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Software competence, virtual power stations, convenient recharging of electric vehicles, Industry 4.0

February 17, 2015  
PI 8792 RB Res/SL

## **Bosch offers viable solutions for a connected world** Sensor technology and the Bosch IoT Suite provide the technological basis

- ▶ Viable technology for a smart power grid
- ▶ Connected buildings and smart homes
- ▶ Connected mobility solutions
- ▶ Leading supplier and leading exponent of connected manufacturing

Stuttgart – The future is connected. Bosch expects that roughly 14 billion things will be connected over the internet by 2022. The supplier of technology and services recognized the potential that this offers at an early stage, and now offers many viable solutions. For example, Bosch sensors register vacant parking spaces, while “virtual power stations” use Bosch software to harmonize power generation and energy demand. Bosch is the global market leader for the micromechanical sensors that form the basis of many connected solutions. On top of that, it can draw on the software competence of Bosch Software Innovations, its software and systems unit. Its IoT Suite is the technological basis for many applications on the internet of things. The following are a selection of Bosch solutions for the connected world:

### **1.) Connectivity as the basis for mobility solutions**

#### **The “Charge&Pay for Mercedes-Benz” app facilitates the recharging of electric cars**

Anyone who travels by electric car and wants to recharge it has to be well prepared. In Germany, there are some 3,000 publicly accessible and web-enabled charge spots, 230 operators, and many different charging cards and payment systems. For a recharging and payment process that is much simpler and more convenient for drivers, Daimler offers the “**Charge&Pay for Mercedes-Benz**” app, developed and supplied by **Bosch Software Innovations**.

Using this app, recharging from the public infrastructure will be just as simple as buying a parking ticket, since it works irrespective of provider. The app displays any vacant charge spots in the vicinity. Before recharging, customers find out how much it will cost at the respective charge spot. Identity verification is also handled by the app, and billing is done automatically via PayPal. Designed for smartphones, the service is available everywhere and at any time – without any contractual obligations or fixed costs.

For more details, go to: <http://bit.ly/1zmTJyC>

### **Flex Inspect diagnostic system, using augmented reality**

Connectivity also plays a role when a car has to be serviced or repaired. Bosch has created a solution for repair shops that makes troubleshooting and repair work easier. In the repair shop or garage, the Flex Inspect diagnostic system can wirelessly read out the vehicle's fault log, and also check the battery, tire pressure, and chassis geometry. This information is displayed on a tablet PC. On the basis of this data, a customer advisor can discuss the type and scope of repairs needed with the vehicle owner. A **live diagnosis using augmented reality** is part of this innovative solution. All the repair-shop mechanic has to do is simply point his tablet computer at the vehicle. Context-related information is then displayed on the image of the vehicle, in the relevant position. Next to where the battery is located, for example, a text box will show whether the voltage reading is sufficient.

For more details, go to: <http://bit.ly/1KPRhHY>; <http://bit.ly/1vOHYnD>

### **Bosch makes parking simpler and more convenient**

The daily search for a vacant parking space in city centers or parking garages is frustrating and time-consuming. But it could soon be a thing of the past. Bosch has developed solutions that use sensors to generate real-time maps displaying vacant parking spaces. Wireless sensors installed on the pavement are one source of information for these maps. The sensors can recognize whether a parking space is occupied or not, and can share this information via the internet. The free parking spaces are displayed on a real-time map. Moreover, vehicles passing any vacant spaces will be able to report them. The ultrasound sensors installed in many modern vehicles register gaps between cars parked along the side of the road. As many vehicles are now online, this information can also be transmitted over the internet and displayed on a real-time map. Transmitting this information to users' smartphones or directly to their cars' navigation devices can help significantly shorten the often taxing search for parking.

For more details, go to: <http://bit.ly/1FGpZQD>

### **Fleet management for fleet operators and insurance companies**

The new Bosch telematics services give fleet operators more clarity and a better overview. Via the interface for the on-board diagnosis system, the vehicle's journey and performance data are transmitted to Bosch for analysis. Fleet operators can use the evaluated data to optimize things such as **operating and maintenance times**. Services such as an electronic logbook and a theft alert system are also available, thanks to the GPS installed in the vehicle. In this way, the total cost of running the vehicle is reduced.

## **2.) Connected energy for more sustainability**

### **IT platform for a smart power grid**

Since September 2014, a new software system featuring smart control via a secure wireless connection has been helping keep the Berlin power grid stable. The software was developed by Bosch Software Innovations in collaboration with the mobile network operator e\*Message. This new technology makes it possible to flexibly manage thousands of local power generators and energy consumers, as well as to take them offline and online – **safely, reliably, and cost-efficiently**. Up to now, this has been done using ripple control, in which the commands are sent over the existing power supply grid. These commands are now sent by radio. In this way, energy consumers and power generating systems can be flexibly managed, collectively and individually, in a process that is either ad hoc, time-staggered, or scheduled. Depending on the weather, for example, night storage heaters can be switched on at different times each day, or photovoltaic arrays can be throttled or taken offline as required. This can prevent the grid from being overloaded. As the first German operator of a distributed grid, Stromnetz Berlin GmbH recently began using radio ripple control. This radio-based technology is manipulation- and breakdown-proof, as well as less expensive to run. In the future, the new Berlin-Britz substation will supply electricity to roughly 25,000 households and 1,400 businesses. It is the first substation to be fitted with this technology.

For more details, go to: <http://bit.ly/1GPv9IW>

### **Software for the Smart City Rheintal virtual power station**

Smart City Rheintal is a consortium of several pioneering projects in the Vorarlberg region of Austria. The region has set itself the goal of achieving CO<sub>2</sub>-free energy autonomy by 2050. In the “smart grid” sub-project, Bosch Software Innovations is working with other partners to design and develop a virtual power station that will **harmonize power generation and energy demand**. This is especially important when using renewable energy, since a lot of solar energy may be available when it is not really needed. For this reason, a large number of photovoltaics arrays are being combined to form one single, virtual source of

electricity. The output of this virtual power station can be controlled by increasing or reducing the injection of power from the photovoltaics arrays feeding into it. The actual and potential output of the virtual PV power station are both constantly measured and predicted on the basis of current weather forecasts. The more precise these forecasts, the better the possibility of planning power consumption appropriately. If, for example, there is likely to be a surge in electricity supply over the next two hours, the power can be used to recharge an electric vehicle that has been reserved for a trip in four hours' time. For more details, go to: <http://bit.ly/1E6Q8XZ>, <http://youtu.be/FrYr5AL1eus>, <http://youtu.be/dz5mzGgv18w>

### **3.) Connected industry – the fourth industrial revolution**

#### **One product, 300 variants, batch size 1**

At its plant in Homburg, Germany, Bosch Rexroth uses over 2,000 components to manufacture more than 300 hydraulic-valve variants on just one production line. These valves control the flow of hydraulic oil in trucks and tractors, enabling load beds to be tipped or plows raised. Some of these valves have to be made just ten times a month, others several hundred times. This calls for a production process that is highly flexible. An innovative new assembly line can deal easily with this variety. It is also extremely flexible. At nine stations on the assembly line, different valve designs are manufactured – in parallel if necessary. The line consistently applies the principles of connectivity.

The nine stations automatically recognize each of the individual workpieces and call up the related processing schedule. Associates then know immediately what they have to do. They know what screws have to be turned and what seals have to be installed. In extreme cases, each valve is different – **production with batch size one**. All this is possible without complex retooling or excessive stocks at the individual stations. In addition, new variants can be included in the production process at any time. And that's not all: on the basis of Bluetooth tags, the line recognizes each individual associate. Monitors mounted at the stations then show animated 3D films of the assembly process, tailored to each associate's level of knowledge. This connectivity can go even further: the aim is to transfer customers' manufacturing orders to the line direct, and to automatically schedule the best possible manufacturing process. For details about the production line, go to: <http://bit.ly/1uSEhpB>

#### **Individualized tests in Blaichach**

At its Blaichach plant, Bosch manufactures the ESP electronic stability program, among other things. This system stabilizes vehicles, reduces the risk of skidding, and plays an essential part in making driving safer. During the manufacturing

process, a lot of information is collected relating to each individual component. During preassembly, for example, a solenoid valve is made for subsequent installation in the ESP unit. For each individual valve, Bosch records large amounts of data about things such as tightness and the force needed to adjust the valve. Combining all this data in a computer shows how extensive the final inspection has to be. The scope of testing for “class A” batches is reduced. For example, certain leakage tests can be foregone. “Class B” batches are fully tested. This individualized testing of batches means less time is spent overall on inspection, which also means **greater productivity and competitiveness**.

#### **4.) Smart home solutions**

##### **Open software platform for smart homes**

People who live in smart homes can use their smartphones to conveniently control devices and appliances of all kinds, without having to worry about different technologies and makes. For this to happen, all the devices and appliances in a house – e.g. coffee-maker, central heating, lights, and blinds – have to be able to send data simply and securely to each other, as well as to smartphones and tablets. ABB, Bosch, and Cisco plan to establish an international joint venture that will develop and operate an **open software platform for devices and applications in smart homes**. As well as developing and operating the software platform, the companies want to make it possible for providers from the areas of household appliances, consumer electronics, home automation, and internet services to collaborate in a business ecosystem. The idea is that this ecosystem will make collaboration easier and help include different user requirements in the development of the software platform. For more details, go to: <http://bit.ly/1AomeML>

##### **Using the Home Connect app to operate household appliances**

In addition to this, Bosch has already launched its first connected household appliances – an oven and a dishwasher – that can be operated by app. The **Bosch Home Connect app is a world first**, allowing household appliances belonging to different brands to be controlled from a single point. Using just one app, many additional functions can be used. In the future, it is planned to make appliance-related services available on the app as well. By the fall of 2015 at the latest, there will be connected appliances in every product category of BSH Hausgeräte GmbH.

For more details, go to: <http://bit.ly/1AomeML>, <http://www.bsh-group.de/>

## 5.) Intelligently connected energy systems

### e.Control

Bosch also offers innovative solutions for intelligently connected, local energy systems: if a photovoltaics array is connected with advanced heat-pump technology, consumers can themselves use most of the solar electricity they generate, and in this way significantly reduce their energy bills. The heart of this system is **e.Control**, a smart control system. Connected with the electricity meter, it monitors flows of energy in the building. Priority is given to the power supply to the household appliances that are currently in operation. And if homeowners supplement their energy system with a Bosch hybrid battery, they can use even more of the solar electricity they generate themselves. The hybrid system keeps the heat pump supplied with sufficient electricity even when the sky is cloudy or after dark. The heat pump uses air or ground heat to heat the house and provide it with hot water. The energy management system provided by the Bosch solution detects when the heat pump needs electricity and covers this requirement with electricity from the photovoltaics array, provided the sun is shining strongly enough.

For more details about e.Control, go to: <http://bit.ly/19n1LQV>

### Press photos:

1-RB-20863: Infographic: drivers of Industry 4.0

1-RB-20864: Infographic: timeline of Industry 4.0

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*The Bosch Group is a leading global supplier of technology and services. According to preliminary figures, its roughly 290,000 associates generated sales of 48.9 billion euros in 2014. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. The Bosch Group comprises Robert Bosch GmbH and its more than 360 subsidiaries and regional companies in some 50 countries. If its sales and service partners are included, then Bosch is represented in roughly 150 countries. This worldwide development, manufacturing, and sales network is the foundation for further growth. In 2014, Bosch applied for some 4,600 patents worldwide. The Bosch Group's strategic goal is to deliver innovations for connected life. Bosch improves quality of life worldwide with products and services that are innovative and spark enthusiasm. In short, Bosch creates technology that is "Invented for life."*

*The company was set up in Stuttgart in 1886 by Robert Bosch (1861-1942) as “Workshop for Precision Mechanics and Electrical Engineering.” The special ownership structure of Robert Bosch GmbH guarantees the entrepreneurial freedom of the Bosch Group, making it possible for the company to plan over the long term and to undertake significant up-front investments in the safeguarding of its future. Ninety-two percent of the share capital of Robert Bosch GmbH is held by Robert Bosch Stiftung GmbH, a charitable foundation. The majority of voting rights are held by Robert Bosch Industrietreuhand KG, an industrial trust. The entrepreneurial ownership functions are carried out by the trust. The remaining shares are held by the Bosch family and by Robert Bosch GmbH.*

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## Data transmission over the internet **Bosch MEMS sensors** World market leader in micromechanical systems

February 13, 2015  
PI 8795 RB Res/SL

- ▶ Micromechanical sensors are a key technology for the internet of things
- ▶ Every second smartphone worldwide features Bosch sensors
- ▶ Myriad possible applications in cars, smartphones, game consoles, and the smart home

*Equipped with delicate structures much finer than a human hair, sensors detect the world around them. They transmit the information they collect over the internet in an energy-efficient way, making them a key technology for the connected world.*

Stuttgart – MEMS sensors (microelectric mechanical systems) are an essential element of the connected world. Just a few millimeters in size, they contain delicate microscopic structures made of silicon. The sensors use these structures to measure acceleration, air pressure, the geomagnetic field, sound, yaw rate, temperature, humidity, and air quality. Objects without their own electronics, such as doors or windows, can be equipped with a tiny, energy-efficient radio interface and a small battery so they can register their environment and become part of the internet of things. Bosch is the world leader in MEMS sensors and has manufactured five billion of them since launching production 20 years ago.

### **Sensors enable smartphones to feel**

MEMS sensors are the eyes and ears of many mobile devices. They help smartphones or tablets to recognize their location in space, meaning how they are being held and how they should rotate the view on the display for the user. Tiny MEMS microphones record sound and speech. The sensors also find application in notebooks, smart watches, game consoles, and sports watches. Machines can be fitted with sensors as well. These register information on the machines' operating condition and can identify changes and deviations that might indicate problems. This information can be sent anywhere in the world over the internet. Sensors, batteries, and transmitters can now be combined in single units that are so small, energy-efficient, and inexpensive that they can be put to

work in their billions. At the same time, data networks are accessible from almost everywhere.

### **World premiere: environment sensor measures air pressure, moisture, temperature, and air quality**

At the CES 2015, Bosch presented the world's first MEMS sensor that measures air pressure, moisture, ambient temperature, and air quality. All of its functions are contained in a single housing that measures just 3x3 millimeters. This opens up many new functions for mobile devices or other objects; for example, measuring the air quality in a room, or having a personalized weather station on your smartphone that automatically adjusts the heating or air conditioning at your house. For indoor navigation, such sensors can send information to the floor that the device is located on, helping users find a particular store in a shopping center more quickly. The sensors are also used in fitness trackers, a popular way to measure how many steps users take or how many stairs they climb each day.

### **Sensor technology for safe and secure transport**

Individual products aren't the only things that can be connected via sensors and enhanced through additional services. Sensors can also help optimize business processes, such as logistics. They can determine how many spare parts are on hand and report the information over the internet to a server. This makes it possible to trigger and process resupply orders automatically. Meanwhile, acceleration sensors affixed to delicate machinery help ensure that the devices are not exposed to any vibrations during transport. In addition, if a crate fitted with such a sensor falls to the ground, the sensor can send an alert by e-mail so that the goods can be examined for possible damage.

**Press photos:** 1-RB-19722-d, 1-BST-20778

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## Sensors, software, and new services **Bosch is an expert on the internet of things** Solutions for connected living

February 13, 2015  
PI 8796 RB Res/SL

- ▶ Bosch has been systematically preparing for the connected world for years
- ▶ Bosch is integrating its expertise in objects and software
- ▶ Products and services are now combined in a unified concept
- ▶ Connectivity is giving rise to new business models
- ▶ Connected industry is increasing competitiveness

Stuttgart – The internet of things (IoT) offers massive potential for connecting objects and sensors with each other in order to provide beneficial solutions for connected living. Over the past few years, the technologies necessary for this have been invented, refined, and then made much more affordable through mass production. These include inexpensive web-enabled sensors and almost ubiquitous (mobile) networks – allowing data to be transmitted by smartphones and tablets – as well as connected machines, fast computers, and IT.

### **Bosch and the internet of things**

The Bosch Group's strategic aim is to supply innovations for connected living. For several years, the company has been systematically preparing for the connected world, for instance by expanding its in-house software expertise. Moreover, Bosch is the leading provider of MEMS (microelectromechanical systems) sensors, a crucial technology for the internet of things. As we move toward the connected world, Bosch is linking its expertise in the world of things to its expertise in the world of software. The technology and services company is working on solutions for connected mobility, connected production, connected energy systems, and connected buildings. Bosch is developing not just products but also new business models, such as connected fleet management or predictive maintenance.

### **Even the stove is online**

Bosch is already connecting cars to the internet, allowing domestic heating systems to be managed using an app, and automatically integrating its suppliers into the supply chain for manufacturing diesel injectors. The company has even connected electric stoves and other household appliances to the internet. Bosch

started systematically preparing itself for the connected world early on when it set up its own in-house software and systems unit, Bosch Software Innovations. With some 550 associates, the subsidiary designs, develops, and operates innovative software and system solutions for the internet of things, including its IoT Suite. Its work focuses on mobility, energy, manufacturing industry, and buildings.

### **Bosch IoT Suite**

The Bosch IoT Suite provides the technological basis for many applications in the internet of things, supplying all functions necessary for bringing together devices, users, companies, and partners on one IoT platform. It can also analyze enormous amounts of data. As sensors and devices become increasingly connected, such as in security cameras, vehicles, and machines in factories, IoT applications are starting to produce huge data volumes. This data could be the millions of braking operations in a car or information from manufacturing facilities. Findings from analyzing this data could give rise to new services, such as for designing a more efficient approach to product maintenance. One possibility is to schedule maintenance for manufacturing facilities in advance.

### **Software is the decisive level**

The internet of things builds up a software level on top of every object, usually a product. For example, sensors collect information on the condition of object. That could be where the object is located in the room, its temperature, ambient humidity, sounds, vibrations, and much more. A tiny radio module relays that information over the internet so that software can process and analyze the data. What's more, the software can spot patterns in the collected data, calculate the appropriate actions to take on the basis of those patterns, and carry them out automatically. All of this takes place based on rules that are set out in the software. This makes it possible to, for example, recognize machine failure before it happens or optimize energy consumption in near real time. Other applications where the interaction of things and software contains rich potential include connected industry or the smart home.

### **Products and services combined to form a unified concept**

Many of the connected solutions that already exist make it clear that the spotlight is no longer necessarily on a single product, but rather on a combination of product and service. Using web-based platforms, companies can partner with other companies to create complementary or new offerings with great advantages for the customer. Market players and sectors that have thus far not had business relationships will become connected and can cooperate in new ways. One example is electromobility, which brings together car drivers, e-mobility providers, charge spot operators, power companies, fleet operators, and vehicle manufacturers into a network.

## **New business models and opportunities for boosting competitiveness**

For many sectors and industries, increasing connectivity in all areas of life offers potential for new business models. At the same time, however, it can cause shifts and disruptions in existing competitive landscapes. For example, new providers can take over the lucrative service and maintenance business from mechanical engineering companies. In Germany, a high-wage location, connectivity offers an opportunity to maintain or even increase competitiveness. This applies especially to connected industry.

**Press photo:** 1-RB-20819-e

### **Internet:**

Bosch Software Innovations

<http://bit.ly/1uBXWkC>

Details about the Bosch IoT Suite:

<http://bit.ly/199R6Jb>

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**BOSCH**

## Press release

### Open software platform for the smart home **ABB, Bosch, and Cisco to Establish Joint Venture** Partner ecosystem planned with appliance manufacturers

December 1, 2014

PI 8762 RB Ho/SL

- ▶ New software platform allows simple exchange of data between different types of devices enabling a new range of services
- ▶ Partner alliance to be open to all appliance manufacturers and service providers

Mannheim/Stuttgart/Munich – ABB, Bosch, and Cisco plan to establish an international joint venture that will develop and operate an open software platform for smart home devices and applications. A shareholder agreement to this effect was signed on November 27, 2014. The joint venture is to be domiciled in Germany. The plan is subject to approval by the antitrust authorities. The companies involved expect that the joint venture will be able to commence operations at the beginning of 2015.

For a home to be “smart,” it is crucial that all the appliances and systems in the home – e.g., washing machine, heating units, lamps or window blinds – can simply and securely exchange data with each other as well as with smartphones and tablets. The aim of the joint venture is to develop and operate an open software platform that will enable this simple exchange of data between different manufacturers’ devices. In the future, therefore, users will not have to worry about technological compatibility when operating their electric and electronic devices at home. The new platform will also make it possible to provide a range of services related to household devices, in areas such as energy management, security technology, and entertainment. This will help enable new business models: Software developers, for example, will be able to create a wide variety of apps for these areas of use.

In addition to developing and operating a software platform, the companies intend to invite appliance electronics manufacturers, home automation vendors, and service providers to join a business ecosystem. The business ecosystem will aim to facilitate collaboration and incorporate a wide range of user requirements when developing the software platform.

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**About Bosch**

*The Bosch Group is a leading global supplier of technology and services. In 2013, its roughly 281,000 associates generated sales of 46.1 billion euros. (NB: Due to a change in accounting policies, the 2013 figures can only be compared to a limited extent with the 2012 figures). Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. The Bosch Group comprises Robert Bosch GmbH and its roughly 360 subsidiaries and regional companies in some 50 countries. If its sales and service partners are included, then Bosch is represented in roughly 150 countries. This worldwide development, manufacturing, and sales network is the foundation for further growth. In 2013, the Bosch Group invested some 4.5 billion euros in research and development and applied for some 5,000 patents. This is an average of 20 patents per day. The Bosch Group's products and services are designed to fascinate, and to improve the quality of life by providing solutions which are both innovative and beneficial. In this way, the company offers technology worldwide that is "Invented for life."*

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**About ABB**

*In 2013, ABB Germany generated sales of EUR 3.37 billion with approximately 10,000 employees. ABB is a leader in power and automation technologies that enable utility, industry, and transport and infrastructure customers to improve performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries and employs about 145,000 people.*

**About Cisco**

*Cisco (NASDAQ: CSCO) is the worldwide leader in IT that helps companies seize the opportunities of tomorrow by proving that amazing things can happen when you connect the previously unconnected. For ongoing news, please go to <http://thenetwork.cisco.com>.*

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## “Connected industry” as an opportunity for Germany **Bosch CEO Denner: Industry 4.0 offers major opportunities for Germany**

January 14, 2015

PI 8782 RB Zi/SL

- ▶ New business models will be possible, new competitors will emerge
- ▶ Potential competitive advantage for high-cost locations as well

Stuttgart – Connected industry, also called Industry 4.0, offers German companies numerous opportunities for new business and improved productivity, and thus also for increased competitiveness. This was the message from Dr. Volkmar Denner, the chairman of the Bosch board of management, at an event with representatives of the business community in Ludwigsburg, near Stuttgart. “Connected manufacturing processes have the potential to improve productivity by up to 30 percent,” Denner continued. “Thanks to Industry 4.0, we can also be competitive in a high-cost country like Germany.” At the same time, the CEO of the technology and services company warned that not all companies have recognized these opportunities. On the one hand, he said, this means that many have not confronted the challenges of connected production early enough. “On the other hand, small and medium-sized enterprises and the mechanical engineering sector in Germany risk losing out to international competitors in this area.” In many cases, countries such as China, the U.S., and Korea are driving forward connectivity far more decisively, Denner argued.

### **Customized products at mass-production cost**

On the path to connected industry, Bosch sees itself as both a leading proponent and leading supplier of software and hardware. The company is currently working on connecting its more than 250 manufacturing locations worldwide. “Industry 4.0 also enables high flexibility in production,” Denner said. “On a connected assembly line, we can for example produce many different hydraulic valves for agricultural machinery side by side, and add new variants at any time – without any complex retooling.” That makes customized products possible in cost-effective mass production as well.

### **Too slow by international standards**

Denner is concerned that the increasing trend toward connectivity and the changes resulting from this are in many cases being given far too little attention in Germany. "Our progress is too slow by international standards. A lot will happen more quickly than many currently believe. But if we tackle it now, the internet of things and Industry 4.0 have the potential to help bring strong growth back to Europe." Denner called on business and political leaders to quickly and concertedly work on creating the necessary practical conditions for connected manufacturing, as Germany otherwise risks wasting its head start in this field.

### **Background: Industry 4.0 – manufacturing on the internet of things**

In conjunction with fast data networks and software, sensors on components and machines enable objects to exchange information with one another without the need for human intervention ("internet of things"). In the future, even objects that up to now have not contained any electronics will be able to communicate with each other. The data created in the process will allow useful new information to be derived and interrelationships to be analyzed. For example, a machine can identify wear and tear and arrange for maintenance in good time. In this way, unplanned downtime can be reduced and productivity increased.

**Press photos:** 1-RB-18494, 1-BST-20778, 1-AA-20558

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*The company was set up in Stuttgart in 1886 by Robert Bosch (1861-1942) as "Workshop for Precision Mechanics and Electrical Engineering." The special ownership structure of Robert Bosch GmbH guarantees the entrepreneurial freedom of the Bosch Group, making it possible for the company to plan over the long term and to undertake significant up-front investments in the safeguarding of its future. 92 percent of the share capital of Robert Bosch GmbH is held by Robert Bosch Stiftung GmbH, a charitable foundation. The majority of voting rights are held by Robert Bosch Industrietreuhand KG, an industrial trust. The entrepreneurial ownership functions are carried out by the trust. The remaining shares are held by the Bosch family and by Robert Bosch GmbH.*

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## Press release

December 16, 2014

PI 8631 Zi/Na

### Bosch heads up research project **IT solutions to stabilize connected logistics systems** Using real time data from production and logistics to aid decision making

- ▶ ProvelT project receives funding from German Federal Ministry for Economic Affairs and Energy
- ▶ Focus on developing a software platform for informed manual interventions in connected logistics systems
- ▶ Aim: cost-effective and reliable supply chains

Stuttgart – Industry and commerce now depend more than ever on reliable logistics. In practice, however, supply chains face numerous challenges from disruptions such as traffic jams, technical issues, missing goods, and any number of other unforeseeable circumstances. This then calls for manual correction. In the ProvelT project (production plan based recovery of vehicle routing plans within integrated transport networks), researchers are now developing an IT platform that will give dispatchers the tools they need to make objectively assessed and dependable interventions in connected logistics systems. The aim is to build up reliable, cost-effective supply chains that are not disrupted due to misguided reactions and interventions. Following approval by the German parliament, the research project is receiving funding of 2.8 million euros from the German Federal Ministry for Economic Affairs and Energy. Robert Bosch GmbH is acting as the lead partner.

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### **Logistics chains and the butterfly effect**

The logistics sector still lacks this sort of decision aid. As supply chains become more and more complex, covering large areas and running according to tight schedules, any disruption – as well as any reaction to a disruption – has a knock-on effect on the entire logistics network. Without access to a reliable set of data and a high-performance IT platform, it is extremely difficult for logistics employees to assess what corrective action makes sense in any given situation. The ProvelT platform will supply dispatchers with the information they need to respond correctly to disruptions. It is also designed to restore disrupted transport networks to their normal operational state quickly. Reliable logistics networks are also a core component of connected industry (industry 4.0).

### **Incorporating production data**

The project team is drawing on a range of familiar technologies, including vehicle tracking using GPS and software for transport planning. What's new is that production information is also incorporated into the decision making process. How urgently does the auto plant, say, need the materials it ordered? Is it a case of topping up supplies, or will production break down if the materials are not delivered promptly? Big data relating to unit sales of products and the traffic situation can also be incorporated into the platform, which will pool all this information and provide users – both companies and logistics service providers – with a range of services for planning and managing logistical processes. For instance, if actual data begin to depart from target data, the platform will warn users and display appropriate responses. The responses offered will take into account the implications for the whole transport network, considering actions holistically rather than in isolation. To enable the platform to factor in real-time data such as vehicle position or delivery status, the project partners are also developing an application that truck drivers can use on their mobile devices.

### **Bringing together partners from industry, IT development, and research**

Together, the members of the project consortium possess all the expertise needed to develop and run the ProvelT platform. Robert Bosch GmbH is heading the project and, like ZF Friedrichshafen AG, is an industrial user of the platform. The logistics service provider Geis has assumed responsibility for the planning of transport operations and operational implementation. The IT providers LOCOM and PTV are developing system solutions for transport planning and management, while the Research Center for Information Technology (FZI) at the Karlsruhe Institute of Technology (KIT) is overseeing the components used to manage irregularities and disruptions. Responsibility for the global concept and scientific approach lies with the Institute for Materials Handling and Logistics (IFL)

at the KIT. In the first phase of the project, the consortium will build up a common system architecture, which will then be tested and refined in pilot operation.

### **More efficient logistics**

ProveIT won't just benefit industry and its suppliers; commerce and transport companies stand to gain as well. The project provides improved tactical support by stabilizing logistics systems in the event of disruption and bringing them back on schedule. This makes supply chains more cost-effective – the project partners anticipate that ProveIT will be able to reduce total mileage by 5 percent for a given transport volume, with all the savings that brings in terms of energy, costs, and CO<sub>2</sub> emissions. The project is due to run until fall 2016.

**Press photo:** 1-CR-20360-e

### **Project partners:**

[Robert Bosch GmbH](#)

[ZF Friedrichshafen AG](#)

[Geis Transport und Logistik GmbH](#)

[LOCOM Software GmbH](#)

[PTV Planung Transport Verkehr AG](#)

[Research Center for Information Technology \(FZI\) at the Karlsruhe Institute of Technology \(KIT\)](#)

[Institute for Material Handling and Logistics \(IFL\) at the Karlsruhe Institute of Technology \(KIT\)](#)

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