BMW
Corporate Communications

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BMW Group Digital Day 2018.
Summary.

Digitalisation is the dominant element in the radical ongoing transformation of personal mobility. It paves the way to a new driving experience, expands the possibilities for enhancing safety and comfort out on the road, and opens up new opportunities for efficient yet customer-focused development and manufacture of vehicles. The BMW Group is systematically forging ahead with digitalisation across all areas. Thanks to its capacity for innovation, not only does it develop cars and motorcycles for the premium segment that stir the emotions, it also devises customer-centric services that optimise the mobility experience as a whole. As part of the Digital Day 2018 event, the BMW Group is offering an insight into current product developments, technological concepts, innovations and manufacturing processes that will enable it to shape the future of mobility.

Today, the BMW Group is already blazing a trail for intelligent vehicle connectivity and the integration of digital mobility services. It is exploiting the potential of digitalisation to further strengthen its status as the leading provider of personal mobility at premium level. The BMW Group has defined the key areas that will form the stepping stones to digitalised and emission-free mobility in the future with its corporate strategy NUMBER ONE > NEXT. In the process, it is driving forward the D-ACES themes (Design, Autonomous, Connected, Electrified and Services) with particular vigour through considerable investment in research and development. The innovations and initiatives presented at Digital Day 2018 exemplify the company's transformation into a mobility tech company.

5G mobile standard: BMW Group is ready to embrace the high-speed information highway.

With improved transfer rates and minimised latency, the future 5G mobile standard offers significantly improved technical possibilities when it comes to data transfer – developments which can also be used to enhance vehicle connectivity. The BMW Group is already working on technologies which will help to utilise the full potential of 5G here. The aim is to be able to offer systems and functions based on 5G as soon as it becomes commercially available in series-produced vehicles in several years' time.

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At Digital Day 2018, the BMW Group is showcasing the benefits of an innovative feature of 5G mobile networks known as network slicing. This technology involves making parts of the network infrastructure available on demand in a way that suits specific applications and their respective requirements. The customer has access to a virtual network made up of individual slices, which can be used to update HD navigation maps, for example, enable the direct exchange of data between vehicles and allow videos to be streamed in HD quality.

Artificial intelligence enhances safety.
Artificial intelligence plays a key role in the development of algorithms, which sort through and evaluate large quantities of data and incorporate it into decision-making on how vehicles should behave. The BMW Group is using artificial intelligence in the development of systems for automated driving which can deal with even extremely complex traffic situations in city centres. Autonomous driving in which artificial intelligence helps to ensure safe and comfortable mobility for all is another BMW Group development goal.

The benefits of systems equipped with artificial intelligence include their boundless capacity for work. Unlike humans, an intelligent system can maintain constant performance levels. It doesn't get tired or distracted, and maintains full concentration even in confusing situations.

Mixed reality assists the development process.
Mixed reality describes the combination of real-life prototypes and virtual simulation that can be used to accelerate and optimise vehicle development. The BMW Group leads the way in the use of such methods and employs technologies from the consumer electronics and computer gaming sectors and a new generation of data glasses which enable users to visualise a growing number of components and vehicle functions extremely realistically. In this way, the impressions created by physical components can be enhanced with digitally generated experiences.

One area in which the BMW Group uses mixed reality is the development of vehicle interiors. Here, computer-generated simulations are combined with an interior model (a mock-up). This allows an all-encompassing image of the driving

experience inside a future series-produced model to be created at an early stage of development.

BMW Operating System 7.0: the display and control concept of the future.
Dubbed BMW Operating System 7.0, the next generation of BMW's display and control system is entirely digital and highly sophisticated in nature, and is designed around the user's individual requirements more closely than ever. Thanks to its clear layout and structuring, intuitive operation, and customisable and personalised displays, it has been designed to always provide the driver with the right information at the right time.

The redesigned all-digital instrument cluster has space to display a section of the navigation map as well as further, individually selectable content. At the same time, it forms a seamless, uniformly designed display cluster with the Control Display in the centre console, which has been further optimised to deliver intuitive touch operation and visualises content in real time on up to ten freely configurable main menu pages, each containing between two and four pads. The flat menu structure also enables fast access to all settings and functions. Multimodal interaction between the driver and vehicle has likewise been further improved with BMW Operating System 7.0. The customer has a choice of iDrive Controller, touch control, voice control and gesture control.

Real-time hazard warning system prevents accidents.
By sending out local hazard warnings to its intelligently connected vehicles, the BMW Group is increasing safety out on the road. To do this, the data registered by the vehicle sensors is collected in anonymised form and processed centrally so information indicating hazard situations can be derived from it. This allows warnings of accident sites or extreme local weather conditions to be relayed specifically to vehicles in the vicinity of those situations.

Warnings of both weather-related hazards, such as fog, black ice, heavy rain and aquaplaning, and broken-down vehicles have been transmitted to BMW vehicles with the requisite connectivity technology since November 2016. This technology still offers a great deal of untapped potential, though. Over the course of 2018, real-time traffic jam reports are set to become even more

specific by using instances of emergency braking, while requests from the police to keep a corridor free for emergency vehicles will also be transmitted. The swift and accurate relaying of information on road conditions and traffic situations also provides an important basis for optimising the operation of automated driving systems.

The BMW Group's secure IT backend provides connected vehicles with live information and digital services.
Connected vehicles are now able to receive live information and transmit data to the BMW Group's permanently available IT backend via a secure mobile connection in a total of 46 markets. Besides real-time hazard warnings, navigation map updates can also be delivered over the air in this way.

In future, the secure IT backend will provide the platform for other data-based applications. The BMW Group employs technologies from the fields of cloud computing and artificial intelligence to both optimise existing functions and develop new services. Data protection and data security take top priority here. Security and availability are guaranteed thanks to the coordinated interaction between specialised systems controlled by the BMW Group. This approach also enables regulated opening of the backend to integrate services from external partners, allowing the internet's rapid pace of innovation to be used to the benefit of customers. Specialised systems include the Open Mobility Cloud, which is used for providing personalised services from BMW Connected, and the Location Platform for transmitting hazard warnings in real time.

Digital processes speed up development and manufacturing.
Digitalisation is opening up new opportunities on the production side as well. The additive manufacturing techniques collectively known as 3D printing stand out in particular for their success in delivering fast, flexible und customisable processes. Classic examples of additive manufacturing applications can be found in areas where custom-made and sometimes highly complex components are needed in small numbers. This is the case especially in prototype development, vehicle validation and vehicle road testing.

An additively manufactured water pump wheel was fitted in DTM racing cars for the first time back in 2010. And the new BMW i8 Roadster features a soft-top

cover with an aluminium bracket made using metal powder laser melting, a cutting-edge technique that has never been used before in car manufacture. Meanwhile, the new MINI Yours Customised product line enables customers to personalise the design of selected components and then have them produced via 3D printing. On top of all this, the Additive Manufacturing Center at the BMW Group Research and Innovation Centre (FIZ) in Munich now supplies around 140,000 prototype parts a year to the company's various development departments.

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The BMW Group

With its four brands BMW, MINI, Rolls-Royce and BMW Motorrad, the BMW Group is the world's leading premium manufacturer of automobiles and motorcycles and also provides premium financial and mobility services. The BMW Group production network comprises 30 production and assembly facilities in 14 countries; the company has a global sales network in more than 140 countries.

In 2017, the BMW Group sold over 2,463,500 passenger vehicles and more than 164,000 motorcycles worldwide. The profit before tax in the financial year 2017 was € 10.655 billion on revenues amounting to € 98.678 billion. As of 31 December 2017, the BMW Group had a workforce of 129,932 employees.

The success of the BMW Group has always been based on long-term thinking and responsible action. The company has therefore established ecological and social sustainability throughout the value chain, comprehensive product responsibility and a clear commitment to conserving resources as an integral part of its strategy.

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