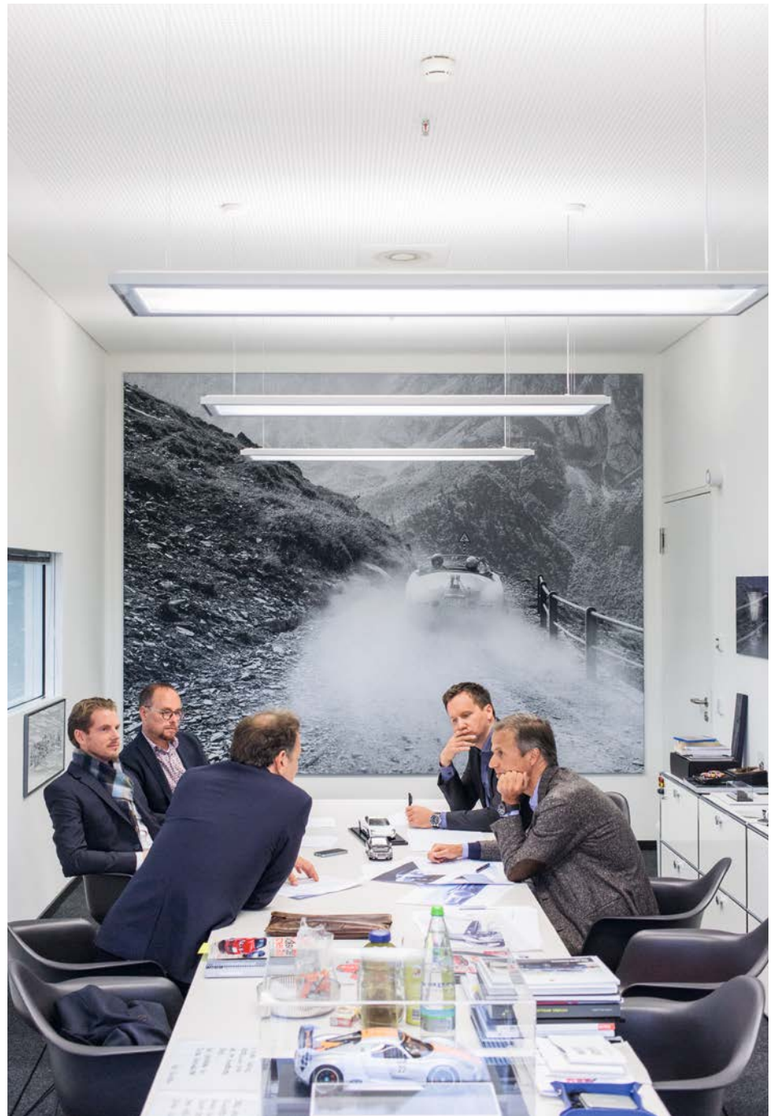




# Giving form to the future

**Design has been an integral part of the Porsche mystique right from the start. And it is becoming even more important today, as the technology, form and utilisation of cars undergo radical change. What are the challenges and opportunities facing design? We talk to the people who are shaping the future of Porsche.**

**by Niklas Maak**



When Michael Mauer looks up from his desk he does not see what a designer would normally see. He sees a cloud of dust. He sees mountains. He sees an exciting, unpaved road leading up one of these mountains with a Porsche 356 on it. What he sees is a photograph that covers the entire wall. It gives viewers the impression that they are looking directly into a bygone world in which what we call the Porsche DNA was born – the core of the brand, what Porsche stands for, what leaps to mind upon hearing the name of the brand. What one sees in this photo is what one normally does with a sports car. It is something one has done – or has been able to do – with a Porsche for as long as Porsche has existed. Because, since the first 356 hit the roads in 1948, customers have been delighted not only with the car's beautiful and soon-to-be classic streamlined form, and not only with the precise ways its technology determines its form, but also with its ability to engage in all manner of adventures.

The photo is a brilliant image in a technical sense, for the Porsche appears here not only as a sports car with an appealing form but also as a vehicle that does not shy away from any adventure, from any snow-covered track that might enable the world to be experienced in different and more intensive ways and that might also encourage its driver to set off on roads less travelled – in contrast to other sports cars that only run on smooth and dry paved surfaces. Right from the beginning, design at Porsche has always meant more than shaping a product. It has also meant facilitating a lifestyle that delights in experimentation and occasionally sends one off on snow-covered dirt roads.

The photo in Mauer's office, which was taken in the 1950s, also captures a moment in history. Today, nearly all roads are paved, and many other things have changed as well – and will continue to change all the more. Digitalisation, electrification and connectivity mean that cars are facing the greatest transformation in their history. These are exciting times of unprecedented upheaval. Cars will have different drive systems, they will send each other signals and they will feel different to drive. Over the long term, combustion engines – whether mounted in the front, in the middle, or at the rear – will become the exception. What does that mean for a brand whose fame is due also and especially to its engines? How will new drive technologies change its design? The layout of electric cars will become ever more uniform, and more skeletal – with short overhangs, four large wheels and an elongated

**Michael Mauer**
**"Yes, Porsche is famous for its engines – but not for them alone. We have to think about how we will carry what constitutes our brand into the future. If I have an electric drive, that doesn't mean that I cannot expand on its emotional qualities. The car that we are developing right now will not have a combustion engine, but it will be one thousand per cent Porsche in everything else."**

domed section between them for the batteries and the occupants. How will Porsche resist this tendency to become uniform? What are the adventures, the dirt roads of the future on which one can have new and intense experiences? And how can engineers and designers translate that which constitutes the core of the brand and its legend into a new form, while skirting the new ideological, technological and political crash barriers of the future?

The prospects of an electric future don't seem to be triggering panic at the Porsche Development Centre in Weissach. On the contrary. The four men sitting there seem pretty electrified themselves by the tasks entrusted to them. They are Michael Mauer, Porsche's Chief Designer who also became Volkswagen AG's Head of Design in 2016; Matthias Kulla, Porsche's Head of Sports Car Design Project Coordination; and two young leaders at Porsche Design: Peter Varga, Director Exterior Design, who was born in Hungary in 1978, and Ivo van Hulten, Director Interior Design, who was born in the Dutch town of Waalwijk in 1977. This morning, as the first still-camouflaged Mission E models do laps through the fog that blankets the woods and meadows of the South German Scarplands, Mauer asks: "What does the sports-car experience as we know it today actually consist of? Does the sound account for 90 per cent of it, or just ten per cent? In any case, a sports car is more than the sound it generates. There is acceleration, there are G forces, there is the way it turns corners. Yes, Porsche is famous for its engines – but not for them alone. We have to think about how we will carry what constitutes our brand into the future. If I have an electric drive, that doesn't mean that I cannot expand on its emotional qualities. The car that we are developing right now will not have a combustion engine, but it will be one thousand per cent Porsche in everything else. And for that matter – an electric car does have acoustics!"

But how does one develop a thousand-per cent sports car? What can be changed, what must remain? Weissach already had to grapple with these questions before the electric revolution. When informed that a new Porsche 911 will soon be coming onto the market, fans of the brand react like people have always done when their spouses tell them they wish to try out a new hairstyle – with a mixture of curiosity, suspense and trepidation. Then, upon seeing the car for the first time, they walk around it excitedly to check whether all the important features are still there: the elliptical side windows, the ignition to the left of the steering wheel, the tachometer in the centre …

Porsche designers have a profession comparable to that of Greek temple builders. The familiar form with its pillars and tympanum has to remain, and the art lies in modifying the original type so as to give it surprising new proportions and adapt it to changing needs and circumstances. How do designers maintain a balance between the challenge of addressing new situations and the wish to retain the classical features that determine identity? At a time when the engine of an electric Porsche can no longer be the defining feature that it was in the era of its flat-six counterparts, the design becomes the main foundation for the brand's identity and what reassures employees and everyone who builds Porsches that they are preserving a legend which is also an economic success. How do designers deal with the now more prominent role of design? And if design is more than the art of giving an object an aesthetically pleasing exterior, what will Porsche design have to address in the future?

"You can take what makes a Porsche an object of desire, or a sports car in general for that matter, and divide it into two categories," says Matthias Kulla. "There is something almost archaic that we are born with, and something acquired that can change over time. The sound is an example of something acquired. We associate sports cars with high-powered engines these days, and we associate these engines with an appreciable volume. This does not always have to be the case. For example, it used to be considered more masculine to drive a car with a non-synchronous transmission – and no one is interested in that anymore. But then there is something fundamental that doesn't change. That is the urge to get places on your own terms and volition, including in adventurous ways if you so desire. What we do here is study and facilitate this urge – I determine where I go – that underlies everything we've acquired." A lot of that consists of examining our usual ways of seeing and hearing things. Compared to its contemporaries in the early 1970s, a Porsche was impressively broad, and its bellows-like bumpers gave it a brawny appearance. The same car today looks slim, delicate, and almost shy when compared to the considerably more powerful rear of a current 911. Form can undergo enormous change in its evolution. What is important, say the designers, is to preserve the essence.

Porsches have always demanded presence of mind from their drivers "who consciously desire to experience the car," as Mauer puts it. "Many people see a contradiction between driver assistance systems on the one hand, and the desire to be not just a passenger in one's

**Matthias Kulla**
**"But then there is something fundamental that doesn't change. That is the urge to get places on your own terms and volition, including in adventurous ways if you so desire. What we do here is study and facilitate this urge – I determine where I go – that underlies everything we've acquired."**

own car but rather to intensively experience the act of driving it. But my question here would be how to put systems like the head-up display, whose original function is to enhance safety and comfort, to different uses, for example on a racing track by superimposing the racing line. Innovation often consists largely of reconceiving and recombining things that already exist." The steering wheel will not be removed from the hands of the driver, says Mauer. "Level 5 of autonomous driving – which is being driven in a car without a steering wheel – is not the future for Porsche. The person in the car always has to have the power to make decisions. Driver assistance systems are welcome in congested traffic, but their main purpose should be to support the activity of driving. And our drivers may decide whether or not to activate these systems, more so than they would with other brands. These are details, but they are also the building blocks of brand identity." Design has long been more than creating an appealing form. It has come to mean shaping the entire brand. "There are things we are expected to do," says Mauer. "Connectivity and butler services are very clear qualifiers for our brand. But if the business saloons of other brands select smooth and straight roads, our product will propose a road that's fun to drive. The nature of what's on offer has to fit the brand – that too is part of what it means to build a brand."

Porsche has become a product family with sports cars, sports saloons, roadsters and all-terrain vehicles, and will soon have e-cars as well. This presents the designers with new tasks. Mauer distinguishes between brand identity and product identity. All the cars have to be recognizable as Porsches. A certain physique – the flared hips, the window lines – is part of the family resemblance, whereas the product identity is expressed by elements such as different headlights – a Macan has different "eyes" than a 911. The scope that product designers can explore between the wish for comfort and safety on the one hand, and the desire for freedom, intensity and self-determination on the other, is reflected in the current range of models that includes a Panamera with all the driver assistance systems as well as a 911R which only comes with manual transmission.

What does the magic of a manual transmission stand for? For direct and immediate communication, for a synthesis of the human body and the car. Porsches – especially the open roadsters and convertibles – have always been machines that allow one to experience the elemental forces of the wind and sun,

**Peter Varga**
**"You should maintain an emphasis on functionality, and design a car that can also serve everyday purposes, one that is not a centimetre too long or too wide, and that also fits in an underground garage. You can make every Porsche more extreme or more expressive – but the key to the brand is its confident, self-contained presence."**


as well as speed and steering power, more intensively. "But this type of experience – the streamlined, direct, effortless qualities that make up a Porsche – is possible every bit as much or more with an electric motor," says Mauer. As Ivo van Hulten adds, "It is very important to recall the past, but it's also important to ask how I can make this experience more modern and even better, and to intensify it." But if the aim is to intensify the Porsche feeling, then one first has to know what that feeling consists of. What exactly goes into it? "You shouldn't overwork the product," says Peter Varga. "You should maintain an emphasis on functionality, and design a car that can also serve everyday purposes, one that is not a centimetre too long or too wide, and that also fits in an underground garage. You can make every Porsche more extreme or more expressive – but the key to the brand is its confident, self-contained presence." In 1963, Porsche put perhaps its first classic car with clear and unadorned lines on the road with the 911. It was the antithesis of the shark-fin excesses and rounded automotive baroque of the 1950s. The Porsche 911 was introduced in the same year in which legendary designer Dieter Rams presented his Braun T1000 shortwave receiver and Mies van der Rohe his design for the New National Gallery in Berlin. All three designs are characterised by spare and exacting lines. Today the car is considered the epitome of classic German automotive design, an engineering work of art that has no place for anything superfluous.

**Mauer distinguishes between brand identity and product identity. All the cars have to be recognizable as Porsches. A certain physique – the flared hips, the window lines – is part of the family resemblance, whereas the product identity is expressed by elements such as different headlights – a Macan has different "eyes" than a 911. The scope that product designers can explore between the wish for comfort and safety on the one hand, and the desire for freedom, intensity and self-determination on the other, is reflected in the current range of models.**

Yet one shouldn't get the wrong idea. The Porsche 911 had what other examples of the somewhat dry Bauhaus aesthetic often did not, namely a very un-Germanic high-speed hedonism. The 911's greenhouse, the cabin and its elliptical side windows show such vigour that one pictures the designer's pencil itself heading off for the race track – without ever crossing the line from dynamism to an overexcitability that would compromise the form. In formal aesthetic terms, a Porsche is always a complex entity whose vibrancy lies in an intensification of opposites. This is immediately evident upon viewing the rear of the current 911, whose tail lights are an homage to the subtle rear lights of the original 911. What you see is a finely structured and almost slender form that is also physically fit and powerful. Moreover, the current 911 highlights the essence of its construction more clearly: its hunched form, the concentrated power in the rear engine – its "nine-elevenness." As if under high voltage, the lines converge between the broad hips of the fenders where the car's centre of power is located, while the air inlets above the engine cast striking furrows. By contrast, the front is dominated by a calm, wide, empty space between the headlights that are now set further apart. Satori (the Asian art of emptiness) in the front, coupled with rock 'n' roll in the back: the design expresses the unique constructive features of the rear-engine car.

Does this translation of driving experience find its form in the Mission E as well? For one thing, all four wheels are extremely accentuated – with the passenger compartment seeming to duck down between them. Then there is the geometry of the headlights, which, as mentioned above, clearly reflects the product identity. Where expansive, glass-covered headlights are usually located, the Mission E has slits that rise from the bumper, serve partly as wind inlets and become headlights at the top. This translates the soundless speed – like the wind – of the electric drive into the front visuals while also emphasizing the fact that, contrary to what one might think, cooling plays as much or more of a role in electric cars than in those with combustion engines. And even the windscreen itself enables a new driving experience. "When there's nothing left in the front, you can lower the base of the windscreen like the Lamborghini Miura," says Kulla. "The car was only 1.03 metres high, but you still looked out onto the bonnet. That was sensational. That changes your perception of the surroundings, they come into the car. The slender A-pillars also bring the outside closer and make everything more open." And the car also seems to sit closer to the road, which would be a new way to intensify the driving experience that is so important to the Porsche developers. The Mission E could then also reverse a trend that has thus far seemed like a one-way street: the fact that car windows have become ever more slit-like and enormous sliding glass tops are meant to counteract claustrophobia in what would otherwise be grottos on wheels.

But might a new car end up being too futuristic? "The question is always one of how far you can go," says Mauer. "Everything that happens here is a wager with the future. The fashion industry is designing things today that will be shown in three months. But for us, at least two or three years will go by before the presentation, and the car will spend another five to ten years – or much longer for a Porsche – on the roads. As designers we therefore have to throw our stone way out ahead. But if I throw it so far that no one will find it, I might have created a fantastic ground-breaking product that people will need another 40 years to understand – which doesn't exactly help the company. We have to take people on board whose mode of perception changes only gradually." That is why Porsche takes something like an evolutionary approach. "When someone comes to Porsche, they're not about to start a revolution," remarks Kulla. In the team's day-to-day work, there are always "a few sketches that you'd say would make a great Lamborghini." But the designers practise the art of discretion and reserve. "The proportions have to work," is Mauer's summary of the task. "We start by looking at how the car stands on the road. Then we consider questions of brand identity, followed by product identity, and then finally get down to the details – and a reserved quality in the visuals is part of this identity."

"Special effects are not what give you iconic design," says Varga. "That's not something you can plan, nor do we have to. We have a brand that has developed such a strong identity that we do not need to make any radical breaks. The design of the first 911 was not radical either, by the way. The 356 was further developed and brought into higher relief, but the 911 had round headlights like a lot of cars. The form itself was not all that new, but rather the combination of performance, harmonious form and everyday usability. The conjunction of those things was what produced an iconic, classic car." How will a 911 look next to the hypermodern Mission E? Upon being asked this question, Mauer laughs and remarks that at some point the 911 might be like a racehorse. "It could seem obsolete to some people as a means of transportation – but it's unbeatable when it comes to evoking emotion."

This emotional quality cannot be achieved by capricious changes to the form. Porsche's design department has opted for calm in reaction to an ever-greater clamour from the radiator grilles. Whereas other brands are expanding their radiators as if the cars consume deer in a single gulp or stare down the road like monsters from the deep, Porsche seeks concentration, reserve and no more lines or shapes than necessary and appropriate. "At a time when video clips and movies are using faster cuts to generate ever more hectic action, I love watching old films with their incredible

**Ivo van Hulten**
**"But when one day cars are so connected that they detect and communicate with each other and collisions become unlikely, that will give design a totally new freedom and lightness. That will liberate design as well."**

sense of duration," says Mauer. "They evince a high art of concentration, engagement and precision. And omitting everything that's not necessary gives them enormous freedom."

Yet form, like the timbre of a beautiful female voice, also needs to command a few dark and smoky tones. The front visuals of a Porsche have traditionally not been designed to intimidate or startle other users of the road, but rather with a type of social compatibility in mind. Beetle drivers need not feel humiliated when a 911 appears in their rear-view mirror – it is simply a faster relative, not something that aims to disparage or push others aside. A Porsche has its roots in popular culture, its ancestor is closely related in both construction and aesthetics to the Volkswagen Beetle. Is this proximity also part of the reason why Porsches are the sports cars that enjoy the highest level of social acceptance? This ethic of reserve and accessibility – despite all the exclusivity of the product – is an "essential component of the brand identity," says Mauer. "If you want to make a loud splash – both visually and acoustically – a Porsche is not the right brand."

As Kulla explains, "Every person lives intuitively in such a way as to have many moments of happiness. And feeling good is also one of the criteria when deciding which car to buy. Will I feel good if my car needs 20 litres of fuel to go 100 kilometres? A Mission E gives me a driving experience that's dynamic in the extreme – yet it also gives me the satisfaction of buying something reasonable, responsible and socially acceptable." The history of Porsche has always been one of interplay between technological and social developments. "There has always been a high need for safety, and this will continue to be the case," says Mauer. "People seek protection in environments where risks are constantly on the rise." Lawmakers often influence design more intensively than one might think. "First there were safety belts," says van Hulten, "then there were the requirements for the front hood in case the cars happened to hit pedestrians." Cars were no longer designed from a best-case but rather a worst-case perspective, and the presence of many details has to do with preparations for a possible crash. Every car carries hundreds of kilos of safety technology around with it in case it collides with something. "But when one day cars are so connected that they detect and communicate with each other and collisions become unlikely, that will give design a totally new freedom and lightness," says van Hulten. "That will liberate design as well. We won't even need traffic lights. Cars will be able to shed their armour."

**Yet form, like the timbre of a beautiful female voice, also needs to command a few dark and smoky tones. The front visuals of a Porsche have traditionally not been designed to intimidate or startle other users of the road, but rather with a type of social compatibility in mind.**

As we move towards that point, the boundaries between engineering and design are becoming increasingly fuzzy. The "emphatic expertise" of designers can contribute to this process in key ways, says Mauer. An initial product of this new age will be the Mission E, which customers will not find to be lacking in any way, he promises. "With the exception of the engine sound, this product has everything that makes a Porsche – and new things customers don't even know yet that they'll love." The designers' relaxed attitude to the electrification of an object many people love for its sound might have something to do with the fact that company founder Ferdinand Porsche built electric cars an entire century before Silicon Valley even thought about doing so. He developed the electric "Voiturette Lohner-Porsche" for the Viennese carriage maker Ludwig Lohner. Powered by two internal-pole electric motors in the front wheel hubs, it came onto the market in 1900. Lohner thought that combustion engines were too dirty to survive for long, and that electric cars were the way of the future. Shortly after 1900, Ferdinand Porsche developed this vehicle further into a sports car – just like he would later develop the Beetle into the Porsche. He gave it four wheel-hub motors instead of two, which meant he also put the first car with all-wheel drive onto the road, and promptly won the Semmering race with it. Electric motors, all-wheel drive – the new Porsche Mission E blends the past with the future in a very special way. It not only anticipates the future of the brand, but is also deeply rooted in more than a century of history. Back then the name of Porsche already stood for a vision – incredible at the time – of driving with electric power. Some ideas simply have to mature before they can take on form. Their time now seems to have come.

Photography: Elias Hassos

**The Mission E could then also reverse a trend that has thus far seemed like a one-way street: the fact that car windows have become ever more slit-like and enormous sliding glass tops are meant to counteract claustrophobia in what would otherwise be grottos on wheels.**

**Michael Mauer** (born 1962) studied Transportation Design at Pforzheim Technical College and began his career in 1986 as an exterior designer at Mercedes Benz AG. In 1988, he became Head of the Mercedes-Benz Advanced Design Studio in Japan. A year later, Mauer took over as Head of Design at MCC Smart. In 2000, he moved to Saab as Executive Director of Design. Michael Mauer has been Head Designer at Porsche AG since 2004. At the end of 2015, he was also appointed Head of the Design division at the Volkswagen Group.

**Matthias Kulla** (born 1962) studied Automotive Design at the Royal College of Art in London and has been working as a designer for Porsche since 1989. His first major project was the Porsche 989 prototype. From 2005 to 2014, he was responsible for the exterior design of all the product lines. Kulla is now in charge of Design Management for sports cars.

**Peter Varga** (born 1978) has been Head of Exterior Design at Porsche since 2016. Born in Hungary, Varga graduated from Pforzheim Technical College in Transportation Design. He has been working as a designer for Porsche since 2014. The current styling of the Panamera, the 718 product line and the 911 Carrera all come under his responsibility.

**Ivo van Hulten** (born 1977) studied Industrial Design at the Design Academy in Eindhoven. Born in the Netherlands, he started his career in 2003 at Audi AG. He was then Head Designer at GM Europe Design Opel in Rüsselheim for several years. Van Hulten has been Head of Interior Design at Porsche since 2014.

**Niklas Maak** (born1972) studied philosophy and architecture in Hamburg and Paris. He wrote his doctoral dissertation on design theory in art history. Today he is the Arts Editor of the *Frankfurter Allgemeine Zeitung*, and also teaches architectural theory as a guest professor at Harvard. He has received numerous awards for his essays and books, including the Henri Nannen Prize, COR Prize, Kennan Award and the Critics' Award *(Kritikerpreis)* from the Association of German Architects (BDA).

# Mobile spheres: new forms of identity

**Digitalisation is extending into all areas of life. In the course of this process, a number of questions have arisen with respect to identity. How can physical identities in the real world be transferred to digital identities in the virtual world? How do independent identities arise in the digital world?**

**by Manfred Broy**

The ability to abstract could well be the perpetuum mobile of human imagination. Like verbal language, graphic concepts can also gradually help propel the formulation of thought to ever higher spheres, enabling statements to apply to an ever greater number of phenomena. Amos Fricke is interested in these types of transitions from one state to another, under conditions of digitality. His forms oscillate indeterminably between classic modern abstract painting and screen-like resolution.

One of the topics in the influential essay by Netscape co-founder Marc Andreessen entitled "Why Software Is Eating the World" is the idea of identity. Individuals and companies take the identities they have created by physical means and pursue them on into the digital world. They can then use the possibilities of the digital world to acquire an identity there as well. Digital identities do not exist in opposition to technical identities. Instead, physical and digital identities merge into single identities on an intersubjective basis in people's perceptions. For digital natives, the digital world is as real as the physical one – and closely interwoven with it.

A notable development is underway in digitalisation. As things are virtualised, technical advances separate the software from the hardware, allowing the software to be understood as an independent entity with its own identity divorced from that of the hardware. Whereas people used to associate identity strongly with physical objects, in the world of virtualisation they associate it with software entities, which have a separate and independent existence above and beyond hardware. The identity of the software becomes fully removed from the physical world. The physical identity of the hardware serves only to provide the resources and therefore the platforms needed to run the software. This gives rise to virtual identities.

## DIGITAL TRANSFORMATION – DIGITAL DISRUPTION

What will profoundly change the culture and identity of companies, their customers, their products and their services are cyber-physical products. These are systems and devices with mechanical and electronic components and integrated software that are connected with each other via networks and generally also connected globally. By virtue of the services they provide, cars – like smartphones – will become agents or partners that interact with customers, assist them and perform comprehensive services whether autonomously or in conjunction with networked services.

Until a few years ago, the products of digital technology were simply tools that people had to know how to operate but which themselves did not possess any obvious identity. The more skilled the person operating the products, the more he or she could benefit from their functions, but ultimately the products were nothing more than tools. Even though cars like the "Beetle" or the "Deux Chevaux" appear to have their own appealing identities, they still remain mobility appliances without wills or an actual life of their own.

That has changed dramatically over the past ten or fifteen years. This is especially clear in the case of smartphones, which people often consider to have independent lives of their own, or to be far less the passive tool of their owners than was the good old telephone. Smartphones combine local caches of personalised information with communication. They connect with the Internet and with social groups. They lay the foundation for coordination, are instruments for information, and a means for solving problems – not only locally but also globally via the many contacts of their owners. The quasi-emotional relationship many people have with their smartphones stands in marked contrast to the emotionless relationship people previously had with their telephones.

But what is so attractive about smartphones, and what does that have to do with people's relationships with their cars, which have often been very close in the past? After all, in the second half of the previous century, didn't cars come to be the absolute embodiment of freedom and independence? This widely acknowledged view overlooks an essential point. Physical mobility has always been a way of enabling people to take part in activities, cultivate relationships, reach locations where they can join others and maintain contacts. Smartphones enable very new forms of participation and contact. Social networks generate closeness without physical proximity. Virtual mobility is replacing physical mobility.

With every step that makes them more interactive, more like smartphones, and therefore more able to enter into dialogue with their owners, the more cars gain their own independent virtual identities. Cars with digital services lead lives of their own and interact with their owners. They can also be unpredictable at times, sometimes stubborn or unfathomable, but often useful. Above all, they possess many skills that their owners do not. As cars become integrated into social networks, they become independent individuals, subjects instead of objects, agents instead of appliances. Autonomous driving also changes the relationship between cars and that which steers them. Humans are losing dominance and influence in their interaction with machines. Roles and identities are shifting.

## CREATING DIGITAL IDENTITIES IN MOBILITY

The major instrument for creating identity consists of the interactions between people and systems. This is the key to attractive functions and the creation of identities. The secret behind the acceptance of digital systems, as well as behind their appeal, lies precisely in shaping the interaction between people and machines in the best possible way. People are only too ready to use a system's astounding functions without necessarily having to understand how these functions are performed. If people gain the impression that the system in some mysterious way understands exactly what they need, if they are pleasantly surprised that it's an easy matter to get the desired services from the system, if a high level of transparency arises as to what services can be relied upon and in which respects the system can be depended upon, then identity and trust are created.

Of note here is that there is hardly any indication of what we might call a persona, i.e. a synthetic person that appears, speaks and interacts with customers in digital media as part of the services provided. Interaction with cyber-physical systems apparently does not have to follow the established patterns of communication and identity we are accustomed to seeing among humans. Digital systems need to develop their own forms of communication and interaction and thereby their own identities within interactions.

Digitalisation is creating completely new opportunities and challenges for established companies. Products that have played a major role in the identity-generating economic landscape, of which cars are a prominent example, will be changing their identities dramatically over the course of digitalisation.

Identity is becoming divorced from physical equipment and becoming attached to virtual services. Access to Google does not depend on the device that is used. Smartphone users today are cyborgs whose smartphones, or more precisely their respective data and services, have long since become part of their identities. When smartphones are integrated into cars, the cars will enter symbiotic relationships with their drivers. They will no longer simply provide a greater scope of physical options, but also increase human communicative and cognitive capacities. They will become instruments that enable people to communicate, become informed, receive assistance and solve problems. A marked shift is underway in how customers view their cars, and ultimately also in how they view carmakers.

At the same time, however, this interaction between cars and customers will extend into the companies themselves. As a basis for dialogue between customers and cars, autonomous driving is a superb example of something that will generate completely different forms of customer access in both directions.

## NEW IDENTITIES IN THE WORLD OF MOBILITY

Transportation is used in multimodal ways today. Transportation will be controlled in multimodal ways in the future. Tomorrow's mobility service providers will offer multimodal services – mobility services as partners of their customers. Customers have mobility needs, which they do not even have to formulate explicitly. These needs will be drawn at least in part from their appointment diaries or their emails. That will provide a basis for mobility service providers to book flights and connections, call taxis and make use of car-sharing offers. Using multimodal mobility services will be like doing Google searches, only more convenient. Digital assistants will meet the mobility needs of their customers in comprehensive fashion, and take all manner of information into account about the services required. Mobility service providers will be partners of their customers with very much their own identities.

The customers of these providers will use different services depending on their needs. For example, car-sharing means that they develop hardly any relationships with the cars they use whereas they might otherwise have done so with the cars they owned. The identity that connects them with car-sharing will be shifted directly to the service and by extension to the service provider. That is analogous to Google and the popular search service it provides. Just like many people associate a specific identity with Google, they will associate clear identities with mobility service providers, characterised by the types and properties of those services. The verb "to google" has long since entered our language. We "google" things. We "ask" Google. In emotional terms at least, users conceive of Google less as a company than as an enterprise that provides reliable answers to questions.

**If people gain the impression that the system in some mysterious way understands exactly what they need, if they are pleasantly surprised that it's an easy matter to get the desired services from the system, if a high level of transparency arises as to what services can be relied upon and in which respects the system can be depended upon, then identity and trust are created.**

CUSTOMER IDENTITIES

It's amazing to think that up to this point in time, cars have not yet known the identities of their drivers. That will be completely different in the future. They will know if their drivers are in a hurry, and how important the next appointment is. They will know not only how far it is to the nearest petrol station, but also which restaurants and hotels their drivers like. They will know which radio stations the drivers have been listening to, including which specific programmes might interest them and can be directly accessed, recorded or offered. Cars will become independent partners of people. Autonomy will again be creating completely different identities.

These partnerships and their identities will be transferred to their providers. Properties of specific products will be equated with properties of the companies that provide those products. Conversely, buyers of those products will get new and markedly personalised identities from the perspective of the car companies – codified via countless data on movement and interaction.

New mobile spheres of identity will therefore arise, and enable customised forms of individuality on the basis of completely new dimensions of customer loyalty and individualisation. Identity will become ever more dynamic, and will arise from the interaction between elements that are themselves undergoing rapid change. People are increasingly acquiring their identities from their interactions with and within digital media. The identities of services and cyber-physical products, and therefore also of their manufacturers and providers, will constantly be forming themselves anew.

AND WHAT WILL HAPPEN TO THE FAMILIAR IDENTITIES?

But where are the boundaries between people's identities and those of their services? And what dangers lie in the dissolution of traditional identities? Are we heading towards a transformation that will necessarily change everything? Or is a brand like Porsche with its iconic 911 precisely the counterexample? A car like the Porsche 911 constantly changes but also remains what it is – the ultimate sports car. Digitalisation is changing companies, and changing their products, but is it also changing their hearts? New types of digital services, non-locally bound communication, information services, comprehensive driver assistance systems, and optimised driving dynamics based on integrated software are turning driving machines into multifunctional systems. But what is happening to driving pleasure, and to fascination with the perfect sports-car experience? Will all of this be eclipsed or replaced by communication, information and the autonomy of integrated assistance systems?

**People are increasingly acquiring their identities from their interactions with and within digital media. The identities of services and cyber-physical products, and therefore also of their manufacturers and providers, will constantly be forming themselves anew.**

The danger exists that traditional brand identities will only live on in nostalgia. Digital natives – the customers of the future – look at brands from completely different perspectives and with the new eyes of a connected world. Brands are increasingly marked by the quality of their services, data and capacities, without thereby losing the perfection of their physical dynamics. The quality of a smartphone, an app or a service platform eclipses the quality and value of a physical product. In the cyber-physical systems on the markets of the future, both of these things have to work – the physical appearance and dynamics on the one hand, but also the quality of the digital services. Human-centred engineering places each one perfectly at the disposal of the other, with the human being as the focus. Perfect and harmonious mutual complementarity between physical manifestation and digital services will be the hallmark of the brands of the digital world of the future.

**Prof. Dr Manfred Broy** headed the department of Software & Systems Engineering at the Technical University of Munich. In 2009 he founded the applied research technology institute fortiss. He was the founding president of Zentrum Digitalisierung.Bayern in 2016. Acatech's Cyber-Physical Systems research agenda that he developed has promoted major initiatives such as Industry 4.0.

**Amos Fricke,** born in northern Germany in 1987, studied Visual Communication at the University of the Arts in Berlin (2008 – 2015) and did his degree in the Class for Experimental Graphic Design, before working with Prof. Siegfried Zielinski as a Masters student; he had an exchange semester in Fine Arts at Parsons School of Design in New York (2011). His focus is on placing objects in a setting, using photography as his primary tool; he has a studio in Berlin and works internationally for a wide range of customers and publications.

## Your things and you

**We humans on the one hand, our things on the other – that used to be the normal view of our relationship to the world. However, the boundary between subject and object is dissolving. What we own and what we interact with forms our identity. We find ourselves in the things with which we surround ourselves.**

**by Tobias Hürter**

The coloured surface is second only to the line as the oldest technique in art. Metamorphoses in ancient myths were given visual expression on ceramic vessels, with figures of heroes on black or red surfaces. Anna Parini's complex metaphors reflect this western tradition, which today only seems appropriate as a refracted type of ironic commentary. These days a hero is someone who can expose the superficial clarity of appearances and see through the multi-faceted play of ambiguity.

Imagine a racing driver in his brand-new car at the start of a race, surrounded by perfect technology. He lovingly strokes the multi-functional steering wheel, casts a final glance at the bewildering array of buttons and switches which he can operate without taking his hands off the steering wheel. He listens to the pulsing drone of the engine and waits for the kick. Can he win the race? Probably not. Next to him in the starting grid is his opponent, who directs his vision calmly and firmly towards the track. He does not notice his car. He forms a perfect unity with it. While one driver turns the steering wheel, presses his foot on the accelerator and feels the power of his engine in the pit of his stomach, the other simply accelerates, hurtling to the head of the field.

In this fictitious race, it is not only two drivers that are competing but two fundamentally opposed attitudes by a person towards his things. The first is fascinated by his car. The second merges with it. Why does the second driver have a better chance of winning the race?

Behind this lies a philosophical puzzle: what is the relationship between us and the things around us? Philosophers have thought about this for 2,500 years – and, in the process, they have shed some light on the puzzle. Their new and old answers are of great significance for manufacturers of technological products.

Like almost everything in Western philosophy, this story begins with Plato, who lived in Athens in the 4th century B.C. Plato did not have a high opinion of material things. He regarded them as a cheap copy of what was true, beautiful and good. He was convinced that in every human being there was an immaterial, immortal soul, imprisoned in a mortal body. The highest goal of human beings was to liberate themselves from this prison and to ascend to a perfect, eternal "empire of ideas". This was Plato's idea of paradise.

With his disdain for things, Plato set the tone for the following millennia. Philosophers of antiquity, the Middle Ages, the Renaissance, and both the Early and Late Modern eras were used to encountering the exterior world with fundamental mistrust. Thus, the separation between humans and things became a fixed component of our culture.

This attitude becomes particularly clear in the philosophy of René Descartes (1596 – 1650). The founder of modern philosophy imagined people as thinking beings who looked out onto and listened to the world from their position inside the skull. The Irish bishop George Berkeley (1685 – 1753) went even further, completely denying the existence of the material world. "To exist is to be perceived," he declared. Thus, everything that exists is in the mind. Philosophers became increasingly caught up in their unworldliness.

**To them, the point was not to observe the turmoil from a safe bird's-eye perspective but to throw oneself into it courageously – searching for stability and for one's own place in the world.**

It wasn't until the 20th century that philosophers had the courage to rethink the relationship between people and things. The existentialists, including Jean-Paul Sartre (1905 – 1980) in France and Karl Jaspers (1883 – 1969) in Germany, criticised the idea that we gradually work our way into the world from the safe ground of our thought. To them, the point was not to observe the turmoil from a safe bird's-eye perspective but to throw oneself into it courageously – searching for stability and for one's own place in the world.

How exactly does one become at home in the world? A famous illustration was given by the German philosopher Martin Heidegger (1889 – 1976) in his main work, *Being and Time*. When a good carpenter is working with his hammer, he forgets the hammer. Perhaps he pays attention to the nails, but perhaps not. He loses himself completely in his activity, practically merging with his tools. It is only if something goes wrong, if the hammer's shaft breaks, a nail buckles or the carpenter whacks himself on the thumb that he becomes aware of the situation and the tools. Then he may think about the wood of the shaft or estimate the weight of the hammer head. "The less the hammer-thing is simply gawked at, the more grippingly it is used, the more primal is the relationship to it," wrote Heidegger. Philosophers may be used to reflecting on things. But those who brood over a relationship too much, kill it. It's no wonder that so few philosophers are successful racing drivers.

It's paradoxical: the more clearly a person becomes aware of a thing, the more foreign the thing becomes to the person. But awareness does create distance, and distance is not a suitable foundation for a good relationship. A true Munich native does not continually reflect on his city any more than a fish reflects on water. He simply lives and thrives there. A good tennis player will not marvel at his racquet, but "merge" with it and use it like a part of his body. The racquet is not merely an accessory for the tennis player – it is what makes him a tennis player.

The Hungarian psychologist Mihály Csíkszentmihályi, who teaches at the Claremont Graduate University in California, tells in his essay "Why We Need Things" the story of a rich lawyer whom he once visited. This lawyer's house was stuffed with select works of art and expensive furniture. Csíkszentmihályi asked him which object was his favourite. The lawyer led the psychologist past all these expensive treasures down to the cellar, where he opened a case containing an old trombone. It was the instrument he had played when he was a student and his life still felt fresh and spontaneous. Today, if the burden of his worries becomes too heavy, he goes down to the cellar, plays a few bars and connects with that part of himself which otherwise has to be silent. The objects in his valuable collection are insignia of his wealth and his successes. "But the most important symbol of his secret self was the trombone," writes Csíkszentmihályi, "it alone has the power to bring him back into contact with himself."

Everybody can probably confirm this from their own experience: there are objects which they are genuinely "attached to" and which people have to know in order to understand them. It may be a book that has opened someone's eyes, the garden in which they can get lost, or a favourite piece of sporting equipment. For most people, their home is not only the place where they can be warm, dry and peaceful, but also the focal point of their existence and the mirror of their way of life and biography – the place where they "belong". Anyone who loses their home feels literally uprooted.

One could perhaps, in a rather derogatory way, ascribe "sentimental value" to these things, but that would not do them justice. It is no exaggeration to say that these things determine the identity of the people to whom they belong. Plato and Descartes were still able to claim that the immaterial soul is what constitutes a person. But hardly anyone still believes in such an inner, essential core in human beings. People's identity is not inside them; rather, it is defined by their relationships to the outside world, to other people, to their body – and to the things around them.

Some philosophers today go as far as to regard things that are particularly close to us literally as parts of us. Thus, the Australian philosopher David Chalmers and the American cognitive scientist Alva Noë represent the theory of the "extended mind": some processes which we are used to localising within people's heads are actually spreading beyond the boundaries of the body to the things around us in the world. For example, if someone reflects on himself and his experiences in a diary, the diary not only documents the person's thoughts about himself but is also a part of these thoughts. If a forgetful person notes down all his appointments in his smartphone and asks it to remind him of them, he is turning the device into a part of his memory. If he uses Google Maps to guide him through a city, the program not only helps him to find the way – it is his sense of direction. The software routines in the smartphone take on tasks which used to be performed by the neural networks of his brain. They plan for him, decide for him, steer his intentions and preferences (for example, by recommending local restaurants). Completely free from neural implants or brain-computer interfaces, they enter into his thoughts, desires and perception.

The fact that some things with which people surround themselves determine their identity can be seen even in the way we are

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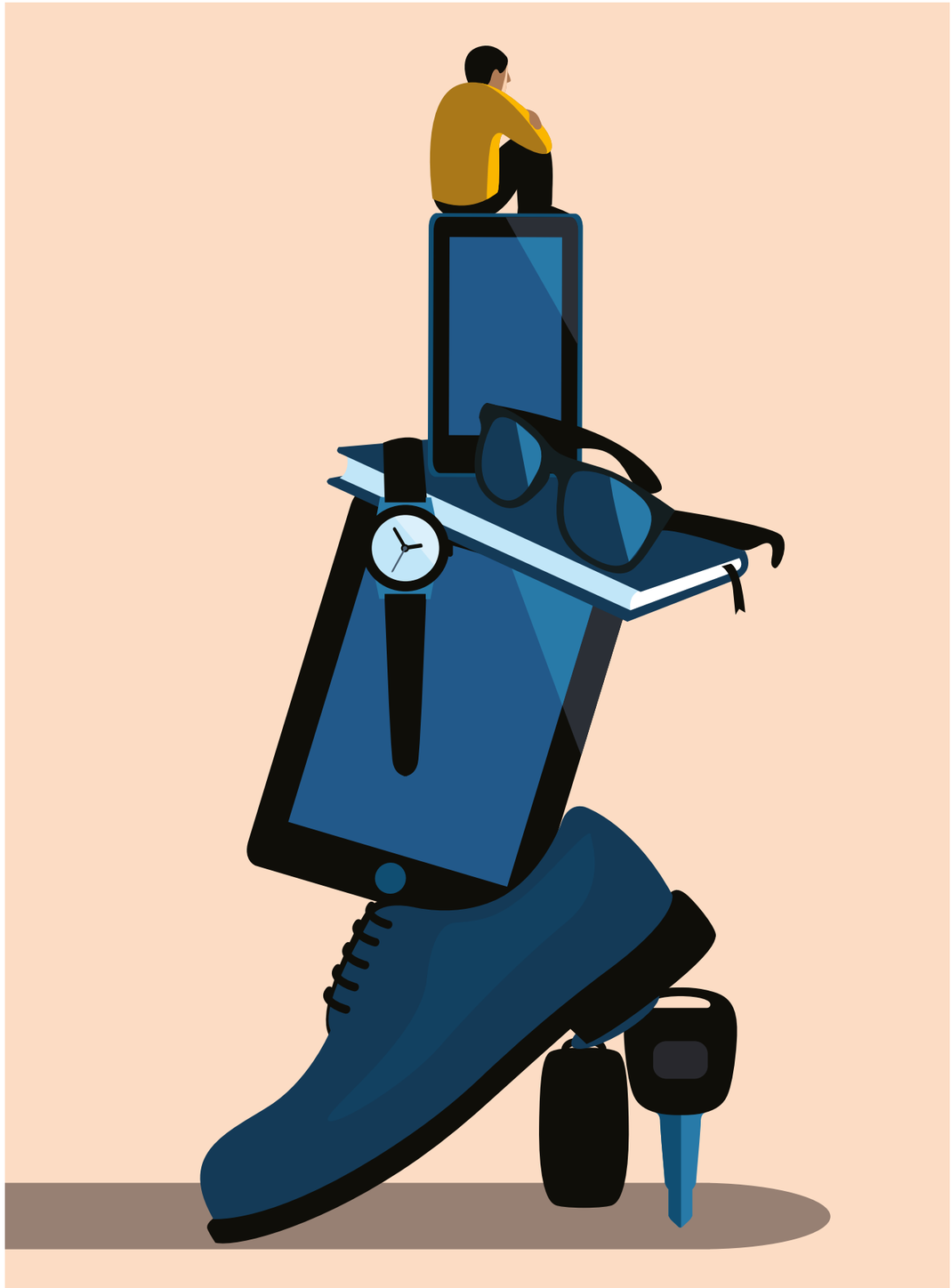

**Technical and aesthetic perfection is a noble goal. Anyone who establishes their products as a status symbol for buyers has already achieved a great deal. However, the greatest art is to conceive your products in such a way that buyers not only regard them as an indicator of their identity, but as part of their identity.**

accustomed to naming the major eras of history after the objects used by the people living in them. The Palaeolithic era gets its name from the simple stone tools which people produced in those days, while in the Neolithic age, these blades and wedges were already more sophisticated. The Bronze and Iron Ages are defined by progress in metalwork, the Industrial Revolution and the digital age by the steam engine and the computer. And each time, not only did the tools change, but the tools also changed the people. Communication and social relationships on the Internet are very different from those of a hunter's clan in the Stone Age. Ownership can now mean buying an app or a digital piece of music – an abstract data sequence. Many people are now almost as at home in the digital world as in the analogue world. They work there, shop there, play and entertain themselves, and meet people whom they would otherwise never meet. A person's Facebook avatar can be an essential part of their identity.

"We know who we are when we look at what we own," said the French existentialist Jean-Paul Sartre. In our age of material excess, there is a danger of losing one's perspective – of losing oneself in the 10,000 objects which today's European accumulates on average. But the way out is not to return to Plato and turn one's back on all material things. The way out is to turn back towards those things in which one really finds oneself and to cultivate a relationship to them – like Csíkszentmihályi's lawyer and his trombone. Everything else is decorative, perhaps nice to have, but dispensable.

It is every manufacturer's dream for his products to obtain such a close relationship to the buyer that they become part of the buyer's identity. Almost all particularly successful products are based on this idea. Apple's iPhone, for example, not only made its way into many people's pockets because it is a technological masterpiece but, above all, because it disappears – so to speak – in the hands of its users, like the hammer in the carpenter's hand. It is an almost seamless extension of our thought, speech and perception. It seems to operate itself – like a sense organ for the digital world.

Technical and aesthetic perfection is a noble goal. Anyone who establishes their products as a status symbol for buyers has already achieved a great deal. However, the greatest art is to conceive your products in such a way that buyers not only regard them as an indicator of their identity, but as part of their identity. Thus, a perfect sports car is not only likely to arouse admiration. It is also designed to "merge" with the driver at certain moments – and here, too, as with the iPhone and its user, digital technologies now open up completely new possibilities for connecting a "nervous system" between the driver and his vehicle. Entirely in the spirit of the "extended mind" theory, the two literally become one. The driver not only experiences himself as the operator of a powerful engine, he feels the power of the engine as his own – just as a runner at the top of his form feels his legs. The driver doesn't steer the car along the road, he flies around the curves with it. He not only drives a fast car, but becomes the winner.

**Tobias Hürter** studied philosophy and mathematics in Munich and Berkeley. He was editor of *ZEIT* magazine and is the co-founder of the philosophical magazine *HOHE LUFT*.

**Anna Parini** is an illustrator who was born in Milan in 1984. She currently works and lives in Barcelona. Some of her clients include *The New York Times*, *The New Yorker*, *The Washington Post*, Google and Save the Children. Her work has been recognized and exhibited by the Society of Illustrators, Communication Arts, American Illustration and the Society for News Design.

# Design beyond reason

**Viewed from a distance it seems simple: that car has to be a Porsche. But why is it that a Porsche has something so characteristic and clearly identifiable from every angle? Details are what influence the design phenomenon of how we perceive a Porsche.**

Walter Gropius opened the Ulm School of Design on 2 October, 1955. At the ceremony, the former director of the Bauhaus School based in Weimar and Dessau and grand seigneur of the International Style of modern architecture addressed his words primarily to the students and instructors in the audience. He virtually implored them not to base their designs solely on reason, but also to take “the magical”, as he put it, into account.

For this Gropius received only polite applause. But he was articulating a key point that even Ulm’s rationalists could not ignore. Which parts of design can be expressly developed with the instruments of reason, and which parts are not amenable to this approach? Or in other words, which qualities of design can be strictly measured, and which ones resist objectifiable determination?

Pairs of apparently contradictory elements that can supposedly only be united at the cost of an unsatisfactory compromise are what characterise the design of a Porsche. Furrows and flat surfaces, curves and corners, aggression and graciousness, strength and elegance, speed and solidity, focused concentration and casual playfulness. The design succeeds emphatically not by plugging these factors into a simple mathematical equation such that they cancel each other out. Instead, it gains its profile by maintaining the respective elements in a precisely calibrated balance. At times sober engineering predominates, and at other times emotional attraction wins out.

The design of a Porsche car is based on values, not on algorithms. From up close or from unexpected angles, and facilitated by a stance of studious observation, details emerge that produce harmonious forms each time in their totality. With reference to motor racing, these include the uncompromising precision of the technical elements required for superior performance. Or the mutual play of curves, lines and reflections of light that break up the surfaces of the headlights. Or the self-assurance of extensive open spaces that vanish softly into the seams.

We lack the exact terms to articulate the effects of these forms of appearance. Gropius called it “the magical” – and he wanted that to be understood without a trace of sentimentality.

Photography: Haw-Lin Services



**left:** From a graphics perspective there are only three lines: a diagonal from the upper left to the lower right, then back to the left with a downward turn, plus a short line parallel to the former that joins it in the middle. But the planes curve in space to create the characteristic form.

**right:** The complex geometrical interplay of curves in the glass, mount and metal surroundings is one of the identifying features of every Porsche.

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**left:** A sharply drawn fiery red edge, like domesticated lava, promises to keep the raw power of the engine under control.

**right:** Instilling style and imparting meaning – the contours of the rear window and taillights.


911 GT3 Touring: Fuel consumption combined: 13.3 l/100 km;
urban: 20.2 l/100 km; extra-urban: 9.2 l/100 km; $CO_2$-emissions: 302 g/km
Cayenne S: Fuel consumption combined: 9.4 – 9.2 l*/100 km;
urban: 11.8 – 11.3 l*/100 km; extra-urban: 8.4 – 8.0 l*/100 km;
$CO_2$-emissions: 213 – 209 g*/km (*Range depending on the tyre set used)

**left:** Porsche's language of design is marked by oscillation between antithetical poles, such as the diffusion of lines and reflections into abstract patterns.

**right:** What the driver sees just before getting into or right after getting out of the car.

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**left:** The prospect of giving the door handle an exciting design must have been tempting. The decision not to shows the importance of functionality.

**right:** How far can the viewer's perspective descend and still find typical Porsche visuals? The sweeping surface of the front hood always seems expansive, even from the same height as the headlamps.

# Proficiency as a prerequisite for self-determination: new abilities and perspectives are essential in order to effectively help shape the age of digitalisation. In this sense, we influence digitalisation – and digitalisation influences us.

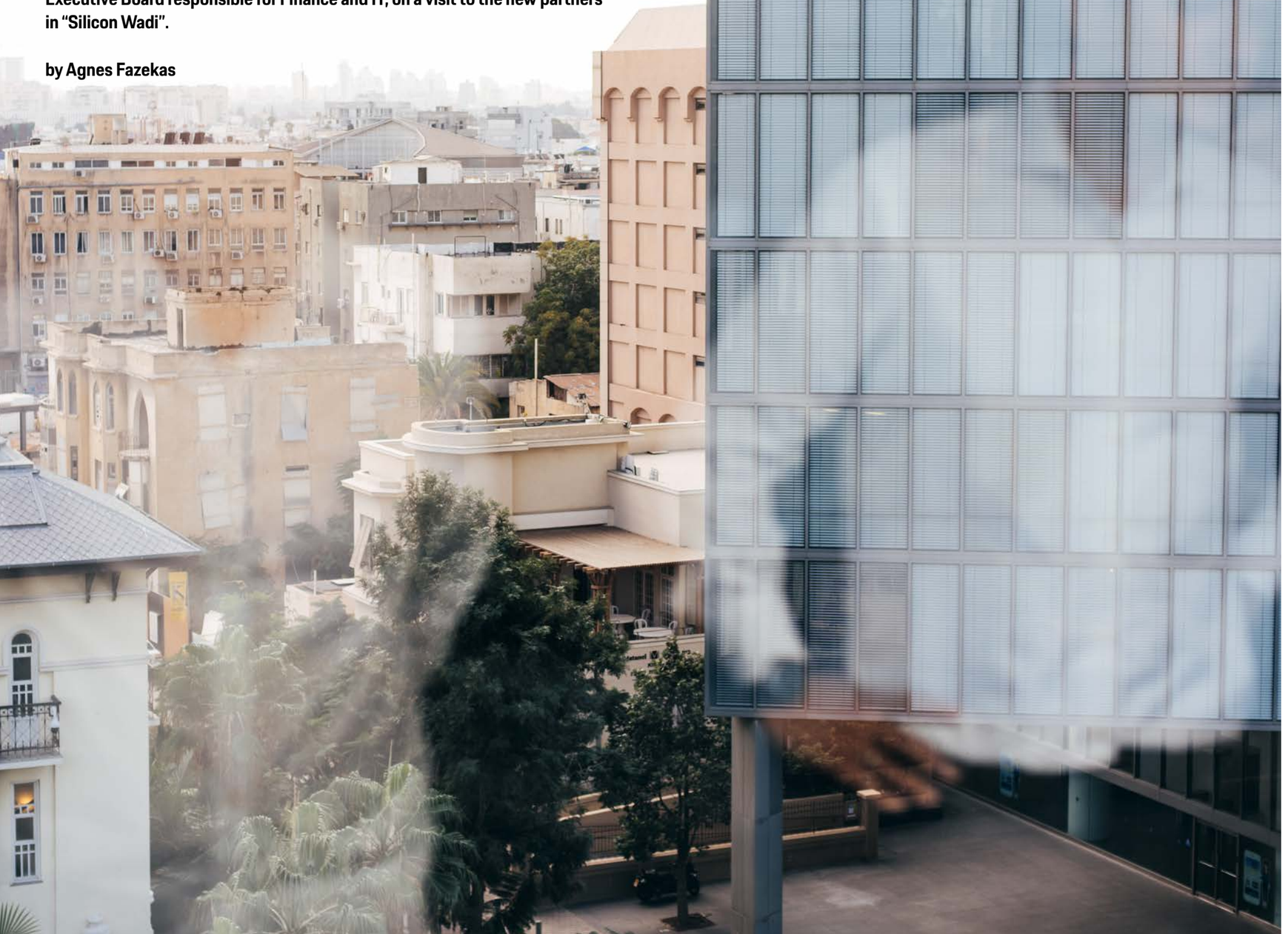
DIGITAL IDENTITY



# “The Israelis make demands on us – and that’s a good thing!”

**Tel Aviv is the next stop on the road to the digital future after Berlin and Silicon Valley. The city on the shore of the Mediterranean Sea has been known as an epicentre of creative developments in the high-tech scene for years. Porsche is set to secure talent and innovative technologies there with a local Innovative Office and investment in venture capital funds. We accompanied Lutz Meschke, Deputy Chairman of the Executive Board of Porsche AG and Member of the Executive Board responsible for Finance and IT, on a visit to the new partners in “Silicon Wadi”.**

**by Agnes Fazekas**



Racing bicycles on the wall, lap dogs dashing to and fro between the open glass boxes and a panoramic view over Tel Aviv’s main traffic artery: Rothschild Boulevard. To some it is a promenade, to others a launch pad for innovative technologies.

The hip, stylish branch of the co-working-hub Mindspace is one of the scene’s well-connected incubators. While people party in the bars and clubs around the Boulevard at night as if there were no tomorrow, here they are already working on the day after tomorrow. The metropolitan area of Tel Aviv is second only to Silicon Valley as the most start-up friendly region in the world. This is no accident. Israel may not have any noteworthy raw materials, and also has to cope with an unresolved political conflict that isolates the country in the region. But it does have immigrants with a wide variety of talents that are concentrated in the melting pot of this small country. After the endeavours in the nation’s early years to “make the desert bloom” with these human seeds, Israel’s pioneering spirit is now focused on the high-tech sector. As a result of the government’s generous support for new businesses, investors have the freedom to finance ideas that may seem crazy at first. It’s no wonder, then, that a number of multinational companies have relocated their development centres to Israel.

Porsche has also been part of this eco-system since February 2017. A figure in the double-digit millions that has been invested in the two venture capital funds Grove and Magma is only the beginning. Porsche’s new Innovation Office is a tiny honeycomb in the hive, located right in the thick of the action.

Lutz Meschke looks out of the third-floor window, down on a villa with a palm garden, built in 1924. Today it’s home to “lone soldiers”, young soldiers without family in the country. Directly behind it, a blue-mirrored office tower rises up into the cloudless sky. Next to it is a condemned building with graffiti flaking off it. Military, business and subculture – there couldn’t be a better snapshot of Tel Aviv’s soul.

Meschke: “This city is extreme. It pulsates massively with energy, it’s extremely young. The people here want to savour every minute of their lives – that alone is already a contrast to Western Europe. This mentality naturally also nourishes the start-up scene. Wanting to experience a lot means you must also achieve a lot quickly.”

Dov Moran is someone who knows both of those phenomena extremely well. He invented the USB stick and is manager of the venture capital fund Grove.

The previous evening the 62-year-old sat on a green wing chair next to the new business partners from Porsche in the eccentric restaurant Nanuchka – and angled for vegan home cooking on shared platters with a fork like all the others. Beetroot carpaccio, pasties with mushroom filling, Georgian pastries. The music is loud, the waitresses sport tattoos. Moran, who is not only a billionaire but also a vegetarian, smiles contentedly. He photographs a napkin with his smartphone, which has a line written on it: “Imagine who you can be.”

The story behind the Nanuchka is one of the fairy tales you can find in this city. For years, the business was crowded because the owner did what she could do best: hearty Georgian cuisine. Her recipe: lots of meat plus lots of alcohol equals wild evenings. Then she became vegan and converted her beloved restaurant, despite all advice to the contrary. Today Tel Aviv is considered the most vegan city in the world – and the Nanuchka is its charming pioneer. The success has been sustained, and, if anything, has grown. An apt equation for the transformation that Porsche is facing.

How can the traditional sports-car manufacturer set the tone without losing its identity when the future will involve solutions for digital mobility – how can the myth and decades of experience be beneficial in this context?

Meschke: “It was a giant leap to even wrap our heads around the topic two years ago. That is how far away it was for all of us. We’ve managed to do it well, but now we have to find the right speed for the implementation. It’s not only about purchasing additional technology and expertise, collaborating with start-ups or with venture capital funds. The actual question is how we convey this new mindset into the core of the company.”

A lot has happened since Porsche Digital GmbH was founded in 2016: a digital lab has been set up, Porsche has put out more feelers with additional satellites, first in Silicon Valley and now in Tel Aviv.

Also conspicuous here is the straight talking that goes on. Initially, the Stuttgart team were told that, although they doubtlessly produced great cars, the Israelis generally didn’t give the industry many more years, at least not in its conventional form.

Meschke: "I'm convinced that vehicle ownership will not be the all-important issue in the megacities of the future. But mobility on demand will be. And who's to say that people who use a service like Uber wouldn't like to choose between premium and economy class? Maybe everything will also all take place in the air someday, with drones. However, that will also be a market that we have to share. Our legendary cars may bring us somewhat further than the high-volume manufacturers. But then most of the money has to come from somewhere else."

Daft theories and future scenarios are passed around the table like the plates containing a colourful mélange of tradition and avantgarde. While Moran's partner imagines the future Porsche brand as an exclusive club, complete with concierge service and its own credit card, Moran is already in the process of imagining how the self-cleaning vehicle could look. Completely in keeping with his motto: no idea is too stupid.

Meschke: "Completely out of the box. Visualisations like that are exactly what we need. Last year I noticed that we should be significantly more candid with regard to Porsche's corporate purpose. Our company culture is characterised by engineering. We are very good at continuing to further optimise things. But we will only be able to do that for a few more years. Then there will have to be completely new solutions, and to do that we have to become more receptive now: not only to the direction of the start-up scene, but also to the direction of other industries. Everything is growing closer and closer together. In addition, we should learn to take the customer's point of view into account even more or we risk developing products that don't satisfy the market because we are too much in love with our own technology."

Moran nods, though he himself comes from the technology side of things. Semiconductors, chips, hardware – those are his world. That's why his venture capital fund Grove keeps an eye out for the "complicated stuff". For example, he advised the start-up Mobileye, whose camera-based security system is installed in many vehicles today – and makes self-driving cars more and more likely.

Meschke: "That is one of our biggest challenges. Even if you start from the premise that our sports car will be one of the last cars with a steering wheel. Our world will completely change as a result of autonomous driving. Electrification, digitalisation, connectivity – those things can all be dealt with, we can think up business models to go along with that, but to do so we first have to find our niche."

Still, the topic of motorsport leaves room for numerous possibilities. For example, one could use the autopilot as a teacher, let a professional like Porsche's brand ambassador Mark Webber show the perfect line virtually, before taking over the wheel yourself. The worlds will not become entirely unconnected; Meschke believes that a longing for the analogous will follow in the wake of the digital wave. The challenge is to combine the two intelligently.

Meschke: "Unlike many of the new players in the market, we bring a strong tradition with us. We can't just throw what we have built up through decades overboard. We don't want to invent mobility without our cars."

Moran tells us how his laptop crashed just before a presentation in 1988. That was the birth of the USB stick, the mass memory storage unit for the pocket. It was simply that no one had had the idea before then to use the available interface for a data carrier.

Moran: "You are on the right track. But one day you will let go of history. Change was the only constant in my company. That's how Israel became a start-up nation: those who are too comfortable, who don't have to fight, are not productive."

Moran offers to help select people and cooperation partners locally. It's not a platitude to say that everyone knows everyone in this small country. The Israelis are extremely proud of their "kombina state", in which everything is organised via the personal network: quickly and efficiently. It already becomes established during people's military service. The conflict with the neighbouring countries is omnipresent – and the army is constantly in the process of upgrading its equipment and developing its defence technologies further. Those who leave military service bring their knowledge into the economy.

Moran: "Where did you serve? That's our first question when we meet someone for the first time. And it says a lot. A pilot has an overall view, but little feeling for detail. All the very smart guys that do cybersecurity now all come from the 8200, which is the elite unit of the secret service."

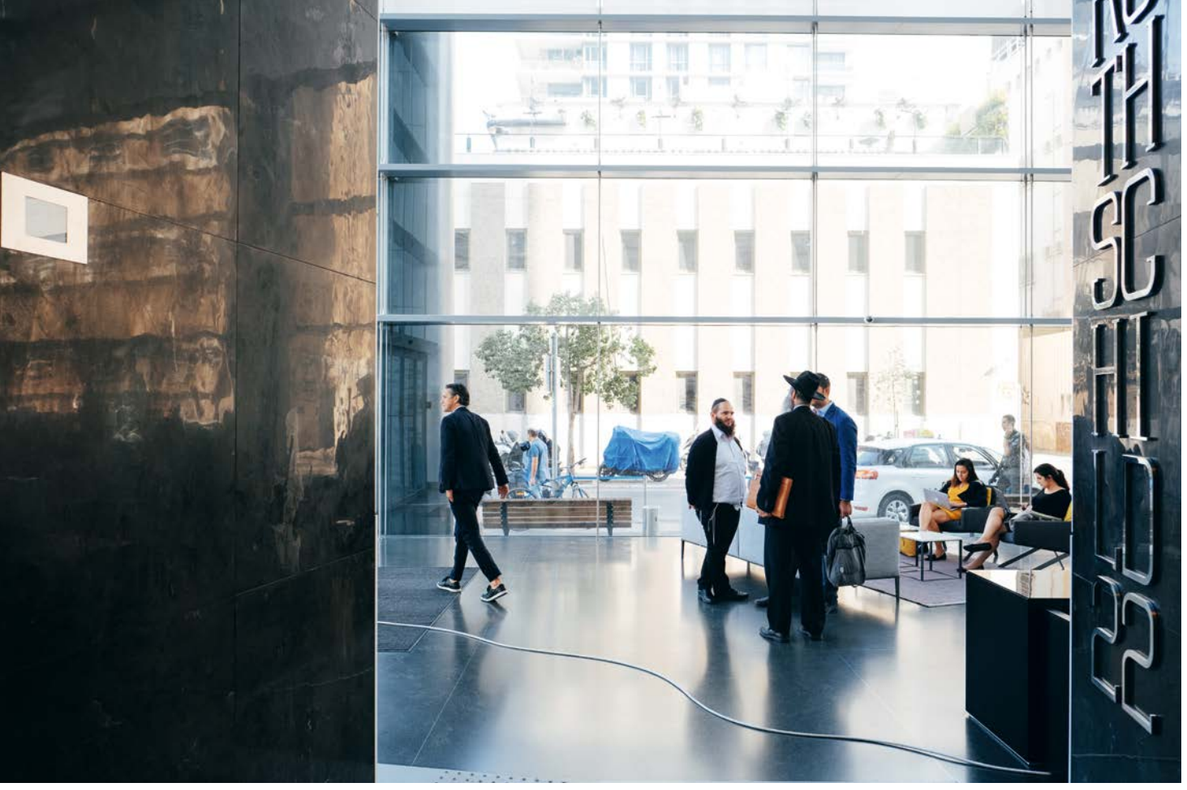
The next morning as Lutz Meschke sits in front of one of the shaded coffee kiosks on Rothschild Boulevard, a place where analogous life intersects with the high-tech city, he seems somewhat energized. Spinning offbeat theories with the Israelis at dinner, the colourful scene on the rooftop terrace bar Speakeasy – this bubble of mirth in the insanity of the Near East, hedonistic, but also spirited, stimulates him to think about the cultural differences, not only between Germany and Israel but particularly in his own company.

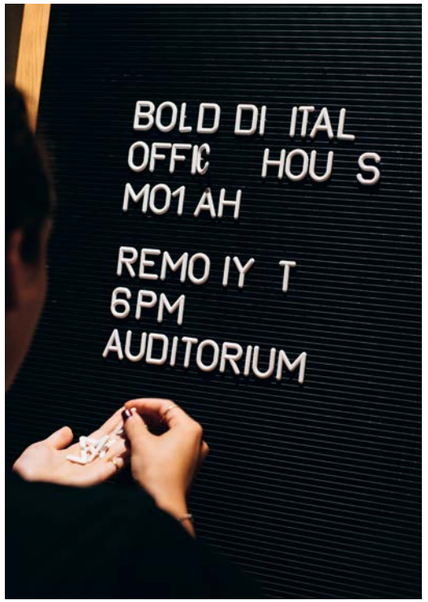
**Meschke: "It was a giant leap to even wrap our heads around the topic two years ago. That is how far away it was for all of us. We've managed to do it well, but now we have to find the right speed for the implementation. It's not only about purchasing additional technology and expertise, collaborating with start-ups or with venture capital funds. The actual question is how we convey this new mindset into the core of the company."**

Meschke: "In Germany the prevailing belief is that we are a very successful industry on which an incredibly large number of jobs depend, and that we can't make any disruptive decisions. It's all about being measured, considered. But in a disruptive world you don't have time to do things in a measured way. You can't check everything down to the smallest detail in advance. We must learn from the start-up culture that, out of ten ideas, perhaps nine of them will die. The name already says it: risk capital."

Right now on the Boulevard, a young man with plenty of chutzpah is on his hoverboard, zigzagging his way between parents on e-bikes rushing to bring their children to the kindergarten. Casual strolling here only happens on the Sabbath. The cost of living is high in Tel Aviv, the work days long.

Meschke: "The Israelis demand a very different tempo from us. The people here are always on their toes, they want to get cracking. In February we said: Yes, the funds are of interest to us. By our standards we reacted quite quickly, made the final decision in four weeks. But I noticed the Israelis were getting restive – that's too long for them. And this constant demand on us is a good thing."



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Meschke has the role of mediator based on his function as Member of the Executive Board responsible for IT – he has to mediate between the mother ship and the digital satellites, and also between two frequently opposing concepts of work culture.

Meschke: "It may be trendy right now to put on trainers with a suit, but in reality everyone just wants to attend to the core business and build cars. That's why the young offshoots should be permitted to develop independently for a bit. But then we have to bring the two cultures together quickly. It's not enough to toss something over the fence to this new, eccentric world now and then. On the other hand, our engineers won't accept implementing only ideas that someone on the outside developed – and rightly so."

Then there's another intercultural difference: at a start-up people sometimes work 20 hours straight and don't want to be hampered by rules.

Meschke: "We have to inspire the people, and take away any anxieties. Anxiety about the world changing and your job disappearing as a result. We have to give them a taste of a world in which machines take over the mindless work and allow the humans to be creative and analytical. However, to do that, it is of course necessary to take them on the journey with us."

The digital satellites are not only laboratory kits for new technologies, but also sources of inspiration to employees, who can sample start-up culture on site and get hands-on experience in cooperations. The expansion of their digital expertise is intended to make all employees transformation drivers. Responsibilities will therefore not only be limited to one area, as was the case up until now.

Meschke: "This new structure works quite well already to some extent. It also means that unlike in the past, every product, every process is not tested down to the last detail before beginning with implementation. By then the technology would be outdated, or the process approaches no longer in vogue. Instead we divide every idea into small steps and go to the initial implementation phase in a relatively short time. In doing so you learn the next development step straight away and in a short amount of time have a product ready to pilot. Perhaps only internally at first, but maybe it is already so good that you can get feedback from customers. Then you go into the next round. That way we can involve the customers in a timely manner."

But not only the customers want to be taken seriously. Young engineers today no longer come straight from classic, lecture-hall environments at university, but instead are learning there to work with start-ups and to network there.

Meschke: "A Porsche employee never used to think about ever leaving the company. Nowadays young people may think our products are brilliant, but their primary interest is to look for an exciting, flexible work environment. If you can't offer them that as an industrial company, then you are not interesting to them."

Meschke hopes to get rid of the silo mentality once and for all in favour of the dual opening approach – both internally and towards the outside.

Meschke: "This is quite pronounced in our company: we are especially proud of what comes from our own department. But we stand in our own way by doing that."

Typically German?

Meschke: "Of course, we feel comfortable with what we know, what we have always been successful with. That's human, to react with caution at first. That's why we are going to the people now and saying: Listen, there is a goal that you are now working towards in a team, defining the procedures jointly. You have the responsibility, don't wait for someone above you to tell you what to do! It's like with sport, then you can celebrate the successes as a team too."

Apropos celebrating. Right now the scene is buzzing with the news of the 430-million-dollar deal in which German supplier Continental bought one of the start-ups in the Magma portfolio, the second venture capital fund that Porsche just invested in.

As is to be expected, the mood at Magma is electric. The fund is located in the same glass tower as Facebook, directly on Rothschild Boulevard. Yet there is another reason. Manager Yahal Zilka is leaning over his laptop: Google subsidiary Waymo just announced via video that its first fully autonomous fleet is on the road in Phoenix's city traffic. What was science fiction just last night has suddenly become reality. The clocks seem to be ticking even louder and faster now.

But first it's time to get back to the start-up Argus Cyber Security, which has just been sold. Yesterday evening Dov Moran told us that back then he had recommended to the

founder to concentrate on the automobile industry after spending eight years in the secret service's elite unit. Just three years later, the 31-year-old's company is considered the world leader in protecting cars from hacker attacks.

The feeling that events are snowballing fades during the drive to north Tel Aviv. The never-ending traffic jam is to blame. On the other hand, the reason the successful navigation app Waze – also a Magma protégé – was created becomes clear.

A young Argus employee is waiting at a quiet car park; she lets Meschke get behind the wheel. A laptop is balanced on her lap. She plays the role of hacker while asking Meschke to drive laps around the car park. She types commands into the car's "central nervous system", beginning with relatively harmless actions, such as activating the windscreen wiper or indicators. Then the speedometer suddenly goes crazy – and finally, a horrible gurgling sound comes from the car's bowels – the brakes are blocked.

The start-up is currently trawling the industry with such demonstrations, showing that no modern vehicle today is safe from attacks from cyberspace. The opposite is true, says founder Ofer Ben-Noon. With the growing connectivity it is even getting easier to hack a car through its various interfaces than a smartphone.

Argus offers its customers a system that allows cars to be monitored in real time and detect, repel and analyse attacks from hackers all at the same time. That's important because cyberattacks are constantly evolving.

Meschke is expecting the company's own hackers in Germany soon. Opening up to the outside also means accepting criticism – and even if it means that your own product is literally "hacked to pieces".

Meschke: "I'm learning an awful lot here. I'm no engineer, but it is also important education for me. Nowadays we as an IT department are well established as a component of the product. That's also another argument for interdepartmental work in the company. You can't separate electronics and IT anymore these days."

The Argus technology will soon be found in many vehicles. To Meschke, it is a sign of how important it is to be locally present if Porsche wants to secure its access to relevant technologies and talents.

**Meschke: "Nowadays we as an IT department are well established as a component of the product. That's also another argument for interdepartmental work in the company."**

Meschke: "There are 600 companies in cybersecurity alone here. How are we supposed to filter them from a distance? In Tel Aviv the main thing for us is to ask: how does our product have to look in future in regard to digitalisation, connectivity and electrification and which security features do we need? They don't need big investments here, they need validation and coaching – and we can provide that."

There's still time for a quick detour to the sea on the way to the airport. It's too cool for swimming, but the kitesurfers are dancing across the waves with their colourful kites. Time for a summary.

Meschke: "It hasn't been long at all since we ourselves were a relatively small company. We've learned to achieve a great deal with few resources; to be creative with small budgets. Therefore, the start-up culture should not actually be particularly foreign to us. Our motto has always been: not necessarily the most horsepower, but we tease the most performance out of it. That is our strength. Now the important thing is to convey to our people: Yes, you are great, you have achieved a lot for us, we need you – please take that sentiment into the future with you!"

Photography: Jonas Opperskalski

**Lutz Meschke,** who has a degree in Business Administration, came to Porsche from Hugo Boss in 2001. He has been a Member of the Executive Board, with responsibility for Finance and IT, since 2009, and was named Deputy Chairman in 2015.

**Agnes Fazekas** is a freelance journalist who has lived in Tel Aviv since 2014. She likes to write about everything that moves people, and the movement people bring about. Born in Munich in 1981, she studied Ethnology, Intercultural Communication and Modern German Literature there. She subsequently attended the Zeitenspiegel-Reportageschule, a German journalism school. Her book reporting on the West Bank was published in 2015.


Flames of progress

Mix and Remix embodies the central distinctiveness of digital forms of expression in contemporary culture all over the world, from music to literature and fine arts. Initially, it appears to be merely a collage technique. However, it is in fact an attitude that perceives and transforms the existing object as a resource for the completely new. Kenta Cobayashi's pictures blast away conventional categories. His pixel streams meander across sharpness and superimposition, microscopic close-up views and periscopic vision.

## Who has control of whom: do we control technology or does it control us? On human self-determination in the age of digitilisation

**by Christoph Keese**

My great-grandmother's name was Leni, and I was fortunate enough to have still met her as a child. She was born the same year that Stefan Zweig was, in the 1880s; she was ancient in my perception at the time. Leni's grandparents belonged to Goethe's era. They came from Thuringia, and Leni told us stories about the inns and farms of her far-flung family, places where Goethe rested during his travels and left spontaneous poems in the guestbook or carved them into benches or tables.

I can picture Leni at work in her small combination kitchen-lounge in Germany's Bergisches Land region. When she cooked, she stood in the smoke of her wood-burning stove, sent us children into the backyard to the metal dustbin with the glowing ashes and rested her fists on her hips with a look of satisfaction on her face when she had thoroughly stirred the many pots on the hot stove surface with her seven wooden spoons. At the end of this physically strenuous work there was a celebration at her creaking wooden table, whose beams bent under the weight of the bowls, saucepans, plates and baskets.

In today's digital age, cooking is a more casual, secondary affair that takes less time than Leni needed to just stuff the wood into the stove. Our nutritional habits nowadays explode any notion of what used to be regarded as possible. Microwaves heat ready-to-eat meals in a few minutes. Convenience food makes marinated sauerbraten from a water bath feasible. Delivery Hero brings hot meals of any conceivable national cuisine to your table in less than 30 minutes. There is a refrigerator that analyses the remaining supplies inside it and reads out recipe suggestions on what can be prepared with the residual contents. "Alexa, bring milk and potatoes," is just the latest thing right now: but it probably will end up obsolete in a year or two because by then Alexa won't even have to be asked to do her duty, as she will have already ordered supplies independently – anticipating our wishes on the basis of the available data and using elaborate artificial intelligence algorithms before these wishes even take form in us. This paradise of endlessly flowing milk and honey with flying roast ducks has been a long time coming. Digitalisation is finally making it come true. That has consequences. The price for progress in convenience is the loss of sensory experience. It is said that we are the children of our times. But are we still the masters of our lives?

I recently met a friend, an off-piste deep-snow skier, who was very nearly killed in an avalanche he caused by triggering a snow slab slip during a ski run on a southern slope in the Swiss Alps. He described the feeling of what it was like as the ground gave way beneath him: "At first I couldn't sense what was happening at all," he reported. "I traversed the slope and was gliding as smoothly as ever through the snow. My gaze was fixed on the ground. Everything looked completely normal. Then I heard a rumbling and looked up. Suddenly I noticed that I was sliding downhill in relationship to the cliff over there, even though I was still headed directly towards it. Then I realized that my usual reference system – the snow that I was gliding through – was absolutely unchanged. But in the larger frame of reference I was losing altitude. The snow slab I was skiing on was sliding down the slope as one whole mass. I was scared to death." Over the course of his description, his experience made me think of its similarity to our experience of change in the age of digitalisation.

The feeling of normality can be deceptive. We consider ourselves to be more or less in full possession of modern digital proficiency, but don't notice the loss of other abilities. We believe that proficiencies stack up one on top of the other, layer by layer, and, without further reflection, are completely convinced that we possess far more proficiency than any other generation before us. We think we are the crowning achievement in the history of technology. We are deeply rooted in an image of humanity that views technical progress as an accumulation of abilities. We fancy ourselves to be in possession of all capabilities in history, topped off by the newest proficiencies of our own era. Yet in that we are mistaken.

It doesn't even cross our minds that it could be different: that proficiencies actually displace each other instead of supplementing each other; that we lose an ability or allow one to atrophy for each one that we acquire. Being human doesn't mean each generation rises

above its predecessors, but that by and large the sum of the abilities remains the same, and only the abilities' substances change. The abilities may be more efficient, perhaps more civilised or cultivated as well. However, that doesn't mean they are anywhere close to being more numerous.

Children shoot and edit smartphone videos in next to no time and populate their YouTube channels with them. Yet they can't ignite a fire in the narrow chamber of a stove with a single match and without puffing. Texts are created effortlessly on the computer, but who is still able to write letters in calligraphic script by hand, in writing that expresses love for the recipient merely by the beauty of the flourishes and strokes?

We don't have to believe that we have a big advantage over the Romans simply because we pull out iPhones whereas the Romans threw slaves to the wild animals in the Colosseum. Supplying a city lacking in water like Rome with fresh water from the mountains via aqueducts doesn't require less proficiency than designing smartphones. There were other proficiencies that dominated at the time, but not necessarily more or fewer of them. The number of proficiencies is more a result of the neurophysiological capacity of the human brain than of the cultural environment in which the brain is able to develop. Or expressed in other words, our degrees of freedom are smaller than we think. We are chained to the cultural context of our times. If we would like to stay on top of our times and are thinking of participating in their digitalisation, then we pay for this with the creeping, barely discernible yet irrefutable loss of other, earlier proficiencies. We are not increasing anything, we are only switching from one to another. We are far superior to the Romans in terms of communications technology, and Caesar would have turned green with envy at the sight of our information transmissions from Gaul and Germania to Rome. If he had had full possession of today's proficiencies, he would have been spared a lot of trouble north and south of the Alps. On the other hand, Caesar would have cut us down with a Roman short sword (gladius) in close combat faster than we could whip out our mobile phones to call for help. Retributive justice prevails between the generations.

Proficiency and self-determination are closely correlated. I can only determine my own future if I also possess the ability that corresponds to that future. A future that I don't have the capability to achieve remains a dream. We can merely step out of the realm of imagination to the realm of reality at those points where our proficiencies can build the bridges to do so. There is no self-determination without proficiency.

This is the point where digitalisation poses a serious problem. Contrary to earlier revolutions such as the mechanical or industrial ones, digitalisation doesn't aim to increase our muscle power immeasurably by means of steam and gears. It increases the power of our mind exponentially, and does so in a steady stream ranging from simple, cognitive abilities to complex, partially subconscious and deeply buried processes. In its early days, the digital revolution directed its attention particularly to the interdependence of external stimuli and internal reactions. Now, though, it is pushing up against regional brain functions that chronologically precede the stimulus and belong more to the area of desires, dreams, imagination and plans rather than to the clearly defined areas of deeds, conscious actions and the measurable effects of concrete causes. The further the digital aids penetrate the blurred regions of our conscious and subconscious minds, the more they will relieve us of tiresome routines, the more they will smoothly accustom us to the state of being taken care of, and the more they will substitute new proficiencies for old ones.

We shouldn't be indifferent to that. What does it actually mean? When algorithms influence the formation of our desires and fulfil them even before they have materialised, then the wish-forming proficiency will deteriorate like a poorly-trained and rarely-used upper arm flexing muscle. With the loss of the ability to conceive desires autonomously, our self-determination also declines – admittedly without our noticing it immediately, much like what happened to my friend, the skier, who at first perceived the sliding snow slab as a normal slope on a normal mountain. As with the deep-snow skier, it can therefore be advisable to lift your gaze in a timely manner and investigate the surrounding terrain, determine your geographic position and recognise the shift in key reference parameters.

Let's take the car of the future as an example. Whereas most people think of electrification, the much more important revolution is taking place in the controls. Electric drives change the form of the energy carrier, but leave the car in the accustomed aggregate state. Only the introduction of autonomous cars triggers the genuine revolution in the relationship between machine and humankind. We will be able to remove our hands from the steering wheel – so far, so good. Yet as soon as an algorithm makes largely accident-free driving possible, it will want to make suggestions for destinations, very similar to the innumerable suggestions that we are already subjected to on the Internet today: "People who bought this book also bought that one," we read at Amazon. Whoever likes spaghetti bolognese usually also likes saltimbocca. Whoever was happy on Ibiza also likes Sicily. Those who listen to U2 also listen to Coldplay. Whoever reserves accommodations at the Hyatt in Düsseldorf also responds to advertising for the Waldorf Astoria in Berlin. Similarly, the autonomous car will also talk to us in an understanding manner: "Quite right, the Rhine floodplains are a lovely day trip destination for this springtime Sunday," says any self-respecting digitalized car. "But why don't we give the theme park Phantasialand a try? Spur-of-the-moment visitors don't pay any VAT there today."

Artificial intelligence, cleverly integrated with the car of the future, will be in the position to eliminate irksome tasks from our lives and – like a sorcerer's apprentice – listen in on us to discover our fundamental desires and fulfil them instantaneously. All the information that is required for such prescient planning is already available in the information systems that surround us today. They only have to be linked, evaluated and placed at our service. We will happily permit the assistants that can do that to take charge of our daily lives. We are glad to concede to assistants that make us happy the authority to act in alignment with our wishes, without them even having to ask us in advance. In future, we will switch to life's autopilot just as naturally as the jumbo plane pilot activates the autopilot for the remainder of a flight after take-off. The car makes such a

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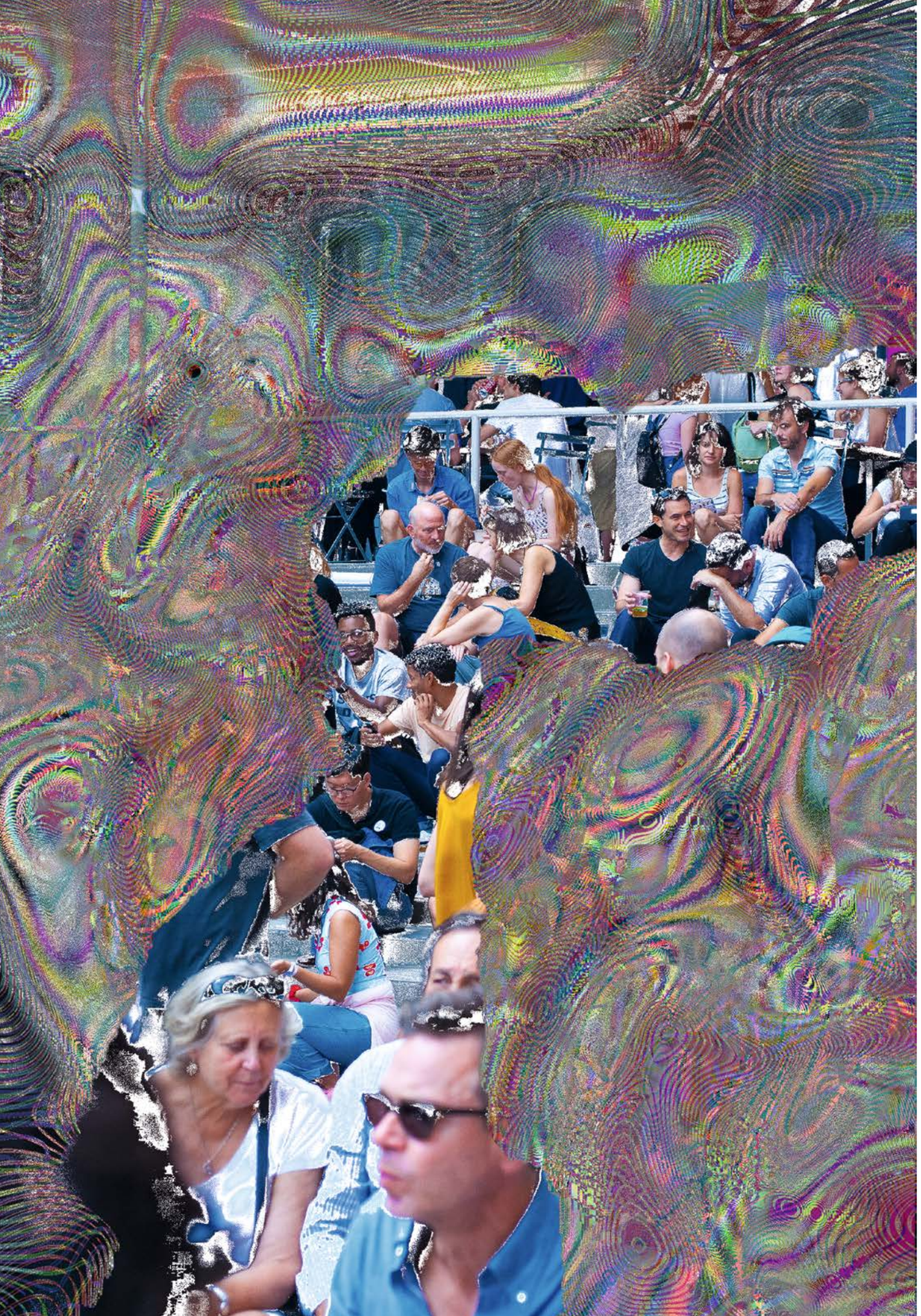

**Artificial intelligence, cleverly integrated with the car of the future, will be in the position to eliminate irksome tasks from our lives and – like a sorcerer's apprentice – listen in on us to discover our fundamental desires and fulfil them instantaneously.**

smooth case for itself as the apt arena for well-meaning digital custodianship because it can change our destination and our route. It functions as an aid to fulfilling subconscious desires, because it chauffeurs us to the place of longing even before we ourselves become aware of that longing.

How will we feel in such cars? Do we perceive the digital assistant as the subjugator of our self-determination or do we welcome it gratefully, because it makes our lives easier? It's most likely that we won't even ask ourselves these questions when the cars actually do become available. Loss of proficiency goes hand in hand with a diminishing ability to reflect. Lost proficiencies are not perceived as a loss. We are generally not aware of most things that we cannot do. We don't suffer in our daily lives from not being able to toss a basketball into the basket confidently from a distance of 15 metres. Only when we are challenged to perform such a throw in front of skilled basketball players do we consider our lack of ability embarrassing and are ashamed. However, if there is no one who can perform such a throw, then we are again indifferent to our own lack of ability. We don't suffer from the fact that we cannot light a cast iron stove with a single match – for one thing because those types of stoves just no longer exist in our kitchens, and we no longer need open campfires in our houses to sustain our lifestyles. We don't particularly miss the lack of an ability provided we are surrounded by people who also don't have it. In precisely that sense, once hyper-precise forecasting algorithms arrive on the scene, we won't perceive the loss of the good feeling derived from drawing up a plan or harbouring a desire as an amputation. Assuming that digital assistants transport us to a state of comforting contentment or even happiness without us having to take a detour to make plans or formulate desires, we will remain satisfied.

Many will say: what a terrible concept. Yet we should not place all too much importance on this horror as we see it today. It will seem far less horrible to us later than it does now. "Life is lived in a forward direction and understood retrospectively," the philosopher Rüdiger Safranski wrote. The loss of self-determination seems terrible to us when looking forward, and seems meaningless in hindsight.

I'm slowly beginning to understand why my great-grandmother didn't want to have anything to do with gas or electric stoves. Leni put the thought out of her mind, I now firmly believe, because she liked the smell of fire. She liked to hear the sound of the crackling wood and loved to feel the smoke wafting around her nostrils. She liked feeling the power over nature when setting a whole stack of wood aflame by striking a match across the striking surface. She felt the pyromaniacal attraction that befalls anyone who starts playing the dangerous game with fire in enclosed spaces. She didn't want the coffee to boil quickly – she wanted to see it come to a boil gradually. She considered coffee to be a greater reward for her life's toils when she had to make an effort to wrest it from the adverse elements. It was not meant to be easy for her – that would have robbed her of the reward earned for the hard, spare life she led. In short, cooking at an archaic fire looked like an anachronism only in our eyes. For my great-grandmother it was a feast for the senses and a celebration of life. Her self-determination ensured that that pleasure would not be taken from her by anything or anyone. Not even by us, the technology-loving grandchildren and great-grandchildren.

Today we can only guess what Leni thought. Just as little as our great-grandchildren will be able to understand why we have subjected ourselves to decision-making in so many trivial situations when so many better things could be done with the time wasted that way. Are these great-grandchildren, who won't understand us anymore in this monumental way, dumber than we are? No, they aren't. They merely have other proficiencies at their disposal, and we must accept that.

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**Christoph Keese**, born in 1964, is a successful book author ("Silicon Valley – Was aus dem mächtigsten Tal der Welt auf uns zukommt") and was recently named CEO at Axel Springer hy GmbH. Previously, he was a manager at the Axel Springer media company where as Executive Vice President he was the driving force behind its conversion to an Internet company.

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**Kenta Cobayashi** was born in in 1992 in Kanagawa, Japan, he regards photography as a means to question what it is to capture *truth* and draws an outline of this question using a wide variety of approaches. His works have been included in group exhibitions such as "trans-tokyo / trans-photo", Jimei × Arles International Photo Festival (Xiamen, China, 2015), "New Material", Casemore Kirkeby (San Francisco, 2016), "Close to the Edge: New Photography from Japan," MIYAKO YOSHINAGA (New York, 2016), "Give me yesterday", Fondazione Prada (Milan, 2016) and "AHEAD STILL LIES OUR FUTURE" (Photography biennale FORMAT, 2017, UK). His works are in public collections at major institutions including the Asian Art Museum, San Francisco. His first book of photographs "Everything_1" was published by Newfave (2016).

# Production 5.0 – Machines with their own identity

Our idea of the future, our vision, always proceeds from what is familiar to us, otherwise we cannot conceive of it. The ideas in science fiction unsettle and fascinate us, because they no longer show matter as an object utterly subject to human design, but rather as something in the throes of gaining an independent identity. Science fiction in today's digital age is generating visions of a post-digital aesthetic, which converge with the familiar ideas of street culture in images from the illustrators at Sucuk and Bratwurst.

**Products as individual as if they were handmade, but produced in a highly automated way – how is that possible?**

**by Ulrich Eberl**

The quiet, hesitating sound has something almost human about it. "We have here a rather unusual individual order," says Kira, appearing as if from nowhere in front of the autostereoscopic OLED walls. KIRA – "Künstliche Intelligenz für Robotik und Automatisierung" [Artificial Intelligence for Robotics and Automation] – appears as a gently smiling, self-confident businesswoman. In response to her hand gesture, a transparent cube, with sides around 120 centimetres long, rises in the middle of the multifunctional table: a holographic display in which 3D objects can be made to float freely around the room by laser control.

In the holographic cube, a vehicle on a scale of 1:5 is turning on its axis. Powerful electric engines drive it. The interior is made of surface-finished steel with 3D textures, while the exterior has chameleon paintwork which shows iridescent colour effects at the touch of a button. Then wings with tiltable electric propellers swing out from the car's underbody. Seemingly effortlessly, the vehicle starts moving vertically upwards, the wheels disappear under the seats, the rotor axles turn – and the car has become an aeroplane which can travel up to 100 kilometres in the air.

A brief murmur in the display, and the view changes to the production halls: production cells and transport machines appear, as do autonomous robots and human "firefighters" who monitor the process and intervene if there is a problem. In the middle of the image, a piece of equipment appears which flashes brightly whenever laser beams touch fine metal and ceramic powder. This is where the extremely stable shape-memory alloys are created, which change their crystal structure when heated and cooled down. Supported at critical points by electrically controllable piezoceramics, they generate the forces for the flying car's complex swing and tilt motions – the simulations show the details of this 4D printing as well as the continuous optimisation of the production processes, the supply chains and dates, the remote diagnosis and maintenance, and even the recycling at the end of the innovative vehicle's lifespan.

## THE VEHICLE WITH PERSONALITY

A scenario, perhaps for the 2030s? Not all the concepts of Industry 4.0 are completely state of the art yet, and futurologists are already thinking about the time after it. What will come after Industry 4.0? Which direction will industrial production develop toward?

The direction is clear: automated production of individual items. People want to live out their individuality, express their personality and be authentic. Brand manufacturers personalise their products; optional equipment generates millions of variations. With crowdsourcing and co-creation, customers become partners. They communicate design ideas and suggestions for improvement over the Internet and are thus directly involved in the development and production processes. In addition, there are increasing numbers of drive variants, ranging from fossil fuels to renewable energy sources and electric drives. In future, smart cars will communicate not just with each other but also with infrastructure. Mobility concepts are shifting more towards needs-based use, with sharing, leasing or mobility-on-demand solutions.

Autonomous electric taxis, summoned via a smartphone app or intelligent speakers, are a model for the city of the future, particularly considering the ageing population. By 2050, one in three central Europeans will be over 65 years old, and one in eight over 80. The number of over 100-year-olds is set to increase tenfold compared with today. Twenty four-hour availability of autonomous vehicles could ensure mobility and, at the same time, relieve traffic-plagued cities. Dubai is already switching to the third dimension with air taxis. By 2030, the United Arab Emirates aims to have transferred a quarter of its traffic to automated transport – on the streets as well as in the air.

## BIRTH AS A DIGITAL TWIN

Mass customisation, the connection of mass production with individual products according to the customer's requirements, is a fundamental goal of Industry 4.0. But how should it look, the flexible factory in which humans and things talk to each other and link themselves up to become a smart factory? How can highly individualised products – in the extreme case, unique items – be produced in a short time, and also be highly automated, energy-efficient and environmentally friendly?

The production of tomorrow is more akin to a perfectly organised ant state with swarm intelligence than to the thoroughly timed planning of the past. Digitalisation encompasses the entire value chain on the basis of Industry 4.0, the intelligent combination of software, sensor, processor and communications technology to connect the virtual and real worlds. In the digital factory, the products first emerge as digital twins in the virtual world, drafted at the

computer and optimised with the aid of adaptive algorithms. Their operation, their maintenance and even their recycling are tested before even a single screw really exists. Developers run through production processes virtually, from human movements to the interaction of the machines.

All the essential partners for planning and production are connected over the Internet, carry out changes in real time and discuss things with each other. Thanks to the digital twin, production employees are not left on their own later during real production, either. Using augmented reality (AR), they can superimpose detailed information, 3D data or short videos directly onto the real environment as assembly aids: for example, they can project these onto the vehicle bodywork and see them on their tablets or using virtual reality glasses. For optimally flexible manufacture, autonomous transport units bring the vehicles and the component parts to be assembled to production cells, where humans and robots work together. If a cell is currently occupied, the transport unit searches for another cell which is vacant and where a production step can be brought forward.

## SMART WORKPIECES TALK TO EACH OTHER

In self-optimising production – the keyword being "Internet of Things" – communication from machine to machine is just as important as between humans and machines. Even today, there are apparently more machines connected over the Internet than people living on earth. And this number is growing by around 40 per cent per year. Every day, all kinds of devices – sensors, computers, smartphones – produce ten times as much data as is contained in all the books in the world. In factories, too, more and more workpieces are "smart" and are transforming into so-called cyber-physical systems – for example, by equipping every workpiece with a radio chip in which its individual product memory – its own identity, so to speak – is stored. Workpieces can thus exchange data with each other and with the factory control system. At every point they also know the status of their own processing and their next task.

In turn, not only people but also collaborative robots will work at the production cells in future. They will work without protective fences, hand in hand with people. Cameras with object recognition and sensitive sensors make them extremely safe: if they register any unexpected contact, for example at the arms or grippers, they can stop their activity abruptly within a thousandth of a second. Also, in future they will be able to store data such as body size or individual restrictions of employees – the machines will adapt to them automatically.

## MATERIALS WITH A MEMORY

Then we come to advanced technologies for production. Previously, people forged, milled, drilled or casted. Today, using lasers in 3D printing, powder materials can be fused layer by layer, and objects with very complex dimensions can be grown – without detours, directly together with the data of the digital twin. This is already possible now, not only with quick-hardening plastics but also with metals and ceramics.

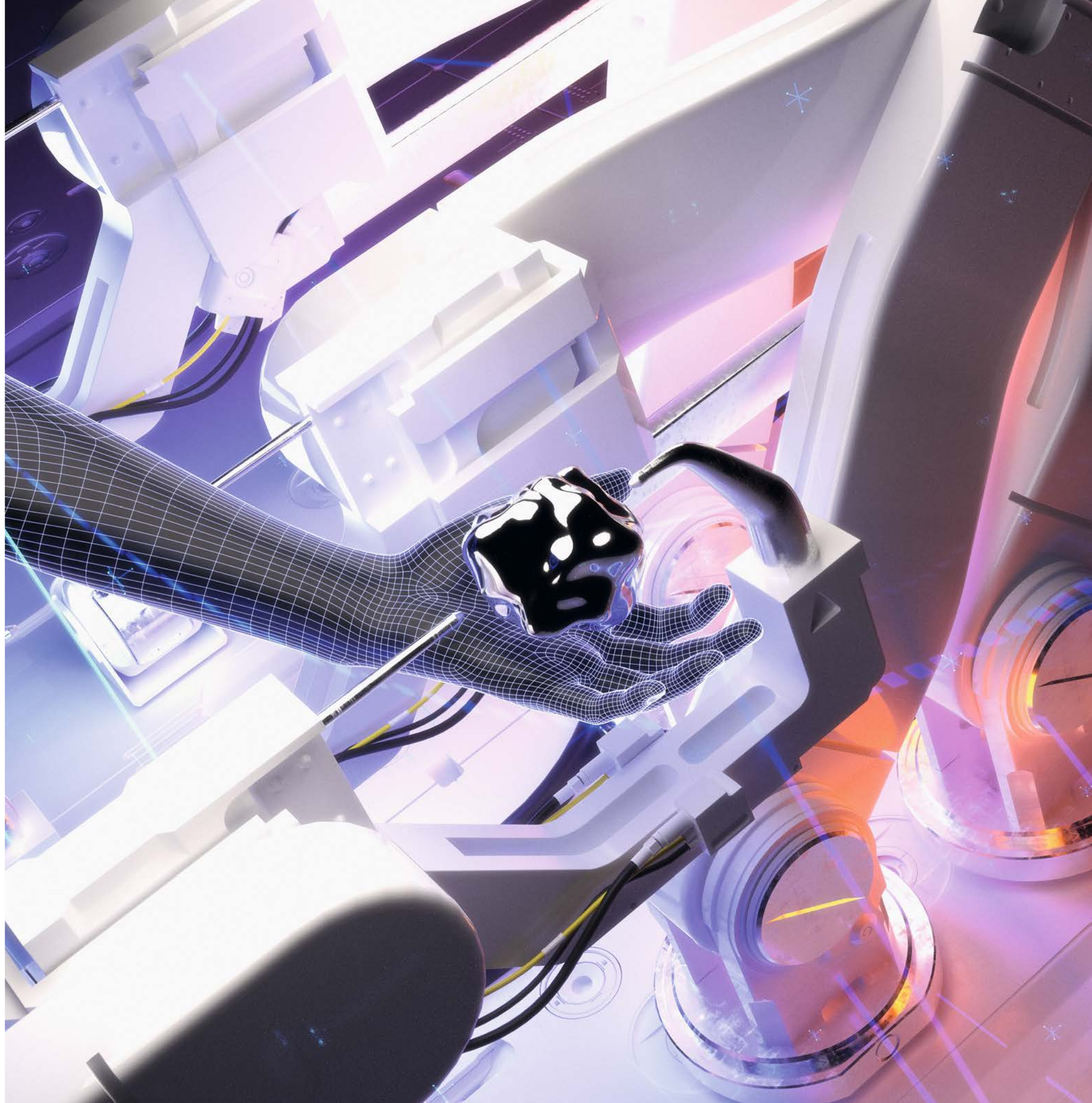
In future, 4D printing will also be possible – that is, materials which are merged together by 3D printing and which then take on another form in the "fourth dimension" of time, so to speak. This transformation can happen through heat, through humidity or via electricity. Particularly suited to this are memory metals: so-called shape-memory alloys, such as nickel-titanium, which take on a particular shape when warmed and then return to their original shape when cooled. Even artificial muscles can be built – for example, from electroactive plastics or twisted carbon nanotubes.

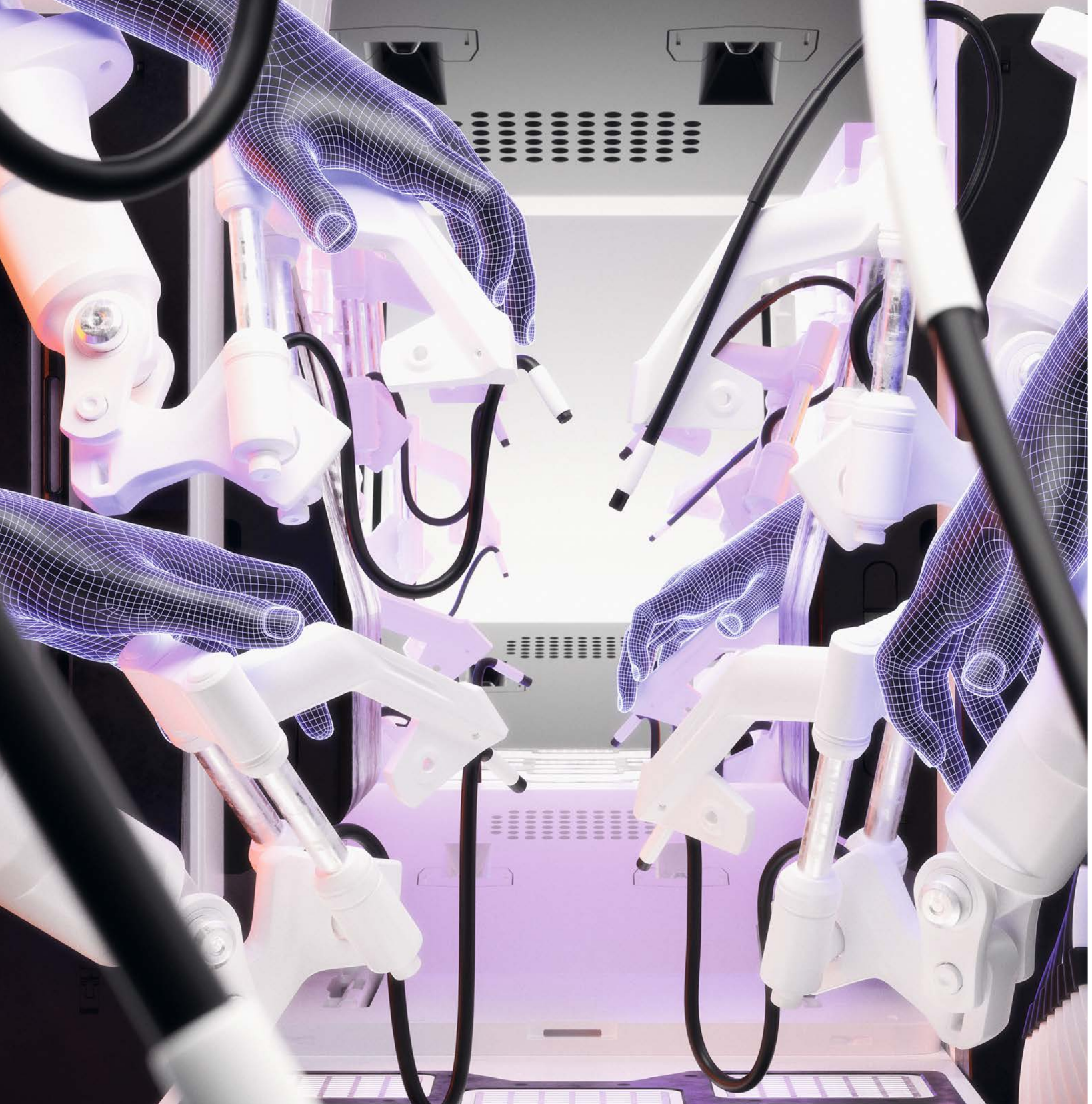
## MACHINE LEARNING: THE KEY TO INDUSTRY 5.0

Whether for the continual improvement of production processes during operation, the training of robots, the integrating of suppliers and customers or for finding the easiest possible way to operate machines, the smart factory of the future is unthinkable without the broad deployment of artificial intelligence (AI). This goes far beyond the digitalisation concept of Industry 4.0 – so far in fact that one could call AI the essential quality leap towards an Industry 5.0. With AI, programming will be a thing of the past. In future, machines of all kinds will be controlled by dialogues in natural language and via gestures: the factory employees will simply show the machines what they are to do, and will speak to them in the same way that they speak to smartphones and intelligent speakers.

In addition, artificial intelligence analyses the data from innumerable sensors and thus detects very early when problems occur







with robots or with processes in the factory – often, deviations, irregularities or quality deterioration are indicated even before they actually occur. Thus, the AI systems can raise the alarm in time and recommend alternatives, which the human experts then discuss, prioritise and implement in dialogue with the machine.

In future, artificial intelligence will also conduct simulations in advance with the data from the digital twins and the information from the actual production environment in order to detect even those problems which have not previously occurred but which are conceivable and for which one should be prepared. And artistic creativity will also increasingly come into play: that is, the smart machines will make design proposals, combine product ideas and manufacturing processes, and continue to refine and improve them on the basis of the feedback they receive from people.

There's no doubt: in ten to twenty years, a smart factory will be, to a great extent, characterised by autonomous machines and workpieces "with their own identity" which communicate with each other. But it is just as certain that people will continue to play an essential role in the factory of the future. And not just as "firefighters" when problems occur. They will also be controllers and thinkers, planners and deciders, creative problem and conflict solvers, guarantors of quality, safety and reliability, and decisive partners entrusted with demonstrating emotional and social intelligence towards their customers and suppliers. Far from becoming more monotonous, the tasks performed by people in the flexible factory of tomorrow will actually be more varied, more diverse and more exciting, and surely more appropriate to the "human individual" than traditional factory tasks were.

Kira, at any rate, is not a substitute for people. Just a means to an end.

**In future, artificial intelligence will also conduct simulations in advance with the data from the digital twins and the information from the actual production environment in order to detect even those problems which have not previously occurred but which are conceivable and for which one should be prepared.**

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**Dr Ulrich Eberl** completed his doctorate in physics at TU München (Technical University of Munich) and was Head of Communications for research and innovation at Siemens for over 20 years. Eberl was the founder and, for 15 years, the chief editor of the internationally multiple award-winning future magazine *Pictures of the Future*. He has also written several books, including "Future 2050 – how we are already shaping the future today" (2011) and "Smart machines – how Artificial Intelligence is changing our lives" (2016).

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**Sucuk und Bratwurst** are a four-man design studio from Mainz, consisting of Alessandro Belliero, David Gönner, and Lukas and Denis Olgac. Inspired by the Internet, by speed and by all that sparkles, they were already doing free work, digital collages and 3D renderings which would probably be best described as *post-internet art* before founding their agency. Since 2014, their design studio has been known for their digital, three-dimensional works located between science fiction and tuning. They put on museum and gallery exhibitions and give lectures at art and design colleges all over Germany, as well as working for international sports brands, musicians and magazines.

# Digital natives

**Where is the journey taking us? In the digital age now dawning, no one can really tell us the answer. That's why it's so important to have the right people alongside you.**

In the early nineties, the Canadian author Douglas Coupland released a visionary novel in which he described the everyday reality and the attitudes of his contemporaries. "Generation X" soon became a bestseller and resulted in lifestyle trends and their adherents long being pooled under monikers such as "Generation Z" or "Generation Golf".

Designations like this are now considered outmoded. Future researchers studying our times will, above all, discern two main groups of people: those who think, live and work digitally – just like the digital natives at Porsche, exemplified by a number of whom we are introducing here. And on the other hand, there are those who have not (yet) embraced the new age.

After all, the upheavals we are currently experiencing are not likely to be any less far-reaching than those of the industrial revolution. Right now, events with a similar transformative power are, quite literally, occurring once again.

Everything is gaining momentum. Yet where this momentum will lead us is something no one can currently predict with any accuracy (and anyone who claims otherwise is lying or overly self-confident). After all, digitalisation is not some pre-programmed package that only needs to be understood, rolled out and implemented. Quite the contrary: it is a quest characterised by adventure, a mission with an unknown destination, and we have all now embarked on it together. Just like any expedition, having a few people alongside you who are scouts, pioneers and driven by curiosity is helpful. They are people who do not inherently know all the right answers either. But they know the right questions to ask.

When it comes to innovation, there are, as everyone knows, three typical reactions. To start with, there are those who will go along with anything. Then there are others who can't work out what is actually happening. And finally, there are those who face the future head-on by doing.

In these times of digital revolution, these people are referred to as digital natives. At Porsche, they are now found in each and every department within the company, and are involved in fine-tuning all sorts of different processes in the widest range of projects. They are people who – regardless of their age, generation, gender or language – feel at home in the digital world. Quite simply because at this very moment, they are the ones who are pooling their efforts to create this world.

Photography: Elias Hassos


**Matthias Hub**
As a member of the Smart Mobility Planning Team, I am involved with all aspects of digital services related to the car. Our goal is to discover and test innovative technologies and issues at an early stage and to integrate them into products. That is why we cooperate with various start-ups and carry out continuous technology scouting using our network and trade fairs. We also develop prototypes in order to try out new ideas. The ideas are then tested in current or future models.

I am also fascinated by the issue of digitalisation outside of work. Using a bus system and several Raspberry Pis, I have turned my flat into a smart home. I programmed the components myself, and now I run big data on a small scale.

My job allows me to remain at the cutting edge of technological development, but it also demands the same of me. Standing still is not an option.

**Saad Azza**
Digital price tags, mixed reality in the sales process or the roll-out of our digital signage solutions: those are just some of the topics I deal with as a Junior Specialist Digital Retail for distribution network management and development. To put it simply, you could say that I'm helping to design the retail landscape of tomorrow. And that landscape is going to be dominated worldwide by the digital dimension.

I grew up with computers and games consoles. I am very interested in the latest technology trends and gadgets. At Porsche, I completed a trainee programme with a focus on Future Retail. A deployment in a Porsche Centre was part of this programme. I was able to find out first-hand what customers expect from a modern distribution landscape. This experience helps me to develop tools for selling technologically complex vehicles and services.

Foreign countries and cultures are my second great passion, which is why I like working in international teams. In conjunction with our subsidiaries, I am currently evaluating, testing and implementing digital solutions for the sales floors in Porsche Centres in the Asia region.

**Alice Chan**
Which digitalisation strategies, innovative concepts and digital technologies will help us move forward? What knowledge is hidden in your data? As a data scientist at Porsche Digital Lab Berlin, I assist the Porsche team in answering these questions.

My journey to the digital laboratory involved interim stops as an Internet of Things researcher at Intel and business analyst at Texas Instruments. During my master's studies, I spent three years researching Artificial Intelligence, Predictive Analytics and Technical Business Development at Taiwan's leading technical university, National Taiwan University of Science and Technology. Prior to that, I founded a start-up that developed an intelligent motorcycle helmet which automatically makes emergency calls if the rider has an accident. Our innovation has been patented and received several design awards.

This life-saving innovation is a good example of what motivates my work — using technologies to find new solutions to solve serious problems. We achieve this at Porsche by combining amazing people with new digital technologies.

**Tobias Acker**
In the automobile industry, when you hear "procurement", you initially think of vehicle parts, clearly defined processes and specialist suppliers for this sector. In the area of connectivity, however, it's quite different. Until now, IT companies have not really had any points of contact with the vehicle sector. We first need to convince these companies to work with car manufacturers.

After my dual course of study, I worked in distribution for a software start-up. Then came my first step into the vehicle industry. Since 2016, I have been a Partner Manager at Porsche for the international procurement of data volumes and connectivity platform solutions. In this job, I am able to apply my entire experience from the IT sector to a completely new area. The important thing is finding the right partners and demonstrating new ways of allowing both sides to work constructively with one another. We define innovative processes and link them with tried-and-trusted purchasing structures. An exciting challenge.

**Katerina Kourti**
Cooperation with developers, start-ups and the Group's own innovators. New technologies and how to implement them in  what I consider to be the best "device" in the world – a Porsche. All of this is what drives me. And it's exactly what I do every day.

I studied Technical Cybernetics at the University of Stuttgart and wrote my dissertation on non-linear observers at UNAM in Mexico City. I then spent a few years working in Athens and Stuttgart for a company that developed robotic and computer-vision systems. After the failed founding of a start-up, I spent my gap year training for and taking part in a sailing regatta, something I had wanted to do for a long time.

Since October 2016, my colleagues and I have been working on developing the Premium Connect services of the future. I am responsible for special projects for the Connected Car and infotainment environments. I am also in charge of Group-wide coordination in this area. In other words, I also work on the automobile of tomorrow.

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