T IoT

Success Stories from the Internet of Things

connect. digitize. get ahead.

IoT in Practice

How digitalisation meets the greatest challenges of our time

Supply bottlenecks, high energy costs, a shortage of skilled workers - these are just some of the many challenges currently facing companies in a wide range of sectors. At the same time, the Institute of the German Economy states that digitalisation is the number one opportunity for companies, the state and society. The practical examples in our new e-book show how the Internet of Things (IoT) can help.

Making business future-proof with IoT Monitor supply chains via a global cellular connectivity, prevent production failures via specialized IoT networks and quickly train untrained staff thanks to intelligent cloud software. The IoT in particular offers cost-effective solutions for many industries on how to future-proof your business model and offer your customers added value.

Meeting challenges with the IoT
Crises often force companies to put their business model to the test. Currently, the trend to digitalise and automate business areas is picking up significantly. Companies that relied on future-proof technologies such as the IoT at an early stage are now benefiting from this. In this e-book you will find reference examples from a wide range of industries:

Read how:

- the logistics service provider Dachser supervises transports
- the machine manufacturer Kässbohrer becomes a service provider
- Lichtwart's IoT solution illuminates buildings efficiently
- HP digitizes printing and production processes
- Satellai transforms data into business value with artificial intelligence
- Cleverciti provides transparency into parking space utilization
- Biotronik saves lives with connected pacemakers
- Deutsche Bahn promotes sustainable transport
- and many more exciting use cases!

Enjoy the reading!

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Stable Supply Chains

Monitoring and protecting goods in transit, efficiently managing and maintaining fleets of vehicles – IoT brings crucial added value to functioning supply chains.

Transport & Logistics

Transparent Logistics Thanks to Connected Swap Bodies

Internationally active logistics service provider Dachser relies inter alia on swap bodies that it now connects by means of the Internet of Things.

The Challenge
Using around 8,500 swap bodies, Dachser mainly ships goods between its central facilities throughout Europe. Swap bodies – unlike semitrailers – are not restricted to specific trucks, but this flexibility made tracking them across Europe in real time a major challenge.

The Solution
Dachser equipped its swap bodies with tracking modules that incorporate high-end Telekom SIM cards. The trackers relay the swap bodies' current position regularly by LTE-M to the cloud, where Dachser can evaluate and visualize the data. Thanks to Telekom networks, roaming partners and GSM fallback the trackers have connectivity throughout Dachser's European operational area. In addition, the hardware is robust and suitable for use in both hot and cold climates.

Customer Benefit
The logistics service provider always knows where its swap bodies are and can estimate arrival times accurately. If a delivery is delayed, the local drivers at Dachser's 237 European road logistics branches do not need to wait. They can use the cargo space for other shipments that are ready to go in the warehouse and then set out to deliver them punctually and fully laden. That streamlines processes, reduces numbers of free parking bays and multiple journeys and thereby benefits sustainability. As Dachser can now provide precise arrival time information, transparency is improved from the customer's point of view.

> "The tracking solution enables us not only to optimize our own processes but also offer our customers more transparency."
>
> **Lars Relitz**, Head of Corporate Digital Innovation & Development at Dachser

DACHSER
Intelligent Logistics

IDS Logistik Uses GPS Solar Modules to Locate Swap Bodies in Real Time

In order to transport general cargo by truck optimally in swap bodies and to be able to locate the standardized containers in real time IDS connected them with the Internet of Things.

The Challenge
Until recently main run arrival times were almost impossible to estimate and employees counted the number of swap bodies available on their daily walk around the yard. As a result, main run processes lacked transparency and manual correction postings created additional administrative complexity.

The Solution
IDS Logistik GmbH developed positioning software. To connect its swap bodies with the software a solar-powered GPS hardware solution was installed on the swap bodies. Telekom kitted out the GPS solar modules with cellular network contracts to ensure stable transmission of real-time position data in Germany.

Customer Benefit
IDS Logistik GmbH now always knows when incoming main runs are due to deviate from their scheduled time of arrival. Local deliveries can then be rearranged efficiently in time and empty runs can be avoided. Manual correction postings and the daily walk round the yard are no longer needed, so IDS employees save time.

> “The IoT solution enables automated processes to replace manual administrative input. That makes our logistics chain markedly more efficient.”
>
> **Tatjana Scheuring**, Head of Product and Process Management, IDS Logistik GmbH

IDS LOGISTIK VON MENSCHEN GELEBT

Transport & Logistics

IoT trackers make the last mile more efficient

Thanks to Drive & Track, citkar always has an eye on the usage data for its e-cargobikes and can therefore offer customers predictive maintenance and better reliability.

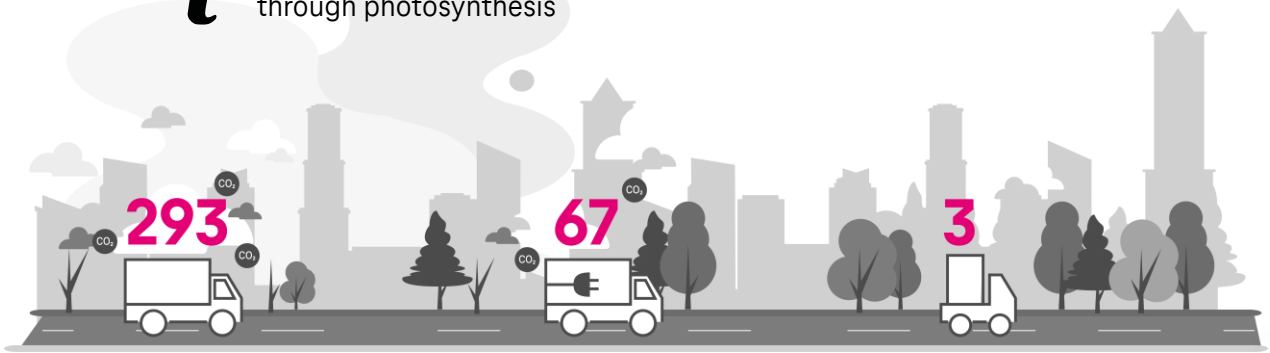
Transport & Logistics

The Challenge
citkar is the manufacturer of Loadsters, a four-wheeled e-cargobike that helps delivery services and transport companies get through city traffic more eco-friendly and efficiently. To optimize reliability and quality assurance as well as implement predictive maintenance, citkar wanted to be able to access usage data of the bikes as well as digital checkbooks.

The Solution
citkar now employs Drive & Track. IoT trackers on the Loadsters collect data on the speed and distance traveled and transmit it to the Cloud of Things. Via the online portal, citkar can view this information as well as the digital checkbooks.

Customer Benefit
The data allows citkar to ideally plan the maintenance cycles of the Loadsters and implement predictive maintenance. This improves the reliability of the e-cargobikes and prevents breakdowns. In addition, the manufacturer can improve quality control and replace fragile components. In the future, the system will be expanded to include the CAN bus inter-face, familiar from the automotive industry, which will allow even more detailed motor and electronics data to be collected. Firstly, citkar's customers save financially: instead of paying 11.20 euros for a car with an internal combustion engine or 4.10 euros for an electric car, they pay an average of just 0.70 euros per 100 kilometers with the Loadster.

A tree can process about 0.01 tons of CO_2 per year through photosynthesis



A **car** with an internal combustion engine emits 2.93 tons of CO_2 per 10,000 kilometers

An **electric car** produces 0.67 tons of CO_2 emissions per 10,000 kilometers (electricity generation)

The **Loadster** generates 0.03 tons of CO_2 per 10,000 kilometers (power generation)

Delivery Services

Beverages from the Cloud

The beverage and food delivery service Flaschenpost responds flexibly to short-notice market fluctuations by means of computing power from the Microsoft Azure cloud and fiber-optic links between its corporate headquarters and its warehouse facilities.

The Challenge
Order drinks online for delivery within 120 minutes is the Flaschenpost business model, but when working at high capacity the delivery service's in-house server capacities and data center resources reach their limits. In addition, the drivers' handhelds are difficult to configure and update and the wearables in the warehouses were often unreliably connected.

The Solution
All of Flaschenpost's infrastructure and platform services have with Telekom support been migrated to Microsoft 's Azure cloud platform. Updates to delivery drivers' IoT devices are now automatic and no longer need to be installed manually. Handhelds are preconfigured and equipped with IoT-enabled SIM cards. The scanners used in the company's intralogistics are now cordless IoT wearables attached to the order pickers' gloves that record the barcodes of crates automatically.

Customer Benefit
"Drinks for everyone immediately" is a promise to customers Flaschenpost can continue to keep because computing power and server capacities in the cloud simply grow with the company. Order spikes are no longer a challenge for the IT. Head office and warehouses are stably connected to the Internet. Handheld devices help to pick orders swiftly and reliably and show drivers the fastest route to the customer. Using the collaboration tool MS Teams employees organize themselves efficiently in project groups, share documents, process them in parallel and trade news and views in chats and web conferences.

> "With the new IT infrastructure that we have rolled out jointly with Telekom, Flaschenpost is in a position to respond flexibly to the latest market developments and to new customer wishes."
>
> **Aron Spohr**, Chief Technical Officer, Flaschenpost

flaschenpost.de

Optimized Supply Chain Thanks to Connected Lubricant Tanks

Now that tank drums are connected Ernst Meister can deliver lubricants to its customers just in time. The SME has optimized its supply chain and can extend its business model as a consequence.

The Challenge
Until recently neither Ernst Meister GmbH nor the company's customers could see how full their lubricant tanks were. Customers phoned the company at regular intervals to arrange delivery dates. That required administrative input and could also lead to deliveries arriving too early or too late. Deliveries were inefficient. After every delivery superfluous lubricant had to be taken back and the tanker cleaned. Delivery too late? In the worst case that meant a production outage for the customer.

The Solution
Using Telekom's IoT fill level gauge Ernst Meister connected the tank drums and developed a retrofit solution. An IoT sensor now pokes through a hole in the service hatch into the tank's interior and measures the fill level ultrasonically. Once a predefined level is reached Telekom partner Autosen's io-key gateway sends the fill level sensor's data to Telekom's Cloud of Things IoT platform.

Customer Benefit
Ernst Meister can view individual tank fill levels on a Web dashboard. When a predefined level is reached the company is notified by e-mail. The customer no longer needs to call and deliveries that are too early or too late are a thing of the past. That reduces customer outages and costs, and thanks to IoT connectivity Ernst Meister can optimize its business model and provide a more efficient service.

> Thanks to the IoT solution we can now offer our customers a markedly more efficient service. We have already noticed positive effects with both existing and new customers.
>
> **Daniel Schulte**, Certified Lubricant Technology Specialist, Ernst Meister GmbH

Meister
Schmierstoffe | Energie | Recycling

Waste Disposal

End-to-End Visibility in Pharmaceutical Supply Chains

Controlant's smart IoT device with a built-in SIM can provide medication manufacturers with an unprecedented insight into their supply chains.

The Challenge

Transportation of pharmaceutical products is subject to strict requirements. Above all, the cold chain must be strictly maintained. If medications have to be discarded, this translates to large financial losses for the pharmaceutical industry. When the supply chain is interrupted, medications arrive late, which impacts the patient. Companies lacking visibility in the supply chain need to create large safety stocks, further increasing financial and environmental costs.

The Solution

Provider Controlant, in partnership with Deutsche Telekom and a range of other partners, developed a monitoring solution based on the Internet of Things (IoT). The Saga Card fits into a carton or even a single packet of medications. It can provide detailed location and temperature data throughout the transport route. Even opening the packaging is registered. The slender device incorporates a software-defined Telekom nuSIM. This IoT-version of an iSIM uses Telekom's worldwide, energy-efficient NB-IoT and LTE-M networks for data transmission to Controlant's cloud platform.

Customer Benefits

Controlant's new monitoring device can follow the path of medication from production to the patient and brings end-to-end visibility into pharmaceutical supply chains. It provides real-time data and notifications about location and condition even on the last mile, for example in-time recognition of interruptions in the cold chain and of medications being opened. The Saga Card brings an enormous reduction in waste; large safety reserves are no longer needed.

> With our new Saga Card we are extending visibility in the supply chain from production to the patient.
>
> **Gunnar Sigurdsson,** Product Manager at Controlant

Controlant

Pharma

Innovative Products and Services with IoT

Smart, connected products provide insights into customer needs, enable innovative services and open up new revenue streams.

Kässbohrer: Networked PistenBully Works More Efficiently

Kässbohrer Geländefahrzeug AG has connected its PistenBully snow groomers on the cell network. Ski slope operators benefit from more efficiency, sustainability and safety in preparing ski slopes.

Manufacturing

The Challenge
Snow production and slope preparation are significant cost factors for Kässbohrer customers who need reliable data-based snow depth information in order to work more safely, more efficiently and more resource-savingly. For the PistenBully Kässbohrer required mobile connectivity that would enable its snow groomers to transmit this data in real time, and every PistenBully driver had to be aware at all times of conditions on the slopes.

The Solution
Kässbohrer equipped all new PistenBully vehicles with a communication module that incorporated a Telekom SIM card. During slope preparation they communicate autonomously with each other and share with the data center information about snow depth and precise position. This data is visualized on a map of the terrain that drivers see on a monitor screen.

Customer Benefit
Information about snow depth and slope areas already prepared enables the driver to navigate more specifically and eliminate duplication, saving time and fuel. Efficient use of available snow resources relieves pressure on the environment because less artificial snow is required and vegetation beneath the snow cover is protected. Water, electricity and fuel are also saved and the IoT solution enables slope operators to extend the skiing season. Drivers are safer too because danger points can always be seen – even in poor visibility. Remote access to telemetric data from vehicles enables malfunctions to be analyzed in advance and resolved in a more targeted manner. And thanks to Telekom's global footprint Kässbohrer can offer this service to customers all over the world.

> "Thanks to cellular connectivity we can now offer our customers new, extended services."
>
> **Christian Mönig**, Business Development Manager, Kässbohrer Geländefahrzeug AG

KÄSSBOHRER GELÄNDEFAHRZEUG AG

Everything at a Glance on the Construction Site

PERI GmbH SE has connected its formwork elements for construction sites and can now offer its customers a comprehensive localization service.

The Challenge

PERI GmbH SE, a specialist in formwork and scaffolding systems headquartered in Weissenhorn, Bavaria, is involved in the daily challenges posed by construction work in over 70 countries around the world. In order to record the deployment or storage location of formwork elements faster and more precisely PERI was on the lookout for a tracking solution suitable for the construction industry.

The Solution

A combination of two IoT tracking systems now ensures transparency. Telekom's Low Cost Tracker is in charge of the rough localization of the elements. Connected by LTE-M, NB-IoT or 2G to the Cloud of Things, Telekom's IoT platform, it shows which part is on which construction site. A second tracker supplied by Telekom partner Syfit reports by Bluetooth Low Energy the exact position of the formwork elements on the site.

Customer Benefit

Connectivity on the Internet of Things has several advantages for PERI. The manufacturer can now offer its customers an additional service when they purchase formwork elements. PERI itself has an up-to-date overview of parts rented out, can manage stocks more efficiently and announce a precise delivery time to customers.

> Thanks to the tracking solution, our customers and we ourselves always have our formwork systems in view. In this way, we make a significant contribution to the digitalization of the construction site."
>
> **Wolfgang Span**, Senior Global Digital Solution Manager bei PERI

Construction Industry

Manufacturing

Networked Ventilators on the Internet of Things

ZIEHL-ABEGG, a family firm in Künzelsau, Baden-Württemberg, manufactures high-quality ventilation and air conditioning systems for a variety of uses. The new Zabluegalaxy platform was develope to ensure that customers are better able to monitor their ventilators. Customers can now keep an eye on them and take immediate action in the event of a malfunction.

The Challenge

ZIEHL-ABEGG ventilators are used in critical environments such as factories, laboratories, agricultural enterprises or server facilities where reliable operation of the ventilation technology is of crucial importance. Maintenance cycles were set at correspondingly close intervals that involved a high level of effort and expense. ZIEHL-ABEGG also wanted a customer and administration portal where customers would have access to their live status and operating data and could be offered additional services such as optimal management, maintenance and procurement.

The Solution

ZIEHL-ABEGG's air echnology products will in future be equipped with additional sensors that at intervals of seconds send a status update by Bluetooth to the IoT gateway. Data collected can be electricity consumption, internal and external temperatures, operating hours or vibrations indicating a possible imbalance. Via a local WiFi, LAN or cellular network connection the gateway relays the bundled data to the IoT platform. With a mouse click on their user interface customers can access the status of their equipment. ZIEHL-ABEGG gains insights into the performance of its equipment in order to improve the planning of maintenance, servicing, product requirements ad service life. Current status information or malfunction notfications for individual items of equipment can also be accessed on the Zabluegalaxy platform, on WhatsApp, by e-mail or by SMS.

Customer Benefit

Connection to the cloud and the Internet of Things now enables the ZIEHL-ABEGG team and customers themselves to monitor connected devices continuously. Threshold levels set in the system ensure that customers and service technicians receive timely alarm notifications. Device downtimes are thereby reduced significantly and unnecessary on-site servicing of ventilators is avoided. ZIEHL-ABEGG has been able to reduce its global customer service costs sustainably and its research and development department benefits from the consolidated device parameters across the entire product lifecycle that networking on the Internet of Things provides.

ZIEHL-ABEGG

Manufacturing

Mit der Cloud zur Smart Kitchen

Dank der IoT-Plattform kann MKN seinen Kunden eine Ende-zu-Ende Lösung anbieten, um ihre Profiküchen zu digitalisieren.

The Challenge
MKN wanted to connect its combi steamers to the Internet of Things in order to provide its customers with digital cookbooks and automatic steaming programmes. In addition, comprehensive analytics and predictive maintenance were to guarantee even greater efficiency and quality of the devices.

The Solution
An end-to-end solution: with the IoT Cloud, Deutsche Telekom provides not only the technological foundation, but also the hardware and connectivity via LAN, WLAN or a mobile network. As such, all device data is consolidated via the Cloud of Things and made available to provide a visual presentation tailored to each end customer's requirements.

Customer Benefit
The IoT platform allows uniform steaming programmes to be installed on the devices. These programmes are based on expert experience and automatically ensure high-quality results. The users benefit from centrally controlled steaming processes, status checks for optimal device use and automated checks for hygiene regulation compliance.

> "Efficient processes and reliable technology are vital in the restaurant sector as professional chefs are today confronted with high expectations, time pressure, a lack of specialist staff and strict demands when it comes to food hygiene."
>
> **Peter Helm**, authorised officer and Head of Innovation and Digitalisation at MKN

Stay Competitive with Data from the Cloud

From brake wear to service requirements: To service cars more efficiently, SELECT AG provides independent workshops with vehicle information from the cloud.

The Challenge

Since 2018, new cars must be equipped with a SIM card that can send an emergency signal in the case of an accident. These cards can also provide manufacturers with valuable vehicle data that they can use to recommend maintenance work at authorized workshops, even before damage or wear is audible or visible. But the more than 21,000 independent workshops in Germany do not have access to this vehicle data and therefore cannot offer services such as predictive, data-based maintenance.

The Solution

SELECT AG offers its customers the opportunity to network cars via an on-board diagnostic adapter and a SIM card. In the case of newer vehicles, an existing car connection can be used. Independent workshops can retrieve telemetry data centrally via an IoT platform, which had been developed by Telekom's digitization for SELECT AG, to store and analyse all the data.

Customer Benefit

Independent workshops now know when an inspection or repair is due for which customer. Through the connection to the cloud platform, the driver quickly receives a recommendation for action. This way, workshops can increase customer loyalty and offer better and faster service. They can service cars in a predictive manner and always have spare parts on site in time to reduce outages.

> “Thanks to this connection and evaluation independent workshops that cooperate with us know exactly when their customers will need a specific repair and are able to recommend appropriate measures, thereby boosting customer retention.”
>
> **Daniel Trost**, Chief Digital Officer SELECT AG

SELECT AG
Made in Quality

Automotive

Transportation

POC

Self-propelled Vehicles and Autonomous Transport Systems

Auve Tech is an Estonian company specialized in the development and deployment of self-proplelled vehicles and autonomous systems.

The Challenge

At present, Auve Tech shuttles—like many other self-propelled vehicles—use sophisticated, cost-intensive LiDAR technology. With the aid of LiDAR the shuttle recognizes its surroundings and calculates its position in relation to other physical objects and obstacles. As a backup in case the LiDAR technology fails (in bad weather, for example) Auve Tech uses GNSS Precise Positioning, which in relation to possible sources of error is largely independent of LiDAR and is also one of the least expensive sensor systems in the context of autonomous navigation technology.

The Solution

To test the accurac of positioning when navigating without LiDAR Auve Tech installed an evaluation kit with a Precise Positioning GNSS module (PGM) developed by Swift Navigation in its shuttles.

Customer Benefit

The test revealed that the PGM and the Skylark Precise Positioning service enable safe and accurate positioning for autonomous navigation. The same test run was undertaken first just with LiDAR technology and then repeated with Precise Positioning. The monitoring system showed the same results for both runs. LiDAR and Precise Positioning defined the same area so that Precise Positioning can demonstrably be used as a standalone solution for autonomous transportation. In a next step Auve Tech will be working on a few minor discrepancies that came to light in the test and optimizing the solution for use in production.

> “We at Auve Tech make the world’s most flexible ecosystem for last-mile transport: our autonomous shuttles. The Swift Navigation GNSS module was tinstalled in our shuttle to improve our autonomous mobility system. Intensive tests carried out on our system serve to make our navigation even safer by means of Precise Positioning.”
>
> **Jorma Hiie**, Project Lead, Auve Tech

auvetech

Manufacturing

Staying competitive with data

The window manufacturer is setting itself apart from the competition by installing chips in its window frames, which can send dimension data and maintenance information to a smartphone.

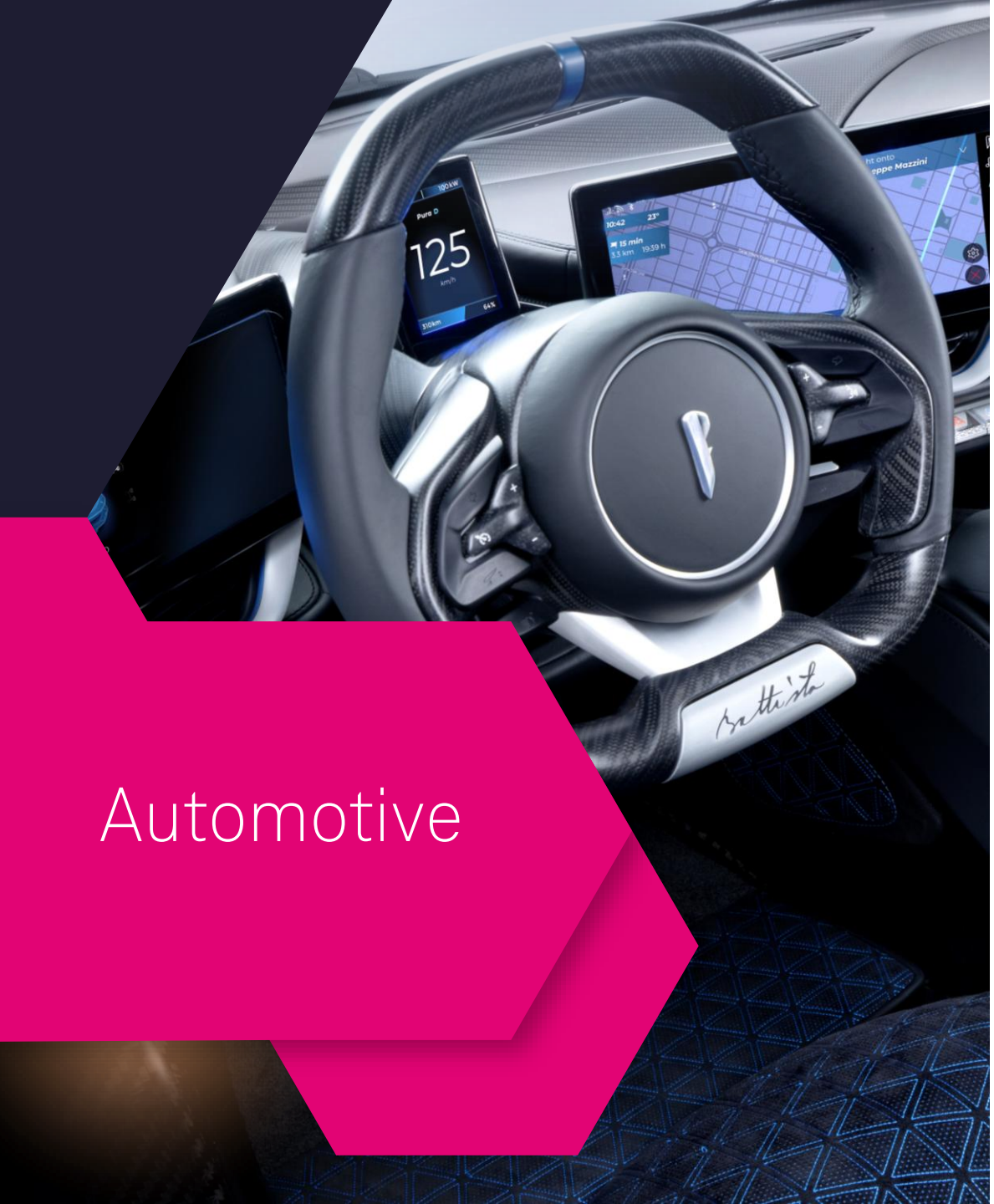
The Challenge
Cheaply manufactured windows from Eastern Europe are flooding the German market. IDEAL hopes to use digital services to impress demanding target groups from specialist retail with the quality products from the Rhineland-Palatinate region in Germany.

The Solution
Since 2019 NFC chips have been incorporated into all IDEAL windowframes. Using an app-based solution from Syfit, a Deutsche Telekom joint venture, and a software-as-a-service solution, dealers and end customers can scan the chips with a conventional smartphone for information about dimensions, certificates and care instructions.

Customer Benefit
Leafing through catalogues, searching through storage facilities and measuring by hand are all now a thing of the past: the app immediately provides retailers with all the information they need on a window. Accordingly, **defects** can be repaired more easily and returned goods can be processed more quickly.

> “Our customers know Deutsche Telekom as an established company. With a solution from them, we are underlining the trust our clients already place in us.“
>
> **Claudia Otten**, Marketing Managerin at IDEAL

IDEAL-FENSTERBAU WEINSTOCK
…mit der Technik von morgen



Automotive

The world's first globally connected electric hypercar

A Telekom eSIM connects Automobili Pininfarina's Battista hypercar, which will debut in 2019, with the Internet of Things all over the world, including infotainment, telemetry and remote fault diagnosis.

The Challenge
Developing 1,900 PS, accelerating from 0 to 100 km/h in less than two seconds and reaching a top speed of 350 km/h, Automobili Pininfarina's Battista EV hypercar is the most powerful automobile ever made in Italy. With a range of 500 km the new hypercar can cover an impressive distance on one battery charge. And its connectivity has to equal this performance in every respect.

The Solution
The Battista is equipped with a permanently installed Telekom eSIM via which the super sports car can connect with the Internet in more than 50 countries around the world. Automobili Pininfarina manages connections for the car in all countries via a central Telekom IoT portal. The platform is operated to the highest data and security standards from a data center in Frankfurt.

Customer Benefit
Via the Battista's Internet access Automobili Pininfarina can download and evaluate comprehensive vehicle and telemetry data in real time, diagnose faults remotely and update software in the car over the air. Reliable connectivity makes infotainment offerings such as route planning possible in real time, including pointers to free charging points.

> "All of these elements of connectivity contribute to our seamless Life on Board Concept. Everything from the driver-orientated user-experience to the convenience features such as the global roaming and OTA updates have been developed and engineered to bring heightened convenience to our luxury hyper GT."
>
> **Paolo Dellachá**, Chief Product and Engineering Officer, Automobili Pininfarina

AUTOMOBILI pininfarina

Automotive

BMW I Global IoT Connectivity

On the Move and Always Online

For large mail attachments, video conferences or streaming services, Telekom's HotSpot Drive provides BMW drivers in selected models with swift and stable internet access on the move.

The Challenge

If you use your mobile data volume in your car to take part in video conferences or enable passengers to use streaming services and watch movies, it won't be long before you are notified that your data volume is almost used up. Wouldn't it be better to be able to access swift and stable in-car WiFi on the move as comfortably as at home?

The Solution

Jointly with Telekom, BMW offers in most BMW model ranges an optional mobile WLAN hotspot. Using Telekom's HotSpot Drive service, BMW drivers can now surf the Net across Europe with swift and stable WiFi. Up to ten mobile terminal devices can be connected to the hotspot simultaneously and a separate SIM card is not required.

Customer Benefit

BMW drivers are now connected with the Internet on roads all over Europe via a fixed antenna. The HotSpot Drive is much faster than smartphone hotspots and personal data volumes are not affected. Thanks to perfect reception jerky video conferences or interrupted streams are no longer a problem.

> "With Telekom's HotSpot Drive BMW offers its customers even better service and makes driving more enjoyable by providing high-speed Internet access on attractive terms in many European countries."
>
> **Sebastian Bales**, Account Manager M2M / IoT Automotive bei Deutsche Telekom IoT

Smart Beermat for Gastronomy

Thanks to a connected beermat from Hoffmann + Krippner, bars and breweries are finding out more about the drinking habits of their guests and customers.

The Challenge
Breweries, bars and restaurants know very little about their customers' consumer behavior. When do they drink and which drinks do they prefer? Are special offers and advertising campaigns effective? Hoffmann + Krippner, a manufacturer of flexible data entry systems, was looking for a digital solution to enable it to provide beverage manufacturers and bars with relevant data.

The Solution
Hoffmann + Krippner developed a smart beermat. It records the weight of a glass by means of a pressure sensor; from that the quantity consumed can be inferred. In addition the company incorporated tiny Telekom M2M SIM cards in the beermats. They send the data by NarrowBand IoT (NB-IoT) to the Cloud of Things, the Telekom IoT platform. The data is then processed for sending to beverage manufacturers, bars and restaurants.

Customer Benefit
Breweries and caterers learn more about their customers' consumer habits and can make them customized offers. They now know which kind of beer is drunk in which quantities and when. Waiters can see from the quantity consumed which guests might want to order another glass and can approach them proactively. Initial tests show that the IoT can help to boost sales by between 10 and 20 percent.

> If we enrich the beermats with extra information such as the weather conditions, beverage manufacturers and caterers can customize special offers to match the the situation."
>
> **Ralf Krippner**, Managing Director, Hoffmann + Krippner GmbH

Hoffmann+ Krippner

Gastronomy

AI-powered IoT sensors optimize the search for parking spaces

Cleverciti and Deutsche Telekom connect parking spaces with AI-supported sensors and IoT technology. The smart solution reduces traffic congestion and optimizes parking space management worldwide.

Challenge

According to surveys, around 30 percent of inner-city traffic is caused by the search for parking spaces. This leads to traffic jams, increased emissions and frustration among drivers. Cities need an efficient solution to better manage parking spaces and quickly direct drivers to available spaces.

Solution

Cleverciti's system for monitoring and controlling parking spaces is based on optical sensors that are mounted on existing infrastructure such as streetlights. One sensor can detect up to 100 parking spaces and uses AI to analyze their occupancy in real time. The occupancy data is transmitted securely and in compliance with data protection regulations to the cloud via Deutsche Telekom's 4G/5G network. Digital displays guide drivers to free parking spaces. A smartphone app also offers navigation and payment options. Cities receive detailed analyses of parking space usage for better planning and more efficient management. Deutsche Telekom's global mobile coverage enables Cleverciti to use the solution worldwide.

Customer Benefit

The Cleverciti solution halves the average time spent looking for a parking space. This reduces emissions and noise and thus increases the satisfaction of residents and visitors. Retailers benefit from increased customer footfall when there is more time for shopping or eating out. Cities optimize their parking management through data-based decisions. The utilization of parking spaces increases, which leads to additional revenue.

> „Thanks to Deutsche Telekom's global IoT network, we can deploy our solution worldwide and help cities transform their parking operations."

David Parker, CEO Cleverciti

Cleverciti

Smart City

Autonomous Cleaning Robots Networked Worldwide

Leading cleaning technology provider Kärcher is connecting its autonomous cleaning robots via cellular networks. Telekom's global networks enable the machines to be used worldwide.

The Challenge
Cleaning specialist Kärcher was looking for a cellular networking option for its new autonomous scrubber drier to transmit operating data and notifications. With this information Kärcher wanted to offer its end customers digital services and better understand customer needs. The wireless solution had to be reliable, secure and available globally.

The Solution
Kärcher opted for an IoT tariff in the Telekom LTE network. A robust industry-grade Telekom SIM is incorporated in a wireless module during production of the cleaning robot. The wireless solution can be retrofitted to other Kärcher models. It enables the machine to transmit operating data such as status, operating time and fresh water or battery level and detailed cleaning reports quickly and reliably via the cellular network to the Kärcher Cloud.

Customer Benefits
Kärcher customers such as building service providers or facility managers thereby have a constant overview of their machine fleet, deployment locations and times. Users can be notified of malfunctions by email or text message. Thanks to Telekom's international cellular networks and global roaming agreements Kärcher can now market its new autonomous cleaning machine worldwide without having to look for local network operators. Telekom's flexible tariff model can be adjusted to meet the special requirements of different Kärcher device families while Kärcher can use the newly acquired findings to focus product development on its customers' needs.

> "With our networked cleaning robot we can now offer our end customers digital services that set us apart from the competition.
> We also gain new insights into our customers' needs and can focus our product development on them."
>
> **Alina Seitter, Product Manager Robotics at Kärcher**

KÄRCHER

Facility Cleaning

Precise job for cleaner waters

Dutch company RanMarine Technology has developed an autonomous, floating aqua-drone for cleaning waterways. It uses Telekom's Precise Positioning System for accurate navigation.

Challenge
The battery-powered "WasteShark" aqua-drone from RanMarine independently cleans harbors, canals, and waterways of plastic waste, oil spillage, or algae. In addition, it measures water quality. However, conventional satellite GPS did not provide the swimming robot with sufficient precision – neither for precise autonomous navigation nor for automatic docking and recharging.

Solution
RanMarine chose the Precise Positioning solution from Telekom and Swift Navigation: A global network of base stations measures local interference with the signals from GPS satellites and sends this data to the cloud. From there, corrected position data is transmitted to the floating drone. Instead of being accurate to within several meters, the position of the watercraft can now be pinpointed to within a few centimeters.

Customer benefits
Thanks to Precise Positioning, the WasteShark can navigate more precisely and fluidly, collect waste more quickly and avoid obstacles more safely. This saves time and operating costs. In addition, the exact coordinate of a temperature or pH measurement can now be recorded. Importantly for RanMarine, the drone can now also precisely navigate its docking and charging station, which was not possible before. Telekom's Precise Positioning service, which is already available in many countries, works out-of-the-box, is scalable for an unlimited number of vehicles and is also more reliable than publicly available correction services.

> Precise Positioning provides us with the accuracy and scalability we need to continually evolve our cleaning aqua-drones.
>
> **Richard Hardiman**, Founder and CEO of RanMarine Technology

RANMARINE

Precise Positioning

Autonomous cleaning machines with a full-service guarantee

Future Machine Labs rents out autonomous cleaning machines as machine-as-a-service. An 80-strong service team guarantees availability – enabled by IoT connectivity over Telekom mobile networks.

Challenge
The building cleaning industry is struggling with a significant shortage of skilled workers. Autonomous cleaning machines could relieve the burden on existing staff, but many companies are put off by the high investment costs as well as the commissioning and maintenance costs.

Solution
Future Machine Labs (FM-Labs) offers autonomous cleaning machines as a machine-as-a-service. The Berlin-based company purchases the devices independently of manufacturers and rents them to hotels, retailers, and logistics companies. FM-Lab‘s service begins with mapping the areas and programming the cleaning routes. Each machine also contains an IoT SIM from Deutsche Telekom. National roaming ensures that the devices are always connected to the best available network. Operating data is transmitted via mobile communications: water flow, filter status, battery level, cleaned areas.

Customer benefit
The transmitted data enables FM-Lab‘s 80-strong service team to perform preventive maintenance: if a threshold value is not reached, the team plans an intervention before the machine breaks down. Ten nationwide locations guarantee response times of no more than two hours. Thanks to the operating data, the machine also cleans as needed where contamination occurs. Over-the-air updates install new features, and technicians fix errors remotely. Customers thus rent a license for a machine that always works – without investment risk or maintenance costs.

> “Our customers benefit from the technology; we take care of everything else. Networking via Deutsche Telekom‘s mobile network is the service enabler: We receive all information in real time and can take preventive action instead of waiting for calls.“

Nick Nidens, founder and CEO of Future Machine Labs

FM Labs

Building Cleaning

Expensive energy resources

Since 2021, companies in the heating and transport sectors have had to buy emission rights as certificates. At the same time, the prices for oil and gas are rising. IoT can reduce these costs.

Smart Light for the Berliner Bogen

Lighting controlled smartly and not just switched on or off: Lichtwart's IoT solution illuminates the Berliner Bogen in the heart of Hamburg energy-efficiently and cost-effectively.

The Challenge

By day the Berliner Bogen in the heart of Hamburg seems to hover over the water. By night the office building, which is one of the city's most important architectural highlights, shines in the light of 28 LED panels. To ensure that the impressive lighting is always well maintained and incurs the lowest energy costs possible, the operator relies on smart functions from the Internet of Things.

The Solution

IoT instead of a simple time switch: Lichtwart handles the Hamburg building's smart light management. Equipped with a twilight sensor and connected with the Internet via Telekom's mobile network, the solution adjusts the system precisely to the prevailing light conditions. On the Web interface of the Cloud of Things, Telekom's IoT platform, the operator has an overview of the lighting's current status. If problems occur, he may also, as requested, receive alarm notifications by e-mail or SMS.

Customer Benefit

Compared with conventional alternatives, smart light management enables the operator to achieve an energy cost saving of up to 40 percent that contributes toward the building's sustainability. Defective LEDs do not go unnoticed for weeks, the building is always well lit, and it looks prestigious in the dark. If LEDs are nearing the end of their service life the operator can replace them by means of predictive maintenance.

> "With the Lichtwart IoT solution we can control and monitor the LEDs on the building quite simply and without on-site technicians That increases energy efficiency enormously and reduces costs."
>
> **Dennis Peizert**, CEO, Hanselicht GmbH

LichtWART®

Building Management

Facility Management

IoT service platform for smart commercial real estate

Lichtwart digitally connects buildings with service technicians: The Herford-based company‘s IoT solution monitors light, energy and building technology in real time and saves up to 60 percent in operating costs.

Challenge
Gas stations, car dealerships or supermarkets depend on functioning building technology. However, operators often have no transparency about the condition of their sites and often only react when employees or customers report problems. These can be annoying failures in lighting or incorrectly adjusted air conditioning and heating systems that consume energy unnecessarily. In addition, service technicians often have to be called out several times because faults can only be localized on site or the right spare part is missing.

Solution
Lichtwart has developed an automated service platform that intelligently networks building technology. The heart of the system is an IoT module that is connected to the cloud via LTE. The solution enables lighting management, condition and energy monitoring as well as building automation for commercial properties. In the event of malfunctions, the system automatically sends alarms to the responsible technicians. Operators monitor all locations via a central web interface.

Customer benefits
The dynamic lighting control system automatically adjusts the brightness of the lighting on buildings or advertising installations to the ambient light, thus saving up to 60 percent on energy costs. In the event of malfunctions, technicians know in advance what the problem is and which spare part is needed. Anomalies in electricity or water consumption are detected at an early stage before high additional payments are incurred. Global connectivity via the Deutsche Telekom network enables reliable, and secure deployment worldwide.

> From gas stations to lottery outlets, from hardware stores to supermarkets – we can connect all types of commercial real estate via Deutsche Telekom's reliable IoT network."
>
> **Johannes Mailänder, Co-Founder & Chief Marketing Officer at Lichtwart**

Lichtwart

© Deutsche Funkturm | Photo: Norbert Ittermann

Building Management

Using and Managing Buildings Effectively

Transparency in the condition and utilization of rooms: World-leading facility services provider ISS is using sensor technology and the IoT to digitize its building management.

The Challenge

Which work areas do employees use? And what about the air quality in rooms? Rather than heating and air conditioning all rooms uniformly and irrespective of their utilization, the ISS approach to building management measures and regulates temperature, humidity and air quality individually.

The Solution

Based on sensors, a gateway and an IoT cloud platform and Web portal, a digital building management system ensures transparency. The walkthrough Telekom solution monitors effectively with a usage orientation working areas, building technology, room quality and comfort parameters in buildings. Sensors measure and record the utilization and occupancy of rooms, the status of doors and windows, carbon dioxide, humidity, noise, light and temperature.

As soon as defined limits are exceeded the user is notified. The solution can be optionally extended and combined with every customer system.

Customer Benefit

Building managers, operators and even users always have an up-to-date overview of room utilization. Heating and ventilation as required ensures a better room climate and saves energy. Lighting is only switched on in rooms where there are people. Environmental systems can be maintained predictively, and rooms can be cleaned as required. Areas can be used more efficiently, bundled, let or otherwise utilized. When rental and service costs correspond to actual requirements customer satisfaction is sure to increase.

Founded in **1901**

485,000 employees

Headquarters in **Copenhagen**

Smart City

IoT Connectivity for Smart Lighting

The Portuguese startup Omniflow manufactures smart IoT lamppoles powered by wind and solar that with Telekom's international IoT connectivity can be connected and put to a wide range of uses.

The Challenge
Conventional street lighting uses a lot of energy and provides just lighting. That makes it expensive to operate and maintain and means bad news for the energy efficiency of cities and municipalities. While many cities switch to energy-saving LED street lights, this infrastructure lends itself to a wide range of smart additional functions.

The Solution
Street lighting, WiFi access point, security camera: the Portuguese startup Omniflow's smart IoT lamppole incorporate numerous Smart City functions and Telekom's 4G small cell technology provides WLAN street light connectivity. Broadband is the basis of many IoT functions, including a link with the cloud. Customers can check and evaluate on a Web portal data raging from air quality to traffic volumes. The lighting is also extremely energy-efficient and sustainable; they run on solar and wind turbine power.

Customer Benefit
Omniflow smart IoT lamppole with Telekom international 4G connectivity offers cities and municipalities around the world- a powerful basis on which to embark on Smart City projects, to collect and evaluate measurement data and, at the same time, to save energy.

> "We supply municipalities, citizens and tourists with smart and sustainable street lighting accompanied by numerous useful extra functions. Telekom makes it possible with international IoT connectivity and a broadband link to our cloud."
>
> **Pedro Ruão**, CEO, Omniflow

Omniflow®

Fleet Management by IoT: More Service, Lower Costs

Facility services provider Avant uses a fleet management solution to plan its vehicles' routes. That reduces fuel consumption costs and journey times by up to 20 percent.

The Challenge
Service provider Avant used to plan the routes of its cleaning teams using Google Maps in the order in which jobs were received. That was how inefficiently coordinated its employees were as they drove around their entire operational area day by day. In addition, they could only use company vehicles privately by applying the 1 % list price method.

The Solution
Avant fitted out 23 vehicles with GPS trackers. They can be installed by plug and play via the OBD2 interface. The company then uses Telekom's Drive & Track powered by Fleet Complete. On the fleet management solution's web interface, the company can see the exact location of each connected vehicle and use the software to plan the optimal routes for its cleaning teams. The solution can be used intuitively on the online portal and no training by external specialists was needed.

Customer Benefit
Avant has reduced its fuel costs by up to 20 percent and now deploys its employees much more efficiently. It discusses directly with its customers schedules that make sense. Customers are also notified without delay when the cleaning team is due to arrive. Avant's managing director can also see on the online portal how much time the vehicles spend at cleaning locations or elsewhere. If necessary, he can discuss times with his employees and optimize them. Employees benefit from an electronic logbook if they want to use a vehicle privately.

Drive & Track Benefits

- Lower costs
- Better customer service
- Ease of handling

Avant GEBÄUDEDIENSTE GMBH

Logistics

Bottle Bank, Please Report!

REMONDIS, one of the world's largest public service, recycling and waste management companies, has optimized the collection cycles of waste glass containers with an IoT solution.

Waste Management

The Challenge
Until recently, REMONDIS drove to its glass recycling containers in towns and municipalities on a rotational basis regardless of whether they were full or not. On emptying, the bottle banks were, on average, at only 60 percent capacity, indicating unnecessary trips and wasteful fuel consumption. On the other hand, the containers were repeatedly overfilled at peak times, with bottles overflowing outside them, risking accidents, injuries, and environmental pollution.

The Solution
The recycling containers were then equipped with ITCPRO, an IoT fill level meter developed by REMONDIS in collaboration with the Fraunhofer Institute and Deutsche Telekom. Via an integrated NarrowBand IoT (NB-IoT) radio module, the laser sensors now automatically report when the specified fill level is reached.

Customer Benefit
REMONDIS can optimize route planning thanks to IoT: Glass collections are now made on an as-needed basis using accurate fill level data. On average, the containers are now 90 percent full before emptying, an increase of 30 percent. REMONDIS uses its fuel-consuming crane equipment to load its collection vehicles much more effectively. This means a considerable reduction in CO_2 emissions per ton of waste glass collected. Workloads have also reduced, enabling REMONDIS to better cope with the increasing shortage of drivers. At the same time, there is no longer any unsightly and labor-intensive overfilling at container locations. Another advantage is the tamper-proof, automated documentation of messages and emptying times. Thanks to NB-IoT, the radio modules are inexpensive to manufacture and energy-saving in operation, so they remain ready for use for up to five years without requiring maintenance. REMONDIS can offer its customers a more efficient collection service thanks to IoT.

> We are absolutely delighted with Telekom's solution, which pays off for us in more ways than one. Together with our municipal partners and customers, we all benefit from the emissions saved."
>
> **Arne Brosch**, CEO REMONDIS Olpe GmbH

REMONDIS®
IM AUFTRAG DER ZUKUNFT

Waste Paper Container, Please Report!

Document and information logistics company Rhenus Data Office has optimized the collection of its customers' document recycling containers with the help of networked IoT sensor technology.

Waste Logistics

The Challenge
Secure Rhenus containers for document disposal are often on different floors in office buildings. Whether they are full can only be checked manually, which leads to a high number of messages between the Rhenus call center and its customers. With some containers full and others half empty, collections can be inefficient and difficult to plan.

The Solution
Rhenus and Deutsche Telekom have equipped the containers with the ITCPRO IoT fill level meter. The meter uses a laser to measure how full the containers are and automatically reports via the NarrowBand IoT (NB-IoT) standard when they are ready for collection. The data is processed in the cloud and visualized clearly in a web dashboard. Customers' systems, such as ERP or route planning, can also be connected to the cloud platform.

Customer Benefit
Rhenus, and if required, the customer's facility manager or other designated person, have an overview of the current fill level of all containers via the web dashboard. This information means that the collection cycle can be adapted to actual demand, conserving resources. Another advantage is that data protection is always guaranteed as containers are replaced before they overflow. Moreover, NB-IoT enables connection even from basements or warehouses. The battery-powered radio modules operate maintenance-free for several years because of the energy-efficient technology. Thanks to IoT, Rhenus now offers its customers a more efficient document collection service.

> "The newly developed fill level sensor turns our document disposal containers into smart safety garbage cans and optimizes collection for the benefit of our customers."
>
> **Michael Wiegmann**, CEO, Rhenus Data Office

RHENUS LOGISTICS

Future-proof Operating Processes

Predictive maintenance, demand-based delivery, usage-based billing – operational processes optimised with IoT save time and money.

Machinery Constantly in View

Construction companies locate their machinery and record all of its operating parameters on the Sharemac SaaS-solution.

The Challenge
Construction companies often don't know exactly where their machinery is. For a significant amount of time, it is left unused and unproductive on construction sites or in storage facilities. Sharemac developed tracking modules to locate machines. The startup then worked on a solution to connect the modules and make construction machinery easy to find.

The Solution
Telekom equipped the telematics boxes with LTE-M-SIM cards and helped with configuration and programming. In addition to location, the modules record parameters such as operating hours, battery status, or idling. All of this information converges on a management platform.

Customer Benefit
Construction companies locate and manage their machinery, record operating hours for billing and gain an overview of the condition and utilization of their machinery on the Sharemac software. Using the GPS geofence function, an anti-theft alarm can also be set up. In a next step Sharemac aims to combine the management system with a rental platform for construction machinery and thereby create a comprehensive solution for construction companies.

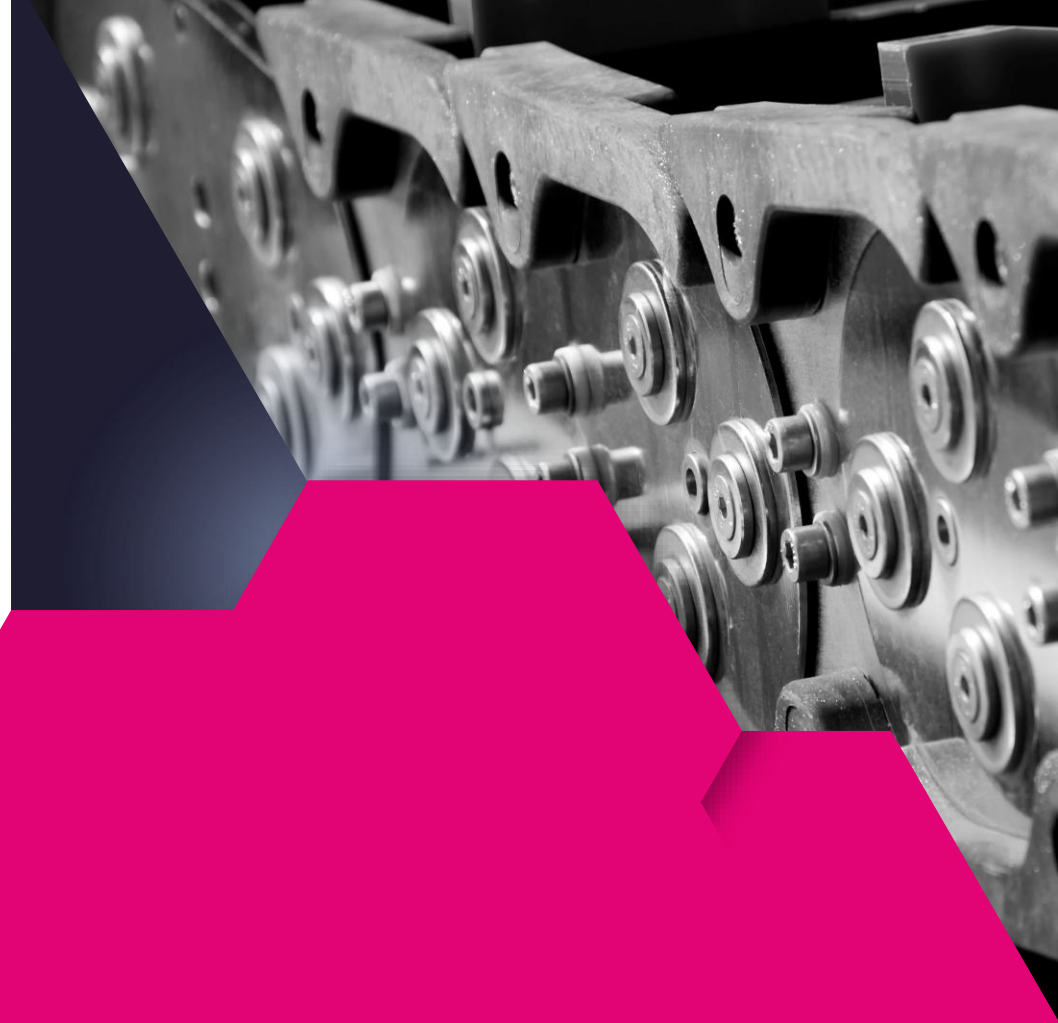
> "Telekom's technical expertise and professional approach, plus its image as the provider of the best network, were what won us over."
>
> **Rezi Chikviladze**, Mitgründer & COO der Sharemac GmbH

SHAREMAC

Construction

Controlling Conveyor Systems efficiently with the IoT

The RUD Group maintains its conveyor systems predictively via the Internet of Things (IoT). That strengthens customer relationships and makes new business models possible.



The Challenge

The RUD Group is the market leader for conveyor chains that are used to remove ash in coal-fired power stations. The chains are essential for the production process because the power station only operates trouble-free if the incineration waste is removed. Chains need to be replaced regularly because the material is severely impacted by the heat, the weight of the ashes and 24/7 operation. The right time for replacement or the material load have until now been determined by means of a rough estimate.

The Solution

To gain a transparent overview of the wear and tear and service life of conveyor chains the RUD Group joined forces with Telekom and fitted them out with IoT sensors. Built-in SIM cards using GSM encryption record all readings and relay the data to Telekom's Cloud of Things. RUD Group employees and customers access the data via the IoT platform's specially secured dashboard, evaluate data, carry out long-term analyses and receive current status reports. If the readings differ from the control values the system triggers real-time alarms.

Customer Benefit

Rather than relying on their gut feeling, RUD service technicians maintain and replace high-performance chains exactly when needed. Customers benefit from plannable plant downtimes and, thanks to predictive maintenance, the RUD Group can schedule and deploy maintenance personnel and replacement material as required. The RUD Group is thereby able to enhance the innovative pioneering role that it plays in its market segment.
With the Telekom IoT solution we are positioning ourselves as an innovator and generating tangible added value for our customers."

> "With the Telekom IoT solution we are positioning ourselves as an innovator and generating clear added value for our customers."
>
> **Klaus Pfaffeneder**, General Manager Conveyors and Drives, RUD Group

RUD®

Engineering

Construction

Bluetooth Beacons Boost Efficiency on Construction Sites

It’s always good to know where tools and construction materials are: How the Otto Heil construction company benefits from its digital asset management.

The Challenge
Otto Heil employees often faced the problem of not knowing exactly where construction machinery and tools were. They were mostly not found to be missing until after employees had dismantled the site. Moving equipment from one site to another was documented only by handwritten delivery notes. In the long term that proved time-consuming and inaccurate.

The Solution
To tackle the problem the company began, jointly with Telekom and its partner Syfit, to attach Bluetooth beacons to items of equipment. Their exact position can then be determined with the aid a smartphone. The data is relayed to and processed on Telekom’s IoT platform the Cloud of Things. A mobile app then shows locations, battery runtimes and other usage data.

Customer Benefit
Otto Heil now knows at all times where every item of equipment is. The company is also notified of how many of each item is at which location. Employees save time by no longer needing to write delivery notes. Communication is easier. Usage periods can be calculated precisely via an ERP connection. Inventories take less time and are less complicated.

IoT Benefits

- Quick search fort products and components
- Time saved by digitization
- Data visualization in the Cloud

OTTO HEIL

Construction

Bauer AG | Condition Monitoring

IoT Improves Safety in the Excavation Pit

Bauer AG uses IoT sensors in its sheet piling to check the extent to which surrounding soil is a burden on excavation pits. That helps to prevent damage and protect employees.

The Challenge
Concrete or metal sheet pilings protect excavation pits and terrain jumps from water or rocks in the soil. Load sensors attached to strain gauges on the walls supplied Bauer AG with data about pressure and possible damage. Engineers monitored these load cells on-site. They noted the data by hand and it was often not manually evaluated for days, so any damage that occurred between checks was only noticed after a time lag.

The Solution
A robust local Telekom IoT control unit receives the signals from all of the load cells and evaluates them. The device relays data continuously via the Telekom LTE network to Bauer AG's Microsoft Azure cloud, where it is visualized and compared with historic data. As soon as the readings exceed or fall below threshold levels the device sounds an alarm to warn construction workers on the site.

Customer Benefit
Thanks to real-time data the engineer in charge can spot the slightest movements immediately and initiate timely countermeasures to prevent serious damage. In addition, he is notified of incidents by a push message. In this way digitized information makes the interplay between construction workers, engineers and construction machinery easier.

IoT Benefits

- Visualize real-time data and couple with historic data
- Compare and optimize construction site structures
- Central data pool saves time and money

Manufacturing

Smart furnaces for crystal-clear quality

Glass finisher GlasGo is able to monitor temperatures in its furnaces using IoT sensors. This keeps the amount of rejects to a minimum and avoids machine downtimes, reducing energy costs by 10%.

The Challenge

The global market leader in the area of glass finishing coats up to 200,000 glasses a day. The special coating is very sensitive to fluctuations in temperature: if it's too hot, the coating will burn, if it's not hot enough, it won't stick properly to the glass. Previously, employees used to monitor production manually but were unable to precisely measure the ideal firing temperature of around 180 °C. If GlasGo received complaints, the lack of transparency meant they were unable to prove that everything was in order during the firing process.

The Solution

GlasGo has equipped its furnaces with IoT sensors to create transparency in the process of monitoring the firing quality. These sensors measure the inside temperatures of the furnaces every ten seconds and send all information to the Telekom Cloud of Things via NarrowBand IoT (NB-IoT) using a connected IoT gateway. Data is processed in real time on the IoT platform and the results are displayed. The shift supervisor is automatically notified via text message or email as soon as the temperature exceeds or falls below the limit values.

Customer benefit

More precision in planning production cycles has reduced downtimes of the sensitive machines by six hours per month on average. It also allows users to avoid unexpected malfunctions as the system immediately alerts you of any fluctuations in temperature. A constant temperature feed also reduces energy costs by 10%. The glass finisher's waste has also been reduced by a few hundred glasses a month.

> "Our customers can also see the measured values of their batches – a special service with which we can further increase the trust of customers."
>
> **Hans-Jürgen Hirsch**, CEO, GlasGo GmbH

GlasGo®

Connected Robot Automates Layout Printing on Construction Sites

An autonomous printing robot from HP, connected via Telekom's global mobile network, accelerates and enhances the precision of the layout process on construction sites worldwide.

Challenge

The layout process on construction sites is time and labor-intensive. HP has developed an end-to-end robotic solution for this task that automatically prints floor plans and markings on the ground in drywall construction. The complete system, consisting of an autonomous printing robot, software application, and tablet, requires a connection to the cloud to download CAD plans and remotely monitor the robot's status. However, construction sites lack Wi-Fi or fixed network connections. Additionally, HP wants to deploy its printing robot globally without having to negotiate with a different network provider in each country.

Solution

The HP printing robot uses Telekom's global LTE mobile network for data transmission, which is based on its own networks and roaming agreements with more than 600 partners worldwide. It guarantees secure connectivity in every country. Telekom provides HP with a central point of contact.

Customer Benefits

Thanks to Telekom's mobile network, the printing robot is reliably connected worldwide at all times. This enables its use on any construction site, regardless of the local infrastructure. CAD plans can be edited in real-time, and changes can be shared via the cloud with all parties involved in the construction project. This accelerates the planning of complex construction sites and saves costs. HP can distribute and deploy the printing robot internationally without having to negotiate new contracts in each country.

> With our SitePrint robot and Telekom's global connectivity, we are revolutionizing the construction process. Our customers can now realize projects worldwide faster, more efficiently and cost-effectively – regardless of the local network infrastructure.
>
> **Jaume Homs, Global Head of Sales and GTM** at HP Construction Services

Construction

IoT Networking Makes Vending Machines Smart

SENVEND digitalizes vending machines with an all-in-one terminal for payment, telemetry, and age verification. Telekom's IoT mobile network ensures reliable connectivity.

The Challenge
Operators of vending machines need reliable, flexible payment systems, must verify the age of buyers for certain products, and want to assist customers remotely. They also require up-to-date overviews of stock and sales. Until now, operators had to combine several separate systems. Age verification, in particular, has proven problematic due to the unreliability of conventional ID card readers.

The Solution
SENVEND has developed a compact payment terminal that combines all functions in one device: payment, telemetry and age verification. SENVEND uses Deutsche Telekom's IoT mobile network for the Internet connection. The terminal accepts all major European payment cards. Age verification works via facial scan with AI, Girocard, ID scan or PayPal. Telemetry can be used to monitor stocks and sales in real time. The integrated display provides customers with help in case of problems.

Customer Benefit
The terminal accepts all common European payment cards. Age verification works via facial scan with AI, Girocard, ID scan, or PayPal. Telemetry allows real-time monitoring of stock and sales. Customers receive assistance via the integrated display if problems arise.

Thanks to Telekom's mobile network, the machines are always reliably connected. Improved age verification results in significantly fewer purchase cancellations, boosting sales by ten percent or more. Flexible payment is especially important for international customers at airports or train stations. Telemetry enables efficient stock management and reduces service trips. Telekom's global roaming agreements allow SENVEND to deploy its solution worldwide.

> "With Telekom, we have found a national provider with a local contact who offers us a reliable, secure network worldwide."
>
> **Jannis Rosendahl,** CEO SENVEND

SENVEND

Vending Industry

Global damage detection for fleets with AI and IoT

Carvaloo uses artificial intelligence to automate the detection and documentation of vehicle damage. Thanks to Deutsche Telekom's international IoT connectivity, the solution can be used globally.

Challenge
In fleet operations, such as car sharing or last-mile delivery, damage often goes unnoticed or is rarely reported. Especially with changing drivers and large vehicle fleets, it is practically impossible for operators to assign damage to the parties responsible. Providers are left to bear the costs. This is compounded by time-consuming manual processes and a lack of transparency in damage management.

Solution
carvaloo uses artificial intelligence to automatically detect damage to vehicles and reliably assign it to the person responsible. Movement and image data from the vehicle are analyzed in real time. The AI reliably distinguishes between normal driving maneuvers and damage-related events. Data is transmitted securely and is available worldwide via Telekom's IoT network. This creates a digital damage report that automates the entire process from detection to settlement. The reports can be integrated into existing fleet management systems.

Customer Benefit
Fleet operators benefit from the recovery of damage costs, made possible by clear allocation to the person responsible. The frequency of damage also decreases in the long term, because the increased transparency leads to a greater sense of responsibility on the part of drivers. Reliable AI damage detection also leads to a significant reduction in manual inspection costs. The solution is internationally scalable and supports providers wherever their vehicles are on the road.

> "With Telekom's IoT services, we can offer our AI solution worldwide in a reliable and scalable manner."
>
> **Tom Althoff,** Managing Director of carvaloo

CARVALOO

Fleet Operator

Locating Water Pipe Leaks with IoT Sensor Data

Gutermann specializes in acoustic leak detection in municipal drinking water pipes. The Swiss company connects the pipes by means of sensors and Telekom's NB-IoT.

Water Supply

The Challenge

Germany's drinking water mains network is 530,000 nkilometers long and damage to water pipes is bound to happen. Efficient leak detection helps keep water losses and repairs to a minimum. Leak location is the Swiss company Gutermann's specialty with its acoustic detection process. It requires sensors that regularly record acoustic signals in the water pipes and relay them to the Cloud for analysis. Gutermann uses correlation to locate leaks especially accurately.

The Solution

To ttransmit acoustic leak detection data Gutermann uses Telekom's NarrowBand IoT (NB-IoT). The mobile communications standard developed for the Internet ofThings not only operates more energy-efficiently than the previous proprietary solution; thanks to NB-IoT's deep penetration additional repeaters are no longer required. The collected sensor data is sent via a software gateway straight to the Cloud.

Customer Benefits

Gutermann has much lower installation costs now that repeaters no longer have to be installed outside of the pipe shaft. Customers no longer have to apply for installation permits. Costs per measurement point are lower too. Preprogrammed NB-IoT modules can be sent to customers all over the world and are ready to run within a minute. And batteries can be changed easily on-site.

> The NB-IoT solution's scalability is its decisive advantage. Thanks to its cost effectiveness and, above all, to Telekom's global network coverage we are able to roll out our solution internationally.
>
> **Uri Gutermann**, CEO of Gutermann

GUTERMANN

Skilled worker shortage

Almost all industries are affected by the shortage of skilled workers – and the trend is rising. IoT can help by making training easier, reducing the workload and improving working conditions.

Manufacturing

Digital parking space management made to measure

By using a digital parking space management system, employees at the camper van manufacturer lose less time when searching for parked vehicles prior to them being moved to production.

The Challenge
Dethleffs used to rely on technologically outdated hand scanners and paper lists for its parking space management. This process cost employees a lot of time before they could find the right vehicle from a stock of over 4,000. This often resulted in delays, as vehicles were often not ready and waiting for the next production step.

The Solution
With an app-based solution from SYFIT GmbH, a joint venture with Deutsche Telekom, the GPS positions of the hand scanners are determined when an employee scans a bar code on the vehicle. The data is transmitted to the back end via a mobile network and is then always available on mobile end devices and in a browser.

Customer Benefit
Long searches in the large parking area are now a thing of the past, as are production delays. Drivers can locate the vehicles quickly and accurately. In addition, stock can be taken at the push of a button. This saves effort, reduces costs and enables just-in-time production.

> „In Deutsche Telekom, we have found a partner that supports us in digitalising search processes in our production.“
>
> **Alexander Leopold**, Managing Director, Dethleffs GmbH & Co. KG

Dethleffs

Precise Time Recording on Construction Sites

At Dekora, a craft business enterprise, digital terminals and apps now take the place of error-prone paper time sheets and automate time recording, payroll accounting, and billing.

Construction

The Challenge

Like so many small and midrange enterprises, Dekora Malereibetrieb und Bautendienst GmbH recorded its employees' on-site working hours by hand on paper time sheets. The details were then transferred—also by hand—to an Excel spreadsheet. The company was on the lookout for an uncomplicated digital solution for this process, partly because time sheets were incomplete or after a while could simply no longer be found.

The Solution

Using ZMI tools, Dekora has automated and digitized time recording. On larger construction sites its workers log in or out of time recording at a terminal in the firm's site container. The terminal incorporates a Telekom M2M SIM with an IoT data tariff. Via the cellular network it relays hours worked to the time recording solution, which processes the data and sends it via a DATEV interface to the payroll department. Each terminal assigns the time to an on-site job. On smaller sites or for one-off jobs, employees use a smartphone app to register their working times.

Customer Benefit

Missing or incomplete time sheets are a thing of the past. Hours worked are recorded precisely and booked automatically. That saves time and prevents booking errors. On larger construction sites hours worked can also be assigned to a specific job. That makes it possible to transfer time worked automatically to an ERP system, including payroll. Exact data compiled on a daily basis enables construction site work to be recalculated precisely. And the team leader always knows exactly where and on which site his team is currently working.

> "ZMI time recording tools provide us with a precise overview of where and for how long our employees are working."
>
> **Tobias Luckner**, Managing Director, Dekora

IoT Technology for More Energy Efficiency in Elevator Shafts

Enterprises and facility managers rely on D+H Mechatronic AG's smart BlueKit Lift Vision box to find out how much energy is lost via their elevator shafts.

The Challenge
Elevator shafts are to blame for increased energy usage in many buildings. Conditioned air often escapes unchecked through vents and apertures into the open air. D+H offers customers a box that measures airflows and temperatures in elevator shafts, enabling them to identify weak points. The system was not very efficient.
A D+H engineer installed on-site a box that was complicated, none too reliable and not user-friendly. The process was elaborate,
time-consuming and maintenance-intensive, and the data was evaluated by a tool that was far from user-friendly.

The Solution
Telekom equipped the boxes with IoT technology and implemented a cloud platform. Depending on the network technology available at the customer's premises, the box sends the data collected by 2G, 4G or 5G via a gateway to the Cloud of Things. There the system uses a special D+H formula to calculate energy losses and costs and visualizes this information.

Customer Benefit
The new solution – BlueKit Lift Vision – is easier to use. D+H can use unskilled operatives to install it all over Europe. It is highly reliable, which saves effort and expense. The Cloud of Things provides a see-at-a-glance dashboard on which both D+H and its customers can read the energy usage data. Measures can then be undertaken to improve lift shaft insulation and make lift shafts more energy-efficient.

> "Telekom's IoT technology makes our product much more user-friendly and efficient. Our customers can evaluate their energy losses in detail on the see-at-a-glance Cloud of Things platform and by using D+H BlueKit they can save thousands of euros a year in heating costs."

Martin Müller, Leiter Business Development und Innovation,
D+H Mechatronic AG

BlueKit D+H Group

Manufacturing

OSRAM uses mobile robots to increase speed and flexibility in production

The light manufacturer uses automated guided vehicles in its production processes to deliver components where they are required.

The Challenge
Large quantities of components are transported to the production facilities on the site of the lighting manufacturer. The company hoped to increase the efficiency of this process by deploying self-driving, wirelessly connected vehicles. However, LAN connections are unsuitable for mobile IoT scenarios, while WLAN does not provide the requisite transmission quality.

The Solution
OSRAM selected a 4G/5G campus network which combines a local edge cloud and an operator edge cloud in a mobile network. **Edge clouds** ensure the required **minimal latencies** and guarantee the smooth deployment of the automated guided vehicles, while the campus network ensures **quick communication** with the local computing resources.

Customer Benefit
The self-driving vehicles increase speed and flexibility in production. OSRAM has built up important knowledge that will aid the company in further optimising its production processes through new technologies. The highly flexible, mobile, secure and powerful network and IT infrastructure will be available as a basis for establishing smarter factories in the future.

> Fast and flexible devices and machines are vital for efficient production processes. The integrated campus solution project has given us the opportunity to examine how we can expand and optimise this approach in the future using new technologies.“
>
> **Hans-Joachim Schwabe**, CEO OSRAM Automotive

OSRAM

Manufacturing

Uncomplicated reading thanks to Narrowband IoT

Deep building penetration and longer battery life optimise Ista communication units. This helps the provider and the consumers.

The Challenge
Especially in larger residential buildings, it is tedious to read each electricity meter manually. Tenants often have to schedule the whole day to allow access to the meter.

The Solution
Within the properties, the readings of water, heat and electricity meters collected by ista on the basis of modern wireless technology converge locally in a battery-powered communication unit and are transmitted from there in bundled form to ista's data centre via Telekom's high-availability mobile network. With battery-powered NB-IoT modules, the provider can read the meters remotely without the customer having to be at home. NB-IoT is based on LTE mobile radio and combines low energy consumption with deep building penetration at low module costs. NB-IoT is the perfect product update for ista's communication unit.

Customer Benefit
The reading and transmission of the metering data is fully automated. This eliminates the need for manual readout on site; no tenant has to be at home on the day of the reading. Remote reading also forms the basis for new services such as ista energy data management.

Utility companies

Founded in **1957**

5.800 employees

Headquarters in **Essen**

Transport & Logistics

Predictive Maintenance: Helicopters Always at the Ready

Connected via the cloud, DRF Air Rescue’s helicopters can be maintained predictively, reducing downtimes and costs.

The Challenge

Sixty DRF air rescue helicopters are in use around the clock in Germany, Austria and Liechtenstein to help emergency patients as quickly as possible and fly them to the nearest hospital. Eighty engineers maintain and repair the airborne emergency rooms at 35 locations. In the past service engineers read the sensor data from the memory card manually every 50 flying hours. In addition a team of technicians was sent out to check the ’copter as soon as a pilot reported unusual flight behavior.

The Solution

Equipped with the Health and Usage Monitoring System (HUMS) and connected with a Telekom IoT solution, each helicopter now continuously collects sensor data about the condition and performance of important components and sends it to the DRF’s servers. The technicians keep an eye on the condition of all components on the web portal. If the data for a helicopter exceeds a defined limit the technicians schedule it for the next service as soon as possible.

Customer Benefit

On the basis of the IoT data DRF optimizes the engine settings so that the helicopters use less fuel, which is a substantial saving with over 40,000 missions a year. The helicopters also spend much less time on the ground for maintenance and DRF engineers only make unscheduled visits to air rescue bases in exceptional cases. Crews and patients can always rely on the helicopters running safely and reliably.

DRF Luftrettung

Founded **1972**

over **1,100** employees

60 helicopters in use

35 locations

around **40.000** missions a year

Digital Beach Chair Rental with IoT and nuSIM Technology

Tourism

The startup Strandbutler is modernizing beach chair rental on the North and Baltic Sea coast by using Telekom's IoT and nuSIM technology. Both vacationers and rental operators benefit.

The Challenge
Traditional beach chair rental is often complicated and inefficient. Vacationers stand in line at the booking hut. If the hut is closed they can forget about hiring a chair. Renting off the cuff outside of the opening hours is seldom possible. And rental operators lack swift access to the capacity utilization of their beach chairs.

The Solution
Strandbutler has developed a digital beach chair rental system. It uses a smart lock attached to the chair that incorporates Telekom's nuSIM technology, which provides a reliable cellular connection. Vacationers can use an app to book and pay for a beach chair and unlock it on the spot with their cellphone. Beach chair rental operators use Telekom's cellphone network to manage their business. If there is a problem with the lock they can open it remotely. The nuSIM is built into the communication chip, making it more compact, with a longer battery life and improved resistance to harsh weather conditions. Locks can also be located precisely by means of GPS satellite positioning.

The Customer Benefit
The Strandbutler digital solution optimizes the rental process for all concerned. Vacationers benefit from 24/7 off the cuff bookings and cashless payment. Rental operators profit from efficient beach chair management with a real-time overview and lower personnel costs. Remote maintenance and location increase the quality of service and flexibility. Beach chair utilization is improved, customers are more satisfied and letting runs more efficiently.

> "Close collaboration with Telekom enables us to offer a customized solution."

Bernhard Sourdeau, Founder and CEO, Strand & Mehr GmbH, Operator of Strandbutler

STRAND BUTLER

Animal tracking on remote pastures with NB-IoT and Satellite

The Spanish provider Digitanimal S.L. connects farm animals on pastures via IoT. By default, tracking is carried out via NB-IoT, and if there is no coverage, satellite connectivity can be activated in the app – so the farmer can always keep an eye on his herd even from a distance.

Challenges
Many farmers manage widely scattered pastures, often far from the main farm. Monitoring the animals is time-consuming – especially as fewer young people enter agriculture, leading to a shortage of staff for daily checks. Keeping an eye on large areas is becoming increasingly difficult, and the call for digital solutions is growing louder. Yet in remote regions, patchy mobile coverage makes digital monitoring a real challenge – even though animal welfare remains the top priority.

Solution
With the IoT solution from Digitanimal and Deutsche Telekom, animals are reliably connected – even on remote pastures. Robust GPS trackers on the collar transmit location data energy-efficiently via NB-IoT. If no terrestrial network is available, the tracker can be switched to satellite conectivity via the app – based on the 3GPP standard. Farmers can activate the satellite option individually for each animal in the app, ensuring reliable data transmission even in remote areas.

The platform continuously analyzes animal behavior: if an animal stays in the same spot for too long or remains inactive over a longer period, an automatic alert is triggered. Additionally, an acoustic signal can be activated to help locate the animal more easily – a kind of “digital cowbell.”

Customer benefits
The combination of cellular and satellite connectivity enables near-complete coverage – even in hard-to-reach areas. Farmers save time searching for animals, detect anomalies faster, and can respond more precisely. Through the app, they can flexibly choose when to activate satellite connectivity, keeping costs under control. The solution enhances efficiency, animal welfare, and transparency in herd management.

> “Thanks to NB-IoT and satellite connectivity, farmers can keep an eye on their animals anywhere – even where there’s no network coverage. That’s what makes our solution unique and indispensable.”
>
> **Carlos Callejero**, CEO at Digitanimal

Smart Farming

ZEISS and Deutsche Telekom open up new perspectives for nature observers

With the digital trail camera, ZEISS is addressing a wide audience – from technology lovers interested in nature to young, digital-savvy users – and combines top optical quality with contemporary digitalization.

Challenge
In nature conservation, extensive and sometimes inaccessible forest areas often have to be efficiently controlled. In order to observe wild animal populations, detect injured animals at an early stage, and prevent damage caused by wildlife, modern approaches are needed that go beyond conventional means.

Solution
To make wildlife monitoring more efficient, ZEISS has developed the Secacam – a smart trail camera with reliable IoT connectivity from Deutsche Telekom.
Thanks to Deutsche Telekom's integrated Global SIM, the camera automatically connects to the best available mobile network – even in remote areas. In this way, it provides high-resolution real-time images directly from the forest, year-round and weatherproof.
The app can be used to remotely control camera settings, view recordings immediately and receive notifications in real time.
Flexible service packages including AI-supported animal recognition complete the offer.

Customer benefit
ZEISS Secacam revolutionizes wildlife monitoring: Instead of time-consuming patrols, the cameras deliver real-time images directly from the forest – efficiently, location-independent and reliably. This saves resources, accelerates processes, and enables early detection of injured or sick animals.
For nature observers and nature conservation projects, this means better data, faster reactions, and more in-depth knowledge.
In addition, users benefit from the strong partnership between two brands ZEISS and Telekom: a high-quality camera and comprehensive connectivity.
ZEISS also benefits from greater simplicity and flexibility: just one contract, one platform, and one central point of contact.

> "... This allows the camera to dial into the networks of all major providers and always opts for the best available network at the installation site. Even in difficult grid conditions, this offers a reliable view of nature."

Carsten Hess, Product Manager and Developer of trail cameras at ZEISS

Digital wildlife observation

photo: ZEISS/ Jan Düfelsiek

IoT meets innovative spirit: sample transport by drone

Ursa-Chemie, a contract manufacturer for chemical products, relies on networked drones to transport samples between production and the laboratory. Deutsche Telekom and its joint venture Droniq provide support with IoT and drone technology.

Challenges
Ursa-Chemie operates two production sites in Montabaur. Samples have to be regularly transported between the sites for quality checks. Previously, a laboratory technician travelled by car to the second production site several times a day, collected the samples there and took them to the laboratory for analysis. Ursa-Chemie was looking for an innovative solution to optimise the transport of samples - and at the same time demonstrate the company's pioneering spirit.

Solution
In collaboration with Deutsche Telekom and its joint venture Droniq, Ursa-Chemie implemented a drone system for transporting samples. The drone flies between the two factory sites on a pre-programmed route. As visual contact is lost on the way over a hill, two employees monitor the flight by remote control at the start and finish. In the future, the drone will fly autonomously: A built-in 5G mobile radio module from Deutsche Telekom will then make the drone visible in air traffic control's aerial image - a prerequisite for safe drone flights without visual contact. Ursa-Chemie is also considering using the drone for company premises surveillance.

Customer Benefits
The drone technology saves Ursa-Chemie around one hour per day compared to transport by car. Automation thus relieves the burden on employees. The system also forms the basis for further innovations and possible applications of drone technology. Above all, however, the project emphasises Ursa-Chemie's pioneering spirit and attracts attention - both in the industry and among potential applicants.

> Our goal is to use technology where it makes people's lives easier. This drone case fits in with our pioneering spirit at Ursa-Chemie.

Andreas Möller, Managing Director at Ursa-Chemie GmbH

UCM URSA CHEMIE GMBH

CHEMICALS

Precise Air Freight Pallet Build-Up with AI and IoT

FIEGE Air Cargo Logistics and Telekom use the Internet of Things and artificial intelligence to enhance precision in air freight handling.

Challenge
During the build-up process at the airport, air freight pallets are manually assembled and packed. Each pallet is carefully loaded to maximize the available cargo hold space while adhering to safety regulations. Once assembled, an employee conducts a visual inspection of the shipment using a contour template.

Solution
FIEGE Air Cargo Logistics, the air freight division of the logistics company FIEGE, has partnered with Telekom to digitize this inspection process at Frankfurt Airport. The system leverages Telekom's AI Vision platform, which provides advanced image and video analysis powered by artificial intelligence. LiDAR sensors precisely measure the pallet's three-dimensional contours, ensuring accurate inspections. The solution is seamlessly integrated with the cloud via an IoT gateway using LTE connectivity.

Customer Benefit
Accurate measurements ensure that the freight adheres to specified contours, enabling safe stowage in the cargo hold. This optimization improves the utilization of the aircraft's transport capacity, enhancing both economic efficiency and sustainability. The mobile network connection to the cloud facilitates rapid adjustments in the event of deviations, allowing technicians to remotely access the system for troubleshooting or calibrations. This minimizes downtime and ensures seamless operations. Additionally, connectivity through Telekom's global mobile network makes the solution highly flexible and scalable, allowing FIEGE to deploy it worldwide without relying on local network infrastructure.

> With the help of AI and IoT, we have developed an assistance system with great added value for our operations in collaboration with Telekom.

Jannis Maximilian Kumbrink, Head of Project Management & Account Management Cluster Frankfurt bei FIEGE Air Cargo Logistics

FIEGE
Air Cargo Logistics

Logistics

Ringing Church Bells Remotely by IoT

A smart IoT solution developed by the German startup smartcustos enables small parishes to control bell ringing remotely.

Parishes

Challenge
Controlling manually when and how church bells ring is often complicated and time-consuming for pastors or sextons. In addition, pastorates are increasingly reduced in number and parishes are merged, which means more work for fewer people.

Solution
A startup, smartcustos, has developed a smart bell ringing control system for small parishes. An IoT box enables ringing to be started and stopped automatically by PC or smartphone by means of a standard calendar app and a connection to the Telekom cellular network. No installation, wiring or special software is needed. Additional sensors measure temperature and humidity in the nave and by the organ. This data is transmitted to the Cloud automatically in order to keep an eye on the indoor climate.

Customer Benefit
Instead of driving to the church to start the bells ringing manually you can now do it from home by means of a simple digital calendar entry. That cuts fuel costs and leaves the pastor with more time for pastoral work. New peals can be programmed easily via the IoT box. Additional temperature and humidity sensors enable the church to be heated and ventilated with greater precision. That reduces heating costs and is important for works of art or the sensitive organ. Smartcustos is also planning to develop a heating control system to automate yet another process.

> Thanks to close cooperation with Telekom we have been able to further develop and improve our solutions for parishes.

Kai Kerwel, CEO, smartcustos UG

SMARTCUSTOS

How IoT Automates Legionelle Compliance in Building

Northern Irish startup CreevX automates legionella compliance in commercial buildings – with IoT sensors, automated flushing, and Deutsche Telekom's global connectivity.

Challenge
In commercial buildings, water that sits unused in pipes for extended periods can become a breeding ground for legionella bacteria – a serious health risk. Regulations such as the UK's HSG 274 require building operators to monitor water temperatures and ensure regular water movement. Until now, this has been a manual process: staff drive to sites, check temperatures with handheld thermometers, and run taps with hot and cold water for several minutes. This approach is costly, wastes water and energy, and offers no reliable proof that the work has actually been done.

Solution
CreevX has developed a two-in-one IoT device that monitors water temperatures every 15 minutes and, where needed, automatically flushes stagnant water through the pipes. The devices use LoRaWAN to communicate with a gateway, which transmits data to the cloud via Deutsche Telekom's mobile IoT network. The system detects when water has not moved for a critical period and opens battery-operated solenoid valves – only when necessary and for the minimum duration required. An AI-powered platform analyzes the data to identify maintenance issues such as faulty boilers or unbalanced mixing valves.

Customer Benefit
Telekom's global IoT connectivity enables CreevX to deploy its solution across the UK, Ireland, and increasingly across Europe – all on a single tariff, without the need for separate contracts in each country. Building operators benefit from up to 60% lower compliance costs, up to 90% less water wasted on unnecessary flushing, and significantly reduced CO_2 emissions from eliminated site visits. The platform provides data-driven evidence of compliance – replacing guesswork with verifiable records.

> *Deutsche Telekom's connectivity allows us to scale across Europe without complexity. The reliability of their network gives our clients confidence that their buildings are monitored around the clock.*“
>
> **Sean Nelson**, Founder, CreevX

creevx

Smart Building

Health & Safety

Early detection and alerting via IoT have great potential to increase our well-being and improve social welfare.

Medical devices

Biotronik I Smart implant

How IoT medical devices save patient’s lives

Biotronik, manufacturer of medical devices, uses IoT technology to help cardiovascular patients in medical emergencies way faster. With success: The smart Home Monitoring system can increase the chances of survival by 60 percent – enormous potential of digitization in the healthcare sector.

The Challenge

Cardiovascular diseases were the most common cause of death in Germany in 2020 – as reported by the Federal Statistical Office also in previous years. The number even rose slightly to around 338.000. The amount represents a good third of all deaths. How can digitization tackle this challenge in healthcare? The Berlin-based company Biotronik asked itself this question.

The Solution

Biotronik, a world leading manufacturer of medical devices, offers a Home Monitoring system with connected implants for patients with cardiovascular diseases. The intelligent IoT technology allows to transmit health disturbances in a minimum of time from the implant to the medical staff. The important interface is a M2M SIM card in the so-called CardioMessenger, which sends the data of the implant to Biotronik's Home Monitoring platform via the Telekom IoT mobile network LTE-M.

Customer Benefit

By transmitting data to the hospital securely and on a regular basis, medical professionals can monitor the patient's health condition remotely. They can also check whether the implant is functioning properly. Since 2003, Biotronik has installed a total of 1.4 million SIM cards in cooperation with Deutsche Telekom. Studies show that monitoring solutions like Biotronik’s Home Monitoring system reduce the risk of death for cardiovascular patients by 60 percent. The solution works globally. More than 5,000 clinics are connected to the Telekom’s and T-Mobile US’ 4G mobile network. In the U.S., one of the largest markets of Biotronik, around 180,000 SIM cards are in use today. Worldwide, there are now around 800,000.

BIOTRONIK
excellence for life

> “With the Home Monitoring system, there is a 60 percent chance to save a life – a true impact for patients with cardiovascular diseases.”
>
> **Volker Lang**, Senior Vice President Research and Development / Biotronik

Communicate securely in the case of an emergency

The personal safety alarm watches of Smartwatcher Technologies have excellent connectivity with Telekom's eSIMs.

The Challenge
Swiss company Smartwatcher Technologies has developed personal safety alarm watches with subscriptions for older people to use at home and when out and about. To ensure that the device always has the best possible reception to start an alarm call, Smartwatcher was looking for the provider with the largest possible reliable network coverage.

The Solution
Deutsche Telekom equipped the watches with an eSIM. When the wearer presses the alarm button on their watch, a call goes out to a pre-registered contacts, e.g. a family member, caregiver or to an emergency call center via mobile radio. The wearer can talk to the contacts who answer the call via the watch's microphone and loudspeaker. As long as the alarm is active, the device automatically transmits its GPS position. This makes it possible for the contact persons to see the geolocation of the device in the optional and free Smartwatcher app. In addition, the device settings can be customized to the wearer's needs via an easy-to-use online platform.

Customer Benefit
Thanks to IoT connectivity via mobile network, the personal safety alarm watches from Smartwatcher have excellent reception. The Telekom network also enables secure and reliable voice and data transmission. Deutsche Telekom guarantees cross-border use of the devices via global roaming agreements.

> Working with Telekom allows us to offer customers the highest level of excellence when it comes to mobile network connectivity. Wearers can rely on their personal safety alarm watch to establish a secure voice connection whenever they need help. A wonderful feeling, making it easier to live more confidently and independently.“
>
> **Jill Allemang**, CEO of Smartwatcher Technologies

SmartWatcher®

Healthcare

Efficient Construction Site Protection with IoT and AI

VIDEO GUARD, powered by Telekom IoT, delivers real-time, scalable video surveillance for construction sites—preventing theft, vandalism, and costly delays.

Challenges
Construction sites are prime targets for theft and vandalism. Traditional security guards are costly and cannot monitor every corner, especially after hours. Stolen equipment and damaged materials lead to significant financial losses and project delays.

Solution
VIDEO GUARD provides mobile camera towers with high-resolution, 180-degree coverage and infrared for night monitoring. Integrated machine learning analyzes video footage on-site, filtering out false alarms. Suspicious events are sent to the cloud for advanced analysis. Confirmed incidents trigger video data transmissions to the 24/7 control center, where staff intervene directly—communicating with intruders via loudspeaker and alerting police or security services. Telekom's robust 4G/5G network ensures secure, high-speed transmission of large video data volumes, with local breakouts for minimal latency.

Customer Benefits
Companies benefit from reduced theft and vandalism, fewer project delays, and lower security costs. The scalable solution adapts to temporary or long-term projects, ensuring privacy compliance and reliable operation—even in remote locations. Telekom's global IoT network footprint allows for a worldwide use of VIDEO GUARD's smart surveillance solutions.

VIDEO GUARD

> Transmitting large volumes of video data is becoming increasingly important for construction site security. Thanks to Telekom's powerful infrastructure, we can scale our solutions flexibly and ensure a stable connection at all times.
>
> **Joern Windler**, President Smart Surveillance at VIDEO GUARD

Construction Site Security

Drone Instead of Security Guard: YADOS Relies on Advanced Tech

The medium-sized company YADOS secures its premises with automated drone surveillance and sensors. The video data is transmitted securely via Telekom's mobile network.

Challenge
With the expansion of production areas in Hoyerswerda, YADOS faced the challenge of reliably securing its extensive company premises. Alternatives to the classic security guard were required due to the doubled area. Increasing staff or an alternative all-round video surveillance threatened to exceed the budget.

Solution
YADOS opted for a digital security concept based on fully automated drone surveillance and intelligent sensor technology. Sensors and cameras monitor the outdoor area and report suspicious activities in real time via Deutsche Telekom's mobile network. An AI cloud platform analyzes the data and activates a drone if necessary, which flies directly to the incident location and transmits live images to the control center. The drone not only ensures a quick response in case of an alarm, but also performs automated patrol flights—keeping the premises seamlessly monitored.

Customer Benefit
The automated solution significantly reduces the cost of securing the company premises and offers higher security than a classic security guard. YADOS benefits from a flexible, scalable technology that is ready for use around the clock and can be adapted to new requirements at any time. Thanks to its partner network, Telekom can deliver the complete system from a single source.

> "We have a central contact for all matters concerning our new security concept. And thanks to the rental model, we remain flexible and also have the assurance of always being technologically up to date."

Olaf Besser, authorized officer YADOS GmbH

YADOS
Energie mit Zukunft

Industry | Drone surveillance

Prepared for heavy rainfall with IoT

Spekter offers hazard maps and an early warning system for heavy rainfall events. For this, IoT sensors measure precipitation and runoff behaviour in rivers and canals.

Challenge
Heavy rainfall events are increasing due to climate change. Enormous amounts of water fall within a short time and can have devastating consequences for people, nature and infrastructures. The software company Spekter offers an alarm system for such events. IoT sensors measure precipitation and water levels and give an early warning when critical values are exceeded. Prerequisite for the system to work: self-sufficient data transmission units with powerful networking and robust SIM cards that can withstand extreme weather conditions.

Solution
Spekter relies on NarrowBand IoT (NB-IoT) from Telekom for the networking of precipitation and water level gauges. Thanks to its deep penetration, the machine and sensor network sends information autonomously, reliably and energy-efficiently from underground manholes or subways. The data runs directly to the cloud for AI analysis. A robust industrial SIM ensures that the measuring units' function perfectly even when water levels rise.

Customer benefit
Spekter's early warning systems are stably networked via NB-IoT at all times. Fallback solutions and national roaming provide additional security. This enables the company to offer a reliable warning system in extreme weather. With Telekom, Spekter has a strong partner at its side: thanks to the broad national as well as international availability of NB-IoT, the company is optimally positioned for its rapidly growing customer base in Germany as well as for international expansion.

> In order to inform all those affected and the emergency services simultaneously and, above all, in good time in the event of an emergency, we need strong communication structures. Telekom offers us these.
>
> **Reinhard Brodrecht**, CEO, Spekter GmbH

SPEKTER
WERTE UND MENSCHEN SCHÜTZEN

Software developmen

Reliable IoT Connectivity for Digital Care Solutions

Swedish health tech company Hepro Care (formerly Zafe Care Systems) connects its care alarms and sensors via Deutsche Telekom's global mobile network – for maximum reliability and multi-operator flexibility.

Challenge

Hepro Care provides IoT-based care solutions for assisted living facilities and municipalities equipping private households with digital care technology – a fast-growing segment across the Nordics. The portfolio includes care systems and panels, GPS alarms, sensors, and camera solutions. All devices require reliable mobile connectivity at all times. Previously, Hepro Care relied on a single national operator whose SIM cards connected exclusively to its own network – even when others offered stronger coverage. Repeated outages and accidental SIM deactivations compromised service reliability.

Solution

Hepro Care switched to Deutsche Telekom's global IoT connectivity. When, for example, a care recipient presses the alarm on a wristband, the signal travels via Bluetooth or RF to the care systems or panels, which uses the mobile network to alert the response center and notify relatives by SMS. Telekom's SIM cards automatically select the strongest available network – whether LTE or 5G – independent of a single provider. The contract includes flexible data plans, from voice tariffs for care panels to data-intensive plans for camera solutions.

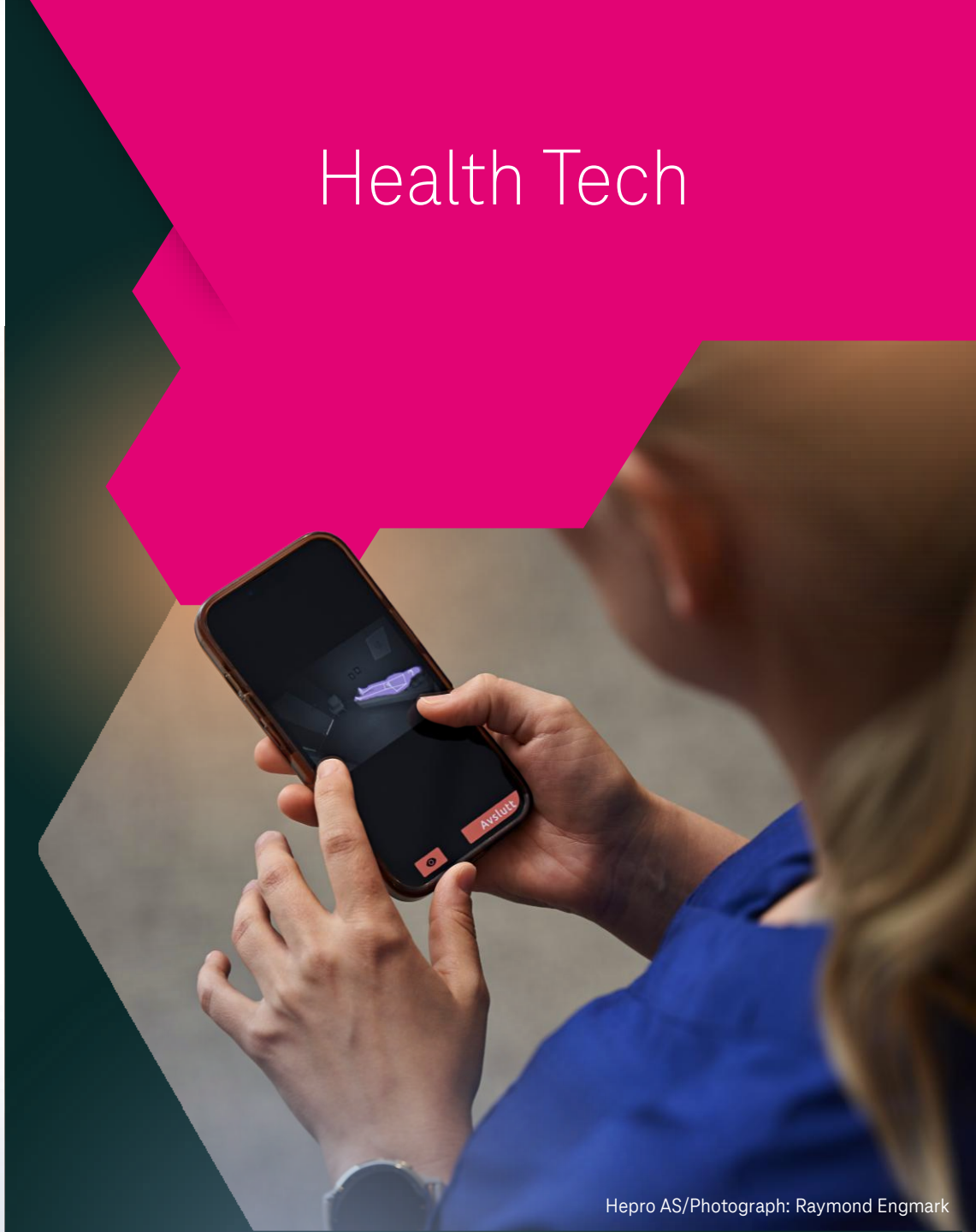
Customer Benefit

Telekom's multi-operator, multi-network approach ensures that every device maintains a reliable connection – regardless of the region, even in areas with limited coverage, and regardless of the country. Hepro Care now has the opportunity to seamlessly provide their solutions all across Europe. Deutsche Telekom's global network makes this possible as a single provider for all countries.

> “With Deutsche Telekom, our devices automatically connect to the strongest network available. That gives us the reliability our care recipients depend on.“
>
> **Robin Hägglund**, Head of IT, Hepro Care

Zafe care systems

Health Tech



Hepro AS/Photograph: Raymond Engmark

Smart GPS Dog Trackers with AI Health Analysis

SATELLAI uses IoT cellular connectivity for ist AI-powered GPS collars that inform dog owners about their pet‘s location and condition.

Pet Supplies

Challenge
Dog owners know the situation: My dog has run away, where should I search? And how is he doing? SATELLAI has developed a GPS collar with integrated AI technology that addresses both problems. The startup needed reliable, global cellular connectivity for expansion into Europe and the US.

Solution
Owners can locate their pet thanks to GPS and set up virtual safety zones. If the dog leaves these areas, the owner is automatically notified. In the cloud, an AI solution analyzes the dogs' daily activity patterns. The system also detects behavioral deviations that could indicate health problems. SATELLAI uses Telekom's global LTE cellular network to transmit the dogs' location and health data from the collars to the cloud. Users can view all information via a smartphone app.

Customer Benefit
Telekom's global cellular connectivity enables SATELLAI to market their collars worldwide without having to conclude local network contracts in each country. Dog owners benefit from mobile access to all information about their pet, regardless of where they are located. If the dog leaves a specific area, the owner is alerted via the app. Thanks to reliable Telekom connectivity via 4G or 5G, all cloud services are available worldwide. The Telekom IoT SIM also supports NarrowBand IoT and satellite connectivity for future product variants.

> “We found the ideal partner for our global expansion with Deutsche Telekom. The global cellular coverage enables us to offer dog owners reliable GPS tracking and health monitoring everywhere.“
>
> **David Teaster**, Product Marketing Director at SATELLAI

SATELLAI

Connected emergency exits: greater safety with IoT

Monitoring emergency exits is critical to safety and a complex task. The mobile door monitor with NB-IoT enables real-time monitoring, centralised control and reduced administrative burden for building management.

Challenge

Emergency exits must be accessible at all times in the event of an emergency, but must not be used without authorisation. Many companies still rely on stand-alone door guards that are not connected to digital systems. As a result, unauthorised openings often go undetected, there is no central monitoring, and critical conditions such as low battery levels are detected too late. This makes it difficult to implement security requirements reliably and efficiently, particularly in large buildings or across multiple sites.

Solution

The AlertLatch mobile door monitor from FiSCHER Akkumulatorentechnik GmbH combines mechanical security with smart IoT connectivity. As a networked sensor, it detects when doors are opened, triggers a local alarm and transmits events in real time to a central cloud platform. Data is transmitted via NB-IoT, a mobile communications standard developed specifically for the IoT, which ensures a stable and energy-efficient connection even in challenging environments such as basements or stairwells. Thanks to the integrated SIM card, no additional IT infrastructure is required. Deutsche Telekom provides the necessary network coverage and ensures reliable connectivity. This gives operators real-time insights across all locations and allows them to access all relevant data at any time.

Customer Benefits

The solution provides real-time visibility of all door statuses. Unauthorised openings are detected and reported immediately, enabling operators to respond straight away. In addition, continuous status monitoring – for example, of battery levels – facilitates predictive maintenance. This reduces effort, minimises risks and sustainably improves operational reliability. At the same time, the solution forms the basis for connected building management in smart buildings.

> *Our IoT solution provides maximum transparency regarding security-related door events – without the need for complex infrastructure. Operators can respond more quickly whilst making their processes more efficient.*“

Axel Fischer, CEO FiSCHER Akkumulatorentechnik GmbH

AlertLatch

Smart Building

Sustainability

To solve the challenges of climate change, business and civil society must tackle ambitious targets. With IoT, companies can make a decisive contribution – and also save precious raw materials.

Embedded Connectivity – Using Water Sustainably

Hidroconta is a manufacturer of water meters and irrigation systems. Its customers include both facility management companies and agricultural enterprises. Its customers include water utility companies, facility management companies, and agricultural enterprises.

The Challenge
Hidroconta wanted to connect its water meters and irrigation systems with the cloud and to manage them globally. Customers were to be enabled to check their water consumption on the Internet and to set irrigation schedules on plantations remotely. Worldwide connectivity was indispensable for Hidroconta to expand.

The Solution
Hidroconta embeds Telekom SIMs in its devices. They send data – water consumption data, for example – by NB-IoT to the cloud, where a management platform manages the cards for both the manufacturer and its customers. Telekom provides a global cellular network along with international roaming agreements.

Customer Benefit
Embedded connectivity optimizes product design because it does not require a separate SIM card slot. Hidroconta can manage the SIMs globally via a cloud platform and set up regional tariffs. Customers can monitor their water consumption remotely and make its use more sustainable.

Facility Management

Founded **1983**

60 employees

Headquarter in **Murcia (Spanien)**

hidroconta metering technology

IoT warns about extreme weather

Extreme weather events are increasing due to climate change. The IoT solution of the start-up divirod collects water data and warns of risks at an early stage.

The Challenge
Water masses that penetrate several kilometres inland from the coast; heavy rain that washes out cellars and roads; buildings that collapse under the weight of masses of snow. Such man-made disasters are occurring with increasing frequency. Those affected are usually taken by surprise and are completely unprepared.

The Solution
Sensors from divirod continuously collect water data such as water level, tides, snow, ice and precipitation worldwide. divirod's customers receive this local and individual information in real time. Radio modules with Telekom SIM cards in divirod's sensors ensure fast data transmission. The modules send the data to the cloud via Telekom's worldwide LTE-M network.

Customer Benefit
With the digital solution from divirod and Telekom, water levels can be tracked continuously, accurately and completely automatically. The data obtained can be used to visualise the long-term effects of climate change. The technology helps to think and act with foresight in order to avoid disasters in the best case or to mitigate the consequences.

> “We achieve resilience when we can respond intelligently and sustainably to the challenges of climate change.“
>
> **Dr. Javier Marti**, CEO divirod

divirod

Smart City

Connected Containers for Clean Drinking Water

SIWAtec Wassertechnik manufactures and sells water treatment plants to water utilities around the world. Its mobile facilities are connected on the Internet of Things.

Water Supply

The Challenge

For mobile use SIWAtec has developed a modular drinking water treatment container. Operation and maintenance of these containers required a high level of personnel and time input, including cost-intensive service callouts. SIWAtec was looking for a networking solution to manage the container technology and read measurements such as flow rates and pH values remotely.

The Solution

For mobile use SIWAtec has developed a modular drinking water treatment container. Operation and maintenance of these containers required a high level of personnel and time input, including cost-intensive service callouts. SIWAtec was looking for a networking solution to manage the container technology and read measurements such as flow rates and pH values remotely.

Customer Benefit

Operators and suppliers can monitor drinking water treatment continuously and are notified automatically if specified levels such as temperature, flow rate, or pH value are exceeded. Service recommendations and predictive maintenance are further benefits. If a service is required SIWAtec technicians can access the facility remotely and change a setting by, for instance, opening or shutting a valve. Remote access makes regular service callouts unnecessary, which saves time, personnel input, and fuel. It also reduces the CO_2 emissions of vehicles that the service provider can put to demand-oriented and more efficient use. Connecting containers on the Internet of Things thereby makes a sustainable local water supply possible. In addition, SIWAtec can offer its customers a more efficient service and keep an eye on its mobile containers throughout their service life.

> “Water provision is one of the challenges of our time that we can solve jointly.“
>
> **Frank Schlichtherle**, CEO und Gründer SIWAtec

Transport

DB Call a Bike | LTE-M Connectivity

Bike Sharing Made Easier and More Energy-Efficient with T Connect

Telekom Connect: Thanks to LTE-M, DB Call a Bike's bikes are easier to hire. Hiring is faster, the bikes are more energy-efficient, and that makes sustainable mobility easier to use and more cost-efficient.

The Challenge

Call a Bike is Deutsche Bahn's bike sharing service. Hiring a bike used to involve generating a code on your smartphone. The code was then entered on the bike. It was a **multistage process**, due in part to the less than optimal network technology used by the bikes.

The Solution

Die Telekom unterstützte DB Call a Bike dabei, das Zusammenspiel der Komponenten – neue elektronische Schlösser und Backend-Lösung sowie Vernetzung – zu optimieren. Sie stattet nun die Flotte von DB Call a Bike mit LTE-M-fähigen SIM-Karten aus und stellt das entsprechende Netz bereit. DB Call a Bike nutzt künftig auch den Telekom IoT Solution Optimizer.

Customer Benefit

End customers can unlock the bikes in next to no time by scanning the QR code on the lock. Thanks to LTE-M's higher energy efficiency and other factors such as solar panels on the bikes DB Call a Bike no longer needs to collect its bikes and recharge them so often. Longer deployment availability boosts value creation. The IoT Solution Optimizer enables the company first to test new developments on digital twins of its bikes. That saves both time and resources.

> "Telekom's IoT technology enables us to offer our customers a state-of-the-art user experience that does justice to the high quality of our bikes. In addition, we can now make our service more economical and more efficient."
>
> **Cornelius Kiermasch**, Head of Shared Mobility bei DB Call a Bike

DB Call a Bike

POC

Find Somewhere to Park Faster in Tulln Thanks to IoT

Thanks to smart parking sensors, drivers in Tulln can now find a parking space faster. The smart parking solution shows how the parking supply in Tulln can be optimized in the future.

The Challenge
Tulln in Lower Austria is internationally renowned for its wide range of art and culture. Thus, the city attracts around three million guests annually and is also considered an important hub for the entire region. Despite numerous means of public transport, residents and tourists also frequently use the car. The city was therefore looking for a solution to make it easier for drivers to find a parking space.

The Solution
Magenta Telekom installed networked parking sensors on 27 asphalt parking spaces as part of a smart parking pilot project with the city of Tulln. The sensors use infrared laser technology to detect whether parking spaces are free or occupied. The integrated radio modules send the occupancy data to a cloud platform via NarrowBand IoT (NB-IoT). Solar-powered LED displays at the parking lot entrances show whether and how many parking spaces are still available.

Customer Benefit
Thanks to the smart parking pilot project, the city of Tulln can now determine how it can align the parking offer even more efficiently with the needs of its residents and guests in the future. The smart parking solution can also be expanded to include additional services and further information. In the future, for instance, drivers will be able to use an app to see where parking spaces are available or when a parking ticket expires.

TULLN/DONAU

Smart City

Embedded connectivity for sustainable smart metering

With smart ultrasonic water meters, Deutsche Telekom and Heitland enable water suppliers to precisely detect water losses in pipelines at an early stage and to extend meter use – at lower overall costs.

Challenge
Water suppliers must detect water losses due to damaged pipes at an early stage. This is time-consuming and expensive and often not efficient. Localization is often done at night. The already small number of staff is then missing during the day and other work remains undone.
In addition, water meters should measure accurately for as long as possible so that an accurate billing of the amount of water consumed per household can be billed.
Consumption data is only received once a year today, so this cannot be solved.

Solution
Heitland has developed a high-end ultrasonic water meter with energy-optimized premium embedded SIM (eSIM). It transmits the encrypted measurement data on water consumption automatically and daily via NarrowBand IoT (NB-IoT). This is something special, there is no comparable product in Germany yet. At present, the ultrasonic counter is made of composite material, and soon there will also be a brass version.

Customer benefit
Deutsche Telekom offers a worldwide mobile network and cross-border roaming agreements. Thanks to this global NB-IoT coverage, the water meters are connected even in remote locations without a power supply. Thanks to the existing network infrastructure, the customer can get started right away and can rely on Deutsche Telekom in terms of availability, maintenance and protection of the networks.

> With our high-end ultrasonic water meters and Deutsche Telekom's NB-IoT network, we offer our customers a holistic solution that not only absorbs the effects of the shortage of skilled workers in the industry but also enables a more sustainable use of water as a resource.

Jan Bangert, Deputy Managing Director, Ernst Heitland GmbH & Co. KG

HEITLAND

Smart metering

Your Partner for the IoT

Finding the Right IoT Partner

Digitization and the Internet of Things offer companies wide-ranging opportunities. But where do you start with your IoT project?

A shortage of in-house digital experts or a complex IoT market are but two of the obstacles that companies face. No provider can cover all aspects of an IoT project alone. What is needed is a partner ecosystem of sensor manufacturers, connectivity providers, cloud operators, software developers, system integrators – and and a project manager to ensure that all parts fit and that the right IoT strategy lies behind it all. The target: We are your IoT project manager so you can focus on your business.

Telekom IoT Solutions for All Sectors

We are the global IoT connector. Building on the leading transatlantic network we develop tomorrow's connectivity and offer platform-based solutions to simplify and accelerate your business wherever you are.

Network Technology of the Future
We deliver the optimal networking solution for every use case, customized for your company: 5G for campus networks and intralogistics, NB-IoT for your smart factory, roaming for multi-country transportation, satellite connectivity for maritime transportation, iSIM or a management platform for your M2M SIM cards.

Global Seamless Availability
Our own mobile networks in the U.S., Germany and ten other European countries along with over 600 selected roaming partners around the world ensure global connectivity for your applications and vehicles. Local connectivity solutions for country-specific regulations round off the offering.

All-round Care Package
We offer platform-based IoT solutions that interconnect seamlessly and amount to much more than a pure networking service. And we set the highest standards, providing security "Made in Germany": EU GDPR-compliant data security and data protection and highly available, highly secure data centers in Germany.

Expertise & Advice
Trust our experts. We have many years of experience on all digital topics around new technologies, networking and device management, integration and cloud ecosystems, security and analytics.

Would You Like to Know More?

Are you looking for IoT solutions for your business model? Would you like to achieve transparency in your supply chain? Do you want to digitize processes in your production? Contact us without commitment and let us work together on a solution that is the perfect fit for your business case!

Sounds interesting? Here you can find more information

- How Does IoT Networking Work?
- The Right Tariff for Every IoT Idea
- IoT Solutions for All Industries
- IoT Connectivity Guide
- Embedded vs Retrofit - How to Connect Your Product Successfully

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