
TÜV SÜD
Add value.
Inspire trust.
ADVANCE
TÜV®

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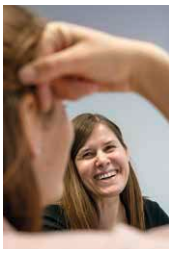

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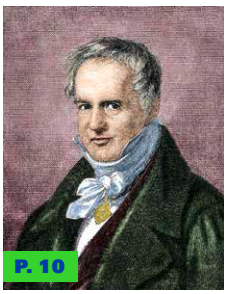

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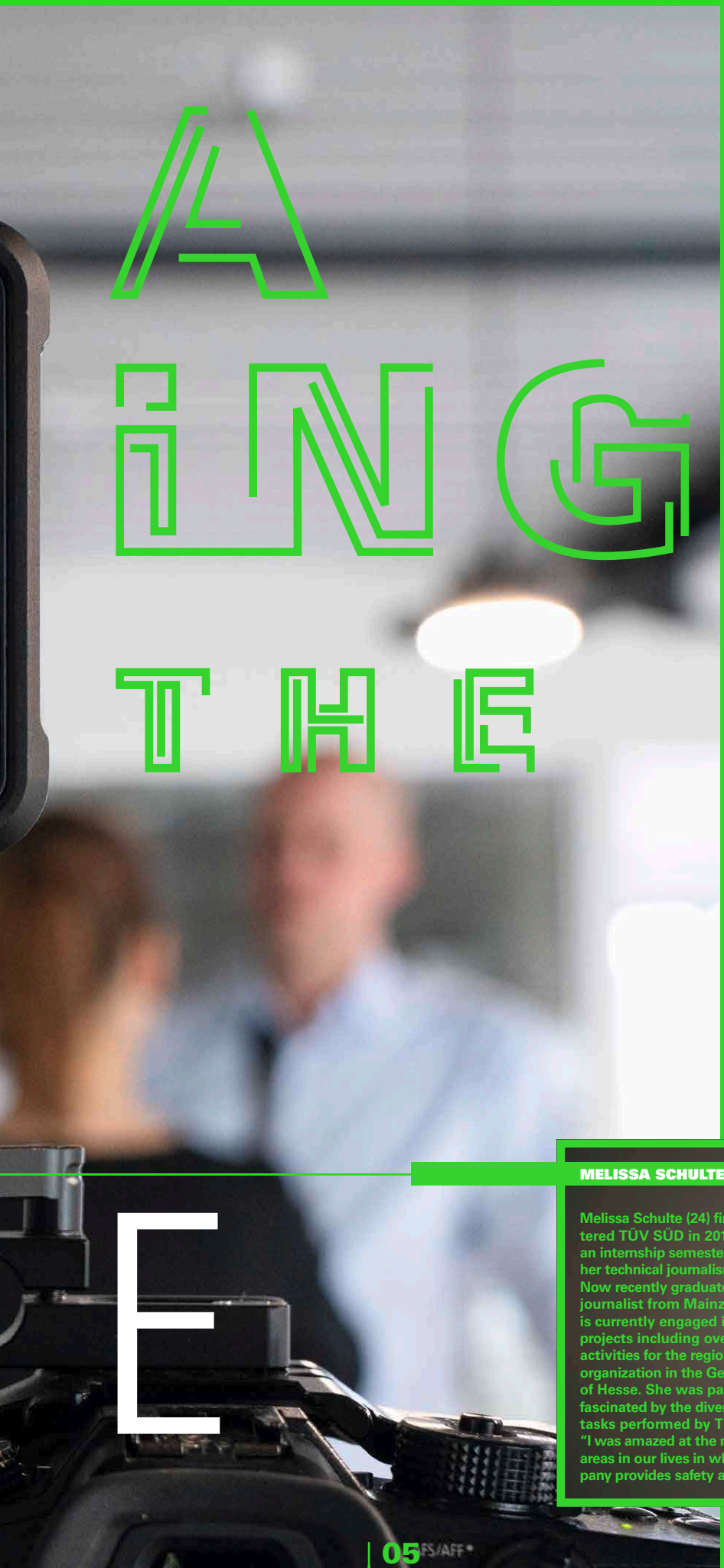
**ADVANCING** The future belongs to the brave, and even the longest road starts with a single step forward. Every era confronts us with new tasks, and we advance by solving them. "The Next Level. Together." is TÜV SÜD's guiding principle. Together we advance our company, our customers, and society as a whole to a new level. A magazine about good ideas.

# EMBRACE FUTURE



# AING THE E

**"The Next Level. Together." is the guiding principle of TÜV SÜD's corporate strategy. We work together to advance the company and continue bringing safety and certainty to society in the age of digital technology.**

**But what exactly is the next level? We believe that it also concerns the many small-scale innovations and developments through which our people at TÜV SÜD make our services a little better day by day. Varied, imaginative, committed, and sometimes unconventional. They are what this magazine is all about.**

**The method we used to create the magazine was unconventional, too. We asked a young journalist to explore three areas of our company. Unbiased, objective, and with the fresh eyes only an "outsider" can provide.**

**Finally, the conditions: In the coronavirus pandemic, exceptional flexibility is paramount for research, photo shoots, and video productions. On-site filming in China and Thailand was replaced with video calls, local photographers, and email interviews. A new experience for everyone involved, and a perfect example of a step to a new level.**

**MELISSA SCHULTE**

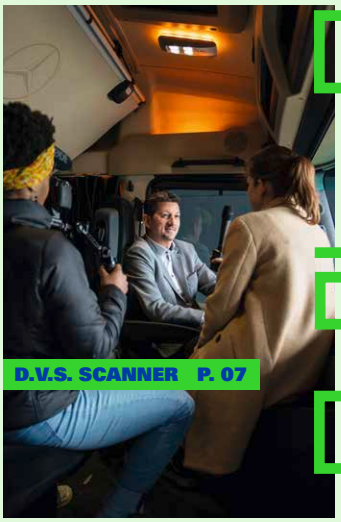
**Melissa Schulte (24) first encountered TÜV SÜD in 2018 during an internship semester as part of her technical journalism studies. Now recently graduated, the young journalist from Mainz, Germany is currently engaged in various projects including overseeing PR activities for the regional Scouting organization in the German state of Hesse. She was particularly fascinated by the diversity of the tasks performed by TÜV SÜD: "I was amazed at the number of areas in our lives in which the company provides safety and certainty."**

**MORE ABOUT THE STORIES ONLINE**
www.annualreport.tuvsud.com/2019/magazine/mobility/

# NEXT LEVEL MOBILITY

Mobility in our society is changing – driven by the developments around digitalization and new drive systems. For TÜV SÜD, this means continuously advancing our technological expertise, optimizing our services, and developing new forward-looking service products. By doing so, we are creating the conditions for safe, secure mobility – now and in the future.

We are accompanying this change with future-facing innovations in areas such as highly automated driving, but principally by introducing a host of smaller-scale improvements that combine to elevate our mobility to a new level in general. Across Germany and internationally, our innovation teams, experts, and specialists are collaborating on new ideas, including digitalization processes for car dealerships, artificial intelligence in damage assessments, and automated car rental returns. These activities will not only make our services faster and better; they will also unlock new capacities for continuously improving the safety and reliability of our transport.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AI P. 08


MIC, THE CAMERA ROBOT P. 09

**MARTIN KUSATZ**

Neu-Ulm, Managing Director Digital Vehicle Scan GmbH & Co. KG

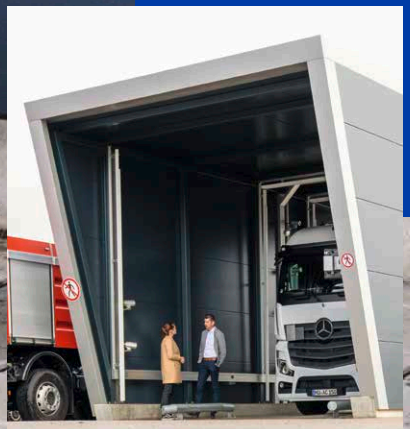
## »IMAGES ARE THE ULTIMATE PROOF!«

**The German city of Neu-Ulm is home to Mercedes-Benz' large-scale commercial vehicle plant – and to a unique installation. Many times per hour, large trucks and vans drive through the box as it digitally records every detail of the vehicles in seconds. The technology is designed to revolutionize vehicle assessment processes.**

»This year we launched our Digital Vehicle Scan (D.V.S.), a new tool for our customers which captures high-resolution 360-degree images of any vehicle, from passenger cars to double-decker buses, in an instant. Its main area of application is in car dealerships, where it enhances trust between dealers, leasing companies, and their customers. At the point of transfer of risk, i.e. the handover of the vehicle to the customer or its return by the customer, the vehicle's condition is fully and precisely documented.

Basis of the technology is the principle that images offer the ultimate proof. Any current damage to the vehicle is automatically recorded, replacing manual photography. The system provides our experts with an in-depth overview of the vehicle's condition that enables them to assess the impact of damage on the vehicle's value. In the future, we plan to install D.V.S. at entrances to car dealerships, which will open up a wealth of opportunities – such as license plate identification, which can improve customer service quality and save time and costs all round when repairs are due.«

The Berlin native has a background in automotive sales and a degree in business management.



The D.V.S. in Neu-Ulm may not look too impressive at first sight, but it is crammed with state-of-the-art technology.

The »Thinking Lab« offers plenty of space for ideas and innovations – and for an interview conducted by our reporter Melissa, in which Martin Vetter speaks about the potential for artificial intelligence at TÜV SÜD.

**MARTIN VETTER**

Munich,
Head of Innovation,
Division Mobility

Martin Vetter and his team have a vision of developing services for the mobility of the future with new ideas that drive the company forward.

# MOBILITY

## »CREATING NEW CAPACITIES WITH AI.«

**Dr. Martin Vetter is Head of Innovation at TÜV SÜD's Mobility Division. He and his team work on applying artificial intelligence in damage assessment.**

»AI can take over simple, time-consuming, and recurring tasks and thus support processes. At TÜV SÜD we are able to combine the advantages of the technology – standardization, flexibility, and speed – with our wealth of more than 150 years of experience. Where the use of Digital Vehicle Scan is concerned, for example, we are engaged in optimizing the results and reliability of AI in automated damage assessments and valuations. The capacities we create thus enable us to deploy our specialists precisely where their experience and their knowledge are most valuable in evaluating complex issues.«

## »LITTLE MIC EMBODIES EVERYTHING THAT INNOVATION STANDS FOR!«

**The Mic project was launched in August 2019. The name is an acronym of precisely what the little robot does: move in circles. As Mic travels around the vehicle, it captures perfect 360-degree images – a sales and marketing innovation!**

»At the start, little Mic was only able to travel in circles and take a video. But after just a few months, the robot now travels around the vehicle automatically and autonomously and delivers perfect 3D images.

We are currently using Mic in a pilot project at one of our locations, but the technology and its software will soon be advanced enough for us to roll it out. Mic will then offer enormous advantages, particularly in vehicle sales operations. The robot can be used at any location where large numbers of used or new vehicles have to be photographed on a regular basis. This is where our technology brings especially huge benefits for employees, who previously had to photograph the vehicles manually. Thanks to Mic this process will be faster, standardized and higher-quality in the future.«

**SEBASTIAN OSPALEK**

Leipzig,
Business Development,
Division Mobility

Previously an automobile assessment expert, Sebastian Ospalek is now lead of the Mic project.

The nimble little robot's basic design resembles a Segway – and could even take a passenger

# Wheels, genes, & viruses

**Again and again, visionaries have inspired pioneering breakthroughs in science and technology. With their inspiration, these fields have increasingly shifted their activities from the real world to address virtual realms and microscopic scales.**


**Left:**
**The Benz Patent Motor Car Number 3, historic illustration from 1880**

**Right:**
**Carl Benz, shown here aged around 80, lived to see his idea come to fruition.**

## THREE WHEELS THAT UNLOCKED A NEW WORLD

**While many contemporaries scoffed at Benz' 1885 invention of the "Motorwagen Nummer 1" ("Patent Motor Car Number One") as a "horseless carriage," his three-wheeled vehicle with its four-stroke engine soon proved to be a milestone in the history of technology – the first functioning automobile.**

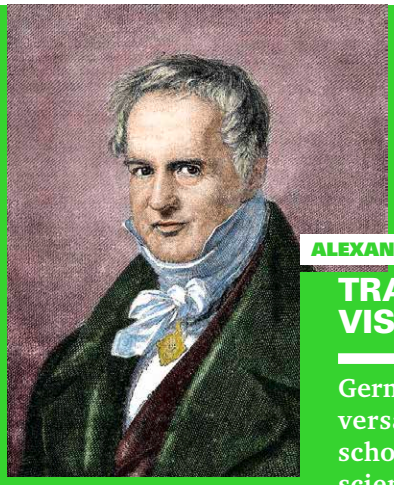
When Carl Benz' "Motorwagen" was first taken to the streets in the German city of Mannheim, it had to jostle for position with a variety of steam-powered vehicles. Benz was heaped with scorn and derision for his work, typically dubbed "ridiculous," "nonsense," and "superfluous humbug" – and the vehicle was admittedly rather unusual in appearance, given that most of it was constructed from bicycle parts. But Benz, a mechanical engineering graduate, was undeterred and filed for a patent on his invention in 1886. This patent document is classified as a UNESCO World Heritage Document as an icon of our automobile society. The patent itself heralded a so far unknown experience of mobility for the human race. Benz achieved a breakthrough at the end of the 1880s when the European high society embraced his new vehicle, and by 1900 his factory was already the biggest automobile manufacturer in the world. Rivals included Gottlieb Daimler, who was notching up sales of his first Mercedes vehicle around the same time. Although Benz withdrew from an active role as early as 1903, he retains the status of successful automotive pioneer. Only one thing was denied him: the first cross-country drive in his legendary "Motorwagen." This honor went to his wife Bertha, who secretly drove 70 kilometers to Pforzheim and back in a Model 3 Motorwagen.

FRANÇOISE BARRÉ-SINOUSSI

## SAVIOR OF MILLIONS OF LIVES

**The stakes were high: the goal was nothing less than the identification of the Human Immunodeficiency Virus, or HIV. This major achievement was claimed in 1983 by Françoise Barré-Sinoussi, a member of virologist Luc Montagnier's research group at the Institut Pasteur in Paris. The AIDS virus had been isolated.**

Barré-Sinoussi had never planned to become a scientist. Her career began with an internship at the Institut Pasteur and culminated with her identification of the virus, which the French virologist successfully isolated from a tissue sample taken from an AIDS patient. By doing so, she laid the foundations for developing HIV drugs and was rewarded with a share of the 2008 Nobel Prize. But Barré-Sinoussi is well aware that her work is not complete. Almost 40 years after her discovery as many as around 38 million people all over the world are still infected. Her tireless research continues.



Alexander von Humboldt, shown here in an 1883 engraving, changed our world forever.

ALEXANDER VON HUMBOLDT

## TRAVELER WITH A NEW VISION OF THE WORLD

**German naturalist and explorer, universal genius and cosmopolitan, scholar mentor and patron of the science: Alexander von Humboldt was all these. In 1799 he embarked on a journey that would elevate humanity's knowledge of the natural world to a whole new level.**

Humboldt became most celebrated for his great voyage to South America (1799–1804), which was later celebrated as the second, the scientific, discovery of South America. The meticulously documented findings he brought back from his travels fundamentally changed the relationship between humankind and nature. Humboldt's analytical approach shaped the field of science to come; natural sciences such as geography, climatology, and ecology all claim him as their founder. Although his books "Cosmos" and "Views of Nature" brought him enormous popularity during his lifetime; fame alone proved insufficient and he was beset by financial difficulties in his later years.

EMMANUELLE CHARPENTIER

Changing lives with a genetic engineering tool

## THE "SCISSORS" THAT REVOLUTIONIZED BIOTECHNOLOGY

**Emmanuelle Charpentier's Nobel Prize-worthy discovery could change many lives. In 2011 the French biotechnologist published the first fundamental principles of CRISPR/Cas9, her groundbreaking gene-editing technology.**

CRISPR/Cas9, a type of molecular scissor technology can be used to cut and edit genetic material and reinsert it into a living organism. One could almost say this technology enables humanity to create the world of tomorrow. The simple idea on which it is based involves taking a physical defense mechanism that attacks viruses with bacteria and using it as an allpurpose genome editing tool. Animals and plants can be designed in this way – and humans with AIDS, cancer, or hereditary genetic disorders can be healed. Within months of their release, Charpentier's findings changed the way laboratories worked. The method is already the most widely used genetic editing tool in the world.

Fathers of the Internet Protocol: Robert E. Kahn (left) and Vinton G. Cerf (right)

VINTON G. CERF & ROBERT E. KAHN

## OPENING UP NEW WORLDS OF COMMUNICATION

**The partnership of a doctor of mathematics and a doctor of electrical engineering laid the foundations for the most incredible information medium in the world – the Internet. Yet neither had the slightest inkling of the impact their work would later have.**

Today the Internet is an essential part of our professional and private lives, used according to 2018 statistics by around 3.9 billion people and rising. But in 1973, when Cerf and Kahn presented their first version of the Internet protocol TCP/IP at the University of Stanford, there was no indication of how sweeping the changes in communication and information would be. The new medium was intended solely as a method to allow scientists to communicate and to connect universities. Continually updated, TCP/IP still forms the basis of data transfer on the Internet today. But Cerf has further-reaching ideas. He has spent many years working on the Interplanetary Internet, aimed to become a communication standard from planet to planet in the near future.

REPORTER MELISSA IN ACTION: MORE ON THESE STORIES ONLINE
https://www.annualreport.tuvsud.com/2019/magazine/industry

# NEXT LEVEL iND

FLAT-BOTTOM TANKS P. 13

Large-scale installations in industrial operations require regular maintenance, whether they are water tanks, pressure vessels, or flat-bottom tanks. After all, they must not present a danger to people or the environment.

TÜV SÜD has provided safety in this field for over 150 years. The cornerstone of the classic testing procedure is always physical inspection, in which an expert climbs into a previously emptied and cleaned tank. However, this involves an enormous amount of work and high costs for the installation owners. The tanks or vessels are then tested for leaks by being filled with water. In the case of special-purpose vessels for substances such as rare gases, these tests are not without challenges and are extremely expensive for the operators. Some time ago TÜV SÜD developed a radically simplified testing method for these procedures: acoustic emissions testing, enabling vessels to be tested during operation.

SPECIAL-PURPOSE VESSELS P. 14

HYDROGEN TANKS P. 15

Dana Dietze is fascinated by large tanks in large-scale industrial installations. She always has a trunk full of equipment along.

# OUSTRY

**»IT'S ALWAYS EXCITING WHEN THE PRESSURE STARTS TO RISE!«**

**A cluster of chemical companies has grown around the town of Burghausen in Bavaria, Germany. Dana Dietze travels the region for TÜV SÜD, testing pressure vessels and piping systems in operations such as refineries. She has used acoustic emissions (AE) testing for years and continues to advance the method. Her vision for the future involves advancing the overall concept of flat-bottom tank testing using acoustic emissions testing combined with other technologies.**

»It's great to see that my work is important. The effects of time on the vessels and the importance of regular maintenance are evident. After all, they often contain substances that are hazardous to health and that must be prevented from contaminating the air or groundwater. We constantly advance our technology in order to offer our customers the maximum safety and efficiency, and acoustic emissions testing is a major step in this direction. In my specialist area of very large flat-bottom tanks, we are currently working on a technology that will allow full-scale testing without the need to send inspectors into the tanks. We will soon be able not only to identify corrosion and cracking in tank bottoms, but also to measure the precise wall thickness.«

**DANA DIETZE**

Burghausen, Installation Safety Expert

The expert's favorite aspect of her job is the variety. It's never boring!

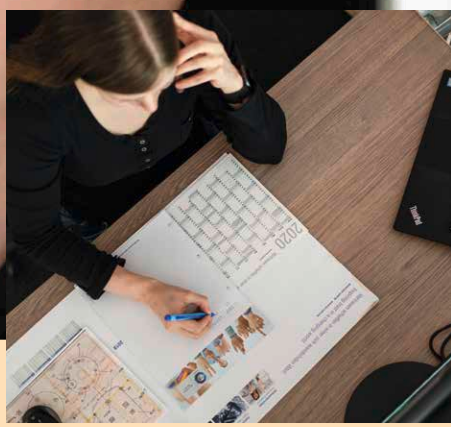
## »IT'S NEVER BORING!«

**Nina Scheuring originally trained as a nurse. But her passion for technology never left her, and she eventually studied and graduated in industrial engineering. Today she is one of TÜV SÜD's top specialists in special-purpose vessels for areas such as renewable energies.**

»Going from hospital to TÜV SÜD was a huge change for me, but now my patients are pressure vessels instead of people! The most interesting thing is that many special-purpose vessels are non-standard. Sometimes we can't attach our sensors onto the vessel wall because it's covered in an oil film, because the material is non-magnetic, or simply because the right point is out of reach. That's when we need improvisation and creativity. We may have to take a trip to the local expert store and buy special materials to complete our tests; sometimes we've even used tension belts to hold the sensors in place! I'm currently involved in a really exciting innovative project. A while ago we noticed cracks in a pressure vessel installation during acoustic emissions testing, and I wanted to know how long the customer could continue using the vessel. We're now building three pressure vessels with precisely defined faults and will conduct controlled burst tests. This will enable us to give our customers more accurate predictions and offer them greater safety, certainty, and trust!«

Always seeking out new challenges – the latest is an exciting innovation-driven project.

**NINA SCHEURING**
Wuerzburg,
Acoustic Emissions Testing Expert



OUSTRY

**DANIEL KRAUS**

Hof,
Group Head Innovation and Complex Systems

Safety first, even for researchers: occupational safety is also paramount for Melissa, so helmet and safety vest are a must.

As a pressure vessel tester, Daniel Kraus travels long distances – even by air if necessary.

## »A PENCIL LEAD FOR ACOUSTIC EMISSIONS TESTING«

**Near the city of Hof in the German region of Franconia, Daniel Kraus and his team focus on acoustic emissions testing. The region is home to numerous companies in the classic production sector, which appreciate the testing services in explosion hazard zones offered by TÜV SÜD.**

»For acoustic emissions testing, I usually travel with a whole vanload of equipment in tow – lots of cable drums, the heavy measurement device itself, and of course all the sensors. One of the most modest items I take along is my mechanical pencil, but it has a crucial role to play! As soon as the sensors are set up I take the pencil and snap the lead off against the vessel at various points. The sensors react to these clicks, which enables us to locate and test them. When it comes to vessels containing highly flammable materials like hydrogen or liquefied gas, AE testing offers an enormous safety plus, both for us and for our customers! They can allow operations to continue as normal, saving time and costs. As part of our ongoing improvements to our customer service, we are currently addressing continuous surveillance. This enables vessel conditions to be assessed at any time, allowing risks to be identified immediately and remedied.«

# Human rights, equal opportunities, & female heads of state

**Equality remains a still-distant goal, widely called for across politics and society. Yet dedicated pioneers have repeatedly won milestone victories in the past, both historically and more recently.**

VIGDÍS FINNBOGADÓTTIR

## LEAVE IT TO A WOMAN!

**A woman, divorced, with an adopted daughter, took on three high-profile male rivals – and won. After becoming the world's first democratically elected female head of state in 1980, the new president of Iceland expressed her admiration for the population's bold move in electing a woman.**

Women in Iceland had already held a protest against the patriarchy in 1975; their one-day strike that year laid the foundations for Vigdís Finnbogadóttir's bid for presidency. What appears so natural today was evidently a matter of vehement debate prior to her election. The lack of a husband by the side of the new presidential hopeful was a persistent theme – but not for Finnbogadóttir herself, who announced that she should be elected because she was a person and that voting for a woman should be every bit as normal as voting for a man. Her narrow yet historic victory in 1980 was followed by three further terms up to 1996. Vigdis, as she is familiarly known to all Icelanders, is still regarded today as an outstanding ambassador for her small country.

**Redefining Iceland's image: Vigdís Finnbogadóttir (right), seen here on a 1985 state visit to the Netherlands with Queen Beatrix**

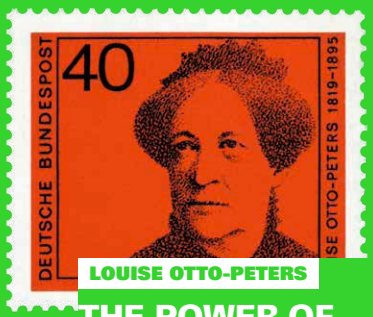

ELEANOR ROOSEVELT

**First Lady of distinction: Eleanor Roosevelt during a radio broadcast in Washington DC, around 1939**

## THE FIRST LADY OF HUMAN RIGHTS

**Shy young Eleanor Roosevelt would embark on a long journey before becoming the most famous and influential woman in the world. She strode this path with assurance, while also transforming the role of the First Lady at the White House.**

Eleanor Roosevelt was always famous for going one step further. As early as 1932, when her husband, Franklin D. Roosevelt, was inaugurated as US President, her role had already far outstripped that of First Lady by his side. Two days after the inauguration she held the first press conference in what would become a weekly series to which only women reporters were admitted. As a consequence, every newspaper was forced to employ at least one female reporter. Such actions were characteristic of Roosevelt. Before her husband became President he contracted polio; so she traveled the country in his place, speaking at party conventions and ensuring the name of Roosevelt was kept in the spotlight. She had been introduced to details of the political system and ways of working by a close family advisor, an unusual step in those times but one which furnished extremely useful knowledge, both for the role she would play as her country's strong First Lady and beyond. After her husband's death, Roosevelt – then 62 – was appointed official US delegate to the newly founded United Nations by incoming President Harry S. Truman. Convinced of the organization's vital role, she chaired the Human Rights Commission and was one of the authors of the Universal Declaration of Human Rights, officially adopted in 1948. The "First Lady of the World" remained one of the staunchest defenders of the Declaration until her death in 1962.




Passionate campaigner for women's rights: Louise Otto-Peters, here on a 1974 commemorative stamp

LOUISE OTTO-PETERS

## THE POWER OF THE PEN AGAINST WOMEN'S INEQUALITY

**Louise Otto was born in 1819, in an era far from any idea of women's suffrage. Although from a good family and financially independent, she had greater ambitions. Through the power of her writing, she became a leading protagonist of the 1848 revolution and the initiator of the organized women's movement in Germany.**

As was customary for 19th-century girls, higher education was closed to Louise Otto despite her thirst for knowledge. The lawyer's daughter from Meissen, Germany, was undeterred and embarked on a lifetime of self-education. Deciding to aim for a career, she quickly put her plans into action and became an author and critical contemporary observer. Louise Otto immersed herself in politics at an early stage. She harnessed the public attention gained by her novels on working-class poverty to promote the cause of women's rights. After the 1848 Revolution she launched her own women's newspaper under the rallying-cry – considered outrageous at the time – that "women's participation in the interests of the state is not merely a right: it is a duty." The newspaper was quickly denounced as revolutionary and was banned. However, Louise Otto – later Otto-Peters – never lost sight of her political goals, even during the period of reaction in the aftermath of the revolution; a few years later she founded the Leipzig Women's Educational Association, paving the way for the organized women's movement in Germany.


Still a powerful presence: Nelson Mandela – graffiti in Soweto Township

NELSON MANDELA

## THE GREAT RECONCILER

**The freedom fighter was already acclaimed during his lifetime as a true giant of history and a statesman conveying a special message of tolerance. Despite decades of imprisonment, this charismatic figure played a major role in peacefully ending apartheid.**

The South Africans had a name for the almost mystical fascination exuded by Mandela; they called it "Madiba Magic" in reference to his clan honorific. But in 1918, when Rolihlahla "Nelson" Mandela was born in the South African state of Transkei, the country was very far from magical. After colonialization by the British and Dutch, the state's majority black population was ruled over by a minority of white settlers. Racial discrimination spread with the foundation of the South African Union in 1910 and was established in law in 1948 upon the introduction of the apartheid regime. In 1944 Nelson Mandela, then a 26-year-old lawyer, joined the African National Congress (ANC) and began to champion the rights of the black population. As Mandela had originally supported militant action against apartheid, he was condemned to life imprisonment in 1964. Over the next 26 years he grew in status to become an icon and reconciler, heralding the end of the apartheid regime; in 1990, newly released from prison, he held a series of dramatic meetings negotiating a bloodless transfer of power from the white minority to the black majority. A mere four years later, Mandela was elected the first black president of his country in free and democratic elections, gaining an overwhelming majority.

VIDEOS AND FURTHER INSIGHTS FROM REPORTER MELISSA ONLINE
www.annualreport.tuvsud.com/2019/magazine/certification

# NEXT LEVEL CERTIFI

BATTERY E-MOBILITY P. 19

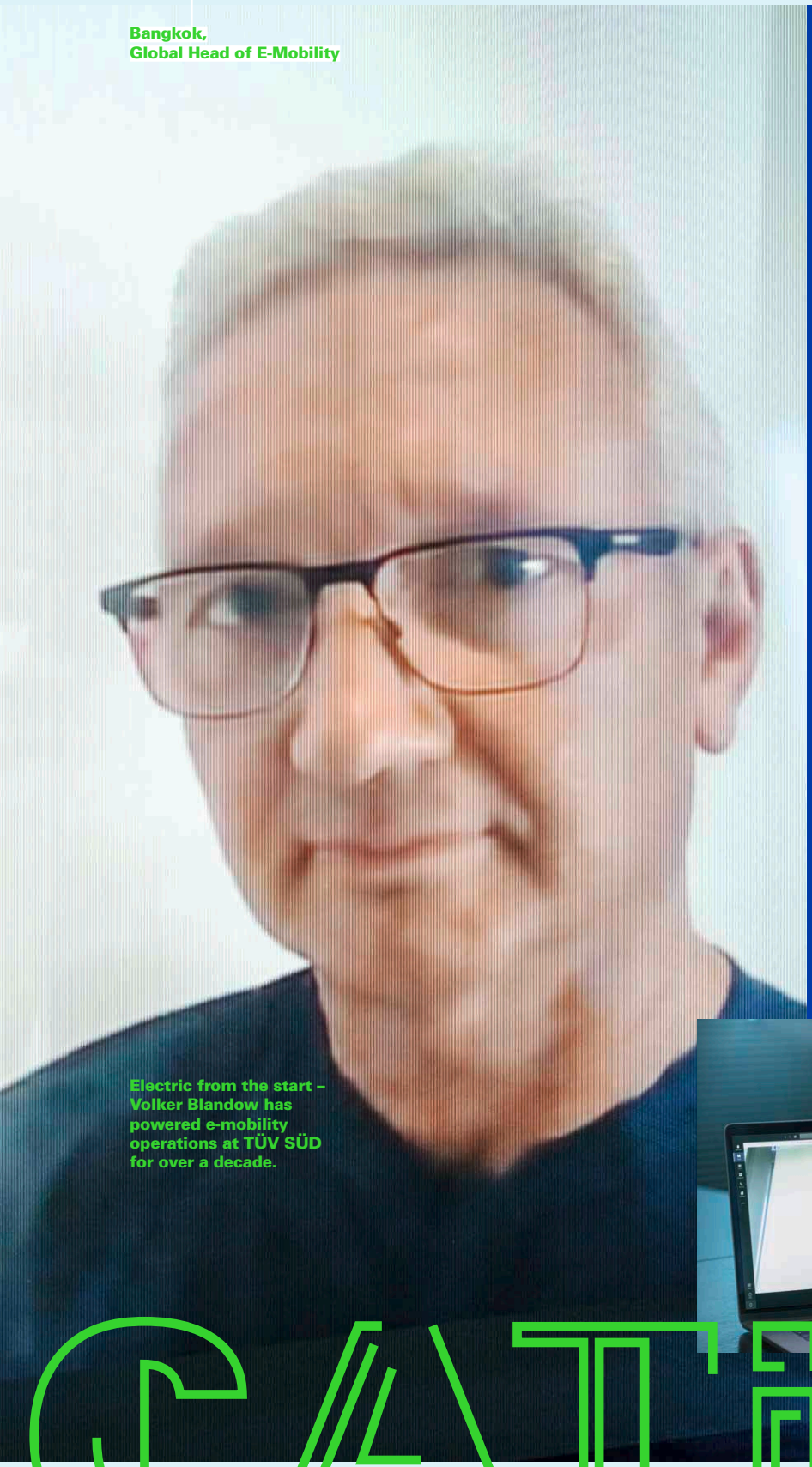
E is in! Although the big breakthrough is still some way off, electric vehicles are becoming an increasingly frequent phenomenon on our roads. But whether they are all-electric vehicles or hybrids, the battery ultimately makes all the difference. It has to deliver maximum performance, long service life, and safety. TÜV SÜD quickly recognized this need and has built up a globally acknowledged expertise in battery testing over the past decade.

The company's state-of-the-art chain of laboratories across Europe, North America, and Asia oversee the safety and reliability of electric vehicle technology. Let us take a look at **CHANGZHOU** near China's megacity Shanghai, where TÜV SÜD recently opened one of the biggest and most modern battery testing facilities in the world. TÜV SÜD's expertise is more sought-after than ever before, therefore further laboratories are already being established at full speed.

TEST LABORATORY P. 20

**VOLKER BLANDOW**

Bangkok,
Global Head of E-Mobility



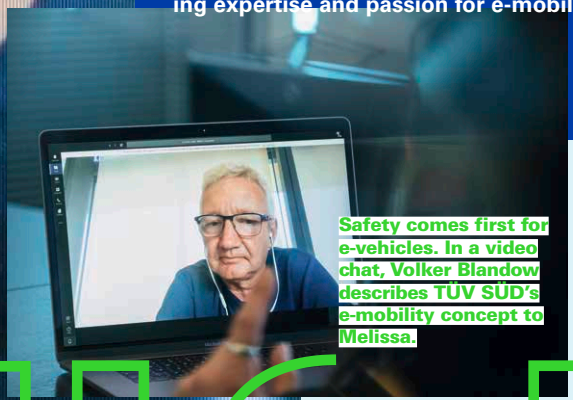
Electric from the start – Volker Blandow has powered e-mobility operations at TÜV SÜD for over a decade.

## »OUR QUALITY STANDARDS ARE ALL EMBRACING!«

**Where the introduction of national safety standards is concerned, TÜV SÜD is much in demand as a partner. As a third-party service provider, we offer expertise to accompany international developments and support global players.**

»There's a little bit of TÜV SÜD in almost every electric vehicle on the European market. We've meticulously put the batteries through their paces in advance, destroyed them, and pushed them to their absolute limits of performance. Our quality and safety benchmarks are exceptionally high, resulting in excellent standards that pay off in terms of customer trust and confidence over the long term! After all, consumers choosing an electric vehicle don't want to compromise on quality, performance, or safety.

Our pioneering position in this field is all thanks to TÜV SÜD's realization at an early stage – long before most car makers – that electric drive systems would play an important role in climate protection. We therefore made optimum preparations for the breakthrough of e-mobility. Many new players are currently entering the market, and we support these developments with our state-of-the-art laboratories, outstanding expertise and passion for e-mobility.«



Safety comes first for e-vehicles. In a video chat, Volker Blandow describes TÜV SÜD's e-mobility concept to Melissa.

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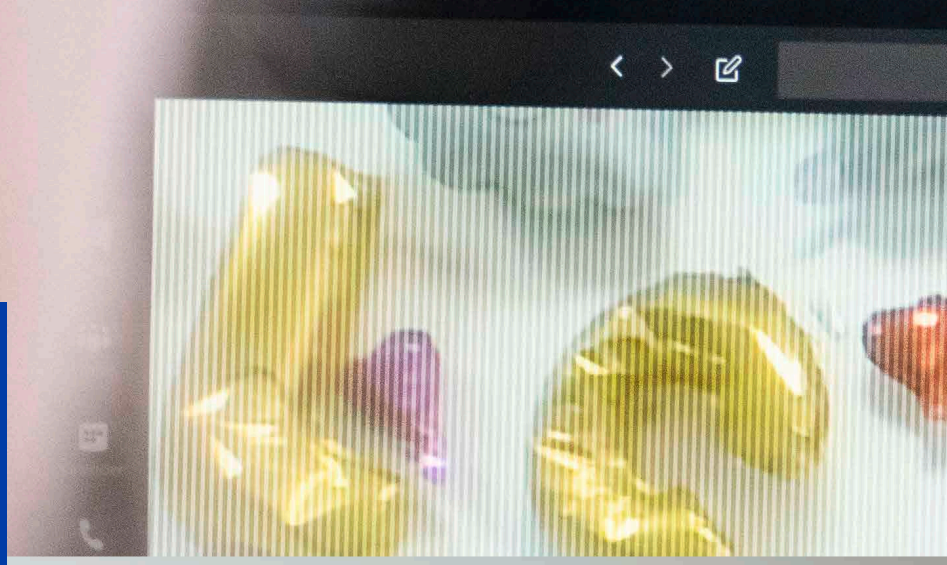


## »OUR BUNKER IS OUR PRIDE AND JOY!«

**The Changzhou testing laboratory is the largest of its kind in the world. Automotive industry customers value and use its services to test their large-scale batteries in simulations of extreme situations, with state-of-the-art technology and monitored by strict safety standards.**

»Our NEV (New Energy Vehicle) laboratory has no international equal. Equipped with cutting-edge technology, it offers extremely high testing capacity! The majority of our customers are automotive manufacturers seeking information on the resilience of the batteries in their electric vehicles. To do this, we have a variety of testing systems that are able to simulate extreme situations. For example, to investigate how batteries react to impact or accidents, we have a test rig that can replicate car crashes or travel over rough surfaces. To monitor performance under extreme environmental conditions, we can also simulate heavy rainfall, extremely high or low temperatures, and temperature fluctuations.

In Changzhou we are particularly proud of our large-scale bunkers – high-safety testing chambers where we make the batteries explode. That's a pretty impressive sight, for us as well as the customers! A battery that has passed all our lab tests is ready for any situation.«

**HURRY XU**

Changzhou,
Director TÜV SÜD
Battery Testing Lab



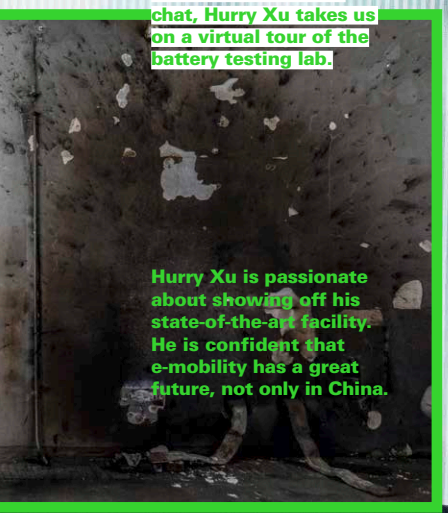
CERTIFI

**LIANG LIANG**

Shanghai, Marketing Manager Certification and Testing

Liang Liang's job is to showcase the work of over 4,000 colleagues who test consumer goods, electrical appliances, and high-tech products for global markets.

Face to face with digitalization: in a video chat, Hurry Xu takes us on a virtual tour of the battery testing lab.



Hurry Xu is passionate about showing off his state-of-the-art facility. He is confident that e-mobility has a great future, not only in China.

CATION

# Moptops, fashion icons, & creative architects

**The forces unleashed by music, philosophy, and design can change the world. The sounds, thoughts, and ideas that generate such profound impacts generally originate from striking personalities.**

Left:
Groundbreaking architect Zaha Hadid

Right:
Spectacular outlook: the panoramic window and viewing balcony at the Messner Mountain Museum in South Tyrol, designed by Hadid

ZAHA MOHAMMAD HADID

## GRANDE DAME OF ARCHITECTURE

**The architect's office opened by Iraqi Zaha Hadid in 1980 would utterly transform the world of architecture. Her buildings often appear to defy gravity or reject any useful purpose – and yet the very opposite is the case.**

For architect, architecture professor, and designer Zaha Hadid, who died in 2016 at the age of only 65, the ambition of completely rethinking buildings, rejecting the tedium of post-modernism, was the driving force. As early as 1983, she won a prize worth $100,000 for her leisure park design for Hong Kong based around a "horizontal skyscraper"; however, her first building would not see the light of day until 1993. This earliest work was a fire station for a factory in Weil am Rhein, Germany, featuring sharp diagonal forms. Later designs included Guangzhou Opera House in China, the National Museum of Arts of the 21st Century (MAXXI) in Rome, Italy, and the Messner Mountain Museum (MMM) on Kronplatz in the mountains of South Tyrol, Italy, all of which will continue to speak of Hadid's visionary mind in the future. Her deconstructivist style can be compared to Frank O. Gehry or Daniel Libeskind. And yet Hadid was also a master of flowing lines. She remained the exception in her field, always battling for professional status in an industry dominated by white men. This determination won her numerous plaudits; in 2004 she was the first woman to win the Pritzker Architecture Prize, the highest accolade in architecture.

IMMANUEL KANT

## THE UNWORLDLY WORLD CHANGER

**Kant's ideas, such as "Sapere aude – Dare to know," heralded the Age of Enlightenment. A watershed in philosophy with an impact that is still felt today.**

Very far from being a cosmopolitan, Immanuel Kant rarely ventured beyond the Königsberg region in East Prussia (then Germany; today Kaliningrad, Russia): the place where he was born, grew up, and died. Yet he changed the world with the power of his thoughts alone. No other thinker of his age was more influential than the "wise man of Königsberg," and no other revolutionized philosophy so extensively. 1781 saw the publication of Kant's most famous work and exposition of his epistemology, "A Critique of Pure Reason." Kant called for people to accept responsibility for their own actions instead of being led by others – God included. In fact, he freed philosophy from the bonds of religion. Kant's ideas were not universally welcomed; as he grew older he fell foul of the Prussian censorship authorities. But ideas are free. Kant, who died in 1804, has influenced countless philosophers right up to the present day.

Pioneered independence for women: Coco Chanel at work, 1930

COCO CHANEL

## VISIONARY STYLE ICON

**It would be a deep injustice to reduce Coco Chanel to the Chanel suit, the "little black dress," or the classic fragrance of "Chanel Nº 5," soon to celebrate its centenary. This unique woman was also one of the first feminists.**

A girl from humble origins made it all the way to Paris as a celebrated designer – and played a major role in freeing a whole generation of women from the physical constraints of the corset at the beginning of the last century. This was more than a fashion decision: this was an act of emancipation, which would not leave women's self-perception untouched. The Chanel suit she created became a kind of standard uniform for the businesswoman of today. But Chanel was also a feminist, believing that women should no longer be mere "arm candy" for their male companions, but should be "willful" in the truest sense of the word – full of their own will, taking their destiny into their own hands. Like Chanel herself. Although by no means averse to male company, she remained unmarried until her death at age 87. In her personal and professional life, she demonstrated that women could be independent in every way, provided they were willing to pay the price.

Overwhelming enthusiasm: fans at a Beatles concert in Essen, Germany, 1966

THE BEATLES

## THE SOUND OF A NEW GENERATION

**They hailed from rock 'n' roll roots, their first single was "Love Me Do," and their style changed the very idea of music for millions of people all over the world. Who were they? Four lads from Liverpool, England, whose first concert under the name "The Beatles" took place in St. Pauli, the red light district of Hamburg, Germany.**

From these early days of relatively innocuous beat lyrics, they became a musical phenomenon whose influence would penetrate every genre of pop and rock music. This development was driven by the Beatles' own musical evolution as they began to experiment with other musical styles from 1964 onward. By the time John Lennon, Paul McCartney, Ringo Starr, and George Harrison split up in 1970 the Beatles' music had drawn on a whole range of influences, from rock 'n' roll, beat and ballads to country, folk, music-hall, blues, and even psychedelic rock, hard rock, and classical music. The most impressive demonstration of their wide-ranging tastes was the 1968 double album "The Beatles," also known as the "White Album," where the band unfurled the full scope of their musical inspirations. Their music is still loved today; by the end of 2019, the quartet had sold around one billion records worldwide. Only their once-popular moptop hairstyle from 1962 has fallen out of fashion.

Inventor of the fitted kitchen: Margarethe Schütte-Lihotzky, around 1935

MARGARETE SCHÜTTE-LIHOTZKY

## KITCHEN DESIGN AS SOCIAL PROJECT

**Bauhaus architecture for all: in the 1920s the "Frankfurt Kitchen" was installed as standard in thousands of social housing apartments throughout the German metropolis on the river Main. The concept brought world fame for its designer, the young Viennese architect Margarete Schütte-Lihotzky.**

At that time, housing shortages in Frankfurt galvanized city construction officer Ernst May into considering integrated housing projects in Bauhaus-style architecture that would be both functional and aesthetic. Schütte-Lihotzky was commissioned to design a kitchen system for the apartments which would combine design with extreme functionality and affordability. The "Frankfurt Kitchen" was intended for the lower middle classes, not the upper echelons. 10,000 apartments in Frankfurt alone had been equipped with the new kitchens by 1930. The relatively inflexible design of this prototype fitted kitchen was not greeted with universal acceptance throughout Germany. However, in the following years the workflow-optimized design principle was retained while the kitchen itself was customized. The concept of the fitted kitchen has survived until today with little change. Schütte-Lihotzky's original design can be found in museums including the New York Museum of Modern Art.

# HEARTS AND

**More responsibility, more sustainability, more solidarity. Advancing our society is the responsibility of us all, of each of us personally, taking big leaps or small steps. Our eight examples show what people at TÜV SÜD are doing to advance the lives of others.**

## 1. STANDING UP TO CANCER TOGETHER

Over 13,000 people develop leukemia every year. Bone marrow donations as the basis for stem cell transplants can help. To help more people find matching donors, Patrick Fruth, CEO TÜV SÜD Division Mobility, is pouring his efforts into supporting donor recruitment drives. Every Christmas he launches donation campaigns at service centers and customers' companies and raises awareness among his colleagues in the company, encouraging them to sign up for tissue typing. A broadly based campaign at TÜV SÜD offers a straightforward process for employees to register as donors – and save lives.

## 2. THE VALUE OF SYSTEMIC IMPORTANCE

Masks and more: Yenifers Sacchetto, Product Service TÜV SÜD America, places some of the currently most sought-after protective products on the market. She coordinates a roughly 20-strong team and serves some four dozen customers in the healthcare sector. Her vision is to help develop new technologies that improve patient care quality with all kinds of medical products and devices. It's a job which can change people's lives – and that's clearer today than ever before.

**PATRICK FRUTH**

... seeks out life savers.

## 3. CHOCOLATE AND TOOTHBRUSHES

In a society where some people have absolutely nothing, community engagement is all the more vital. Elaine Machado, TÜV SÜD Brazil, seeks to make those people's lives a little better. She joined forces with colleagues to found a committee that organizes regular private fundraising activities and collects donations. Their dedication has sweetened orphans' lives with gifts of chocolate, provided the homeless with toothbrushes and hygiene kits, and arranged communal meals for older people. "Making other people's day better and spreading happiness is a great source of personal satisfaction and joy for me," affirms Elaine.

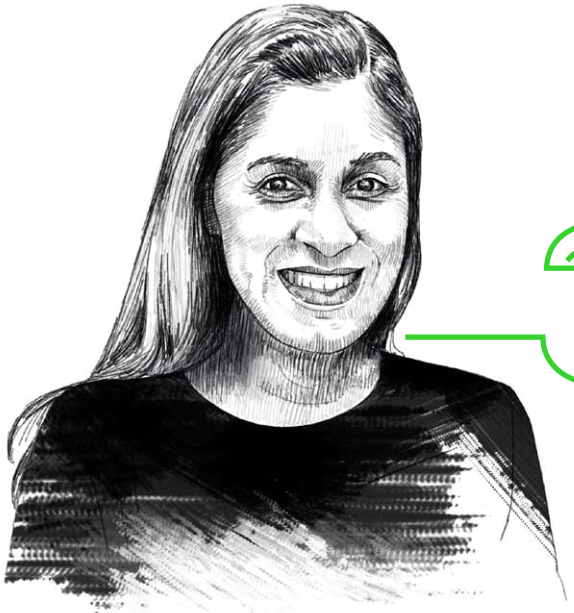
# MINDS

2

**YENIFERS SACCHETTO**

... has her mind on face masks, and more.

3



**ELAINE MACHADO**

... wants better lives for as many people as possible.

**MICHAEL NEUBURGER**

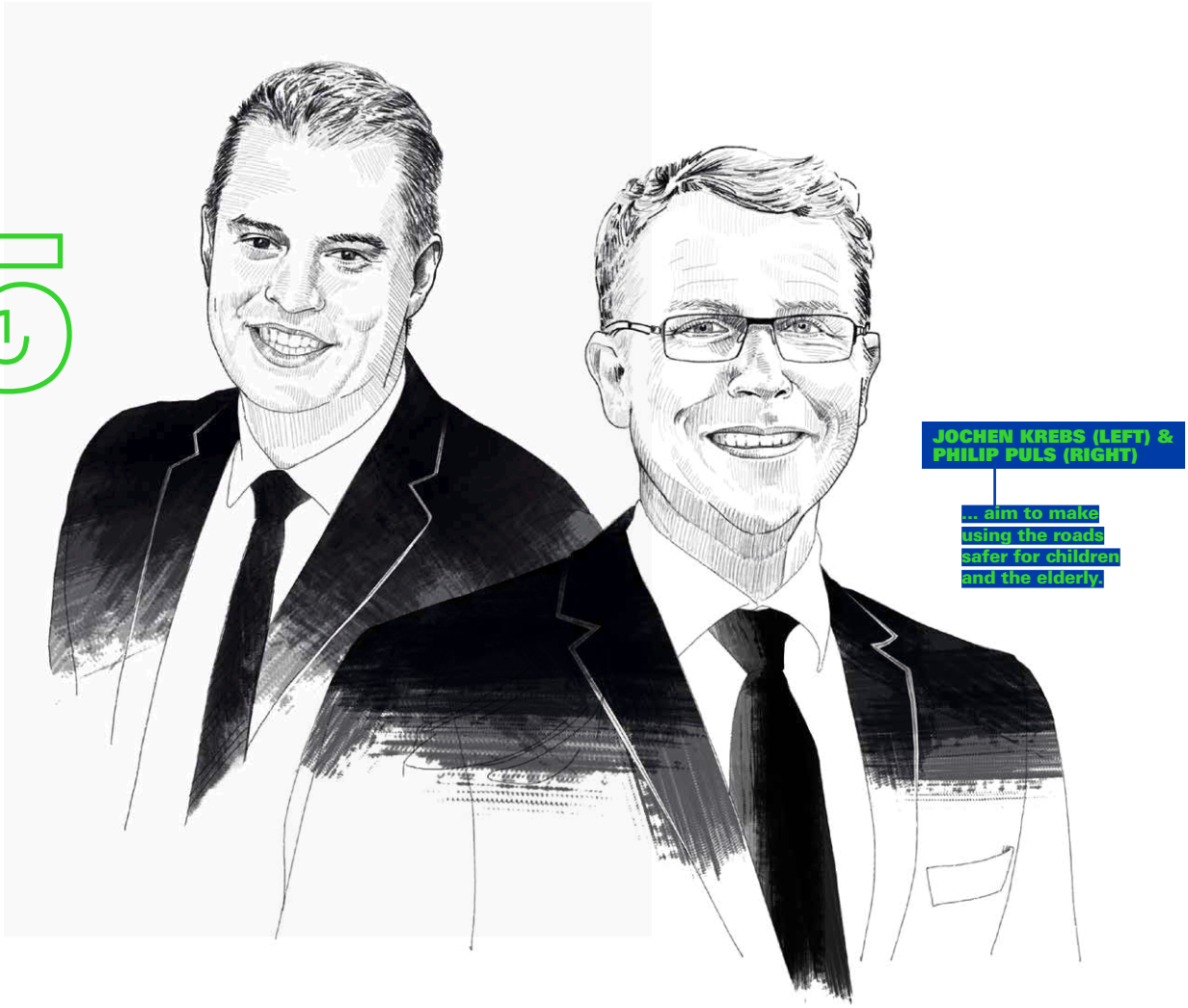
... aims to pass on his passion for two wheels.

4

## 4. SUSTAINABLE MOBILITY

Many employees in Division Mobility could be said to have "gasoline in their veins," a lifelong passion for cars, trucks, and motorbikes. Michael Neuburger, assessment expert at the Heidelberg, Germany, service center, is no exception – and yet he has a vision of working with his colleagues to set up the first carbon-neutral testing facility, at least with respect to mobility. But this is by no means at odds with his passion. Neuburger not only cycles the 18-kilometer route from home to workplace and back every day. He also takes a bike from the cycle pool whenever he has to visit a customer. Others are echoing his commitment; many of his Heidelberg colleagues have likewise switched to pedal power. And their new habit has been met with great approval by customers.

5



JOCHEN KREBS (LEFT) & PHILIP PULS (RIGHT)

... aim to make using the roads safer for children and the elderly.

## 5. MAKING CHILDREN STRONG

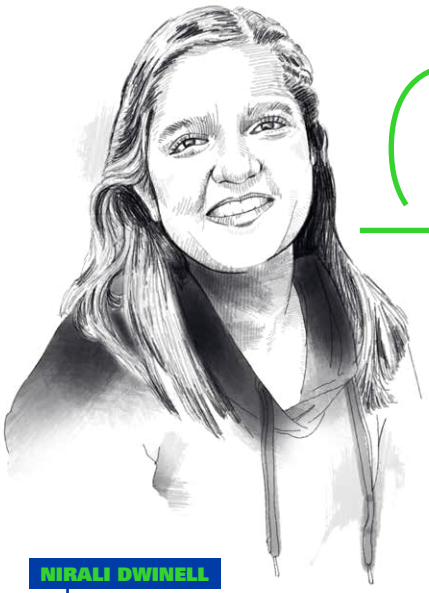
Road safety is a priority for Philip Puls and Jochen Krebs from the TÜV SÜD Division Mobility. Both are voluntary board members in Verkehrswacht München, a nonprofit road safety organization based in Munich, Germany. Their aim is to hold information events and training courses in kindergartens and elementary schools that educate children in road safety – and help prevent accidents. "We both have children of our own, so we're particularly conscious of children's safety on the roads," says Puls. Verkehrswacht is also addressing the ever-growing category of elderly people. Its dedication is paying off; while over 200 people died on the roads in Munich in the year 1949, this figure had fallen to 17 at the last count.

## 6. A DOG-GONE SAVIOR

Nirali Dwinell spends her days working for TÜV SÜD in the USA – and her free time saving lives. Based in Massachusetts, the dedicated animal-lover volunteers with a rescue organization for abandoned and mistreated dogs. She often ends up taking animals home herself and looking after them until a new owner can be found. "I've always loved animals and find it incredibly fulfilling to take in a scared, sick, or unloved pup and turn its life around," says Nirali.

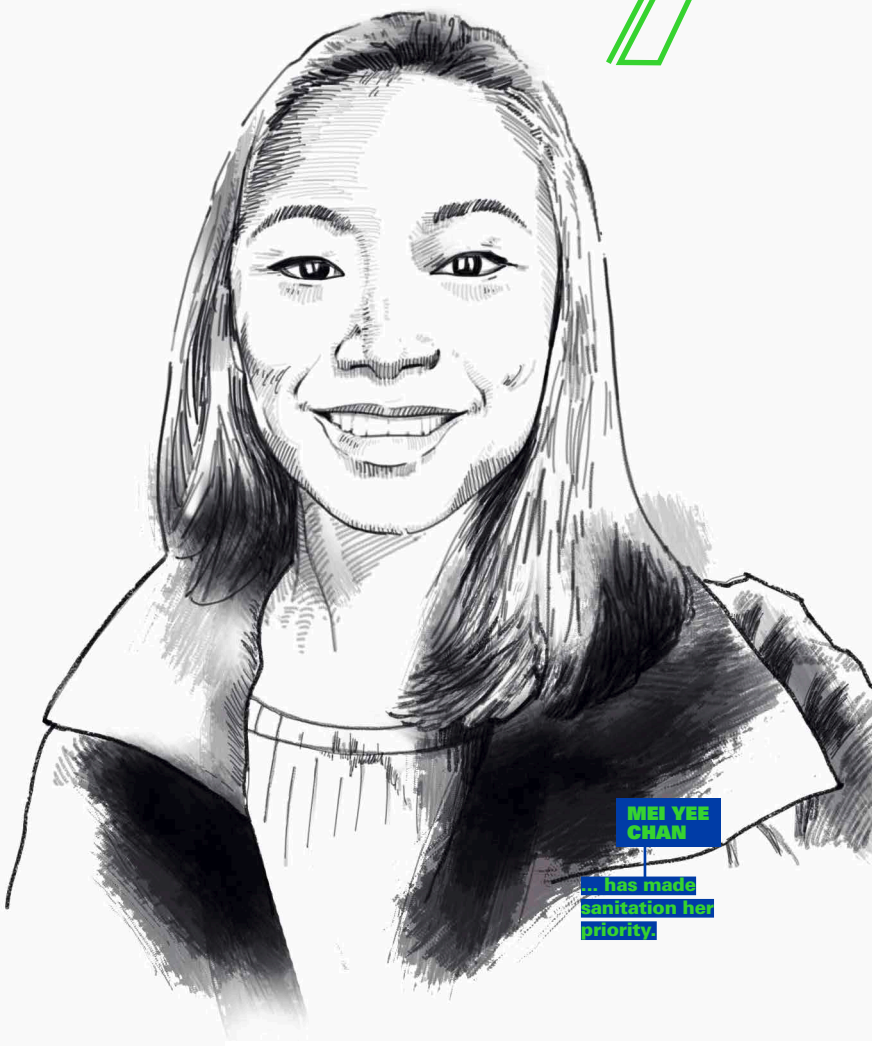
## 7. PREVENTING SICKNESS

Over the past few months – especially in the light of the coronavirus pandemic –, the crucial importance of daily hygiene routines has become startlingly clear to people all over the world. But this is bad news for the billions of people worldwide without access to clean water or functioning sanitation. Singaporean Mei Yee Chan is working on improving the situation. As part of a TÜV SÜD team, she developed standards for toilet systems that worked with a minimum of technology and without the need for sewage systems. Simple, low-cost ideas that function in even the poorest areas of the world – and help prevent sickness.



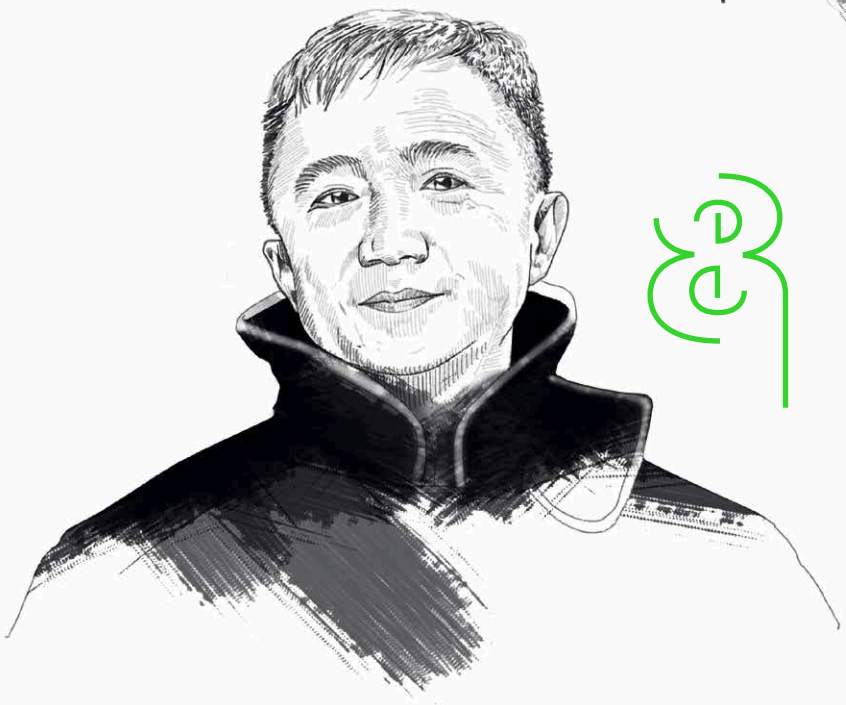
NIRALI DWINELL

... is a dedicated dog whisperer.



MEI YEE CHAN

... has made sanitation her priority.



MISHA LU

... is afire for voluntary firefighting.

## 8. SECOND CHANCE

When do we ever take the time to help the people around us? When we are young, with our focus on training, qualifications, and starting a career? In life's "rush hour," with work and family devouring all our energy? Or at retirement age, just as our strength may be starting to fail? For Misha Lu, Head of Marketing TÜV SÜD China, there is only one answer: follow your heart, and any time will be the right time! Two years ago, in his late forties, Misha decided to embark on something completely new and began to train as a volunteer firefighter. For six months every weekend was taken up with seminars and drills where he was usually the oldest in the team. He ignored what others said and soldiered on. Now Misha can look back on numerous call-outs to accidents and fires where he helped people and saved lives. Because it is never too late.

**Melissa Schulte and her research explorations into the next level at TÜV SÜD: for more information and videos, visit**
www.annualreport.tuvsud.com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