Vodafone Business: shaping the mobility of tomorrow

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THE FUTURE OF AUTOMOTIVE INNOVATION

Electric vehicles, autonomous driving, connectivity and shared mobility are reshaping the automotive industry landscape. This transition comes with many challenges, from ensuring customer acceptance to meeting regulatory requirements.

The transition to EVs (electric vehicles) is at the forefront of this revolution. OEMs (Original Equipment Manufacturers) are investing heavily in R&D, increasing manufacturing capabilities and expanding the charging infrastructure to keep pace with the growing demand for EVs. However, widespread adoption is happening slowly. Concerns such as range, battery technology, charging speed and payment mechanisms must be addressed to shift to an electric future.

Simultaneously, consumer preferences and needs are undergoing extraordinary changes. Today's buyers are seeking personalised, connected and sustainable vehicles, and the ability to interact with the new features and services simply. One in three buyers will research and buy their next car online, with simplicity and speed as key drivers. But traditional options also remain popular as consumers would still like to go for a test drive. In fact, 87% of consumers say they want to test drive before purchasing.[1]

In 2023, 13.6 million electric vehicles were sold, a 31% growth compared to the previous year. The increased demand for electric vehicles is driving demand for batteries, too. Automotive lithium-ion (Li-ion) battery demand increased by about 65%, primarily due to growth in electric passenger car sales. In 2022, about 60% of lithium, 30% of cobalt and 10% of nickel demand was for EV batteries.[2]

By 2030, over one in four new passenger cars sold will be electric[3] and the top automakers are expected to account for more than 70% of global EV production (in 2022, this was only 10%).
Manufacturers must stay ahead of these evolving preferences by developing innovative features, enhancing the user experience and offering environmentally friendly options. The industry's ability to embrace these changes will determine its success in surviving and thriving in this dynamic era of automotive evolution.

And this is where innovation plays a critical role, more than before. Innovation used to be purely about developing new products or services, but perceptions around it have shifted – companies now have a more holistic perspective and recognise that innovation is now considered a way of working. Our Fit for an Innovative Future report[4] reveals that innovation is no longer just a goal. In fact, businesses that are 'Fit for the Future' see opportunities for IoT, particularly in quality control (47%), process monitoring and optimisation (35%), process automation (35%) and surveying and monitoring (28%).
As we delve deeper, we'll explore how these emerging trends shape the future of the automotive industry and how innovation and connectivity underpin them all.

HOW DO VODAFONE EXECUTIVES SEE THE AUTOMOTIVE WORLD TODAY?

Looking at the landscape of your market today, what surprises you the most about it?

"I am struck by the parallels between what is happening to our industry – the convergence of the physical and digital as everything is becoming software-defined and remotely programmable."

Jennifer Didoni
Head of Cloud, Edge and Mobile Private Networks, Vodafone Business

What are the most common business challenges you help customers overcome?

"Ultimately, I run a portfolio intended to take the "headache" of managing infrastructure away from my customers so they can focus on building the best software and applications that delight their end customers and employees and help them optimise their operations."

"For all of the focus around ACES (Automation, Connected, Electric, Shared), what surprises me the most is the divergent paths each of these are taking, in terms of timescales, leaps forward in capability and adoption. The acronym brings all the concepts together, but the reality can be something quite different. However, there is a commonality across these four areas, which brings them back into synchronisation or at least some kind of order – telematics. And from telematics comes data, and here is where the surprises have only just started – the use of this historical and future data, together with AI technologies, will drive an era of increasingly intelligent preventative services, with the potential to remove entirely negative experiences linked to driving and mobility (e.g., crash/damage, loss, delay, environment)."

David Brown
Head of Connected Mobility, Vodafone Automotive

"Across a number of our customers, be it Automotive OEMs, vehicle dealerships, insurers and fleet operators, there is a common set of business challenges we help them overcome. When it comes to automotive OEMs and dealerships, we help address challenges such as generating service revenues, maintaining relevancy and contact with the customer, and helping to unblock customer buying decisions due to safety and security concerns. We help insurers manage their risk better, develop price policies more fairly and encourage better driving behaviour, with reduced fraud levels. For fleet operators, we focus on keeping the costs of running their vehicles as low as possible (for example, fuel, tyres and maintenance) and facilitate a smooth transtition to electric fleets."

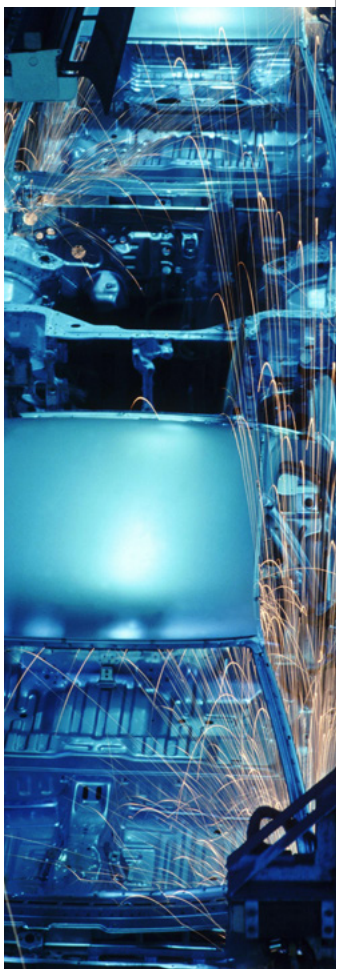
TAKING INNOVATION FROM THE FACTORY TO THE ROADS AND BACK

In navigating the fast-paced landscape of the automotive industry, a car maker or automotive enterprise must strategically harness technology and connectivity to propel innovation across the entire product lifecycle. Innovation starts from the office to the factory floors, through to the show floors (or e-commerce sites), and with data and intelligence from cars on roads, it can be brought back to further innovation. Read on for more insights into how technology and innovation can help across various points of the car lifecycle.

VODAFONE'S ROLE IN THE CONNECTED CAR MARKET

Vehicle makers

We supply over 60% of the world's leading car manufacturers with connectivity, specialist hardware, software and services.



Car insurance

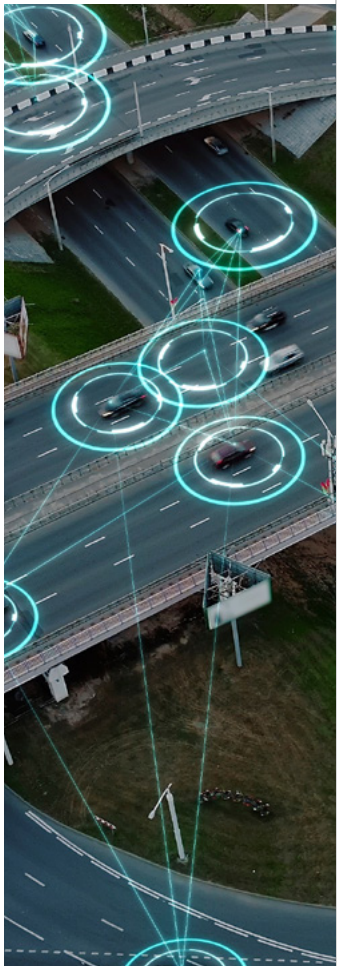
We provide connected usage-based insurance to the top automotive insurers in Europe.

Fleet management

We track and recover stolen vehicles in over 50 countries via our network of dedicated Secure Operating Centres.

Safety and security

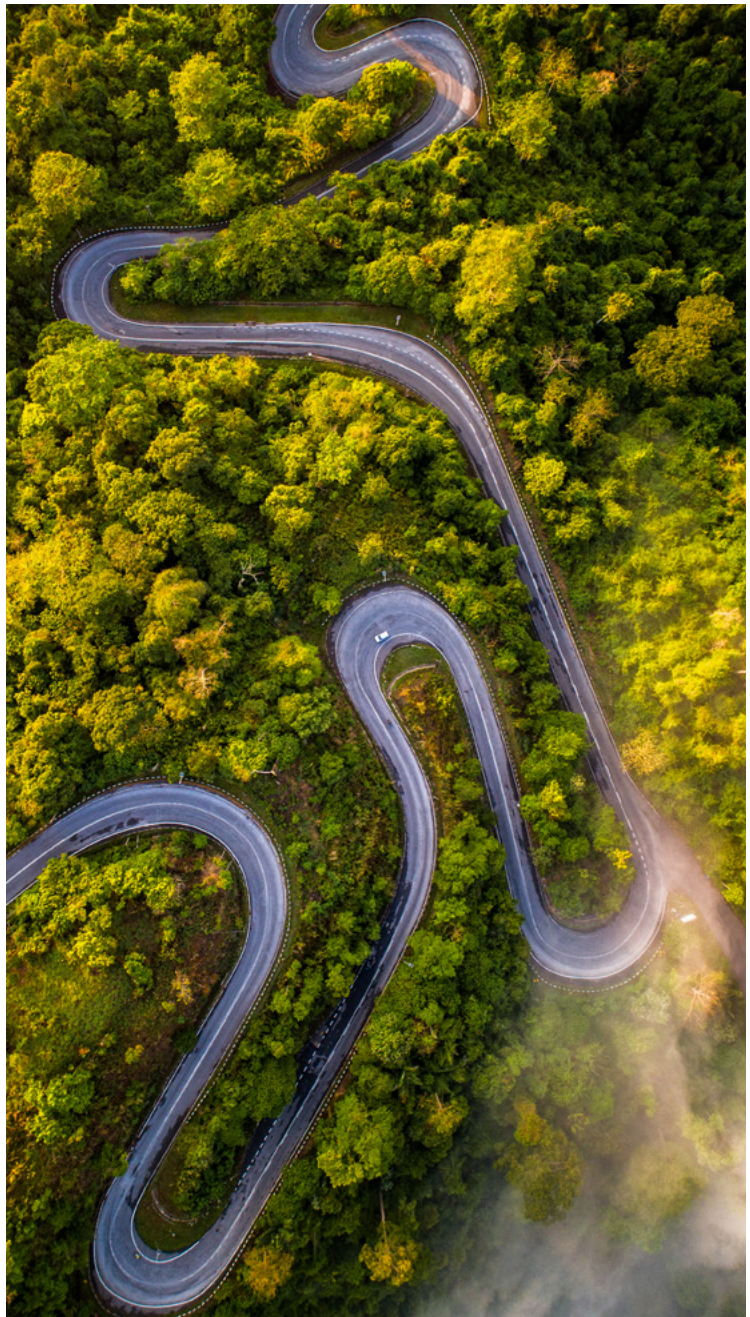
We track and recover stolen vehicles in over 50 countries, with data security built in from the ground up.



Autonomous driving

We connect L1 to L4 autonomous vehicles and provide platforms for urban safety.

FAST TO FRICTIONLESS OPERATIONS



Take your operations from fast to frictionless

In the business world today, it's all about optimisation and adaptability. To accelerate a high-performing digital business, upgrading technology isn't usually enough.

According to the IBM Institute for Business Value's recent report, 92% of executives agree that they will digitise their organisation's workflows and that their operations will be based on AI-powered automation by 2025[5]. Operations combined with data-driven insight, automation, software engineering and security will optimise a company's digital immune system. By 2025, businesses that invest in digital immunity will decrease their downtime by up to 80%[6].

Vodafone Business Smart Operations supports businesses to go from fast to frictionless, incorporating Mobile Private Networks, Edge Computing, IoT and 5G services. This helps create productive, adaptable and hyperconnected environments to make better decisions and respond faster to market changes.

Combining Edge Computing with secure 4/5G Mobile Private Networks enables near real-time synchronisation between assets, machines and people. The combination of Edge Computing and IoT allows businesses to quickly collect, process and analyse more data across their organisation to drive greater quality control, reducing errors and creating autonomous feedback loops across operations.

As enterprises increasingly rely on technology, new vulnerabilities are opened across the ecosystem. Vodafone helps reduce the risk of malicious attacks and helps OEMs stay agile and supported while benefitting from a productivity uplift.

- **Improve quality control**
- **Boost workforce productivity**
- **Respond faster to market changes**
- **Maintain your competitive edge**
- **Deliver ROI**

SECURING YOUR ENTERPRISE

Innovate with security in mind

The move to Industry 4.0, which involves the integration of digital technologies and the Internet of Things (IoT) into manufacturing processes, has brought about a range of security challenges for automotive manufacturers. These challenges include:

Increased attack surface
With the proliferation of IoT devices and interconnected systems, there are more entry points for cyberattacks. Each connected device can potentially be a target, making it crucial to secure all endpoints.

Data security
The automotive industry collects vast amounts of data, including sensitive customer information, design specifications and production data. Protecting this data from theft or tampering is a significant concern.

Supply chain vulnerabilities:
as automotive manufacturers rely on complex global supply chains, the security of third-party vendors, suppliers and partners becomes a key concern. Weaknesses in one part of the supply chain can impact the entire ecosystem.

Legacy systems
Many automotive manufacturing facilities still use legacy OT (Operational Technology) systems not designed with modern cybersecurity in mind. Integrating these systems with newer technologies can introduce security vulnerabilities.

Remote access
Monitoring and controlling manufacturing processes remotely can be a double-edged sword. While it provides convenience and efficiency, it also presents security risks if not properly protected from unauthorised access.

Insider threats
Malicious or negligent employees can pose a significant security risk. Whether intentional or unintentional, insider threats can compromise sensitive data or disrupt operations.

Zero-day vulnerabilities
As technology evolves rapidly, staying ahead of emerging threats and vulnerabilities becomes challenging. Automotive manufacturers need to monitor for and respond actively to zero-day vulnerabilities.

Compliance and regulation
The automotive industry is subject to various rules and standards related to data protection and cybersecurity. Compliance with these requirements can be challenging and costly.

Ransomware and cyberattacks
The rise of ransomware attacks and other cyber threats can disrupt manufacturing operations, causing significant financial losses and damaging the brand's reputation.

Lack of security awareness
Workforce training and awareness about cybersecurity best practices are essential. Employees need to understand the importance of security and how to identify and report potential threats.

OT-IT convergence
The convergence of IT and OT systems can create new security challenges, as these two domains traditionally have different security practices and protocols.

To address these challenges, automotive manufacturers are implementing robust cybersecurity strategies, including network segmentation, regular security assessments, intrusion detection systems, encryption, access controls and employee training. Collaborating with cybersecurity experts and staying updated on the latest security threats and solutions is also essential to protect their operations in the Industry 4.0 era, supported by Vodafone Business Secure Connected Enterprise.

Incorporating SASE, Secure Connected Enterprise combines network connectivity, cybersecurity and managed threat detection to protect data no matter where you are. This is especially important in the automotive industry, securing access to cloud-based apps and services with consistent, reliable data protection regardless of location, application, or environment.

We have more than 8,000 experts to monitor and manage security 24/7 so you can focus on what's important. You can combine these services without compromising any functionality.

STOLEN VEHICLE RECOVERY

Stolen vehicle recovery is a critical concern in the automotive industry. If not addressed sufficiently, insurance premiums and customer concerns can be a barrier to vehicle sales, damage reputation and impact OEM revenues. Some of the challenges associated with this aspect of vehicle security:

Sophisticated theft techniques
Criminals continually develop more sophisticated vehicle theft methods. They may use hacking techniques to bypass vehicle security systems or exploit vulnerabilities in keyless entry systems, making it difficult to prevent theft.

Privacy and data protection
Collecting and transmitting vehicle data to aid recovery efforts raises privacy and data protection concerns, as manufacturers must balance tracking capabilities with customer privacy rights.

Legislation and regulation
Differences in laws and regulations across regions can hinder cross-border cooperation in stolen vehicle recovery efforts. Harmonising legal frameworks is a challenge.

Public awareness
Vehicle owners may not be fully aware of theft prevention and recovery technologies or fail to take basic security precautions, making their vehicles more vulnerable to theft.

Addressing the challenges

The automotive industry, law enforcement agencies and stakeholders need to work together to mitigate theft risk. This can involve the following:

Enhanced security measures
Developing and implementing advanced vehicle security systems such as GPS tracking, remote immobilisation and immobilisation and anti-jamming technologies.

International cooperation
Collaborating with national and international enforcement agencies and organisations to combat cross-border vehicle theft and trafficking.

Legislative and regulatory changes
Advocating for consistent laws and regulations to support theft prevention and recovery efforts and facilitating data sharing between law enforcement and industry.

Technology innovation
Continuously improving theft prevention and recovery technologies to stay ahead of evolving criminal techniques.

Private-sector involvement
Collaborating with insurance companies, technology providers and other stakeholders to create a more comprehensive approach to stolen vehicle recovery.

Vodafone's Stolen Vehicle Recovery services are made possible by constant communication between our GPS/GSM tracking system and Vodafone Automotive's server infrastructure, the integrated network of remote monitoring platforms and specialised operators, working in partnership with local police:

Our live tracking data (made possible by a SIM card) means that we're able to pinpoint a vehicle's position and movement, including speed and direction of travel.
The combination of our technologies enables the constant transmission of the position data – across over 360 local GSM networks.
Our Stolen Vehicle Tracking systems are designed and manufactured to meet all automotive standards in Vodafone's state-of-the-art production facility.

Pay by car

By 2025, in-car payments could reach $86 billion[7]. However, the automotive industry faces several challenges in car payment services, as the development of a convenient and efficient payment infrastructure is crucial for the widespread adoption of electric vehicles (EVs). Some of the challenges in this domain include:

01 **Accessibility and compatibility**
Accessing charging stations and making payments should be straightforward, but issues related to app compatibility, account creation and payment options can cause user barriers.

02 **Privacy and data security**
EV charging payment services involve collecting personal and financial data, raising concerns about privacy and data security. Ensuring robust cybersecurity and data protection measures is essential.

03 **International travel**
For EV owners traveling across borders, using different payment systems and currencies can be challenging. International roaming and cross-border payments need to be simplified.

04 **Scalability**
As the number of EVs on the road increases, the charging payment infrastructure must be scalable to handle higher transaction volumes without compromising performance.
Regulatory compliance: payment services must comply with various financial regulations and standards, adding complexity and costs to their operation.

05 **Regulatory compliance**
Payment services must comply with various financial regulations and standards, adding complexity and costs to their operation.

Addressing these challenges requires collaboration between automotive manufacturers, charging service providers, governments, and industry stakeholders. Standardising payment methods, improving user-friendly mobile apps, enhancing data security, and promoting cost transparency are essential steps to provide a seamless and convenient payment experience for electric vehicle charging. Additionally, regulations and policies can promote fair and efficient payment services in the EV charging ecosystem.

Vodafone's Pay by Car IoT platform seamlessly transforms connected devices into automated and cost-efficient economic agents open for business, enabling in-car payments with just the SIM to help address the above challenges. We create a wallet and vehicle identity passport, linking to payment rails and smart contracts for automated in-car payments so that it can securely transact with people, services and other devices, enabling the car to pay for things like charging, drive-through services and parking, as a few examples. This need is already here now, and by 2025, the economic impact of IoT is forecast to be $12.6 trillion[8].

Additionally, Pay by Car can support autonomously communicating vehicles with the warehouse on arrival, automatically recording an accurate, reliable, on-time delivery status, or you can track and monitor goods in transit, keeping records of border checks and transactions associated with supplies.

ROAD TRAFFIC SAFETY

Safer Transport for Europe Platform

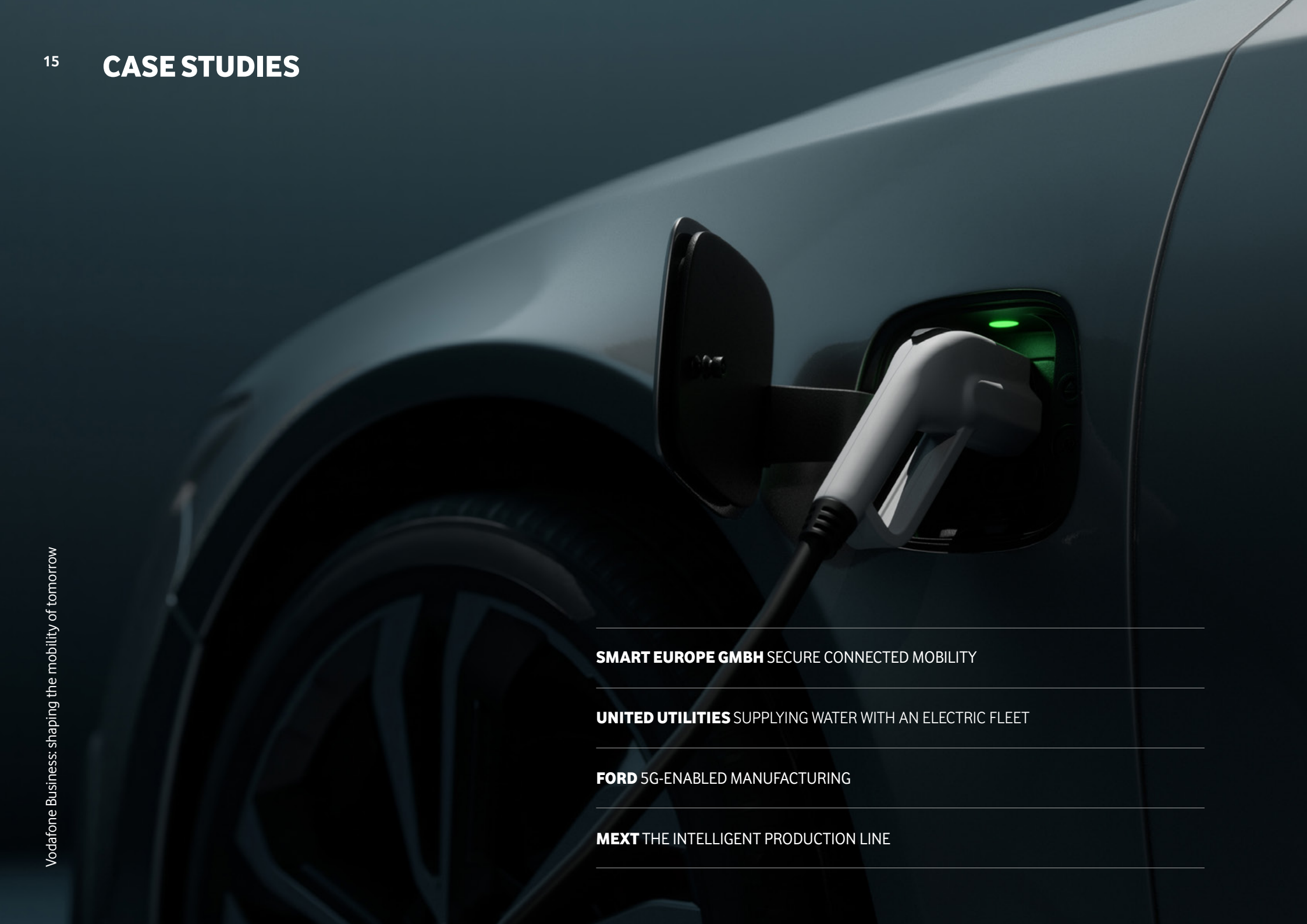
Road traffic injuries are the leading cause of death for children and young adults aged 5-29. Road traffic safety is still a significant challenge, especially for vulnerable road users, with 3,500 deaths per day globally because of road traffic accidents. More than 50% of the deaths are among vulnerable road users (pedestrians, cyclists, and motorcyclists), and this has risen substantially since 2009.

At Vodafone, we're committed to making European roads safer for all. The Safer Transport for Europe Platform (STEP) is the Vodafone cooperative mobility solution that helps road users and operators make mobility more secure and accessible. The platform distributes data and mobility insights across all European traffic and transportation domains and is designed according to guidelines from major standardisation institutions such as ETSI and 5GAA. Some use cases include:

- **Pedestrian and cyclist detection and warning system**
- **Emergency vehicle warning**
- **Excess speed warning**
- **Time To Green (Green Light Optimal Speed Advisory)**
- **Roadworks warning**

We are working with the automotive industry to incorporate this technology into vehicles to help make roads safer.

CASE STUDIES



SMART EUROPE GMBH
SECURE CONNECTED MOBILITY

Protecting data and vehicles

Smart Europe GmbH manufactures electric vehicles. Their R&D team analyses vehicle data to detect and prevent attacks or anomalies. As they couldn't afford data loss or damage, they needed a cost-efficient and reliable solution to securely transfer the data from the EVs to their private cloud.

Smart Europe GmbH can transfer the data from EVs across Europe to their AWS Cloud in Germany for further analysis using our secure and high-performance connectivity. Cloud Connect helps them minimise the risk of data loss and increases savings. It's more cost-efficient than traditional solutions relying on IP-VPN and MPLS. Vodafone also provided them with an extensive alarm system, with sensors giving maximised protection against all kinds of theft attempts to prevent vehicle lifting and tow-away.

Read the case study

UNITED UTILITIES
SUPPLYING WATER WITH AN ELECTRIC FLEET

Going electric for a sustainable future

United Utilities provides water and wastewater services in the North West of England and delivers 1.8 billion litres of water a day to homes and businesses. This involves hundreds of reservoirs, treatment works and pumping stations, thousands of kilometres of water pipes and sewers and a 5,000-strong workforce. When a burst water main needs urgent intervention, there's no time for technical issues. United Utilities' staff and vehicles always need to be ready to deal with urgent situations and provide their customers with instant support.

The company decided to move from diesel vehicles to a fully electric fleet by 2028 as part of their journey towards carbon net zero. The company needed real-time analytics to make the move a smooth one. Vodafone Business Fleet Analytics provides United Utilities with real-time telematics data to help them spot and fix issues. Regular predictive maintenance helps the company minimise vehicle wear-and-tear, avoid unnecessary off-the-road time in service depots and cut repair costs – resulting in more vehicles being available when they need them and a smaller total fleet to run. Real-time insights have also given them reduced idle times and fuel consumption, and they have access to driving behaviour reports and can give drivers feedback on their driving styles such as cornering and speeding.

Read the case study

FORD
5G-ENABLED MANUFACTURING

Ford and Vodafone create the car factory of the future

Ford wanted to move away from internal combustion engines to plug-in and fully electric vehicles and transform its production line. They decided to introduce new laser welding technology for electric cars. They needed to handle large amounts of data collected during this process – welding can generate up to half a million pieces of data per minute.

Ford needed reliable high-speed wireless connectivity to ensure continuous monitoring and maintenance. Vodafone provided them with a 5G Mobile Private Network with high bandwidth and ultra-low latency at Ford's Dunton Technical Centre in Essex so that they could capture images and analyse the data using Artificial Intelligence. If the welding isn't up to expectations, the system can re-weld the parts based on the data while still in the machine.

This way, Ford can get rid of unnecessary downtime and manufacturing delays. They use the HoloLens system to get real-time support from 5G-connected Vodafone Business experts to diagnose and fix any problems. 5G also enhances security, as Ford uses SIMs on its devices that ensure continuous monitoring of their dedicated network and protect it from external threats.

Read the case study

MEXT
THE INTELLIGENT PRODUCTION LINE

Helping Mext build Türkiye's first 5G-enabled digital factory

The Turkish Employers' Association of Metal Industries (MESS) represents the largest metal manufacturing companies in Türkiye. MESS has established MEXT, the world's most comprehensive digital transformation and capability-building centre in Istanbul. It includes an ecosystem of more than 50 global technology providers, universities and institutions to support Turkish companies in their journey towards Industry 4.0.

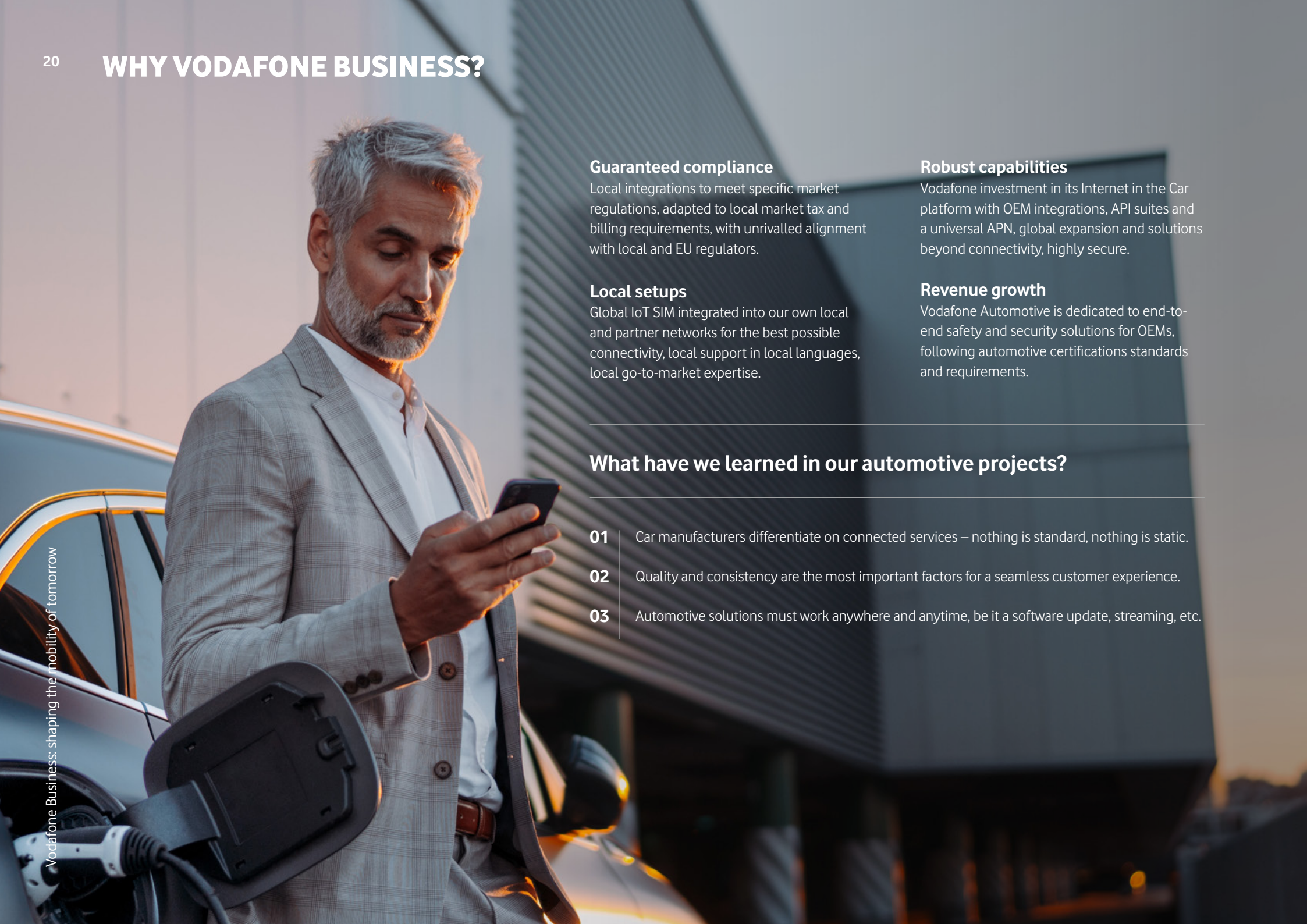
Vodafone established a 5G-enabled Mobile Private Network (MPN) for them. MEXT is the first facility in the country to use this technology in a production environment, making it stand out from similar tech centres.

The Safe Area Violation Solution allows real-time detection of potential occupational safety issues. These are reported to the Occupational Health and Safety (OHS) management system using existing security cameras with MPN. The system determines which areas are safe, risky, or forbidden to enter and creates geofences to ensure efficient monitoring.

Thanks to 5G MPN, connectivity issues don't stand in the way of digital innovation. MEXT can now carry out tasks and use digital assets that help smart factories become more flexible, sustainable and productive in the future.

Read the case study

WHY VODAFONE BUSINESS?



Guaranteed compliance
Local integrations to meet specific market regulations, adapted to local market tax and billing requirements, with unrivalled alignment with local and EU regulators.

Local setups
Global IoT SIM integrated into our own local and partner networks for the best possible connectivity, local support in local languages, local go-to-market expertise.

Robust capabilities
Vodafone investment in its Internet in the Car platform with OEM integrations, API suites and a universal APN, global expansion and solutions beyond connectivity, highly secure.

Revenue growth
Vodafone Automotive is dedicated to end-to-end safety and security solutions for OEMs, following automotive certifications standards and requirements.

What have we learned in our automotive projects?

01 Car manufacturers differentiate on connected services – nothing is standard, nothing is static.

02 Quality and consistency are the most important factors for a seamless customer experience.

03 Automotive solutions must work anywhere and anytime, be it a software update, streaming, etc.

Together we can

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