

ENERGY AND BUILDING

SOLUTIONS

2022

A Magazine About Security, Comfort and Efficiency in Commercial Buildings

Timber and Sensor Systems for True Sustainability

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BOSCH

Invented for life

Comprehensive
Protection for
Dresden's Chip
Factory

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State-of-the-art
Building Automation
for Paderborn
University

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Mobile Access:
Using Smart-
phones to Open
Doors

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Dear readers,

we have a vision of the commercial building of the future: it's safe, low in emissions and can be maintained both economically and with little effort. Every day of the year, it does its part for sustainability, it independently analyzes, regulates and optimizes energy requirements, and adapts perfectly to the needs of its users. It interacts with the operator and also maintains a dialog with its users. Its digital features provide people with the tools they need, open up new horizons in comfort and convenience, and promote a sense of well-being.

Thanks to many technologies, systems and sensors in your buildings, the foundation for the IoT of the future is already in place today. It's now time to take the next important step – together – in this digital transformation. The connected building solutions and digital services that we offer allow us to create more and more new added value for owners, operators, and users, while making our contribution to the environment. And by using artificial intelligence, we can raise the performance of your real estate to a whole new level.

In this issue of our magazine, I invite you to join us in exploring this new world. After all, the future is already here.

I wish you an enjoyable read!

THOMAS QUANTE
CEO Bosch Building Technologies



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Highest Security for the Smallest Chips

The Bosch Waferfab in Dresden is one of the most modern chip factories in the world. Any number of in-house technologies make everyday operations there safe, efficient, and sustainable.

The clean room lighting emits a special yellow light that contains no UV rays.

It is the largest single investment in Bosch's corporate history, and will be a huge asset in the future: around €1 billion for a new semiconductor factory in Dresden. This is where microchips will be manufactured, without which today's vehicles, smartphones and vacuum robots would not be able to work. The raw material for semiconductors is round silicon wafers, which is why the Dresden plant is also called the 'Waferfab' ('Fab' is short for factory in German). Bosch relies on in-house solutions to keep people and prop-

erty safe, to make processes more efficient, and to keep energy and resource consumption to a minimum. The majority of these solutions are digital and networked, making them an ideal for a state-of-the-art factory.

RAPID RESPONSE WHEN MALFUNCTIONS OCCUR

Any number of people come in and out of the Waferfab every day – customers and component suppliers, for example. The staff at ↻

100,000

square meters is the size of the property on which the semiconductor plant is located. That is equivalent to about 14 soccer fields.



reception are supported by a visitor management system that systematically records the entire visit, thereby simplifying the process. Smart security cameras are also installed at several locations around the site. They're equipped with AI video analytics, allowing them to sense motion from long distances and keep people in view.

The Building Integration System pools analyses of the security systems from the production areas – for example, from the Aviotec cameras, which are able to perform live image evaluation, or from sensors installed

in the different wiring systems – in one user interface. About 50 different gases and around 40 chemicals are required for the delicate chip structures. If there's a problem, the control center can see it and respond immediately.

CONNECTED COMMUNICATION IS THE KEY

Sustainability is an important issue for Bosch, which is why the building was designed with energy and resource efficiency in mind from the very outset. Of course, a manufacturing plant like this one still holds

potential for optimization. A cloud-based software solution from Bosch analyzes information from different data points in the plant and reports above-average consumption to on-site maintenance teams. Communication with facility management has also been digitalized. If a door is damaged or the heating system malfunctions, for example, associates can simply send a service request to the FCM team using an app – attaching a photo and the exact location at the same time. Since the requests are registered and managed digitally, facility management can optimize how they're processed and provide the subcontractors with systematic guidance. The digital, interconnected solutions increase convenience, safety, and efficiency for everyone in all areas of the Waferfab.



A fire protection solution, designed specifically for the clean room, detects the finest smoke particles quickly and reliably.



Read more about Waferfab here.

ROBOT LAWN MOWER
Semiconductors control the lawn mower's motor and are essential for navigating it across the lawn.



DIGITAL ALARM CLOCK
Semiconductors control the time display and alarm function.



ELECTRIC TOOTHBRUSH
Semiconductors control the brush's motor, charge the battery, and detect when too much pressure is being applied to the teeth.

60

micrometers – this is how thick a wafer is. That makes it thinner than a human hair.



SMART SPEAKERS
Semiconductors transmit voice commands to the Internet and convert the data received into speech or music.



LAPTOP AND TABLET
Semiconductors form the device's CPU core, bringing the keyboard and touchscreen to life and allowing communication with the Internet.



RAIN SENSOR
Semiconductors calculate the amount of rain on the basis of reflections on the windshield surface, and adjust the windshield wiper interval accordingly.

Around 70



per cent of the innovations in new vehicles can be attributed to the use of semiconductors.



AIRBAG SYSTEM
Semiconductor sensors at the front and sides register an impact, with integrated circuits processing this information and deploying the airbags as needed.



DOOR MODULE
Integrated circuits are used to activate power windows and exterior mirrors.



ELECTRIC STEERING
Power semiconductors activate the motor for the power steering.



PARKING SENSOR
Integrated circuits send and receive ultrasonic signals and use them to calculate the distance to the curb or to vehicles parking.





COMPREHENSIVE PROTECTION

A Safe Solution for a Chemical Plant

KURT OBERMEIER GMBH & CO. KG is a medium-sized, family-run company specializing in the production of silicone-based substances as well as wood preservatives and products used in wood finishes. The security solution introduced by Bosch meets industry-specific requirements for the production of chemicals and provides comprehensive protection for employees, visitors, and property. Documenting and coordinating the flow of people and trucks were particularly important aspects of the solution, as were video surveillance of the plant premises and a comprehensive fire protection concept. The top-level BIS management system merges and connects all security-related services.

CUSTOMER SURVEY

First Choice for Purchase Decisions

OVER 120 CUSTOMERS in Germany took part in our 2021 survey regarding awareness and perception of our brand, as well as attitudes toward it. Of particular note: there is an exceptionally high degree of awareness of Bosch Energy and Building Solutions. Asked about providers of building solutions in the areas of building security, energy efficiency, and building automation, four out of five respondents named Bosch Energy and Building Solutions first. The vast majority of customers surveyed primarily associate us with values such as partnership and commitment, and we are seen as a complete solution provider. Bosch Energy and Building Solutions is also at the top of the list when the time to buy comes. Almost all respondents take the brand into consideration when making a purchasing decision, and we are, in fact, the first choice for an overwhelming majority of respondents. We would like to thank our customers for their valuable feedback! Your praise motivates us to build on our successes, and continue to improve and remain your reliable partner for building security, energy efficiency and building automation.



The Bosch Building Technologies team has grown by leaps and bounds. Together, we are building on our strong position as your partner for connected building solutions and services.

In November 2021, **PROTEC FIRE AND SECURITY GROUP LTD** became part of Bosch Building Technologies. The company is a leading system integrator for security and fire alarm technology, boasting an innovative product portfolio in the United Kingdom, and operates

under the Hacousto Protec brand in the Netherlands. Protec employs around 1,100 people and has five decades of experience. Protec's products and services are used in transportation and industry as well as in numerous other sectors.

At the end of December 2021, the Bosch subsidiary Climatec welcomed **RGBS ENTERPRISES, INC.** into its portfolio. The company is active in the New York City area and acts as a systems integrator for building automation and energy management solutions for the commercial, residential, and industrial building sectors.

In February 2022, a specialist in building automation and energy management, **HÖRBURGER AG**, also joined the Bosch family. The company's more than 200 employees at six locations in Germany and one in Romania add their expert knowledge to the portfolio. With a comprehensive range of products and services, Hörburger AG has 45 years of experience in planning, implementation and service. It directs a particular focus on systems for operating buildings both efficiently and sustainably. Its solutions are used in numerous sectors, and are a popular choice at large industrial companies, health-care facilities and retail chains, for example.

NETWORKED BUILDING TECHNOLOGY

GFR goes Bosch

IN 2019, GFR Gesellschaft für Regelungstechnik und Energieeinsparung mbH, which has more than 300 employees, was added to the Bosch family. The company has more than 40 years' experience in engineering complex automation solutions, an essential service for the efficient and sustainable

operation of buildings. Now this expertise has been united with the Bosch brand: in April 2022, GFR made its debut on the market under its new name Bosch Building Automation GmbH. GFR's own, well-established DIGICONTROL brand will remain available as an independent product line.

A façade comprised of green glazed terracotta panels was developed especially for H7.


Made of Stern Stuff

With its wood and its sensors, H7 Münster gives us a vision of true sustainability. It succeeds in doing so not only because the building was designed and built to be energy efficient, but because it was also designed for sustainable operation.

North Rhine-Westphalia's largest hybrid timber building in Münster's harbor district is a real feast for the eyes: over seven floors, the 25-meter-high office and administration building houses a total of twelve rental units on an overall area of around 4,500 square meters, along with an underground parking garage about 2,400 square meters in size. In German, the name H7 is self-explanatory – the H stands for 'Holz' or timber, and the 7 stands for the seven floors.

SUSTAINABILITY AS A PROGRAM

Ambitious ecological goals were set for the building during the planning stage,

which is not surprising since H7 was first intended as a home to the corporate headquarters of an organic supermarket. In line with the corporate philosophy of this anchor tenant, the aim was to implement high standards in building biology. The objective was perfectly clear: to produce as few pollutants as possible while striving for low energy consumption. For reasons of sustainability, the architects at Heupel GmbH decided on timber as their primary construction material. This done, there was still one particular hurdle to overcome: under building laws that applied in North Rhine-Westphalia up until that point, timber buildings could only be permitted if they were built with a maximum of 



three full stories. However, after the concept for a hybrid timber building proved to be both feasible and safe, the building permit was issued and, ultimately, there was nothing standing in the way of the sustainable building plans. Because this innovative office and commercial building had to satisfy much more stringent requirements – due to its main building material – special attention was paid to fire protection. The solution: all load-bearing timber components were made stronger than statically necessary so that they could theoretically withstand a fire lasting for 90 minutes.

DESIGN MEETS AN OPTIMIZED ENERGY BALANCE

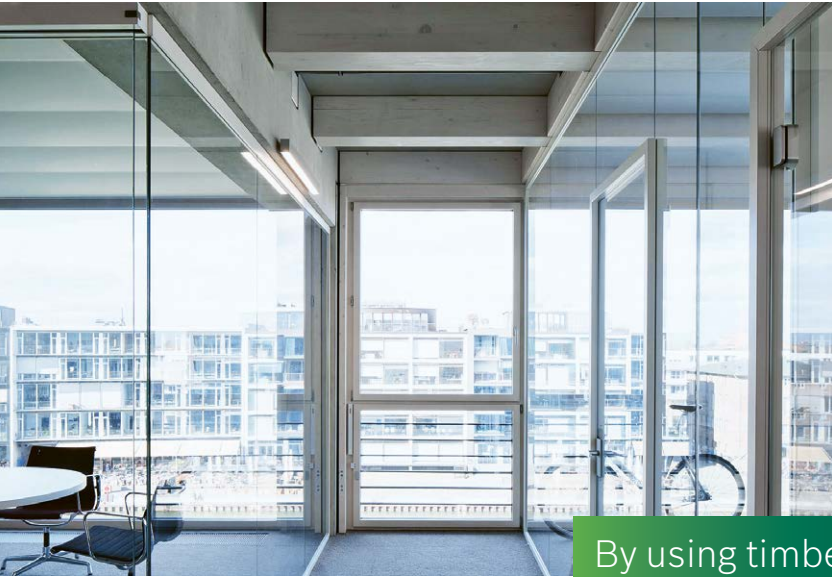
While the white-glazed spruce timber that was used as a load-bearing element adds a lot of warmth to the building, the core structures for the stairwells and elevators, made of reinforced concrete, offer an exciting contrast. The front façades of the building are made of glass, providing a view of the goings-on in Münster’s harbor. Green glazed tiles on the façade perfectly match the timber, lending an architectural accent to the building’s ecological theme. By replacing and supplementing concrete and steel with timber, CO₂ emissions in the production stage alone could be reduced by 1.1 tons per cubic meter of lumber. In addition, every cubic meter of timber stores a further 0.9 tons of CO₂. The use of wood therefore saved around 260 metric tons of CO₂ compared to a conventional reinforced concrete building. Other energy efficiency measures in H7 include the use of the existing district heating network, a high-quality seals used for the building envelope, a natural ventilation concept, and the use of LED technology in the lighting. In addition, charging stations are provided for electric cars and e-bikes. Not only con-

serving resources, but sharing them as well, was another goal when planning H7. That’s why there are shared social areas and meeting rooms for all the companies based in the building, which are optimally booked to maximize use.

SUSTAINABLE AND SAFE BUILDING OPERATION OVER THE LONG TERM USING AUTOMATION SOLUTIONS

The architecture and plans for the construction of H7 are prime examples of sustainable building concepts. However, the decisive factor for the long-term energy efficiency of any building is the way it is actually operated. To ensure that all potential is also exploited within the structure, building automation was included in the plans right from the start. The use of innovative technology and field-tested solutions allows the different components that comprise the technical building equipment to be merged, centrally monitored, controlled and optimized. “Building automation makes background operation of the building much

The project, with a construction time of 13 months, was honored at the Deutscher Holzbaupreis (German Timber Construction Award). It received one of a total of twelve gold awards at the ‘best architects 18 award’.



By using timber, CO₂ emissions were reduced by 1.1 tons per cubic meter compared to using concrete and steel.

easier, and simply more efficient. When it works perfectly in the background, no one even notices it, but users of the building will still experience it, because the environmental conditions are perfect,” says Bosch project manager Hermann Bojer.

In H7, the interaction between energy control centers and energy meters is networked, making a significant contribution to energy optimization in the building while ensuring comfortable conditions in all rooms. For example, intelligent data exchange ensures that the systems provide

the exact amount of energy required in the individual rooms. Moreover, the heating and cooling ceilings are also regulated automatically, which creates optimum hydraulic conditions in the system. The result

is not only economically attractive and efficient energy consumption, but also high

utility for everyone in the building, who can benefit a healthy, comfortable, and inviting environment.

Safety is also crucial for the pioneering hybrid timber building – another factor that can be promoted by clever automation technology. For example, fire dampers and other fire protection components have been integrated into the automation system. This enables seamless and integrated communication within the automation system, while boosting safety during ongoing building operation and, in particular, in the event of a fire.

The automation technology itself that has been used in H7 also ‘thinks’ about the future: if, for example, areas of the building are to be used differently at some point in the future, or if the requirements need to be adapted to new tenants, the systems have the flexibility to be changed and upgraded. This ensures the building gains additional versatility over the long term, and can continue to adapt to new circumstances. ●

How Smart Buildings Support our Well-being and Promote Health

People spend about 90 per cent of their time in buildings. They provide protection from wind and weather, offer a space for living and working, and are places to meet, enjoy culture, and share knowledge.

Design and modern conveniences, lighting, thermal comfort, acoustics, and air quality all contribute to people's well-being and productivity. Innovative con-

cepts can make buildings considerably more attractive to users. Anyone considering modernizing a building to ensure resource-efficient operation should keep in mind that today's building technology not only saves costs and increases the attractiveness of the property, but also benefits the well-being and health of everyone who uses the building. There is a now greater demand for modern working environments that promote well-being and comfort than ever before.



INTERIOR DESIGN

Colors and interior design are crucial for ambiance. Plants and organic shapes also make an important contribution to people's sense of well-being.



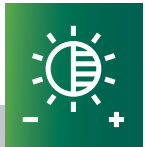
ACOUSTICS

Unwelcome and disturbing noises such as the constant rumble of traffic or manufacturing noise adversely affect work processes or people's ability to concentrate on conversations, and should be considered during the planning phase.



AIR QUALITY

Too much CO₂ soon leads to fatigue. Optimal levels of air quality and ventilation have a positive impact on people's ability to concentrate, among other things.



LIGHTING AND AMBIANCE

Lighting systems designed with circadian rhythms in mind keep our biorhythms in balance. Intelligent lighting, perfectly adapted to the seasons and the time of day, improves our working atmosphere, positively influences our productivity and performance, and makes us feel good.



THERMAL COMFORT

Thermal comfort includes air temperature, air flow rate, and humidity. The temperatures at which we feel comfortable depend on a number of factors, including the type of activity, our gender and our personal preferences.



If you would like to learn more, see all the information we've put together online.

“Buildings Must Become More Intelligent”

Thomas Quante has headed the Bosch Building Technologies division since June 2021. In this interview, he talks about building solutions for a better life and which benefits the key trends of connectivity and digitalization will bring.

Mr. Quante, you took up your position as CEO of Bosch Building Technologies in June 2021, having previously been a member of the divisional board of management and responsible for the international systems integrator business, among other things. What is your daily source of motivation?

There's a number of things. Our products and solutions allow us to make an important contribution both to the environment and to helping people feel safe and comfortable in commercial buildings and public spaces. We help protect people's lives,

buildings, and property. That's already something worth getting up for every day. That's what drives me and our employees – to prove our unwavering commitment to our customers, to our partners, and to our company, every day. Our mission of 'building solutions for a better life' perfectly reflects this level of commitment.

With Bosch as our owner, we also have a partner at our side that provides us with support over the long term. As a foundation-owned company, a large share of the profits that we generate flows back into the

company, and continues to drive innovation. An annual dividend goes to the Robert Bosch Stiftung and benefits social projects and therefore the community as a whole.

This basis for growing the business is a great motivator for me.

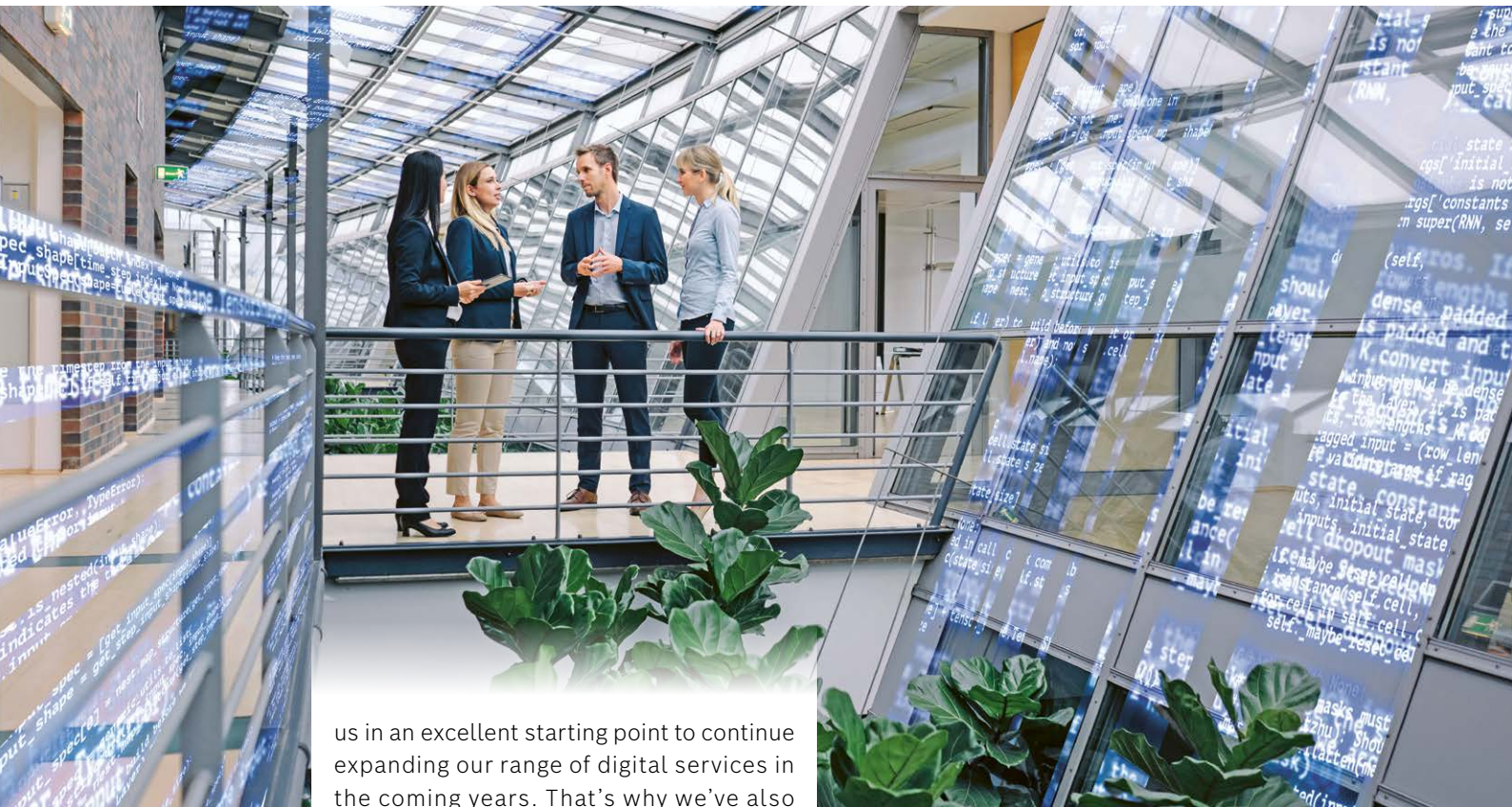
Of course, we also have a great team working in all divisions. It's really the people who make a company – and it's the people at Bosch Building Technologies who make the difference for me.

Each and every day, I look forward to going to work with our associates, our customers and our partners, and exchanging ideas with my colleagues on the divisional board of management.

What priorities have you identified for the next few years? What can customers expect?

The market is a key point of orientation for us. What trends are emerging, and what are the current and future needs of our customers? These are the questions that we address every day. The most important topics in this context are connectivity and digitalization. Given the ongoing digital transformation, which the coronavirus pandemic has accelerated even further, I see some great opportunities: the interplay between artificial intelligence (AI) and the Internet of Things (IoT) – the term we use here is AIoT – allows us to generate even more added value for our customers with innovative, connected products and digital solutions. Pushing ahead with these things is a major priority for me. This also includes the topic of digital services. As a system integrator, we have direct contact with our customers, consistently sharing information with them and involving them in our developments. This enables us to identify exactly what the customer needs. This gives

“We help protect people's lives, buildings and property. That's already something worth getting up for every day.”



us in an excellent starting point to continue expanding our range of digital services in the coming years. That's why we've also launched an in-house accelerator program: ambitious young employees act as intrapreneurs, devoting 100 per cent of their energy to building up a new range of digital services.

Can you give us an example of what you mean by digital services?

One example is a digital service for heating, ventilation and air conditioning systems, known as HVAC systems for short. This service extends from analysis and monitoring solutions to IoT services that can improve the energy efficiency of HVAC systems.

Which brings us back to the topic of trends. There are other trends that have a huge importance due to their very real impact on buildings and the people who live and work in them. In this context, the topics of sustainability and a company's footprint are particularly significant. Buildings need to become more intelligent to emit less CO₂. There is also a growing need for comfort and security. New worlds of work are emerging – and all this has an impact on buildings. We're already actively helping to shape this area and are continuing to work on innovative products and solutions that generate added value for

our customers and thereby provide safe, comfortable, and efficient environments to live and work in.

You mentioned the term AIoT. What's the relevance of this topic?

AIoT, or forming networks between physical products and using artificial intelligence, is a key topic for the Bosch Group overall and one that we're working on across all divisions. In-house, we like to

“Ambitious young associates act as intrapreneurs, devoting 100 per cent of their energy to building up a new range of digital services.”

say ‘Leverage the Power of Bosch’. Bosch employs 34,000 software developers worldwide. This alone provides proof of relevance. The catalyst for the use of AIoT across the Bosch Group was when the

‘Bosch Center for Artificial Intelligence’ opened in 2017, where some 300 experts are now working on more than 180 projects at seven different sites, and lending their support to the business units in developing and using AI. This also has benefits for everyone at Bosch Building Technologies.

In the area of security and building technology, we intend to use AI to help our customers gain even more insights and a greater understand of events – or even to anticipate them in the future – so that they can act proactively as well. The keyword here is ‘predictive’. I'll give you two concrete examples: in the area of Video Surveillance as a Service (VSaaS), we have developed a cloud-based digital AI service that aims to significantly reduce false alarms being triggered by cameras so that security operators can focus on real threats. Our Aviotec fire detection system is also a prime example of AIoT. It involves video-based fire detection that uses AI algorithms to enable reliable early detection of flames and smoke.

Do you have any examples of how customers benefit from these developments?


As part of VSaaS, we can minimize the number of costly false alarms in Bosch or third-party video security systems by improving the detection and identification of people and objects. In addition, the configuration and maintenance of Bosch cameras can all be done remotely. All in all, VSaaS is an efficient and cost-saving solution that contributes to significant improvements in security. We are currently preparing the market launch of VSaaS, including cloud-based alarm verification for perim-

eter protection, as the first specific application for AI.

AI algorithms are used by our Aviotec video-based fire detection system to detect whether or not a fire is breaking out directly at the source of ignition. This functions reliably within seconds. Solutions that use this technology are especially helpful in rooms with high ceilings, where it would take a long time for smoke to rise to the classic detectors, as well as for smoke ➞

“Our ‘Aviotec’ fire detection system is a prime example of AIoT. It involves video-based fire detection that uses AI algorithms to enable reliable early detection of flames and smoke.”



 More information can be found on page 36.

produced by easily flammable materials such as pulp and paper. This is why Aviotec ensures particularly fast and reliable fire detection in, for example, aircraft hangars, paper mills, and warehouses where packaging materials are stored.

Overall, the more data are available, the more AI can do. It allows new functions to be added AIoT products and services, and ensures they remain up to date, which is of enormous benefit to our customers and the environment.

Bosch is an expert for sensors used in all industries. Where do you think ‘Video as a Sensor’ will have the most impact, and how do you utilize Bosch’s sensor expertise for your business unit?

For many years, the Bosch Group has been developing intelligent video sensors for the automotive sector, where they are currently used for driver assistance systems and automated driving applications. We install the same technology in our security cameras, bringing artificial intelligence to the applications that our customers use. By using AI, video cameras are now being transformed into intelligent context-sensitive sensors that understand what they see. The corresponding AI algorithms developed by Bosch are a key component in, for example, intelligent traffic systems, critical infrastructure, and industry. With their ability to perform functions that extend far beyond simple surveillance, our cameras can be used for intelligent waiting line management at airports, for ex-

ample, thereby ensuring shorter wait times, compliance with hygiene concepts, and efficient personnel planning. The AI algorithms are integrated into Bosch cameras at the factory. The data are processed right ‘at the edge’ – on the raw video stream from the camera sensor – making a central server for analysis unnecessary. This saves time and resources, thereby providing an efficient and cost-saving solution.

Sustainable building management and energy efficiency are also gaining importance for customers. What is your approach to these areas?

Energy efficiency and sustainability enjoy a huge significance for our customers and for us as well. The Bosch Group is the first multinational industrial company whose more than 400 production sites worldwide have been carbon neutral since spring 2020. Our ‘Energy Platform’ solution has allowed us to make an important contribution to this. The cloud-based application analyzes energy data in real time, and helps optimize energy consumption. Intelligent algorithms predict how high energy consumption will be, for example, and prevent peak loads. The Energy Platform is already in use at more than 120 Bosch plants and sites, and is also being used by customers elsewhere. Demand for solutions that increase energy efficiency and reduce CO₂ emissions is rising continuously. Bosch has been sharing the experience it has gained from its own carbon-neutral operations through an independent consultant, Bosch Climate Solutions GmbH, since 2021. The market has been very receptive.



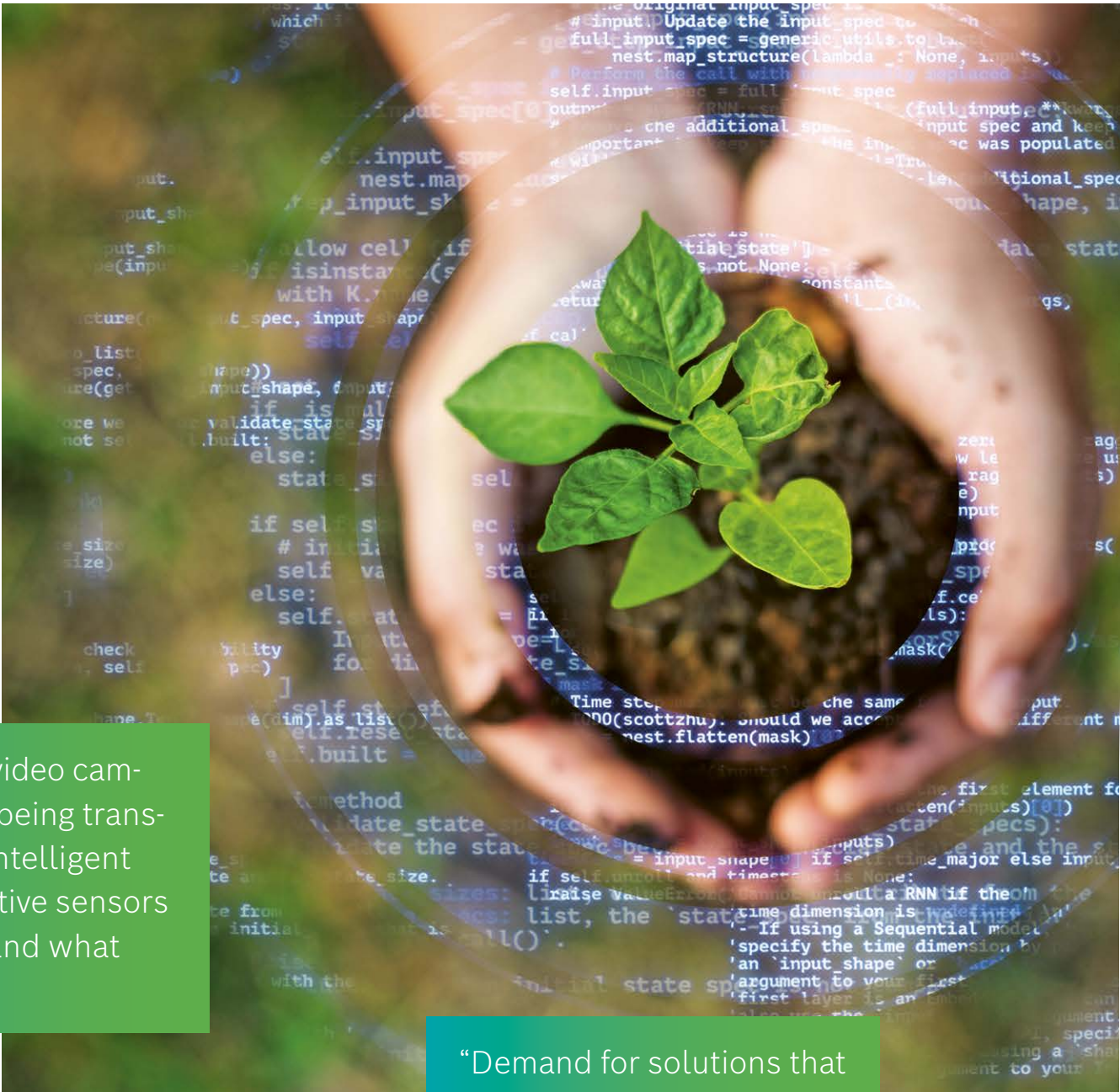
More information on Bosch Climate Solutions can be found on page 39.

“By using AI, video cameras are now being transformed into intelligent context-sensitive sensors that understand what they see.”

“Demand for solutions that increase energy efficiency and reduce CO₂ emissions is rising continuously.”

It’s not just industry – accounting for around 40 per cent, the building sector itself causes a significant share of global greenhouse gas emissions, making this another area where we are taking action. Recent acquisitions in the USA and Germany, for example, have allowed us to expand our portfolio to include more building automation. This is an area where we want to grow, while simultaneously helping our customers to become more energy efficient by using intelligent solutions. We offer a range of solutions such as automatic atten-

dance management, intelligent indoor climate and ventilation control, intelligent lighting, and automatic shading systems. They help our customers to optimize the way their buildings are operated as they benefit from cost savings, conserve resources and thereby make their buildings ‘greener’. And when it comes to this, we have the wind at our back due to the current political situation. The European Union’s ‘Green Deal’, for example, with its ambitious targets to reduce CO₂ emissions, opens up opportunities for us that we intend to exploit. We are also closely involved in the German Electro and Digital Industry Association (ZVEI), of which I am a member of the executive board. Experts from Bosch Building Technologies and Bosch Thermotechnology are also active in the new ‘Platform Buildings’ initiative, one which brings together the industries relevant to building within the ZVEI. The ZVEI not only fosters an exchange with colleagues from other sectors, but also promotes dialog between industry, political actors, and other stakeholders about the requirements of modern and sustainable building technology.





Enjoying live sports in safety: Davos Ice Stadium relies on a system based on intelligent, video-based, early fire detection.

Sensors and Smart Fire Protection for More Safety

More networked than ever before, fire protection is becoming more dynamic, more intelligent and more responsive. The important thing now is to not fall behind on the technology.

When technical building equipment is interconnected to form a network, it means that previously separate functions, such as lighting and fire protection, can communicate with each other. The future lies not only in the use of these infrastructure networks, but also in the immense added value they bring for building operators and users. If the maximum potential that networked fire protection concepts offer is exploited, then visual analyses and information that is transmitted directly to smartphones or other mobile devices will provide support with early fire detection and verification. Intelligent alarm servers and voice alarm systems can also be used to alert and evacuate building occupants and to coordinate first responders. Another positive factor is that the integrated function of all systems is ensured by remote maintenance, which means that any maintenance activities do not disrupt normal operations.

Today, smart fire protection technology provides a new benchmark in safety that goes far beyond the requirements specified in standards. New fire protection systems also score points with energy costs that are 50 per cent lower, and significantly lower maintenance costs. The greatest boon, however, is modern sensor technology, which not only makes it possible to record vast amounts of data, but also opens up entirely new perspectives. Last but not least, it generates invaluable, ongoing synergies with other areas of building technology and other services.

SENSORS ARE THE KEY

Sensors are used so that data relevant to fire protection or other building

technology measures can be captured in buildings. These technical components register certain physical properties (e.g. heat, temperature, brightness or smoke) and send them to actuators that trigger specific commands. They function much like sensory organs: depending on their intended purpose and place of use, they 'feel' and measure defined properties of their environment. In short: no sensors, no data – no data, no detection.

The ongoing refinement of sensors and fire detection technology in conjunction with AI or AIoT is a major driver of progress in fire safety systems, and plays a key role in the areas of early fire detection and remote services in particular.

FASTER AND EARLIER DETECTION

A good example of how AI can be used in places where conventional fire alarm systems have reached their limits is innovative, video-based fire detection systems. Using intelligent algorithms as a basis, they make effective and reliable fire detection possible even on otherwise difficult premises, such as storage areas located close to buildings or in outdoor areas. The ability of the new technologies to adapt to changing wind, weather and light conditions while simultaneously reacting to even the slightest suggestions of a fire, regardless of ceiling height, considerably improves safety – and also offers the opportunity to protect buildings from other negative consequences caused by outside influences.



To detect fires, the Aviotec camera evaluates its video feed live.

When Silent Buildings Learn to Speak

The digital transformation is making rapid progress in many sectors and industries. What that means for commercial buildings, above all, is increased efficiency, comfort and quality based on artificial intelligence and IoT solutions. When it comes to new buildings, digitalization can be part of the thought process from the outset. But how do you make existing buildings smart – and what are the benefits for the users?

It's Monday morning, and Ms. Müller is on her way into the company's underground parking garage. Her ID is detected upon driving in and the gate opens automatically. Finding a parking space also goes smoothly: her app for employees shows Ms. Müller where there is a free space, and at which charging station she can 'fill up' her electric car later. When the project manager enters the office building, the elevator is already waiting for her and takes her to the right floor. Today, Ms. Müller is on her way to a meeting room she hasn't been to before for a discussion with the team – thanks to the indoor navigation on her app, she quickly finds her way. When she finally opens the door to the room, the light and ventilation system switch on. The temperature is pleasant because the heating system knew how many people would meet here at what time, based on a reservation in the digital booking system. The entire building was working in a coordinated fashion and catering to its users in advance. Pretty accommodating, or in other words: pretty smart.

The example of Ms. Müller offers a glimpse of what commercial buildings could be capable of in the future – and in some cases, are already capable of doing. A building becomes a smart building when the individual components of the building technology are linked up to form a network. In essence, the building uses a shared 'brain', i.e. a central control unit in the form of artificial intelligence (AI). This allows the individual components to 'talk' to each other and exchange

data between different parts of the system.

THE 'BRAIN' NEVER STOPS LEARNING

As all this is happening, the AI is constantly building up its knowledge. It learns from the data generated by operations, the users and the environment in order to formulate suggestions for improvements. This allows processes to be managed and optimized, thereby generating both economic and environmental added value for building operators. For example, the 'brain' identifies unused areas and switches off cooling, heating and lighting systems accordingly.

All relevant technical building processes can be monitored using a central management system. This includes energy management, building safety and fire alarm systems, as well as control and monitoring systems. Digital data capture as comprehensive as this greatly simplifies building operation, while also ensuring greater efficiency – which is of immense added value for the operators. Another advantage of smart buildings is that, by combining Internet of Things (IoT) technologies into an integrated software-based system, they will never actually become outdated. The sensors can be replaced at low cost, and the software can be updated as required, just like a PC or laptop.

"AN UPGRADE IS ALWAYS BETTER THAN A NEW BUILDING"

This is what fundamentally distinguishes a smart building from ➞



other commercial buildings that are equipped with self-contained building technology. In the latter case, the different systems run parallel to one another, instead of communicating with each other. However, intelligence and connectivity are by no means only suitable for new buildings – existing buildings can also join the digital age.

After all, many older properties are already equipped with the cornerstone for it, with many technologies, systems and sensors already having been installed in them. “In the long term, this is about teaching the systems how to talk to each other,” says Klaus Dederichs, head of the Information and Communication Technology division at Drees & Sommer. For this to work, Drees & Sommer carries out a ‘digital ready check’ in advance and checks technical requirements such as IT infrastructures and connectivity.

When talking about the digitalization of (existing) buildings, there’s an important technology that can’t be left out of the discussion: the ‘digital twin’. Historical data and real-time data capture are used to create a dig-

ital replica of a property – and one that is constantly evolving. This technology enables transparency and provides knowledge

about the building as well as how it operates – an ideal basis for continuous optimizations. Use of the digital twin also makes another thing clear: “Each existing building is one of a kind with its own needs,” as Bent Mühlena, who is in charge of real estate project management at Union Investment Real Estate GmbH, says.

According to Mühlena, however, one principle applies to all existing properties: “The longer a building exists and is in use, the more sustainable it is. An upgrade is therefore always better than a new building.”

INTELLIGENTLY SUSTAINABLE: RECOGNISING AND TAPPING POTENTIAL SAVINGS

Smart buildings that have been born out of existing buildings can also become role models in terms of sus-

“We are talking about buildings with a brain – artificial intelligence ingeniously combines all technical systems, sensors and planning, operating and user data to allow optimal control of the processes in the building.”

KLAUS DEDERICHS, HEAD OF INFORMATION AND COMMUNICATION TECHNOLOGY AT DREES & SOMMER

tainability. This is an area in which there is an urgent need for action. Buildings currently account for almost 40 per cent of global CO₂ emissions. Intelligent real estate can make a major contribution to reducing these emissions, as Bent Mühlena explains: “An intelligent energy management system, for example, allows emissions to be reduced by up to 30 per cent per building.”

Systems like this calculate and analyze the energy consumption in the building. These analyses are used as a basis to identify potential savings and ensure energy efficiency gains over the long term – lower costs with no loss of performance. “Load peaks and incorrect settings can, for example, be identified, faults are detected at an early stage, and the entire energy infrastructure is optimized,” says Mühlena.

Klaus Dederichs can offer an example: “Let’s take heating, cooling and ventilation for rooms such as offices – this is where some of the highest costs are generated.”

Regulation does take a certain period of time to take effect, as it depends

on various factors – for example, the outside temperature, the humidity or the wind conditions. In most buildings, a default time period that will definitely suffice can be assumed. As Dederichs point out, “A smart building, on the other hand, determines the optimal period of time and automatically regulates conditions in the rooms in response to actual requirements.”

SAFE, COMFORTABLE, EFFICIENT

In addition to increased energy efficiency, smart buildings offer any number of other advantages and opportunities for owners, operators and users. Let’s take another look at the example with Ms. Müller: in her case, the building has, in the background, largely catered to her needs in terms of looking for a parking space, booking a room, switching on lighting and adapting the temperature – a significant contribution to the comfort, satisfaction and health of everyone in the building. This is revealed by the small details: if the coffee machine is broken, for example, it is easy to notify facility management using the app. More-

over, indoor navigation guides visitors to the right place, innovative monitoring processes ensure greater security and, by using ‘predictive maintenance’ systems, maintenance work can be planned in advance – which includes the option of remote maintenance.

The sky is the limit in this regard – the potential of systems like this is all but infinite. Dederichs is, however, keen to point out that new solutions need to focus on the benefits for people: “Smart buildings are never an end in themselves.” Yet they could play a more significant role in the battle to recruit younger employees in the future, as he says: “The expectations that digital natives have of their working environments keep getting higher.”

CYBER SECURITY STRATEGIES: STAYING ON THE SAFE SIDE

Smart buildings such as the office building that Ms. Müller works at, along with others that have been equipped with smart technologies such as airports or shopping centers, have complex security requirements. An office building with thousands ➞



“Smart buildings condition the rooms according to their actual use and make a major contribution to energy efficiency – and therefore also an important contribution to achieving our climate goals.”

KLAUS DEDERICHS



of networked sensors offers significantly more points of attack for cybercriminals than a ‘silent’ building does. Security requirements for software and hardware should therefore be factored in during the planning phase.

But if you have the right cybersecurity strategy from the outset, you don’t have to worry too much, as Klaus Dederichs says. According to him, one of the measures required is penetration tests: “IT experts use hacker methods to test the vulnerability of the systems to external attacks.” In addition to firewalls, anti-virus programs and regular updates, the smart building expert also recommends subdividing the IT system into network segments with clear access rights and round-the-clock security monitoring.

A NEW MENTALITY FOR A SMART FUTURE

Sustainable, comfortable, efficient: it’s no wonder that the market for smart buildings is growing rapidly and the demand for innovations is rising. And yet the trend has not yet arrived everywhere, notes Klaus Dederichs with dismay: “In some cases,

people are still planning the same way they did 20 years ago – we really need to join building planners in creating a new mentality.”

At the same time, Bent Mühlhena reminds us not to get carried away. Every single time it’s important, he says, to re-examine which solutions really bring benefits for which type of building: “I recommend the ‘CS’ principle – common sense. This will also help you to find smart solutions that satisfy your own requirements.” And this is exactly what the topic of smart buildings is about, as both experts are unanimous: directing the focus at people and their needs.



Keep reading to find out more about smart buildings.



SABIC’s own fire brigade protects the eight production plants on the factory premises.

SABIC

Good Chemistry

To prevent major accidents involving dangerous substances, certain industrial activities and facilities must comply with strict safety requirements. The Dutch branch of Bosch Energy and Building Solutions is now implementing advanced safety and security solutions to minimize risks at a chemicals factory.

SABIC, a global diversified chemicals company, headquartered in Saudi Arabia, has five large production sites in Europe. These sites are required to comply with the stipulations of the so-called Seveso III Directive, the main EU legislation on measures to manage major hazard control in connection with dangerous substances. The Dutch branch of Bosch Energy and Building Solutions is currently upgrading the safety systems of SABIC in Bergen op Zoom, a multistage project that will run until 2024. The goal is a comprehensive, standalone safety solution that will meet



Ferry Ditewig of Bosch: “We will implement the complete safety concept in just four years.”

and exceed the requirements of the relevant standards well into the future.

The Seveso III Directive calls for extensive monitoring of all chemical plants in the European Union at which there is a risk of major accidents. “The companies operating them are required to prove that they have taken suitable precautions to prevent and contain accidents and mitigate the associated risks,” says Ferry Ditewig, business development manager at the Dutch branch of Bosch Energy and Building Solutions.

In the first phase of the project, the Dutch branch of Bosch Energy and Building Solutions is installing new fire alarm systems in the 200-hectare site’s 14 buildings, which include eight production plants. SABIC also has its own fire brigade that can quickly respond if required. Fire protection there involves considerably more than defensive measures for preventing damage. The system can now use sophisticated innovative technologies, including artificial intelligence and intelligent sensors, to detect and pinpoint fires at an early stage while reducing false alarms. The intelligent solutions being installed will also ensure a high level of safety well into the future, having been designed to facilitate their expansion or the integration of new systems as the requirements evolve.



Smart Buildings for Smart Minds

With its state-of-the-art infrastructure, the campus of Paderborn University can be seen as a benchmark for modernization and refurbishment. Dr. Martina Gerdes-Kühn, director of the Department of Facility Management, Building Services, Occupational Health & Safety and Environmental Protection, is responsible for the operation of the building complexes on the campus. In this interview, she talks about the importance of comfort, well-being and sustainability for students and academics.



Martina Gerdes-Kühn: Understanding the modernization of buildings as a process.

Dr. Gerdes-Kühn, the focus on the topics of energy efficiency and climate change has become keener in recent decades. What importance do these topics have for Paderborn University?

The topic of conserving energy is a tradition for us. We have long been dedicated to optimizing operations to ensure that as little energy as possible is needed. Climate protection is also an important issue for the state of North Rhine-Westphalia: the state government aims to be carbon neutral by 2030. Half of all state properties belong to the universities, so we make an important contribution.

How do you make the campus more energy efficient?

We have invested a lot of practical know-how and expertise into energy-optimized management of buildings. For example, we have equipped all lecture halls with building automation systems so that the ventilation can be controlled automatically and

the room temperature can be adjusted to suit current occupancy. We will be installing photovoltaic systems on the new buildings. This all makes good building automation essential for utilizing the electricity generated. We have combined heat and power plants for heating and electricity production. In this case, building automation has also made a significant contribution to our ability to operate these systems in an energy-optimized way and exploit the full potential of heat output and electricity production for the university.

You place a lot of emphasis on sustainability and comfort – are these factors important for students today?

Definitely! It is an illusion to believe that students can be reached through attractive fields of study alone. Students and scientists have particular expectations of the quality of the space and the ambiance. To meet the expectations of well-being and convenience, we have equipped every ➞

“A campus is a living organism.”

last corner of the buildings with WiFi, the library is transparent and exhibits an open layout, and we are in the process of creating contemporary common areas in the buildings and the outdoor facilities.

What excites you about the potential of advanced building automation networks?

One thing is that we will be able to influence the quality of the buildings. Networked, systematic building automation can improve conditions for users at a very low cost. And all this without the users noticing a thing. The sun protection systems, for example, operate automatically according to the time and the position of the sun, and no longer need to be operated mechanically – the building automation therefore works behind the scenes. Another thing I'm excited about is that it will be possible to integrate different systems such as intruder alarm systems and fire detection systems at

a shared management level in the future in order to exploit synergies. Whether it really will be possible to monitor and control all systems from one central location remains to be seen. We do have to take a cautious approach to development. After all, a campus is a living organism; changes have to function and mustn't bring the university to a standstill. We therefore place great importance on qualified employees who understand the systems, who manage energy consumption, and who can intervene if necessary.

What role does digitalization play?

It plays an important role in building automation. For example, digitalization enables fault messages to be automatically sent to the mobile phone or laptop of colleagues who are on standby, allowing them to view the building system on the campus using a VPN tunnel. This means that my team can, in some cases, deal with fault messages from home and it doesn't always have to be on site. I think this is a really big step forward, as it allows us to optimize the deployment of staff.

What is the structural condition of the buildings on the campus?

Paderborn University is not an old, traditional university, although we are celebrating its 50th anniversary this year. It

was founded in 1972 as a campus university with interconnected buildings. These legacy buildings were built using what can be described as a

modular principle, as were other universities founded at that time. These buildings are now getting old, they urgently need to be modernized – with regard to energy, but also in terms of user quality. Modernization is an ongoing process. One of our key goals is to modernize and carefully modify the buildings in a way that allows scientists to pursue their work and research reasonably, and offers students optimal teaching and training conditions. We are also continuously adding new buildings. We will have

Transparent design and an open layout: the library at Paderborn University.

PADERBORN UNIVERSITY

Paderborn University was founded in 1972 as a campus university with connected buildings. The teaching and research profile at the five faculties covers a broad spectrum of subjects in the fields of the humanities, economics, natural sciences and engineering. The university offers around 70 degree programs and has 44 buildings. With more than 20,000 students, it is one of Germany's medium-sized universities. It stands for cutting-edge research, innovation, interdisciplinary research projects and dynamic growth. Paderborn University uses building automation systems – on which it has been working with the company GFR, Gesellschaft für Regelungstechnik und Energieeinsparung mbH, a subsidiary of Bosch, for more than 20 years. The company has been called Bosch Building Automation GmbH since April 2022.



DR. MARTINA GERDES-KÜHN

Dr. Martina Gerdes-Kühn holds a doctorate in technical chemistry and wastewater disposal and subsequently became involved in building operations through the cluster of topics accounted for by occupational safety, hazardous materials management, waste disposal and fire protection. She has been working at Paderborn University as director of the Department of Facility Management, Building Services, Occupational Health & Safety and Environmental Protection since 2003. Her technical building management team comprises a staff of 40 employees, including engineers and technicians.

modernized a large section of the campus by 2027.

What requirements do you have when new buildings are constructed?

Our standards always depend on the type of building – the different buildings each bring different challenges. Since Paderborn University is particularly successful in the field of research, our requirements of research buildings are particularly high. For example, we will build an optoelectronics building with optical laboratories and cleanroom technology – and expect the highest standards in terms of building automation, comfort and degree of technology penetration.

What challenges are you encountering?

The construction of the 'green' data center presents us with a special

challenge: we intend to set a nationwide standard on how to operate one of the most state-of-the-art high-performance data centers in Germany in an energy-efficient manner. The large amount of electricity required by the Noctua supercomputer is challenging: it requires half as much electricity as the entire campus. We want to improve sustainability by exploiting the valuable waste heat to heat the other buildings on the campus. The building automation system is an important source of momentum. Building automation will ensure that the buildings can talk to each other – one building produces heat and the other reports its demand for it. The project is in the middle of being developed, and I trust my own technicians and the experts at Bosch Building Automation GmbH, all of whom are very committed to implementing this project in a way that we will all benefit from it.

What goals have you set yourself for the future?

We want to build and equip the new buildings with technology that will ensure they remain viable for a long time to come, and can be used by future generations of scientists over the next 40 to 50 years. For me, it is also important to have attractive building lighting. In my opinion, you shouldn't try to save too much on lighting and leave the buildings looking gloomy and dreary. This is why it's my goal to create atmospheric, inviting lighting that projects an attractive image of the university to the outside world: a university that shines.

Working in Tandem to Serve Customers

Security expert Michel Huger and service technician Roland Simion work in tandem to look after their customers' needs in Allgäu. They believe that first-class solutions and personal contact are what distinguish the trusted partnership between Bosch and its customers.

For many years, Roland Simion and Michel Huger have been jointly supervising the cable cars operated by Fellhornbahn GmbH for Bosch Energy and Building Solutions. The Fellhorn is a mountain in the very south of Germany.

In 2020, Bosch safety expert Huger planned the comprehensive fire detection system that is used to forward messages to the integrated local control center. He and Bosch service technician Simion agreed on which detector technologies were needed for the cable car stations and could withstand the extreme weather conditions on the mountain. To complete the process, the individual signal points were connected to the Bosch network EffiLink. The systems can be analyzed and configured remotely and potential faults can be rectified using the cloud-based platform. This

makes the daily work much easier, with tangible benefits for customers as well. The two colleagues function like well-oiled gears. They not only work together – they complement and support each other. “In general terms, the systems that customers



Roland Simion (left) and Michel Huger enjoy the cable car ride to the top station.

can choose from are similar,” says Michel Huger, who works as a sales manager for fire detection systems, public address and evacuation systems at Bosch Energy and Building Solutions.

“We sell solutions and services – and people are behind it all.”

MICHEL HUGER

In his own words: “We sell solutions and services – and people are behind it all. Customers make a conscious choice in favor of the Bosch brand and in so doing, they also choose Huger as a safety expert and Simion as a service technician. They want to know who they’re dealing with. That’s one of the secrets to our success.”

OUR TEAM MAKES THE DIFFERENCE

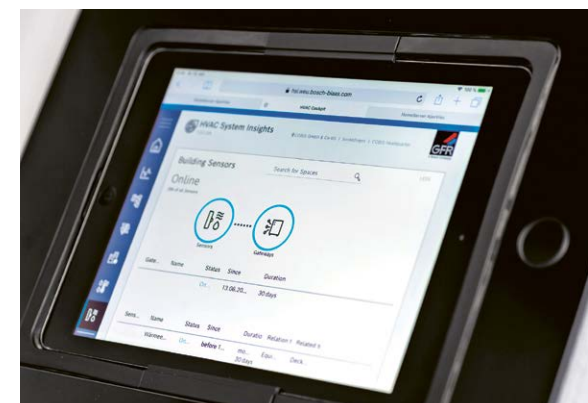
Over 5,000 associates bring all their expertise and dedication to serving our business and our customers every day. They do so in a wide range of positions, with diverse backgrounds, in different regions, but with a shared goal: to create building solutions for a better life. Would you like to learn more about the inspiring teamwork between Michel Huger and Roland Simion – or how a lead project manager for large, complex construction projects turns visions for the future into reality? Together with our associates, we present fascinating stories that give you interesting insights into our work.



Read the entire article online and discover even more stories about our staff.

Connecting Data for Greater Energy Efficiency

Using a digital building twin as a basis, Bosch is working on new IoT services in order to continuously optimize the performance of buildings – for example, in order to save energy and protect the environment.



Insights from anywhere: the cockpit for this service can be accessed and viewed at any time over the Internet.

with information about building floors and rooms, and combine the information to form a digital building twin.”

Hartwig is fully dedicated to digital service: “I’m the jack of all trades here and ultimately responsible for all areas – much like at a start-up.” From the product definition and sales, to team building and project implementation. He is backed by a team of developers.

The advantages of the new technology are clear: commercial buildings can be made more efficient with lower emissions, and this without users having to sacrifice comfort. There are further advantages for owners and operators, including time saved for operations, the efficient use of staff in the area of facility management, and the high level of operational reliability and system availability. This enables operators to save costs and meet sustainability goals. Finally, the building sector will be making a key contribution to achieving climate protection objectives. And last but not least, everyone involved benefits from an attractive property and happy users.

The technology’s first deployment has been promising. The IoT service is currently being used at the headquarters of COBIS, an established customer in the building automation area. COBIS is the operator of the energy efficiency park in Sindelfingen and takes a proactive approach to energy efficiency – the park’s thermal requirements are covered using technologies such as geothermal cooling and a combined heat and power plant to generate heat. There is also a photovoltaic system that provides a source of electricity for adjacent businesses and electric charging stations. “The building automation solution efficiently controls and simplifies operation. However, we’d like to use data even more intelligently so that we can identify even more potential savings,” says Hartwig. By combining data from

The cockpit that Andreas Hartwig is demonstrating on his tablet features a straightforward and elegant design, and exhibits a tiled structure with pictograms that stand for ‘Comfort’, ‘Systems’ and ‘Energy’. “It’s not immediately apparent,” says Hartwig, who is responsible for the IoT service at Bosch, “how much technology is behind it.” The heart of the software is a digital building twin – a very powerful virtual image of a property that digitally represents and simulates all devices and processes. “There is a tremendous amount of know-how and development work involved in the application,” says Andreas Hartwig with evident pride.

Large amounts of data are generated using the technologies and systems installed in buildings. “We are harnessing their potential for our customers,” as Andreas Hartwig explains. At its core, the new digital service aims to increase the efficiency of heating, ventilation and air-conditioning systems. “We use existing sources of data from the building automation system, security technology or HVAC systems, and we collect new data on the basis of building use and operation. Then we bring it all together

Building data are analyzed and evaluated in real time to identify potential savings and identify errors before users are impacted.

the past and using extensive real-time data capture, developers at Bosch have created a cohesive image that is constantly being updated and enhanced. What was previously just raw data has been enriched with additional information. The use of ontologies makes it possible to understand the semantic relationships and use them to gain valuable insights. "We can see, for example, that a room might be cooled and heated simultaneously in order to keep the temperature constant. This is not deliberate, of course, but it actually happens really often," says Hartwig. He speaks from experience: Hartwig was responsible for optimizing buildings from an energy standpoint for several years.

The IoT service is being developed on a continuous basis. Regular feedback from customers and communication among developers play a major role in this process. Hartwig and his team work in three-week cycles. In the meetings, the Bosch experts receive feedback from the customer – for example, about user friendliness or new insights – that flows directly into the work by the interdisciplinary development team. The agile software development process makes it possible to react flexibly, and deploy smaller functional software components quickly. For example, a function is in the works to identify creeping changes at an early stage using the digital twin and to carry out maintenance before a device becomes defective – in short, predictive maintenance.

The digital service allows operators and facility managers to quickly ascertain the state of the technical systems, regardless of location. "What would have taken an energy engineer two weeks to do now only takes two minutes," says Hartwig. It has now reached the point where the service provides specific recommendations for action. "This will soon give us a smart building that independently analyzes and optimizes its technical building systems in a sustainable and efficient man-

ner, without any loss of comfort." The project at COBIS shows that building automation customers also benefit from the application. Potential shortcomings in the system technology become visible and can be rectified immediately. Overall, the in-house systems reach maturity more quickly. Incidentally, the digital service can be used irrespective of whether it is for a new building or an existing building. Many existing buildings are already equipped with a building control system. In many cases, there is also a bus system used for communication within the system technology. "We use these structures, but any other sensors necessary can still be installed later," says Hartwig.

Other digital services are currently in development. Andreas Hartwig and his team are busy planning the next step: the aim is for the system to soon be able to automatically implement specific recommendations for action. "With the aid of artificial intelligence – that is, by using simulation and modeling – smart buildings might one day be able to control their technical systems autonomously," explains Hartwig. "For example, it is possible to calculate how much solar irradiation is striking the façade using the known positions of the sun and the current cloud trajectory."



Andreas Hartwig is responsible for the new digital service.

The digital service allows operators and facility managers to quickly ascertain the state of the technical systems, regardless of location.

The Master Plan for Climate Protection

How Bosch Climate Solutions helps neutralize CO₂ emissions.

Save energy? Reduce carbon emissions? "The question is no longer if, but how," says Lisa Reehten, who is responsible for Bosch Climate Solutions (BCS). Together with her colleague Philipp Günther, senior consultant at BCS, and an experienced team, she has spent two years providing companies with vital support in developing the right measures for climate protection.

Bosch Climate Solutions was founded against the backdrop of the Group's own climate protection activities: manufacturing at Bosch has been carbon neutral at its 400 sites around the world since 2020. This got the attention of many in the business world: how does the company do it? There's a huge need for information. BCS is now systematically sharing that experience with others – "multiplying the global Bosch know-how into the market," as Philipp Günther says.

"Over a period of four to six weeks, we develop a climate master plan with the customer," explains Lisa Reehten. The first step is to analyze where the company currently stands in terms of its energy consumption and CO₂ emissions. In the second step, savings potential is identified

and implementation scenarios are developed. Increasing energy efficiency, generating renewable energy, purchasing green electricity, compensating unavoidable emissions by supporting climate protection projects: the means and methods used depend on the company. What can be achieved with which measures in which timeframe and at which cost? "The customer receives an analysis from us that visualizes everything exactly. We create transparency. And then the customer can make a decision," explains Philipp Günther. Upon request, Bosch will then also

help with implementation. The BCS team can consult and draw on numerous Bosch experts and the experience gained from more than 1,000 energy-efficiency projects.

"Our approach is a hybrid one," says Philipp Günther. Depending on the focus, factory visits are also part and parcel of a consulting project. For the most part, however, BCS's work is done using virtual channels. It's highly efficient. And customers like it. Around 60 per cent will return after the first project and will place their faith in BCS for the long haul. Companies such as Hansgrohe, Trumpf, Mahle and Boehringer Ingelheim count among its references. They trust the role model. Lisa Reehten: "If an industrial giant like Bosch can achieve carbon neutrality, anyone can do it."

Read more about the activities of Bosch Climate Solutions in an interview with Lisa Reehten and Philipp Günther.



Lisa Reehten and her colleague Philipp Günther are supporting climate protection activities with Bosch expertise.

Opening Doors with a Smartphone



An innovation team is working hard on a mobile access solution for new office environments and smart neighborhoods.

When Julia Steinacker rides her bike to work at Bosch in Aachen every morning, she no longer has to stop, rummage around in her bag to fish out her card and hold it in front of a card reader. The garage simply opens on its own. On the way into the building en route to her office, she simply holds her mobile phone in front of the card reader instead of a plastic card and the door opener reacts right away. All she has to have with her is her smartphone, which is something you don't forget as readily as a card. The 33-year-old has been working with her team on the new solution, which enables this 'open sesame' access and other flexible options for access control with a smartphone, for just over a year.

Julia Steinacker studied industrial engineering in Aachen and has been at Bosch for four years. As a product manager, she has been working on the topic of cards and readers from the very start. In the process,

she maintains a vigorous dialog with her customers, whose companies were often spread over several locations and who had to manage and request a corresponding number of different access cards. "Why can't I use my smartphone to access the site?" was a question she began to hear more and more often. It quickly became clear: "This is turning into such a big trend that it could completely change the market for access systems."

UNLIKE ACCESS CARDS, SMARTPHONES ARE ALWAYS HANDY

As part of a Bosch innovation program, Julia Steinacker and her colleague Ulrich Pinsdorf (from Engineering) were given the opportunity to develop a mobile access solution with a team specifically put together for this purpose. The mission: to find the most straightforward, most flexible and most secure entry solution possible on a smartphone, capable of being integrated into existing or new access systems at the customer's premises. Julia Steinacker: "It has to be easy to understand and data protection-compliant, it has to work reliably and it can't be any more complicated than using an access card." And mobile access must be able to be granted to employees as well as visitors and be supported by the respective management system, such as Bosch visitor management. Until now, for

"This is turning into such a big trend that it could completely change the market for access systems."

**JULIA STEINACKER,
PRODUCT MANAGER AT BOSCH**

example, visitors, external participants in a meeting or service providers had to hope that there was someone at reception who also had time for them, and that there was no long line of people waiting for access cards to be issued. It was all too easy to arrive too late.

On part of the operator of the company building, this involved considerable outlay in terms of time, personnel and therefore also costs: the operator must ensure that reception is adequately and competently staffed, that there are enough easy-to-program plastic access cards available, and also ensure that the cards are handed over by visitors when they leave the building. In addition, cards like this are often misplaced or forgotten – this rarely happens with your smartphone.

The requirements for building operators are becoming even more complex as working environments change. If there are no fixed workstations, alternating teams only come together to work on a specific project and team rooms and other resources need to be used flexibly, meaning the mobile access solution offers many other advantages compared to the card. Two-way authentication on a smartphone, an app communicating with the reader using low-energy Bluetooth, and interfaces to existing management systems offer many more options for flexible configuration and deployment.

Julia Steinacker was quite skeptical about the smartphone as a door opener when the development process began. This was due to a personal experience, when a booked holiday apartment could not be opened using her cell phone as had been promised. "It was really annoying!"

In the meantime, her own project has completely convinced her that the smart- ➔

phone “has huge advantages and that it’s a cool solution”. For Julia Steinacker and her team, intensive user research has been at the core of the development of the new system in recent months. What is important for visitor processes? What are the technical requirements? What security requirements does the system have to meet? These were some of the questions that the team asked again and again over the course of many interviews and discussions in workshops. They then adapted the mobile access solution accordingly, had it trialed again by test customers, and scrutinized it again in more interviews until everyone involved was ultimately satisfied with it.

GUARANTEED SECURITY THANKS TO TWO-FACTOR AUTHENTICATION

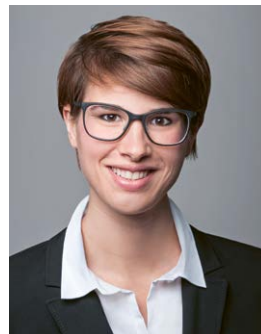
As part of the user research, the team also held intense discussions with portfolio managers at real estate companies. A new trend in the industry is campus projects with different user groups, such as people renting apartments, employees in offices, and a public that uses all the other spaces – from retail stores to day care centers. Projects like this in particular require secure, easy-to-integrate and customizable solutions with a secure app that can also be used by other applications, a straightforward management solution that can be used to send authorizations by email, for example, and comprehensive end-to-end support. A modular solution and service portfolio with software for access management, different user licenses, mobile card

packages, compatible readers, software maintenance offers and more has emerged from all the answers. The entrances to the building are equipped with readers, the required software is installed in the customer’s system and, ideally, connected to visitor management. At this point things become very easy for employees: on their phones, they install the mobile access app, which is coupled with certain security criteria such as two-way authentication (PIN, fingerprint, facial recognition, etc.). If the employee is registered in the management system, the authorizations necessary are stored in the system. If the user has received their digital card, they simply have to hold their smartphone up to the reader and the door opens as soon as the access system has been checked.

Julia Steinacker’s team can’t wait to start refining the app, making the browser-based visitor management interface and the other components of Bosch’s mobile access system even more user friendly on the basis of the first pilot installations with up to 140 users. ●

“A modular solution and service portfolio has emerged from all the answers.”

JULIA STEINACKER



500 Horsepower for More Efficiency

Climate change calls for rapid and sustainable solutions. Industrial companies play an important pioneering role when it comes to sustainable production and avoiding carbon emissions.

Individual solutions for a range of plant areas.

Increasing energy efficiency in production facilities can have a major impact on the path to carbon neutrality. When energy generation and energy consumption are optimized, year-on-year savings of up to 15 per cent are not uncommon – providing a significant source of gains that should not be overlooked.

Bosch’s partnership with Daimler Truck in Mannheim demonstrates how this potential can be identified and leveraged. Bosch experts have been providing support with the analysis and exploitation of untapped energy efficiency potential since 2017, and have even been providing guarantees for specific savings. Together with the client, they analyzed and developed suitable measures for a

range of areas at the Mercedes-Benz Mannheim plant, from heating, ventilation and air conditioning technology to machining and foundry processes, by holding a series of workshops and by collecting information on site. The outstanding ideas contributed by in-house employees were also taken into account and added considerable value to the project. Implementation was carried out in stages, with Bosch assuming responsibility for the complete project management.

SHARED KNOW-HOW DELIVERS THE BEST RESULTS

Over the course of the project, new potential was continually identified and further energy efficiency gains were consistently generated to

achieve maximum savings. In addition to the saving potential offered, for example, by adapting the air exchange rate to the actual demand using regulation systems, or the modification of the hydraulics and control technology for heat recovery from the compressed-air cooling circuit, production processes also provided plenty of opportunities. Optimizing switching hysteresis at the return pumping stations for cooling lubricants, as well as the optimization of shutdown management at machining centers and in the foundry, was combined with other measures such as the elimination of compressed-air leaks to generate overall savings. The collaboration has demonstrated once again that shared know-how brings the best results. ●



Modern Office and Lab Buildings: Security Meets Comfort

TÜV SÜD has moved into a new building in Singapore. Security and conference systems from Bosch are making it a great place to work.

The latest TÜV SÜD office that opened in Singapore is a state-of-the-art building with an area of 18,000 square meters spread over seven floors and providing space for some 600 employees. TÜV SÜD is a globally active safety, security and quality service provider for testing, inspection and certification (TIC) with roughly 1,000 offices worldwide. The new building is home to 60 laboratories and a Digital Service Center of Excellence (CoE), which is supporting Singapore's Smart Nation initiative with many pilot projects. The experts at TÜV SÜD are

driving the development, incubation and market launch of innovative projects with partners from the public and private sectors. The building in the city-state of Singapore is the company's largest investment to date outside TÜV SÜD headquarters in Munich. It is fitted out with cutting-edge security cameras as well as audio and conference systems from Bosch, all of which were planned and installed between September 2019 and November 2020.

ACCESS CARDS REPLACED BY AN APP

Bosch technology ensures convenience and security as soon as employees enter the building. They no longer require an access card to enter the building, and instead simply use an app installed on their smartphones. "We have installed the eVisitor management system, which



Access control by app: employees sign themselves in at the smart building.



is our very latest access control system," says Matthew Tan, sales manager at Bosch. The system uses near-field communication (NFC) as an interface, which is a wireless technology that is used to transfer data over short ranges – in this case between smartphones and the receiver in the front door. "Every TÜV SÜD employee can use their smartphone for access," says Tan. All they need is a security authorization and a corresponding app.

WELL-CONNECTED IN WEB MEETINGS

Video conferences are becoming increasingly important in daily business. The new TÜV SÜD building in Singapore therefore has ten conference rooms equipped with TV screens and webcams. Bosch provided the technology used to connect



Conferences in the smart building: simply book meeting rooms by email or tablet.

the rooms, and installed a state-of-the-art reservation system. "It's very easy for employees to reserve the conference rooms using their e-mail program, or use the tablets in the respective rooms to sign up for spontaneous meetings," says Joel Sua, a project engineer at Bosch. The ten conference rooms have wireless connectivity options for added

convenience. For example, when an employee enters a conference room with their laptop, the laptop is automatically connected to the large screen there.

COORDINATION USING VIDEO CLIPS

Bosch worked on the project with a team of around 15 associates. The biggest challenge proved to be the coronavirus pandemic, which made face-to-face meetings and site visits with the customer impossible. Nonetheless, the Bosch team found a solution: "We filmed the progress of installation work in the building with a video camera, and then discussed the recordings in web conferences with the customer," says Matthew Tan. This allowed the project to be completed on time despite the complications.

FRANKFURT'S PUBLIC SERVICES

What a Difference!

SUSTAINABLY REDUCING ENERGY COSTS and significantly reducing emissions – companies and operators of public buildings alike are faced with this daunting challenge. In practice, the task is to identify energy-saving measures in the first step and implement them in the next. This is exactly what Bosch Energy and Building Solutions did for the 'Behördenzentrum' in Frankfurt, a building that houses the public administration. This involved an extensive modernization of the building control system and energy supply with guaranteed reductions in energy costs and long-term operational management. The mission has been a success. So much energy is now being saved at Frankfurt's public services that the investments to the tune of millions now pay for themselves.

COSMETICS

High-quality care products used around the world

ANIMALS

Such as polar bears on an oil rig in Alaska

ART AND CULTURE

From modern Art in Kunsthallen to historical cultural objects and race cars in many museums

CASTLES AND MONUMENTS

Such as Neuschwanstein or the Kulturpalast Dresden

MUSICAL INSTRUMENTS

Such as guitars or other light and sound equipment in Europe's largest music shop

All-round Protection

With our solutions and technologies, we not only ensure the safety of people, but also...



PUBLISHER INFORMATION

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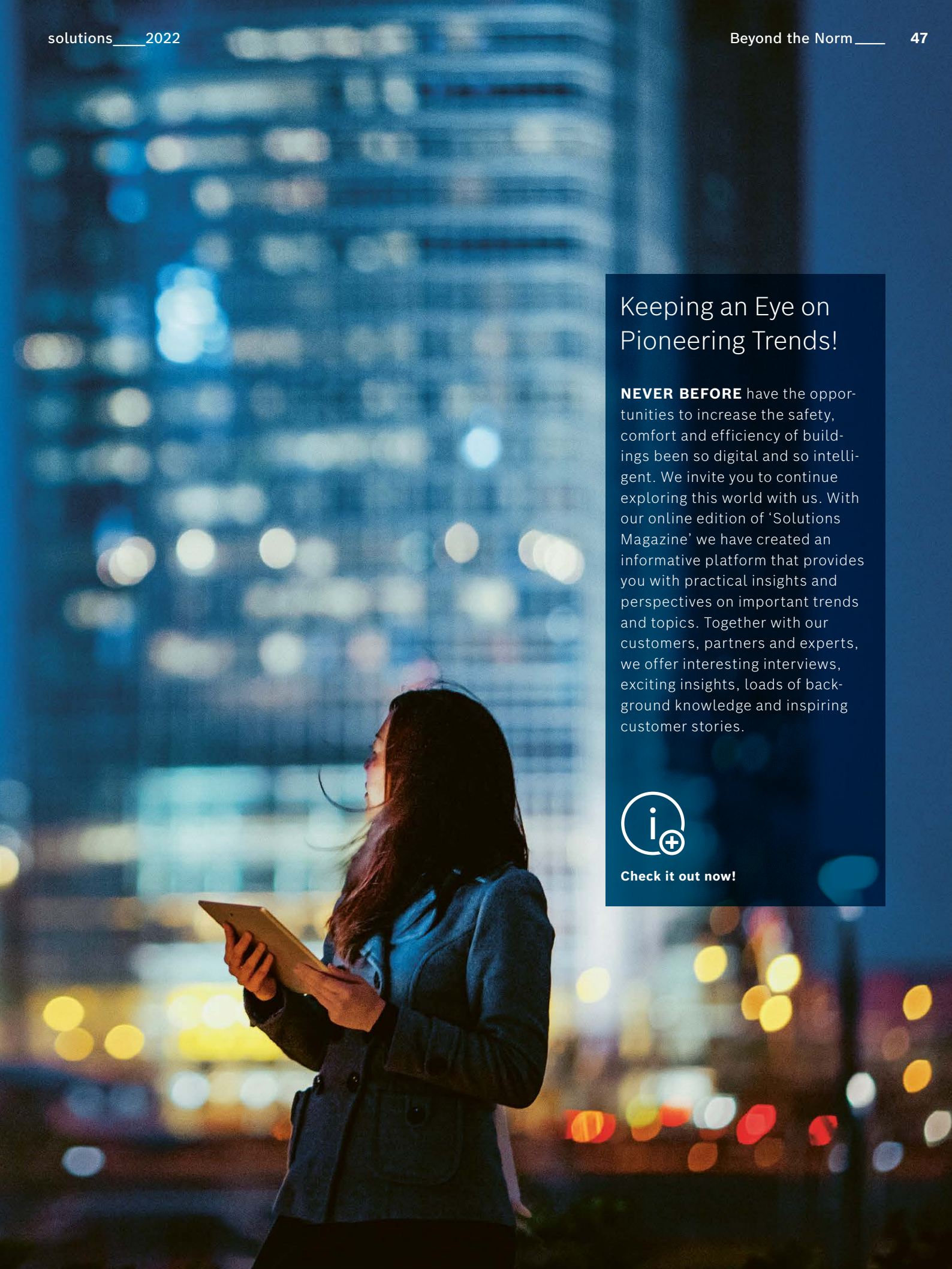
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Keeping an Eye on
Pioneering Trends!

NEVER BEFORE have the opportunities to increase the safety, comfort and efficiency of buildings been so digital and so intelligent. We invite you to continue exploring this world with us. With our online edition of 'Solutions Magazine' we have created an informative platform that provides you with practical insights and perspectives on important trends and topics. Together with our customers, partners and experts, we offer interesting interviews, exciting insights, loads of background knowledge and inspiring customer stories.



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As your reliable partner, we provide connected and integrated solutions that make your buildings more secure, more comfortable and more efficient. Our experts support you as consultants, installers, and service providers with tailor-made safety and security systems, building automation solutions as well as individual energy services.

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