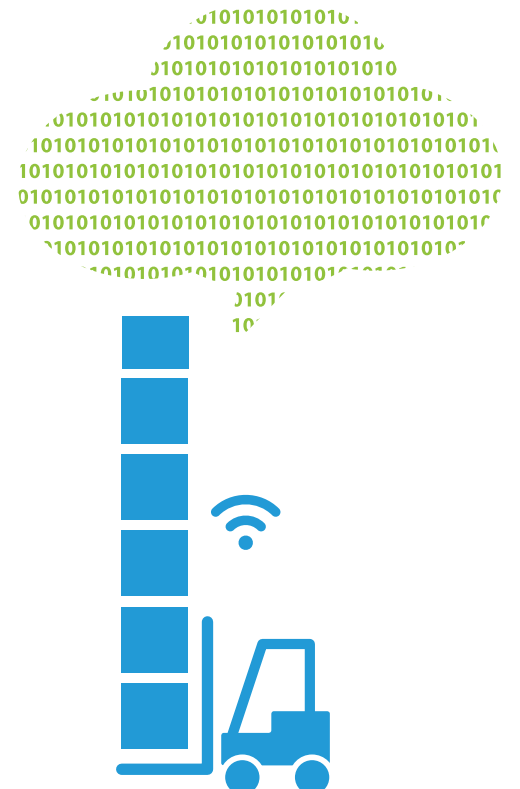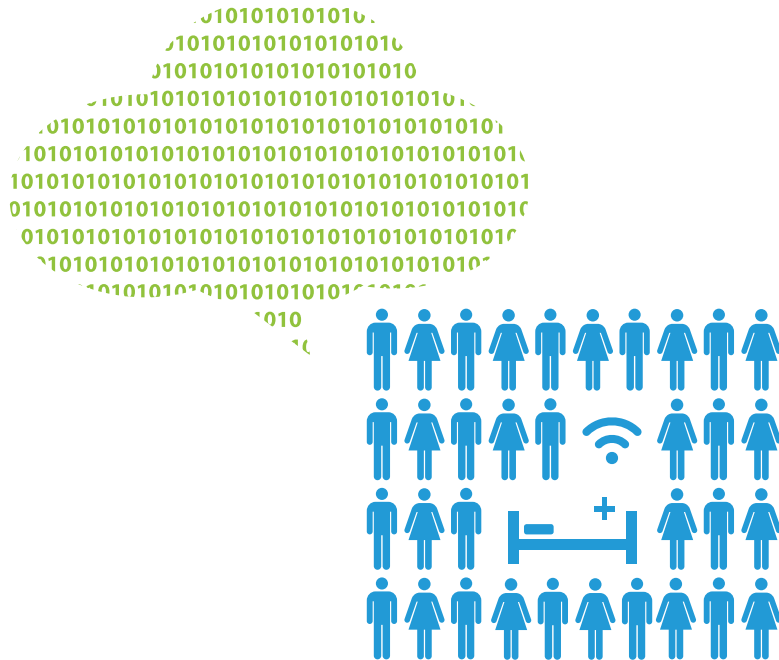# Industrial Big Data

Know the future – automate processes

Software for data analysis and accurate forecasting

blue yonder

Forward looking. Forward thinking.

More and more devices, manufacturing tools, plants and vehicles are being equipped with **sensors**. They collect massive amounts of data about themselves and their surroundings. **When organizations manage to identify patterns in this data and, based on these patterns, make accurate forecasts, they work more effectively**. Forecasting methods geared to the future are called predictive analytics. By using predictive analytics based on Big Data, processes can be fully automated. Because of this, the US market expects a yearly productivity increase of 1 to 1.5 percent. We'll show you the possibilities for industrial Big Data for locations in Germany.

Content

4

BENEFITING FROM ELEMENTARY PARTICLE PHYSICS:
INDUSTRIAL BIG DATA INCREASES PRODUCTIVITY AND OPENS NEW BUSINESS OPPORTUNITIES

It's estimated that in 2016 there will be 48 million Internet compatible vehicles. Every day, a single modern production machine delivers several gigabytes of structured and unstructured data via numerous sensors. A huge market potential opens up for the automobile industry, the logistics industry, mechanical and plant engineering, manufacturing companies and the health industry: Integrated offers and extra services promise high profit margins. Automated processes, a forecast-controlled production, as well as a predictable machine management, increase efficiency and effectiveness: costs sink.

Approximately one out of ten million events is interesting

In order to increase productivity, modern data analysis software must be able to accurately forecast special events from large data quantities. Everyday business intelligence applications do not meet these needs of these new requirements. Instead, there is a need for modern methods of data analysis based on findings in leading research. The particle accelerator Large Hadron Collider (LHC), at the nuclear research center CERN, is recognized as one of the largest machines in the world. At CERN, 40 million events are saved per second in experiments, each having a data volume of 1,000 terabytes. With the help of an intelligent algorithm, extremely seldom and potentially interesting events – one out of approximately 10 million – are filtered out online from the rest of the data stream. The tracking of seldom events was made possible through the creation of statistical procedures. These procedures were optimized specifically for use with large data quantities, in order to be able to carry out part of the analysis in real-time. By using a holistic approach, complex relationships could be analyzed and forecast.

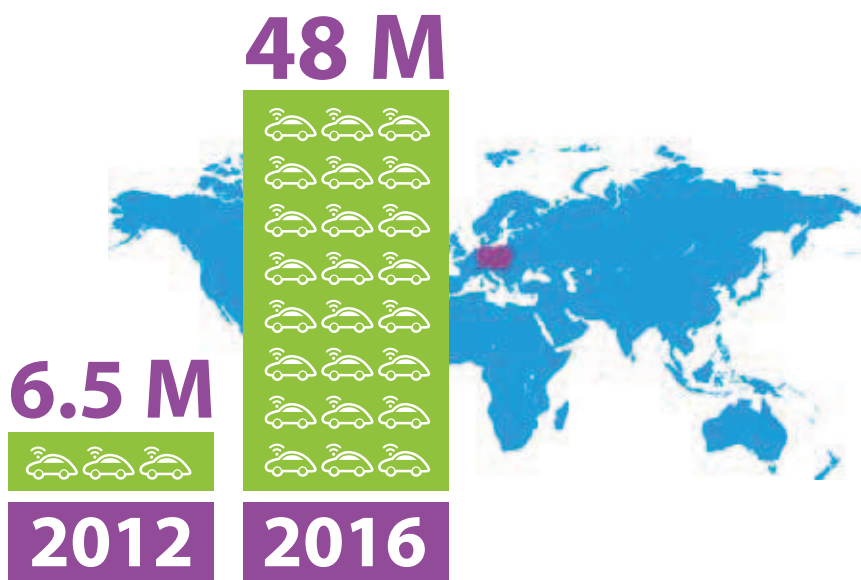### "Connected car" as a paradigm for predictive analytics in the industry

This is how, for example, error messages in premium vehicles can be recognized and analyzed, giving insight into optimization possibilities in production and service. Other parameters, like ordering spare parts and making contact to the vehicle owner, are also collected and trigger automated processes in real time. The concept "connected car" shows the possibilities of industrial Big Data. We are at the beginning of a revolution that will change the way business is done today:

▸ The software in automobiles already accounts for forty percent of the value add. The **AUTOMOBILE INDUSTRY** as a connected branch of manufacturers, suppliers, importers, dealers and service partners is already capable of placing intelligent extra services on the market today. By having a consolidated database and analysis aimed at the future, organizations are able to immensely streamline their processes and lower costs.

▸ When **LOGISTICS SERVICE** providers use GPS data and information from sensors consequently, they reduce fuel usage and shorten their routes.

▸ The **MANUFACTURING INDUSTRY** is recognized as one of the most innovative economic sectors in Germany. Research initiatives from business, science and politics are promoting the Industry 4.0 concept. The machine-to-machine communication is largely responsible for the increase in efficiency. If changes in Big Data streams are recognized early on, processes can be predictively and automatically adjusted as needed.

▸ The amount of data collected in the **HEALTH INDUSTRY** is large and heterogeneous. A consolidated analysis with predictive analytics promises not only lean and effective processes, but also serves the well-being of each patient.

THE CONNECTED CAR: DEVELOPMENT, PRODUCTION, SALES AND CUSTOMER SERVICE OPTIMIZE PROCESSES AND INCREASE PROFIT

The connected car market is estimated to be worth 220 billion euros in 2020. The connected car clearly indicates in which direction IoTS (Internet of Things and Services) is going: Cars will get IP addresses and transmit immeasurable data with the help of numerous sensors and the mobile devices of the car owners. For example, the new Mercedes-Benz A-class has incorporated the iPhone into the display and instruction concept. Other car manufacturers are opening their software for apps of different providers. This makes enormous amounts of incoming and outgoing data readily available not only for OEMs and system suppliers, but also for telecommunications providers and Internet companies like Google.

▶ Predictive analytics allows the forecasting of which customers should be targeted with which specific products and services. Sixty percent of the respondents of the Auto Bild magazine's market barometer 'Connectivity', thought it would be beneficial to have their vehicle data transmitted directly to the automotive repair shop.

▶ Organizations that are able to analyze industrial Big Data gain new market potential (according to the Auto Bild magazine's market barometer 'Connectivity', there is a willingness to pay around 3,000 euros for a connectivity package).

▶ The vehicle can be managed over the entire life cycle – from the development to the production to sales and customer service.

▶ With the new mobile generation LTE, recalls can be avoided if the errors can be fixed directly in the software.

Recording of tank data

Disposition

FMS data

Area supervision

Contract management

Recording of driving time

Time recording/status information

Free text communication

Localization by change of course x-degree

Operating hours meter

Localization by km/h greater/smaller x

Routes and stops

Battery (alarm by theft)

BIG
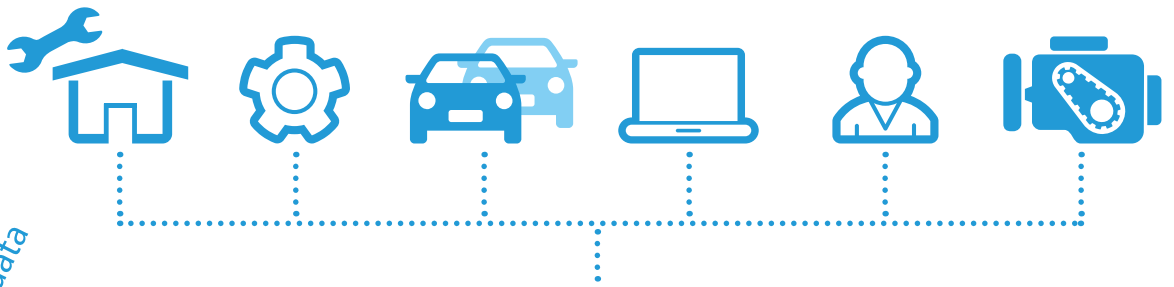**FROM**

48 M

6.5 M

2012 **2016**

The number of Internet capable vehicles in western Europe is steadily increasing.

40%
VALUE ADD SHARE

Without IT unthinkable: Alone today the software value add share in a car is 40 percent.

Localization by ignition on/off

Driver identification

Recording of telemetry data

Reports/Analyses

Navigation/Truck navigation

Stop pattern

Car fleet administration

Recording of resting time

Maintenance data bank

Localization every x-km

Electronic logbook

Automatic alarm via email or SMS

Recording of performance via GPS

Customer address/Contact administration

Localization every x-min

DATA SENSORS

IP 203.000.113.195

Different areas at the manufacturer use the data from the vehicle. This data is tracked over the entire life cycle together with the suppliers, garages and trade shops.

2016

80%
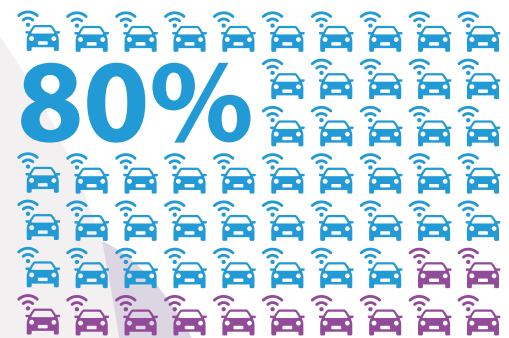
Huge market for new services: By 2016 four fifths of all new cars will be connected.

OIL

SOS

Drive Kit Plus

OPEN XC

OEMs are making their vehicles ready for smartphones and apps of different providers. First offers like "Drive Kit Plus" (Daimler) and "Open XC" (Ford) are already on the market.

MOBILITY IN TRANSITION:
SECURING COMPETITIVE ADVANTAGES THROUGH EXTRA SERVICES AND PRODUCTS IN TIME

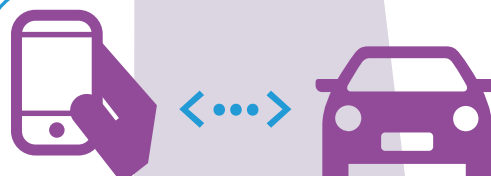Starting in 2015, in order to increase traffic safety, new cars will be required to be equipped with eCall. The "black box" contains an automatic emergency call function and records and saves actions like acceleration and the use of the brakes. Because of the European initiative, alone in Germany over 15 million vehicles are required to have a fixed data connection by the year 2020. This creates an opportunity for the entire automobile and telecommunications industry to develop and offer a wide range of extra services. Another source of data is that which is gathered from the toll systems. This data can be turned into intelligent traffic control mechanisms with predictive analytics – Dublin and Stockholm are leading by example. In addition, the automobile industry is getting ready for the mobility transition with car sharing or pay as you drive models.

▶ The applications for connected cars reaches as far as automated driving. Google Autonomous Car was approved in 2012 in California. Organizations from different branches can gain market share in vehicles, if they have access to the necessary Big Data skills.

▶ Predictive analytics recognizes inconsistencies, changes or errors in Big Data in real time. This way the flow of traffic can be guaranteed and traffic jams can be avoided.

▶ Organizations that use predictive software can offer car sharing with large fleets and can optimally plan the availability with respect to location.

BLACK BOX

SOS

The world's largest insurance provider has put black box in over

80,000
VEHICLES
in nine countries over the last five years.

- 2,500
FATAL ACCIDENTS
PER YEAR

Source: www.automotiveit.eu

CAR2GO

EUROPE & NORTH AMERICA
IN 18 CITIES
275,000 USERS

€

GERMANY
IN 6 CITIES
70,000 USERS

Approximately every
4 SECONDS
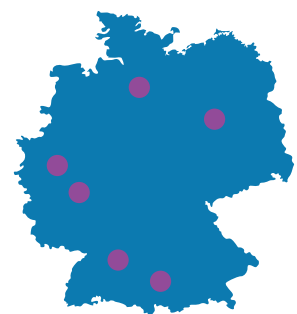a car2go rental agreement is signed

"Politics should insist that starting in 2015, the successor system be traffic controlled and the incoming data masses be made anonymous and made available for new services."
BITKOM Vice President, Volker Smid

The toll charges in Germany will be taken in through over 700,000 On-Board-Units (OBU): 25 billion driven kilometers per year.
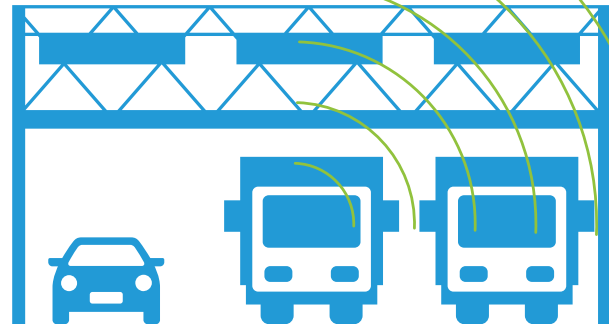
Source: www.bitkom.org – BITKOM_LF_big_data_2012_online.pdf

ANONYMIZED
25,000 GPS DATA
s

- 20% TRAFFIC VOLUME AND EMISSIONS
- 50% DRIVING TIME

STOCKHOLM

In Stockholm, 250,000 anonymized GPS data from mobile users, traffic and accident reports, as well as data from sensors and toll systems are analyzed making it possible to direct traffic flow.

DUBLIN

Dublin reveals all their traffic relevant data in order to encourage the development of alternative mobility concepts.

Economic costs caused by traffic problems in the 30 largest metropolitan areas in the world:

266 BILLION DOLLARS PER YEAR

A Fraunhofer study on behalf of BITKOM quantified the use of intelligent networks at

10 BILLION EUROS
per year.

GPS DATA AND SENSORS:
PREDICTIVE ANALYTICS LOWERS THE FUEL USAGE AND SHORTENS ROUTES

In terms of revenue, according to the German Logistics Association (BVL), logistics is the third largest economic sector in Germany. In 2012, with 2.85 million employees, the logistics branch had approximately 225 billion euros in revenue – three percent more than the previous year. The most important growth factor in package offers is e-commerce – a market with rosy prospects. However, it is also a market with climbing competitive pressure that is forcing the players to optimize their processes. With industrial Big Data, logistics organizations and the logistics areas within industry and retail increase their efficiency. UPS is a prime example of how it's possible to get the best performance with little investment.

▶ With the implementation of predictive analytics the fuel usage of a logistics company can be significantly reduced. To enable this, GPS and sensor data are analyzed together with external factors. For example, forecasts of fuel price trends can be taken into consideration.

▶ A route optimization based on the analyzed data leads to a considerable shortening of the route. Transportation orders can be processed quicker.

▶ Predictive analytics allows the predictive maintenance of car fleets. Sensor data gives insight into the condition of each vehicle. Repair shop appointments can be planned accordingly and breakdowns are avoided.

MEASURING OF FUEL USAGE

1

R

46,000
UPS VEHICLES
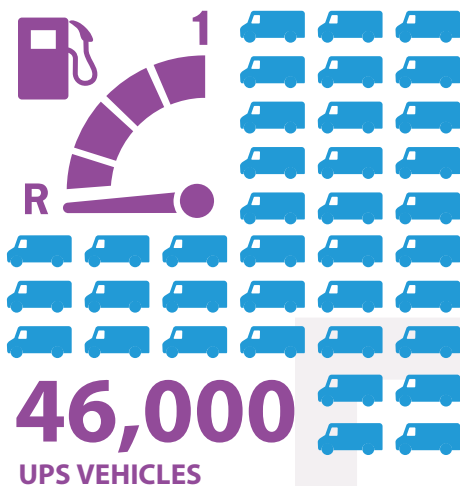
- 32 M LITERS
OF GASOLINE

- 135 M KM
DISTANCE TRAVELLED IN ONE YEAR

NATIONAL PACKAGE MARKET: MARKET VOLUME 2012
7.8 BN €

COMPETITION
59.1%

DHL
40.9%

National package market

DHL PACKAGE DIVISION

Packages and small packages per weekday — **3 M**

Branches and points of sale — **20,000**

Package stations — **2,500**

Package boxes — **1,000**

DHL LETTER DIVISION

64 M letters per weekday

40 M households

Business customers — **3 M**

Packages per weekday — **3 M**

Branches and points of sale — **20,000**

Package stations — **2,500**

1,000 Package boxes

82 Letter centers

33 Package centers

2013

3%

3%

2.7%

2.3%

1.2%

TRANSPORT SERVICES ARE INCREASING

# FORECASTS BASED ON HOMOGENOUS DATA SOURCES: PREDICTIVE ANALYTICS INCREASES PROFITABILITY AND QUALITY

The study "FAST 2025 – Future Automotive Industry Structure", a joint project of Oliver Wyman and the Automotive Industry Association (VDA), indicates massive upheavals coming to the industry. Manufacturers and suppliers are being forced to face increasing competitive pressure, particularly from the emerging nations, combined with huge innovation pressure. At the same time, the complexity of the processes and the relationships, as well as the sheer amount of data, is almost impossible to surpass. Today, a single OEM has to deal with data in the ten terabyte range on a daily basis. Electronic steering components continuously supply data that is often unstructured, as well as completely archived. Predictive analytics software enables organizations to reduce and evaluate this data down to the essentials and to automate processes based on this information.

▶ The permanent evaluation of incoming data enhances the awareness for the partners in the value chain – regardless of whether it involves new or changing requirements, dreaded delivery delays or poor quality.

▶ The monitoring of vehicle data – even after the vehicle has been delivered – increases quality management. The early recognition of errors increases profitability.

▶ The evaluation of the vehicle data, as well as the vehicle performance, can be used in the development of new products.

▶ The massive sensor data streams derived from research and development (test tracks, continuous operational vehicles) are evaluated immediately. This increases the efficiency and the quality of innovation.
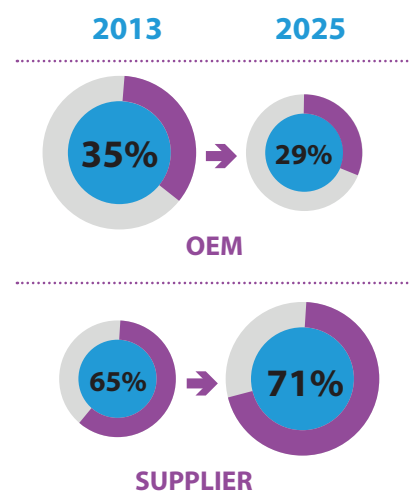
"OEMs and suppliers are facing huge challenges. That's why it will be more important than ever to take advantage of all the possible opportunities using the right value strategy. Who, if not we, the German automobile industry, should be able to take advantage of this opportunity. That will put the cooperation of manufacturers and suppliers to a whole new test."
Klaus Bräunig, Managing Director, Automotive Industry Association (VDA)

VALUE ADD SHARE RESEARCH AND DEVELOPMENT

2013   **2025**

60% ➜ 47%

OEM

32% ➜ 36%

SUPPLIER

9% ➜ 17%

ENGINEERING SERVICE PROVIDER
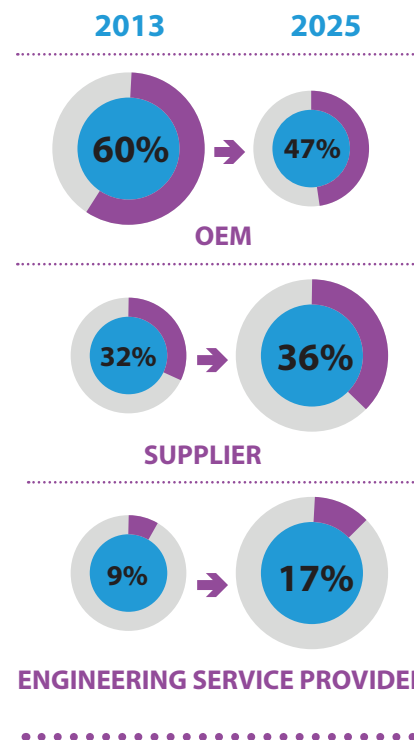
VALUE ADD SHARE PRODUCTION

2013   **2025**

35% ➜ 29%

OEM

65% ➜ 71%

SUPPLIER

1990 APPROXIMATELY **8 MODELS**

2013 APPROXIMATELY **24 MODELS**
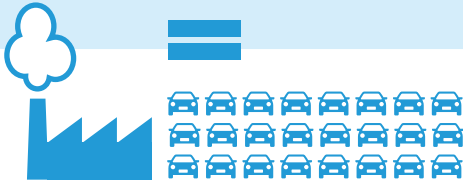
PER MANUFACTURER

INDIVIDUAL CUSTOMER WISHES REIN-FORCE THE REPRODUCTION OF VEHICLE MODELS AND OPTIONS

SHORTER PRODUCT LIFE CYCLES

COSTS PROCESSES STRUCTURES

CUSTOMER REQUESTS INCREASE

THE INNOVATIONS EFFORTS OF OEMs WILL BE LESS ORIENTED TOWARDS COMFORT, BUT RATHER TOWARDS ENVIRONMENTAL FRIEND-LINESS AND EFFICIENCY

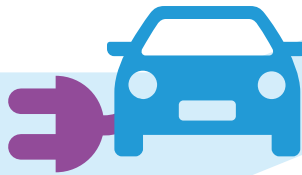**ELECTRIC MOBILITY AND LIGHTWEIGHT CONSTRUCTION WILL BE THE FOCUS**

COST PRESSURES WILL REMAIN

Expensive

STRONG COMPETITION MAKES IT ALMOST IMPOSSIBLE FOR HIGH VEHICLE PRICES TO MAKE IT TO THE MARKET

GOVERNMENTS DEMAND MORE EFFICIENT VEHICLES
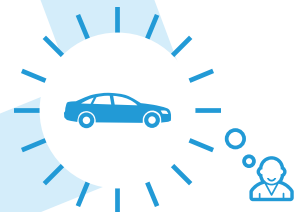
CUSTOMERS WANT HIGH QUALITY VEHICLES

BIG DATA VOLUME

10 TERABYTE

INFORMATION ABOUT THE QUALITY OF THE VEHICLE

INCREASING CUSTOMER SATISFACTION

INCREASING PROFITABILITY BY RECOGNIZING ERRORS EARLY

IMPROVING QUALITY BY ELIMINATING ERROR SOURCES SHORTENS THE TIME FOR DETECTING ERRORS AND CORRECTING THEM

BIG DATA ANALYTICS SHORTENS PRODUCTION TIME BY

30−50%

CUSTOMERS CONFIGURE VEHICLES ONLINE

AUTOMATED ANALYSES IN REAL TIME:
ERROR CORRECTION, OPTIMAL MAINTENANCE PLANNING, AND INCREASE QUALITY OF SERVICE

The progress of micro electronics makes it possible to equip ever smaller sensors with ever bigger functionality. This makes the monitoring and maintenance of machines easier for mechanical and plant engineering, but at the same time presents new challenges:

▶ **Which events can be isolated and handled by a service employee?**

▶ **Which errors influence the operation of a complete industry plant?**

▶ **Is there a correlation between the errors?**

The question of inter-dependencies of events is related to the types of questions found in experimental physics. That's why modern statistical methods, that give the rate of possibility of every event, can be used.
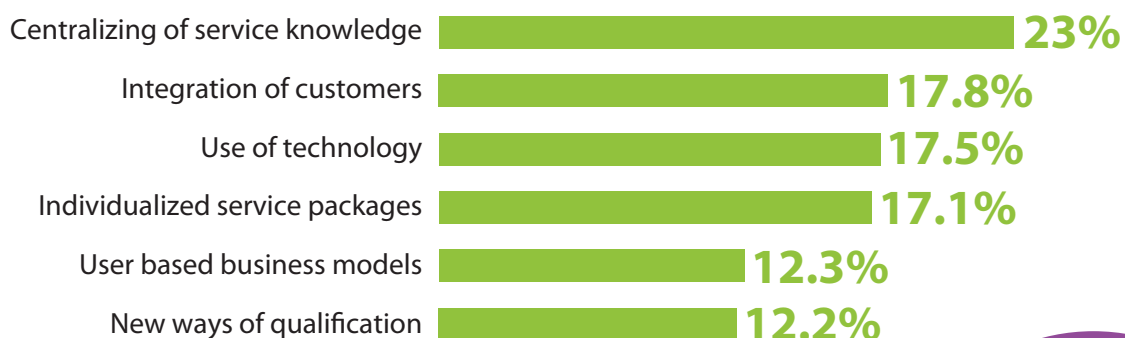
▶ Through the analysis of machine and surrounding data in real time, engineers and mechanics are able to realistically estimate the condition of the machine. They can respond in time, if necessary, and avoid unnecessary and ineffective work steps.

▶ Through predictive maintenance, unscheduled downtimes are avoided.

▶ The quality of service increases by decreasing costs (avoiding of false alarms).

▶ Predictive analytics enables organizations to concentrate on relevant data. In this way, the efforts for Big Data analytics are kept in check.

▶ The machine performance of all locations can be controlled by machine-to-machine communication. This increases global efficiency.

"The centralizing of service knowledge, and the new positioning of information and communication flows in technical services that accompanies it, is the top future topic for manufacturers and service providers alike."

"Manufacturers of machines and plants see meaningful trends in the development of customer specific service packages and in the development of new business models. Industry service providers see a meaningful service development for the future in extended customer integration as well as in technology implementations at the customer interface."

Source: Fraunhofer IAO.
Results of a short survey at the MAINTAIN trade fair 2012

Estimation of the meaning of service trends

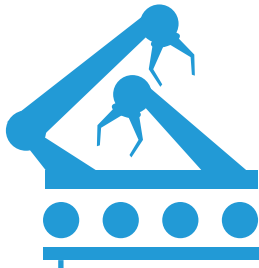|	
Centralizing of service knowledge	**23%**
Integration of customers	**17.8%**
Use of technology	**17.5%**
Individualized service packages	**17.1%**
User based business models	**12.3%**
New ways of qualification	**12.2%**

Source: Fraunhofer IAO, from the study "Manufacturer services 2022. Results of a short survey at the MAINTAIN trade fair 2012"

**TOP TOPIC
CENTRALIZING OF
SERVICE KNOWLEDGE**

23%

PURE ALARM SYSTEMS

KNOWLEDGE BASED DIAGNOSTIC TECHNOLOGY

RESOLVE MAINTENANCE LOWER START UP ERROR

1 GIGABYTE
3 GIGABYTES
2 GIGABYTES
5 GIGABYTES
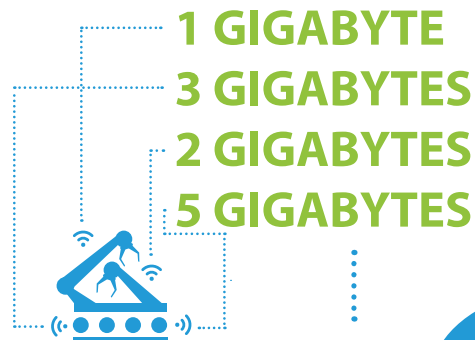
RELEVANT EVENTS
COMPARE DATA HISTORY
PREVENTIVE MEASURES
IDENTIFY TRENDS

1010101010
1010
1010   10
1010   010
1010101010

REMOTE SERVICE

1,000 DEVICES
=
3.5 GB/MIN

QUICKER RESOLUTION OF ERRORS
OPTIMAL PLANNING OF MAINTENANCE PROCEDURES
BETTER SERVICE QUALITY WITH FEWER COSTS

80%
FALSE ALARMS

20%
QUALIFIED SIGNALS

INDUSTRY 4.0:
REACT TO CHANGES IN DATA STREAMS AND AUTOMATE PROCESSES

Warning! Change the ball bearings here!

The manufacturing industry and Internet are growing together. In an ideal situation, centralized control in manufacturing is replaced by a self-regulating system of intelligent components and machines that communicate with one another (machine-to-machine communication). The product collects information about the complete life cycle, which can be jointly evaluated. Machines automatically report their status, as well as replenishment needs. If the partners in the value chain have access to a common pool of data, orders can be delivered just-in-time to the production line. A critical success factor for Industry 4.0 is Big Data analytics. Only strong predictive analytics software is capable of distinguishing patterns in large data quantities from different sources and be able to activate the appropriate next steps.

▶ Predictive analytics decreases material procurement and, at the same time, excludes the risk of supply shortages: Orders are automatically triggered based on exact sales and requirements planning.

▶ Make-to-order manufacturing or the production of smaller series of items can be very profitable with the use of Big Data since the specialists are required to take action less often. Machines and parts exchange information about the production process automatically through IT.

▶ The consideration of individual wishes increases customer satisfaction and loyalty.

ORGANIZATIONS MAKE DECISIONS BASED ON DATA »

COMPETITOR

+5%
PRODUCTIVE

+6%
EARNINGS

+50%
STOCK MARKET VALUE
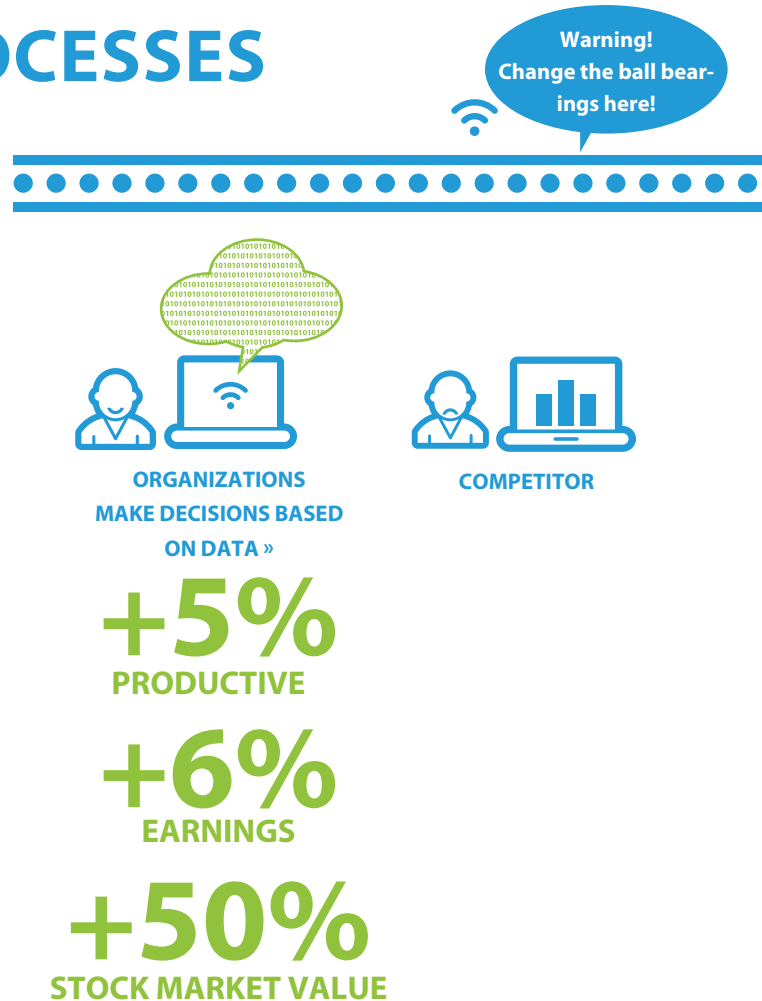
Source: Prof. Erik Brynjolfsson, Professor for Information Technology at the Boston Research Institute MIT

MEANING OF THE MANUFACTURING BUSINESS FOR GERMANY

Proportion of the manufacturing business (including energy) on the total economical gross value add
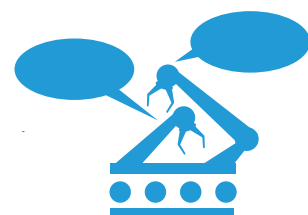
AUSTRIA
GERMANY
JAPAN
USA
FRANCE
ITALY
UNITED KINGDOM
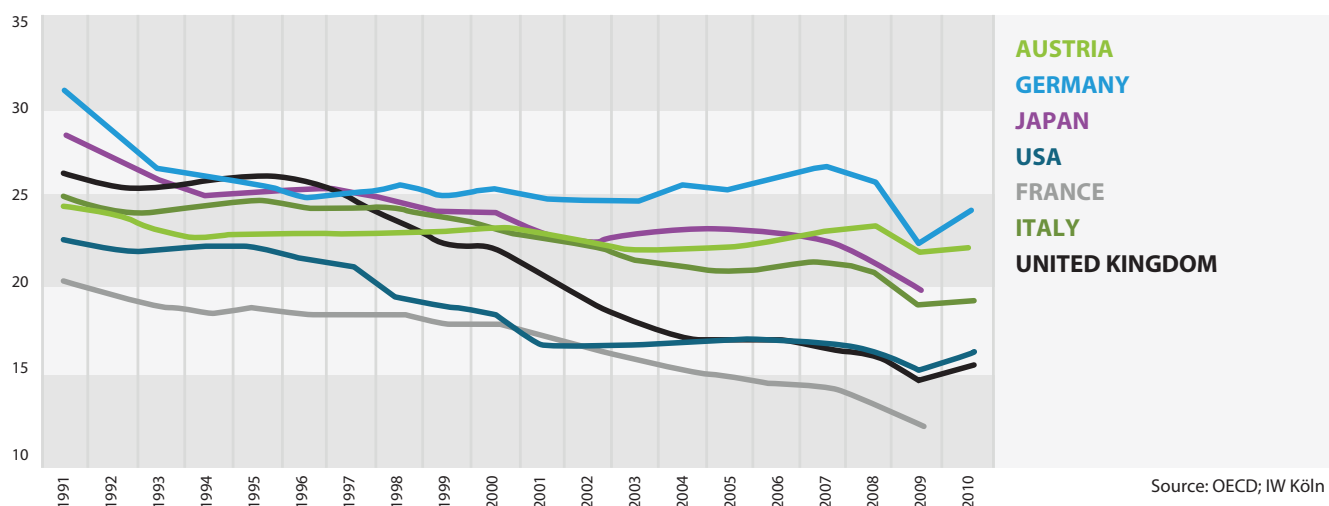
Source: OECD; IW Köln

International comparison of the manufacturing industry. Source: OECD; IW Cologne/Forschungsunion Wirtschaft & Wissenschaft
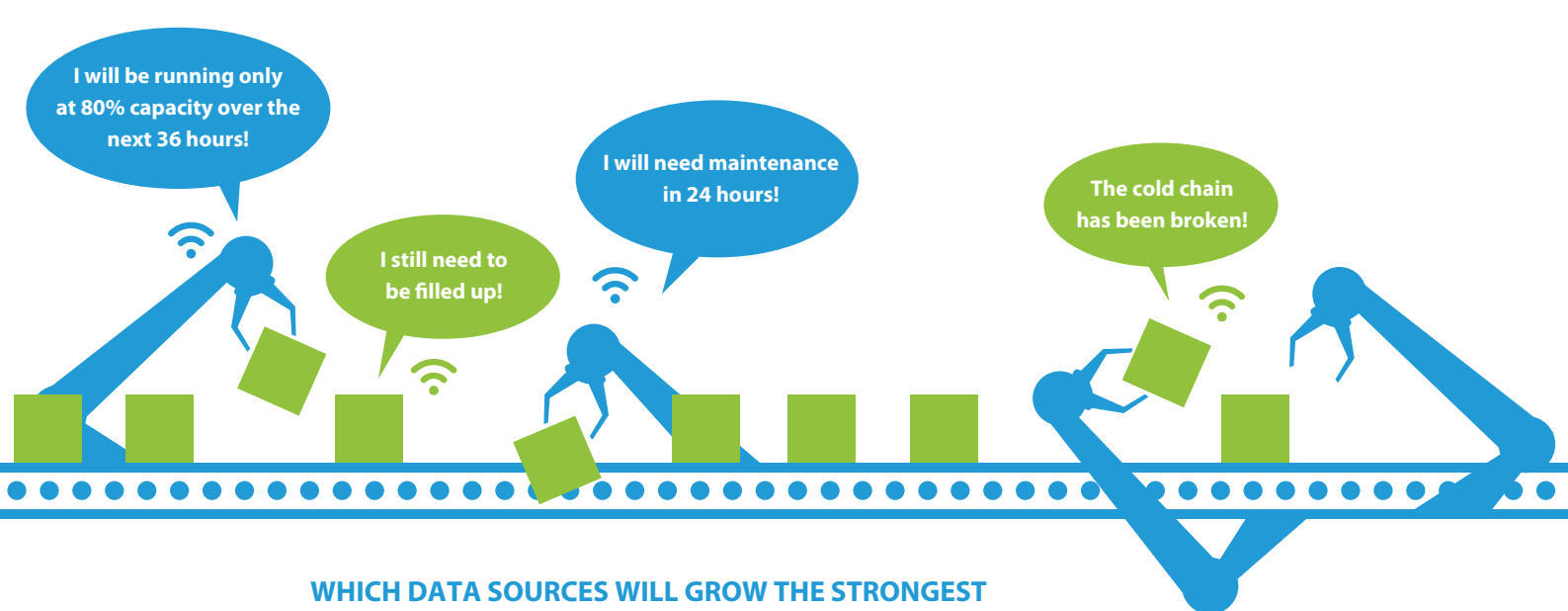
WHICH DATA SOURCES WILL GROW THE STRONGEST IN YOUR ORGANIZATION?

Data source	Percentage
Mobile applications	40%
Data from IT and telco systems (log files, connection data, system monitoring)	39%
Data from applications in the cloud	36%
Unstructured content (emails, office documents)	34%
Transaction data from business applications like ERP	29%
Graphic data (pictures, videos)	27%
Machine and sensor data from production environment (manufacturing, logistics)	27%
Scientific data	25%
Data from social media applications (ex. social networks)	19%
Clickstream data from Web applications, Web traffic, RFID, etc.	13%

n=254, more than one choice possible – Source: IDC, October 2012

2015

6 BN
DEVICES WITH IP ADDRESSES
IP 203.000.113.195

Source: www.silicon.de

2017

1.7 BN
## M2M CONNECTIONS

Cisco estimation
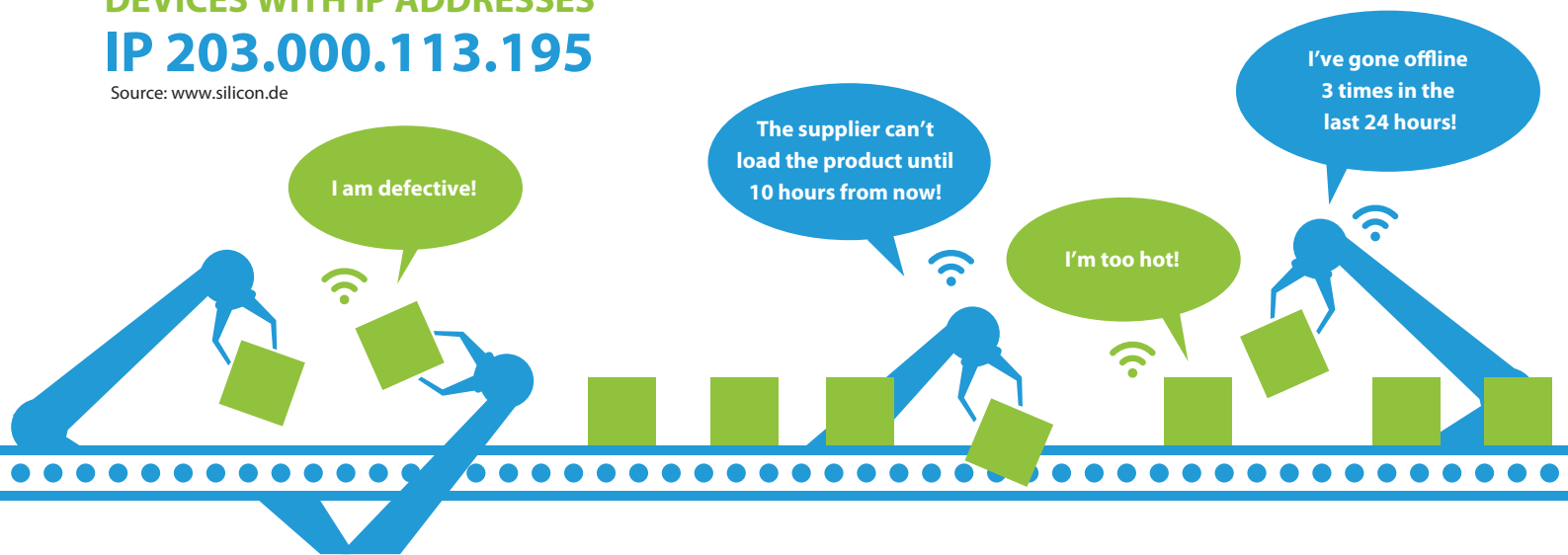
INDIVIDUAL SUCCESS FORECAST:
TREATING PATIENTS INDIVIDUALLY AND EFFECTIVELY

In an essay, the publisher and author Tim O'Reilly gets right to the point when he speaks of the dilemma of a medical field without predictive analytics: Patients are being treated averagely, everyone in the same manner. Perspectives can be reversed with the use of Big Data analytics – for the good of the patient. If, for example, a medicine to fight breast cancer has an effective rate of 80 percent, it doesn't mean that it will help in four fifths of the cases. It's more correct to say that it is the medicine of choice for four out of five patients and is completely ineffective in one patient. Predictive analytics can help identify the one woman that can only be helped with a different medicine.

In the medical field, Big Data has to be evaluated on a grand scale. Alone magnetic resonance tomography (MRT, nuclear spin tomography) produces a data volume of more than three gigabytes during each examination. It takes a lot of effort to recognize relevant data and patterns to archive them. In addition, data that has been collected in different locations, and at different times, have to be pulled together. On top of this is the need for the institution carrying out the data intensive examination to relay the results in a compact form to the medical specialist. High performance analytical software supports diagnostics, patient management and therapy.

▶ A thorough and unified snapshot of the patient is created through consolidated data storage and the implementation of central forecast tools. Diagnostic steps and treatments are synchronized with each other and the patient is effectively treated.

▶ Predictive analytics can better predict whether a particular treatment on a particular patient will be effective.

▶ The pharmaceutical industry evaluates data from this field and shares their knowledge about diseases and patterns. The development of new, more effective medicine becomes quicker and more cost effective.

▶ Through the evaluation of large amounts of heterogeneous data, it becomes easier than ever to specifically develop and test innovative diagnostic methods, treatments and medicines. In the end, predictive analytics serves the good of all people.

18.8 M
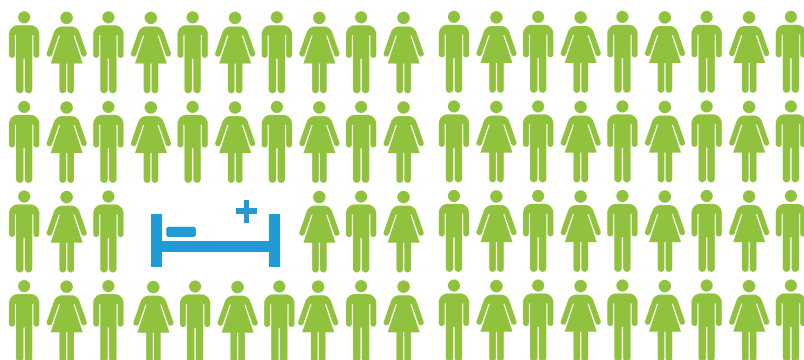
PEOPLE IN GERMANY WERE TREATED IN A HOSPITAL

Source: Federal Statistics Bureau, press release nr. 128 from 04.04.2013

54

THE AVERAGE AGE OF A PERSON BEING TREATED IN A HOSPITAL WAS 54

Source: Federal Statistics Bureau, Economics and Statistics, February issue 2013

TOTAL SPENDING ON
HEALTHCARE
293.8
BN/YEAR
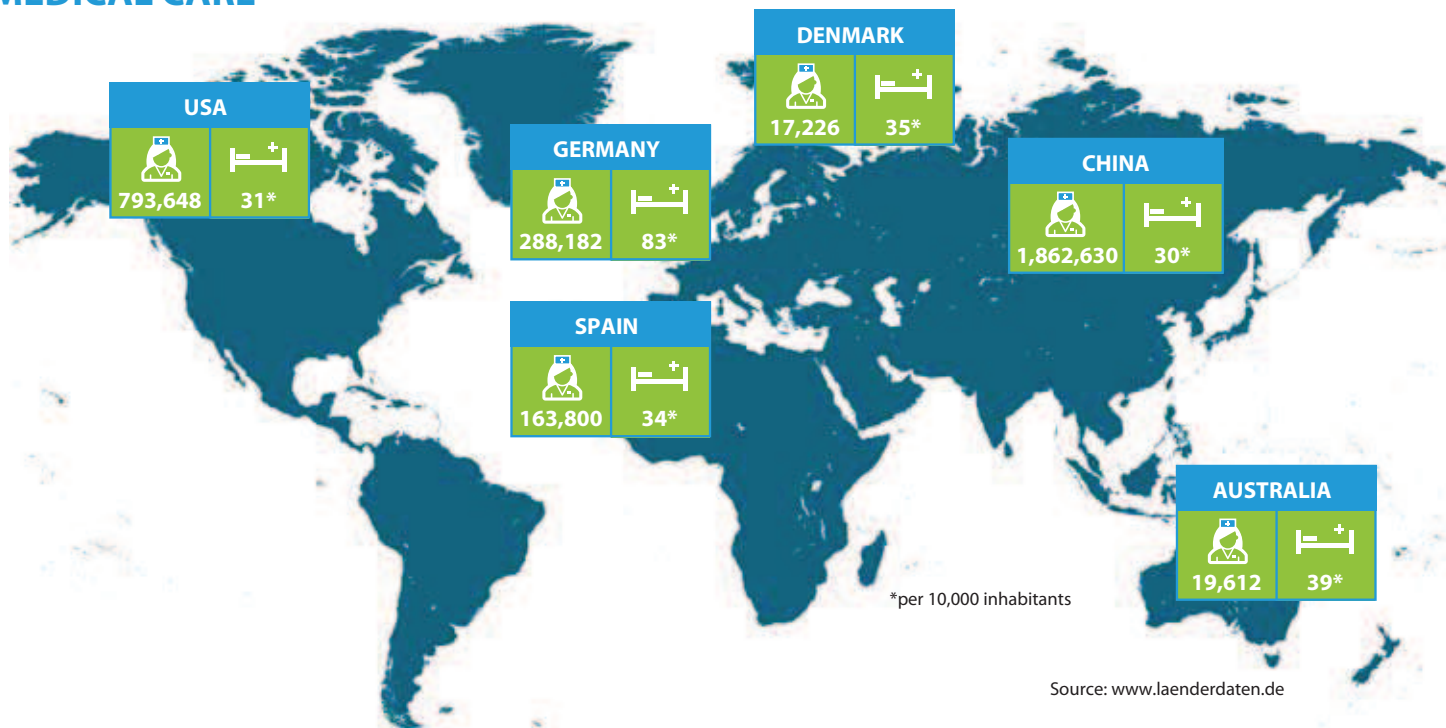
**BROKEN DOWN TO THE SINGLE
RESIDENT LEVEL**

3,590 EUROS

**IN HEALTH RELATED COSTS WERE SPENT
ON EVERY CITIZEN**

Source: Federal Statistics Bureau,
press release nr. 128 from 04.04.2013

MEDICAL CARE

USA

793,648	31*

DENMARK

17,226	35*

GERMANY

288,182	83*

CHINA

1,862,630	30*

SPAIN

163,800	34*

AUSTRALIA

19,612	39*

*per 10,000 inhabitants

Source: www.laenderdaten.de

6 M MRTs/YEAR
1.76 BN EUROS

▶ **3 GIGABYTES PER SESSION**

▶ **BREAKING DOWN AND ARCHIVING OF DATA IS
VERY TIME-CONSUMING**

▶ **DISTRIBUTED DATA (DIFFERENT TIME, LOCATION)
HAVE TO BE PROCESSED**

▶ **RESULTS ARE MADE AVAILABLE TO
SUPPORT THE SPECIALISTS**

Source: hmi.ucsd.edu – HMI_Case_Neuroimaging.pdf

"In order to profit from the upcoming changes, OEMs and suppliers have to have a clear strategy and get ready for the future. This means recognizing growth areas and markets in time, understanding the growth potential of their own organization, rethinking the value add strategy and preparing themselves competitively for the future."

From the summary of the study "FAST 2025 – Future Automotive Industry Structure"
by Oliver Wyman and the Automotive Industry Association (VDA)

"I think that mechanical engineering is underestimated. This division was always interdisciplinary – for example with embedded systems – but they do it in secret."

Roland Bent, Managing Director of the automation technology provider Phoenix Contact

"Every car produces approximately ten gigabytes of data per hour if you take all driving aspects, breaking, steering, turning the radio on and off, etc. into consideration."

Intel researcher, Tim Plowman

"At CERN we use an algorithm that is perfect for analyzing industrial Big Data: The software recognizes within an unimaginable data amount, which events are relevant and identifies relationships between completely different data types. We've also taught the software the relevant data patterns, but we first have to have an idea of what the patterns look like. In science and also in business, Big Data projects depend on the knowledge of the experts."

Blue Yonder founder, Prof. Dr. Michael Feindt

"Earning power and flexibility are the core success factors for suppliers when it comes to future investments in technology and global expansion. Courageous, goal-oriented action is called for in order to achieve the prerequisites needed to belong to the winners circle in this challenging, albeit attractive, market."

Lars Stolz, partner at Oliver Wyman and author of the study "FAST 2025 – Future Automotive Industry Structure" by Oliver Wyman and the Automotive Industry Association (VDA)

"Organizations that make their decisions based on facts, are five percent more productive than their competitors. They have a six percent higher income and their market value is on average 50 percent higher."

Erik Brynjolfsson, Professor for Information Technology at the Boston Research Institute MIT
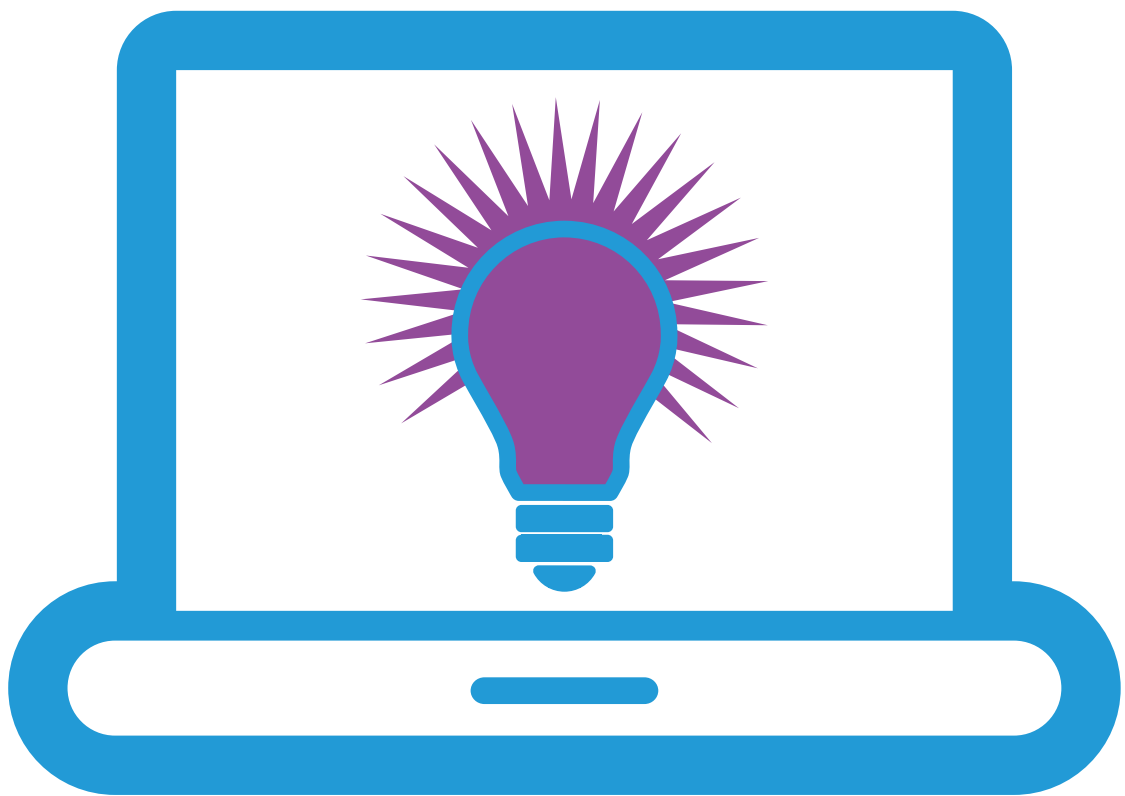
About Blue Yonder

Blue Yonder, established in 2008, is the leading software provider in the fields of forecasting and data pattern recognition or predictive analytics for short. With precise predictions, in real time and cloud-based, Blue Yonder makes an important contribution to a company's success. Blue Yonder recognizes previously undetected relationships and patterns in structured and unstructured data.

Originally developed in elementary particle physics, the software evaluated quantities of data in the petabyte range, every second, in the world's largest particle accelerators at research institutions such as CERN. Many different branches of industry are now using this capability for a variety of applications: In this scenario, the self-learning (machine learning) and dynamic software provides accurate sales predictions and automatic order recommendations. It is used successfully in dynamic pricing and in the analysis of customer data. Companies are, therefore, in a position to address customers with individual product recommendations and offers, and to identify well in advance customers who are considering switching. Precise predictions allow for a more exact analysis of creditworthiness of new and existing customers. In addition, Blue Yonder analyses offer significant value add for the risk management of the bank.

Well-known customers of Blue Yonder include OTTO, Vodafone, and EOS. Blue Yonder has already won the well-regarded Data Mining Cup three times. In addition, the FOCUS Digital Star Award 2013, the CyberChampions Award 2011/12 and the CyberOne Award 2012 went to Blue Yonder. Forecasts that constantly and automatically adapt to changed basic conditions make an important contribution to making business processes profitable and sustainable.

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