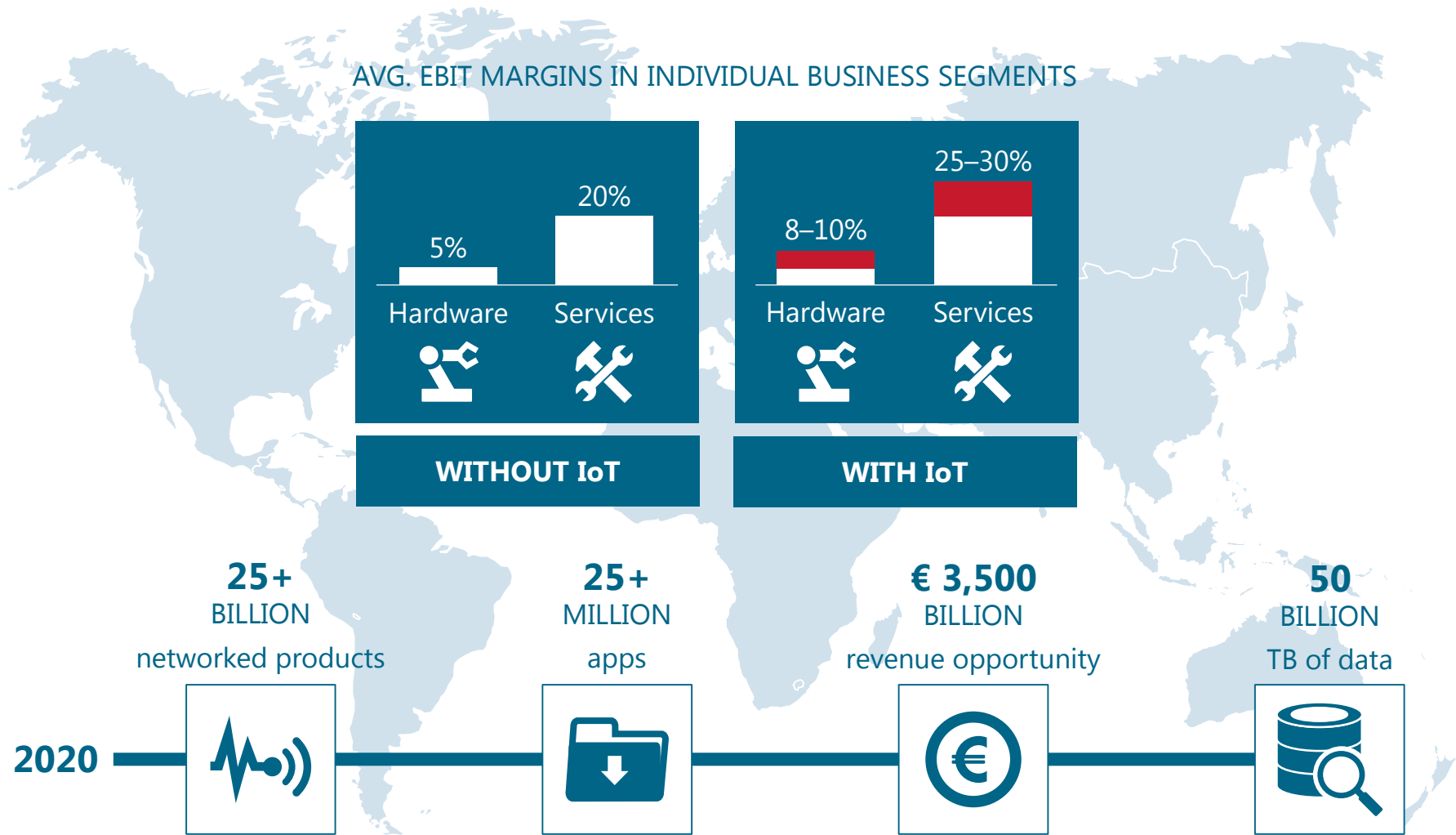




# THE INDUSTRIAL INTERNET OF THINGS

New business models for industrial companies  
with a sustainable effect on operating profit

# EBIT margins can be doubled (in hardware) or increased by up to 50% (in services) with IoT<sup>[1]</sup> offerings



[1] IoT = Internet of Things  
 Source: goetzpartners' project experience in the industrials sector, benchmark analyses, IDC

# Leverage IoT potential to the full – rethink and apply innovative business models

## EXECUTIVE SUMMARY

- 1** The Industrial Internet of Things describes the increasing networking of smart, web-enabled products and the resulting data insight to achieve productivity improvements and/or possibilities for product or service differentiation.
- 2** The Internet of Things is shifting the competitive boundaries within industries – away from individual products and services and towards systems consisting of networked products. The Internet of Things is also extending industries themselves by linking up industry-internal systems with other industry-related systems.
- 3** goetzpartners' project experience and international best-practice analyses demonstrate that launching Internet of Things products and services has a lasting effect on a company's profitability. IoT services can enable industrial corporations to grow EBIT by as much as 100% in their hardware-based core business and by up to 50% in the service business.
- 4** Besides the digitalization of products and services and the transformation and integration of almost all value chains, the development of sustainable IoT business models represents the biggest challenge for industrial companies.
- 5** Compared with leading US industrial and technology firms, German companies have certainly picked up on the potential of the Internet of Things but all of the relevant fields of expertise (incl. digital strategy, products and services, business models, big data analytics, partnerships) still hold potential for development, sometimes significant.
- 6** goetzpartners has developed an Internet of Things business model framework for industrial companies which enables them to develop their business model from three interconnected perspectives: the markets/competition, customers and finances. The method can be used to develop IoT business models in an integrated and efficient approach.

## ABOUT THE STUDY

**goetzpartners conducted a structured market research project which involved speaking to 50 large and SME industrial companies about what they do and the expertise they offer as providers of Internet of Things services.**

**In projects with industrial clients, goetzpartners regularly carries out national and international benchmark analyses on industrial corporations' digital activities in general and innovative business models in particular, the findings of which are also incorporated in the study.**

**Authors:**  
**Marc Ziegler**  
**Head of Digital Business**

**Dr. Wolfram Römhild**  
**Managing Director**

# What is the Industrial Internet of Things?

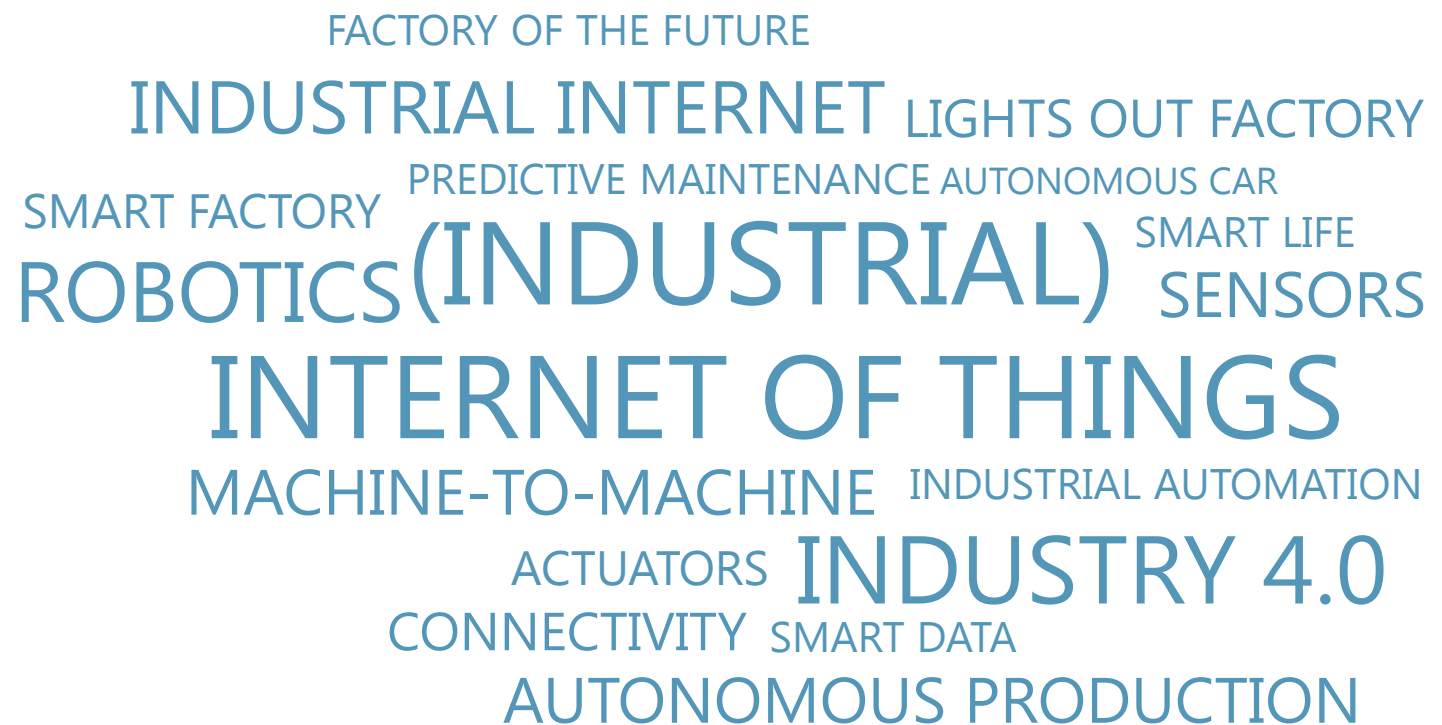
## AT A GLANCE

IoT describes the increasing **networking of smart, web-enabled products** (devices, machinery, components, plant and products) and the resulting data insight (big data analytics<sup>[1]</sup>) to achieve productivity improvements and/or possibilities for product or service differentiation.

This networking is enabled by a combination of **physical** (mechanical or electronic elements), **smart** (integrated processors, storage or software elements) and **networking product components** (IP protocols, interfaces).

Distinguished from the phrase "Industry 4.0"<sup>[2]</sup> by its scope, the range of applications for the Industrial IoT stretches far beyond the boundaries of the production process.

## IS IT ALL THE SAME THING?



INDUSTRIAL INTERNET OF THINGS = COMBINATION OF BIG DATA ANALYTICS<sup>[1]</sup>  
+ THE INTERNET OF THINGS

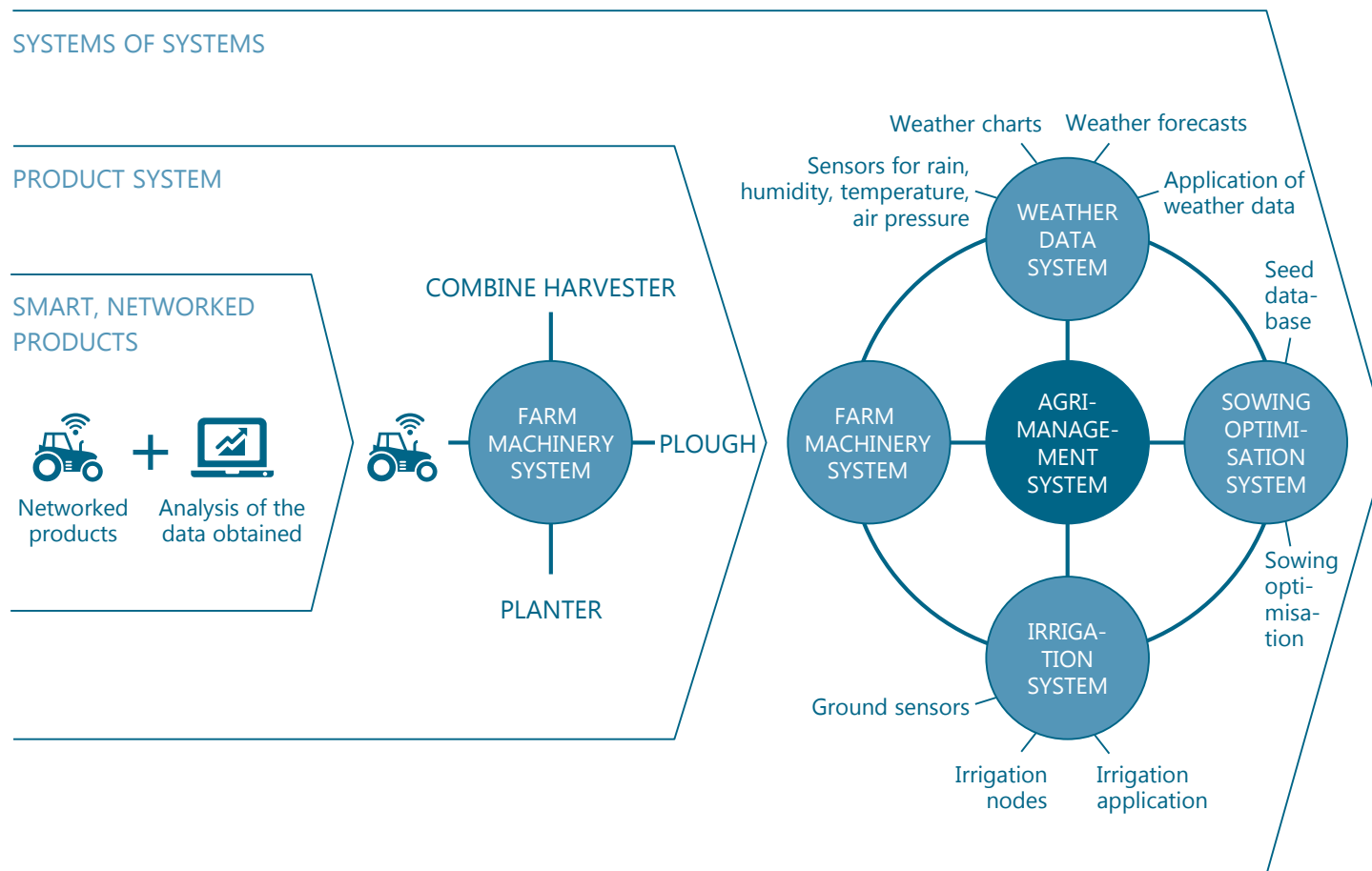
[1] The analysis of large volumes of data obtained from different sources to produce business-relevant insight

[2] A phrase used only in German-speaking countries

Source: goetzpartners

# The Internet of Things is extending industries by networking application systems

## EXAMPLE OF THE FARM MACHINERY INDUSTRY



## AT A GLANCE

IoT is shifting the competitive foundations within industries – away from individual products and services and towards systems consisting of networked products.

The Internet of Things is also extending industries themselves by linking up industry-internal systems with industry-related systems. For a tractor producer this entails, for example, an expansion of the business segments in which it operates, incorporating a wide range of systems for all aspects of agricultural automation.

For established industrial companies, the IoT's value creation, based in many cases on data intelligence, is also synonymous with a threat from industry newcomers. The latter can leverage the strengths of established providers – without having their own hardware – by means of system networking services.

# Successful companies have the technology to cover all layers of the IoT expertise pyramid

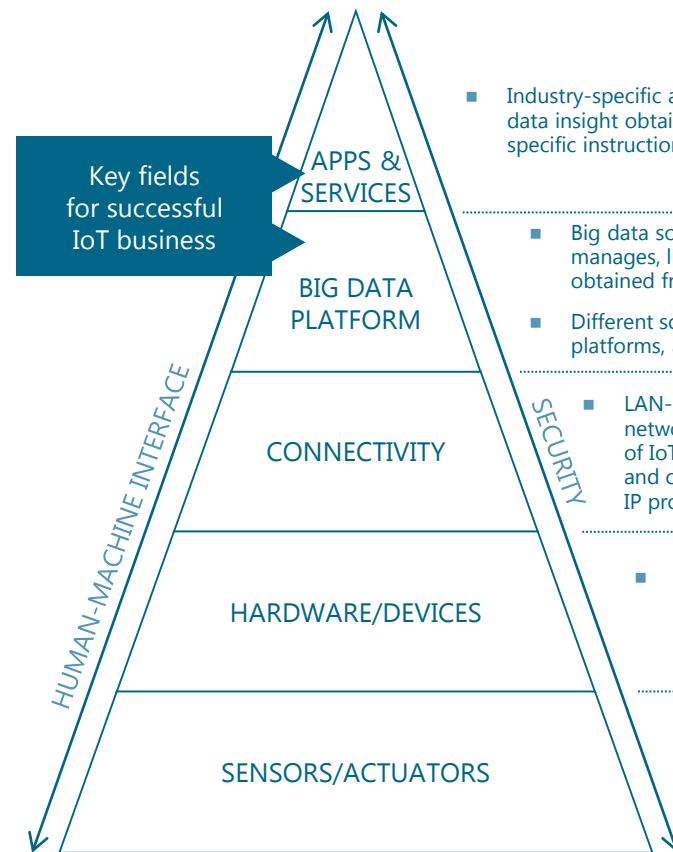
## AT A GLANCE

In order to establish a successful IoT-driven business, companies need to build up a brand new technology infrastructure.

Industrial companies normally develop IoT capabilities successively, from the bottom of the pyramid to the top, with the biggest recurring revenue and margin potential to be found in the two uppermost data-driven layers.

## IOT PYRAMID OF TECHNOLOGY EXPERTISE

### IOT INFRASTRUCTURE



- Industry-specific applications which visualise the data insight obtained and translate it into specific instructions and associated services

- Big data software framework which manages, links & analyses data volumes obtained from disparate sources
- Different software can dock onto platforms, also externally

- LAN- and WAN-based gateways and networks which ensure the transfer of IoT data between devices, sensors and cloud solutions despite different IP protocols

- Industry-specific IoT hardware or individual modules of it, e.g. robotic arms, plugs, devices in the field

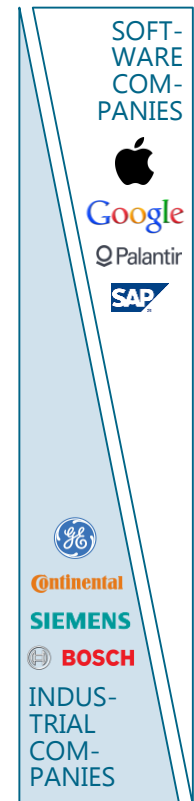
- Sensors and actuators for recording and transferring data or executing commands

### POTENTIAL

#### REVENUE MARGINS

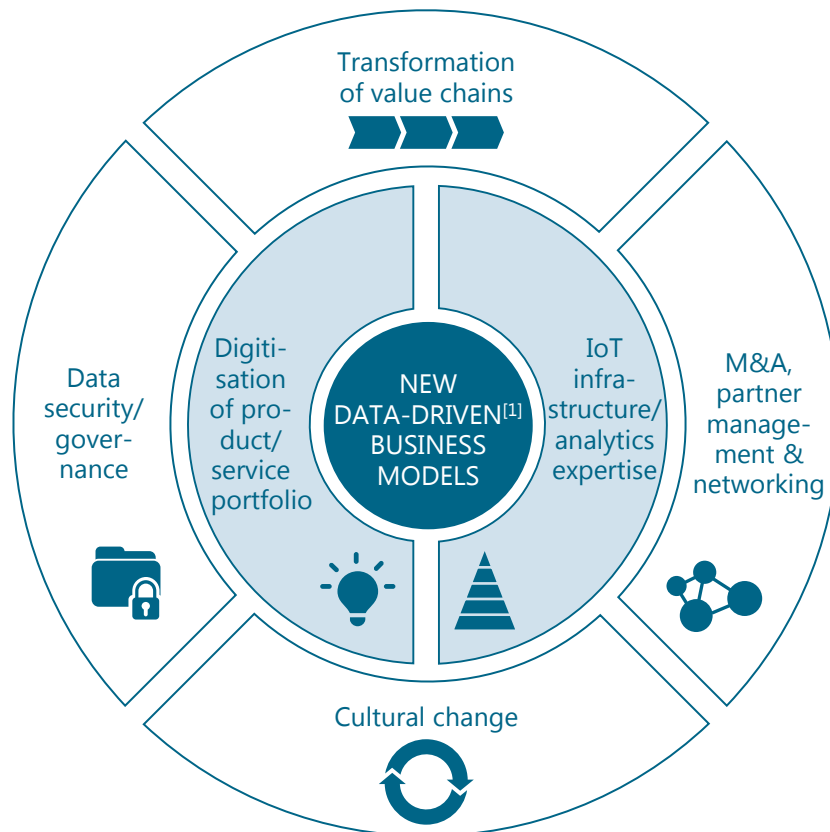


### PLAYING FIELD



# The key challenge for industrial companies is to develop sustainable IoT business models

## PRECONDITION: EXTENSIVE CORPORATE DIGITAL TRANSFORMATION



[1] New value added services emerging on the basis of data analyses in the area of current and future products  
Source: goetzpartners

## AT A GLANCE

### ESTABLISHED EXPERTISE

- Mechatronics
- Optimisation of production parameters and systems

### NEW/EXPANDABLE EXPERTISE

- Software innovation/development
- Data analysis and visualisation
- Strategic partnerships with IT/data-driven companies
- Transformation of value chains

### BASIC CONDITIONS

- Change of underlying mind-set and culture
- Creation of standards or building on standards
- Data security

Often disruptive, these developments in technology change the way industrial companies create value – less from developing and selling plant and machinery and now more focused on obtaining a profit from information.

For industrial corporations, this entails a transformation of the entire company. This needs to focus on the development of sustainable IoT business models, which ultimately set the pace for all further prerequisites that need to be put in place for a successful IoT business.

# German industrial companies can see what they need to do

## AT A GLANCE

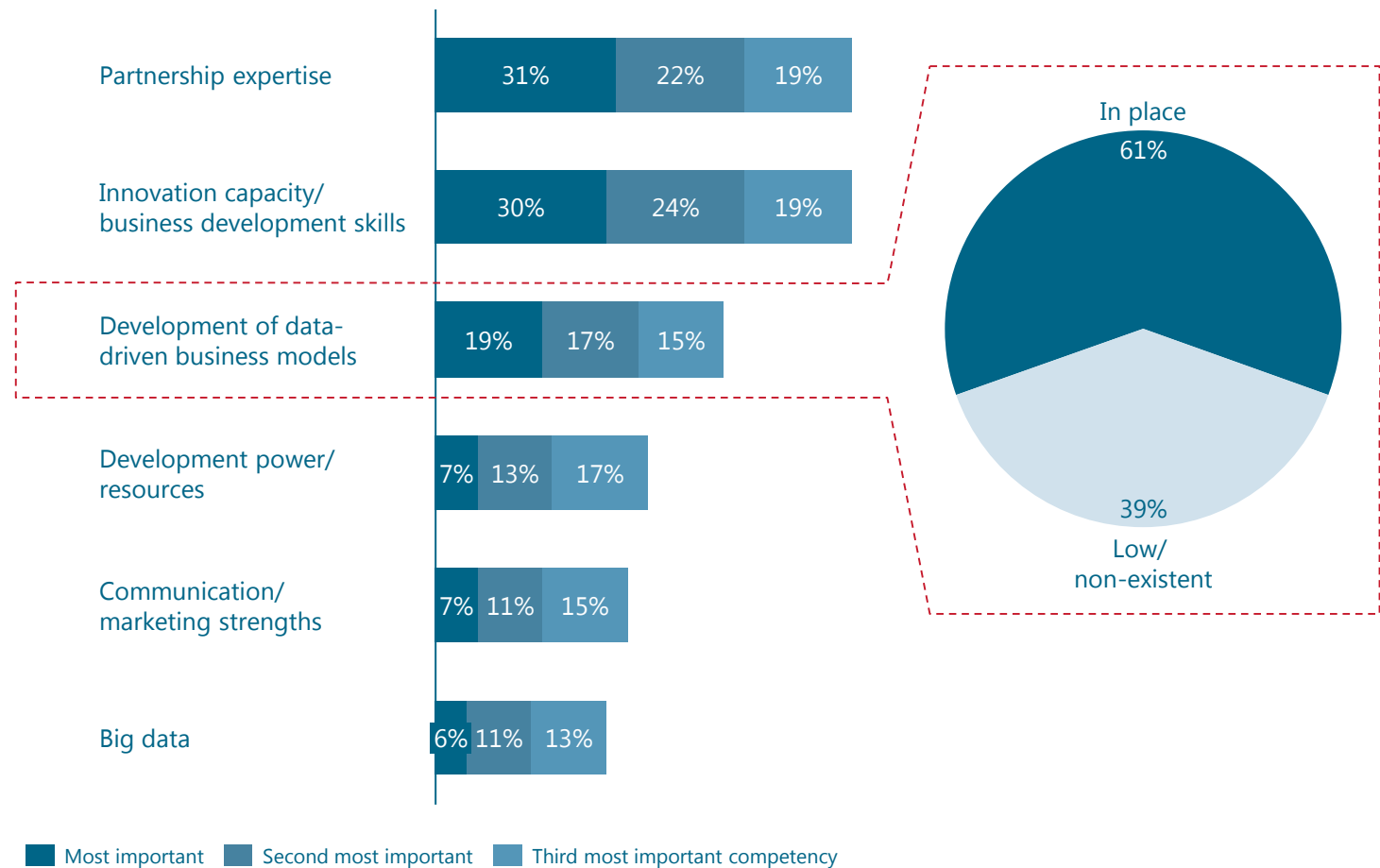
Our survey of more than 50 German industrial companies found that most firms are aware of the key challenges of the IoT business.

More than 70% of companies can see that they need to enter into partnerships in order to obtain the required IoT expertise.

The development of data-driven business models is seen by more than 50% of companies as crucial.

That said, some 40% of companies view their expertise in this area as very low to completely non-existent.

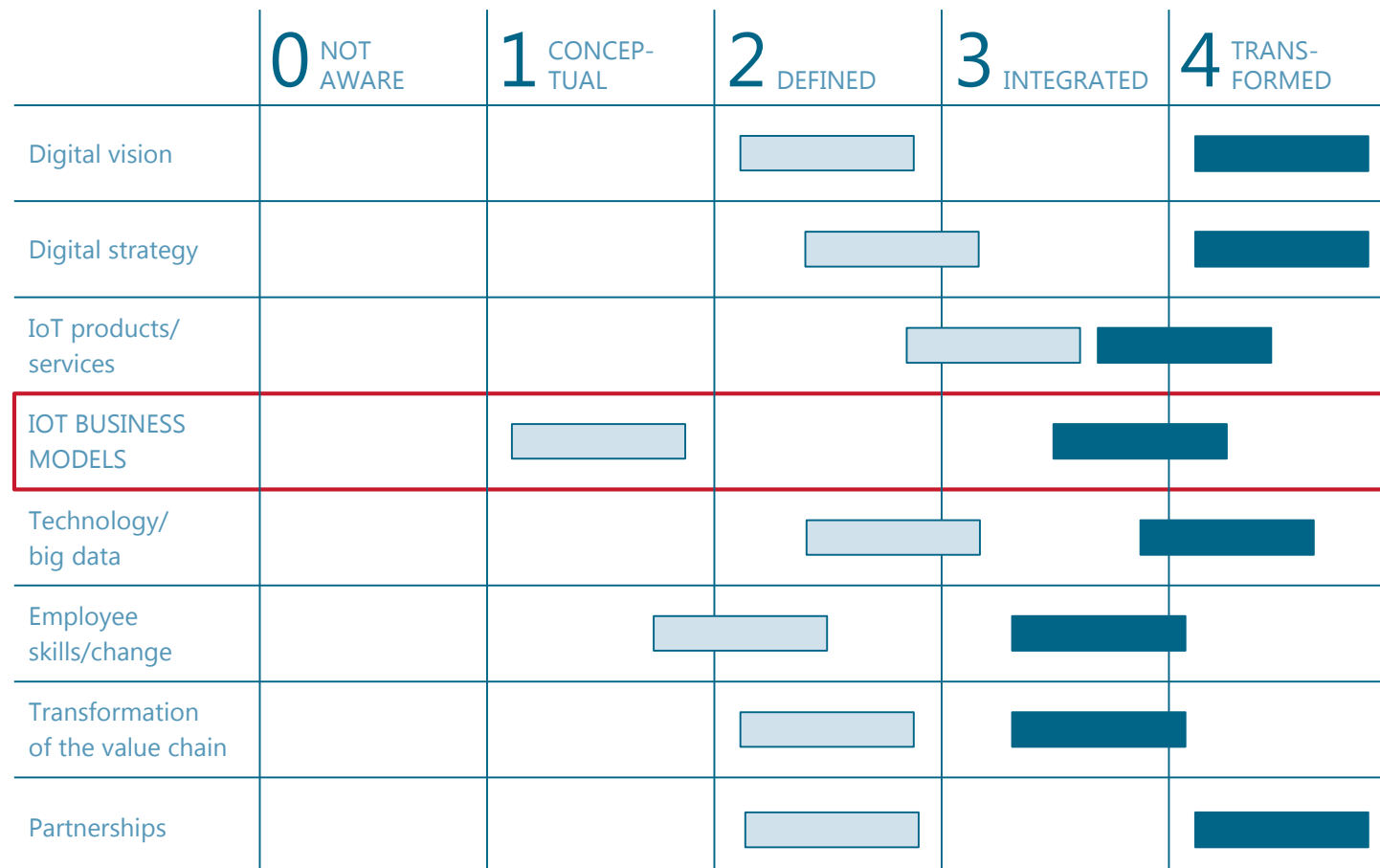
## EXPERTISE IN THE IMPLEMENTATION OF BUSINESS MODELS






# Compared with leading US players, German industry is lagging behind in IoT developments

## GERMAN INDUSTRY'S IOT READINESS INDEX



 Extent of competency of the top quartile of German industrial companies

 Extent of competency of the top industrial companies in the USA

Source: goetzpartners

## AT A GLANCE

Besides surveying 50 industrial companies, goetzpartners also conducted an independent evaluation of IoT expertise at the surveyed companies, particularly reflecting leading US industrial corporations.

Although German companies' readiness scores range widely across a 4-point scale in the individual fields of expertise, German industry still has considerable development potential in all dimensions overall.

Top US players (like GE), on the other hand, spotted the potential of the IoT early on and worked hard – making rigorous investments, continuously expanding their digital expertise and ensuring excellent partner management – to create their own, open IoT ecosystem.

**BEST PRACTICE**



# GE's Predix platform is an IoT ecosystem setting standards across industries

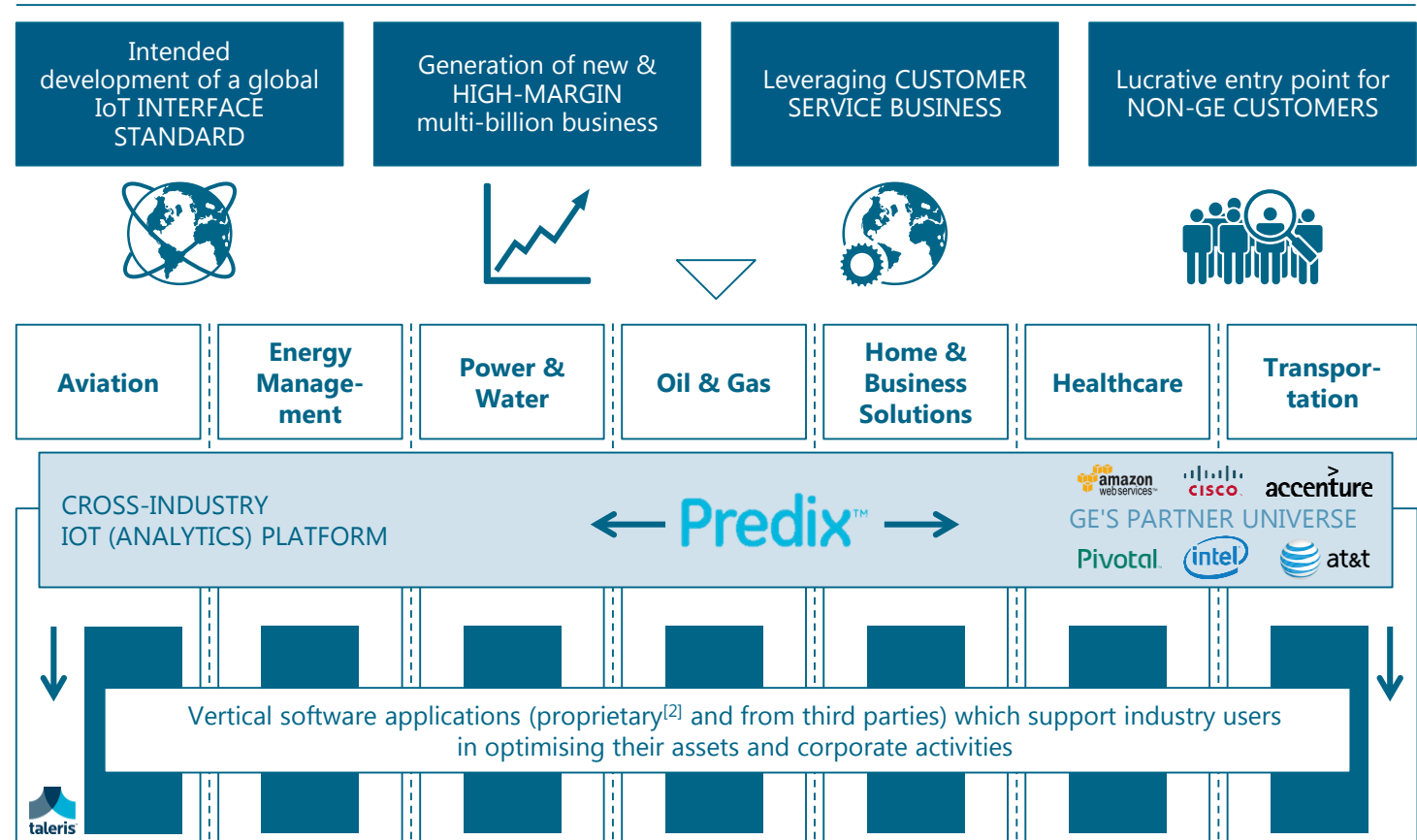
## AT A GLANCE

Since 2011, General Electric (GE) has been establishing its own IoT ecosystem around its "Predix platform" – big data middleware that creates a network between smart machinery, data and employees. GE generates highly profitable new business with the platform itself (and the applications based upon it). GE is also able to expand its high-margin service business.

GE's IoT revenues<sup>[1]</sup> rose from US\$ 0.3 bn in 2013 to US\$ 1.1 bn in 2014 – and revenues of US\$ 4–5 bn are expected in 2017.

## GENERAL ELECTRIC'S ECOSYSTEM

### BUSINESS LOGIC BEHIND GENERAL ELECTRIC'S IOT APPROACH



[1] Revenues directly associated with the IoT business (excluding service revenue levers) [2] 40–45 proprietary GE vertical applications by end of 2014  
Source: goetzpartners, GE company information

# Rolls-Royce uses data from sensors in the engines to manage and conduct maintenance in real time

**BEST PRACTICE**



## ROLLS-ROYCE'S ENGINE-AS-A-SERVICE MODEL



- More than 100 sensors embedded in aircraft engines<sup>[1]</sup> ensure **REAL-TIME MONITORING AND ANALYSIS OF THE FAILURE PROBABILITY** of more than 4,000 aircraft and 14,000 engines
- Rolls-Royce makes this data available to its customers under long-term service agreements



- Temperature, pressure, vibration and speed data are transmitted in real time via satellite to a centralised data control centre (Rolls-Royce **ENGINE HEALTH MONITORING UNIT**)
- More than 150 engineers analyse in excess of 500 m data sets per year and detect problems before they occur



- In the event of critical information, Rolls-Royce has local service units on hand to provide an **IMMEDIATE MAINTENANCE RESPONSE** and the necessary spare parts
- Since 2014, Rolls-Royce has also been fitting engines with repair robots that can carry out minor maintenance work in real time in-flight

## AT A GLANCE

Rolls-Royce uses an Engine Health Management service to identify the current status of the engines it has sold. This is done in real time using embedded sensors. A data control centre analyses all of the information and makes predictions regarding when functional faults are likely to occur and when predictive maintenance is needed. This is then passed on to local service units. As a result, safety is significantly increased and downtimes minimized.

The engine-as-a-service business model has led to a major increase in long-term and high-margin service agreements. The share of engines sold with long-term service agreements has risen from 45% (2004) to 75% (2013). Operating profit rose in the same period from 7% to 11.3%.

**BEST PRACTICE**



# Michelin uses telemetry data and fuel analytics to make truck fleets more efficient

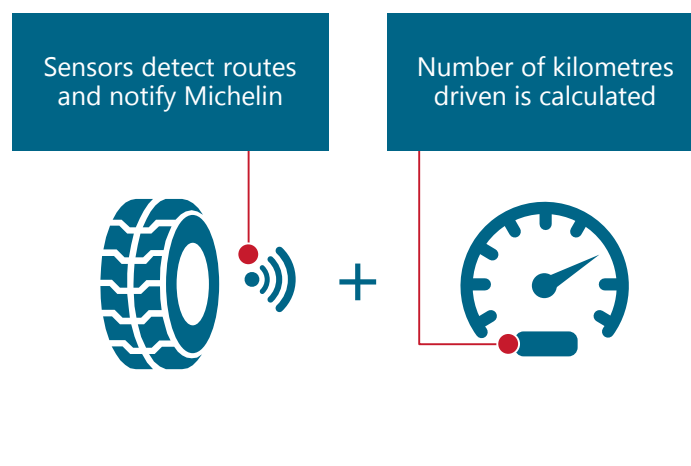
## AT A GLANCE

Michelin is using the data from sensors fitted in trucks to realise two new business models at once: Michelin offers logistics companies a consumption-based way to pay for tires depending on number of kilometres driven. And as an additional service, drivers receive recommendations on how they can adjust their driving to reduce fuel consumption on the basis of fuel analytics fed with data from a telemetry application. In return, customers commit to Michelin for a period of 4 years.

The launch of the IoT business model saw EBIT rise at Michelin Truck<sup>[1]</sup> from 6.5% in H1 2013 to 9% in H2 2014.

## MICHELIN USES TELEMETRY DATA AND FUEL ANALYTICS TO MAKE TRUCK FLEETS MORE EFFICIENT

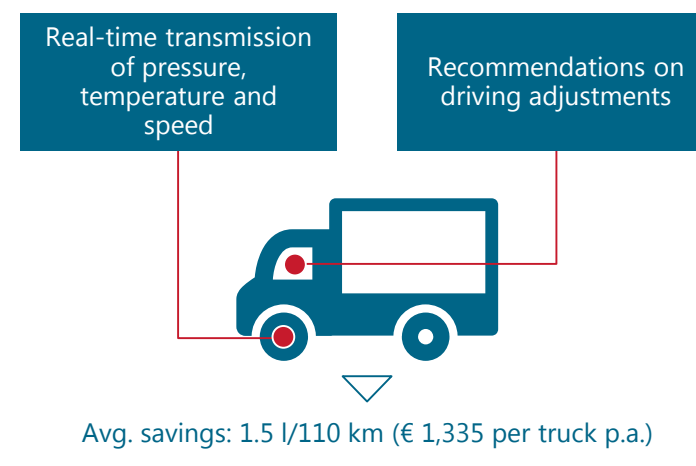
### TIRE AS A SERVICE



### PERFORMANCE-BASED TIRE LEASING

- Michelin offers usage-based tire lease contracts for logistics service providers keen to optimise their operating costs
- Sensors identify the routes driven by all fleet vehicles fitted with Michelin tires – to an accuracy of one metre
- Michelin bills customers for the total kilometres driven on a monthly basis

### EFFIFUEL SOLUTION



### EFFIFUEL

- Long-term service agreements with truck customers (4 yrs+)
- Fuel savings targets are agreed on the basis of various KPIs (routes, load capacity, etc.)
- Continuous monitoring of usage data through tire & telemetry sensors and fuel analytics
- Recommendations on how to achieve savings (e.g. driving adjustments)
- If the annual savings targets are not met, Michelin refunds a portion of the service costs

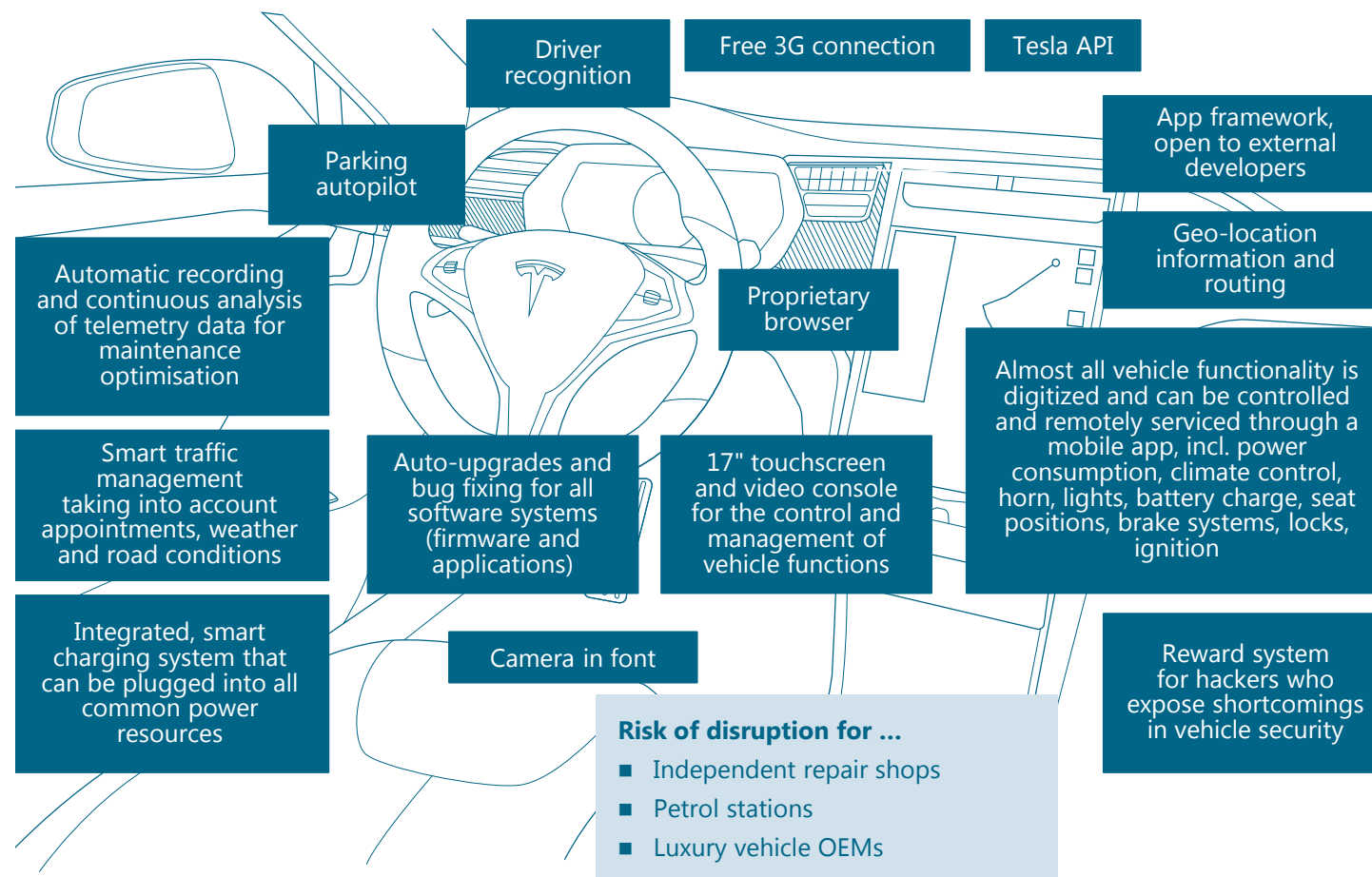
[1] EBIT of Michelin's Truck Division in % of revenues  
Source: Michelin, goetzpartners

# Tesla uses 360° vehicle connectivity to make trips to the repair shop unnecessary

**BEST PRACTICE**



## TESLA S MODEL: IOT FEATURES



## AT A GLANCE

Each Tesla vehicle is connected with the Internet via mobile broadband. Tesla can monitor the vehicle through this connection and diagnose faults. If any modifications need to be made, Tesla software updates can be installed remotely, thereby avoiding the need to put the car in the repair shop.

Revenues (EBIT) after the introduction of the Tesla S model rose from US\$ 117 m (US\$ -147 m) in 2010 to over US\$ 3,300 m (US\$ -110 m) in 2014e.

**BEST PRACTICE**



# Drawing from its wealth of data, vRad optimizes radiology workflows in healthcare facilities

## AT A GLANCE

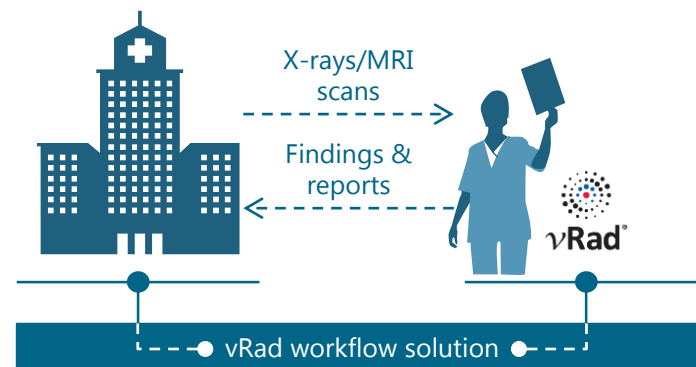
vRad is an American company that handles the analysis and interpretation of MRI scans and X-rays for healthcare facilities as an outsourcing partner.

vRad revolutionized their analysis and interpretation with a digital workflow solution for receiving and analysing X-rays and MRI scans anywhere and generating the corresponding reports.

vRad does not produce the X-ray and MRI machines but it does now have ownership of the resulting key data and has developed innovative business and service models around this data.

## RADIOLOGY PATIENT CARE

### VIRTUAL RADIOLOGY



- vRad offers hospitals an outsourcing solution for 24/7 interpretation of X-rays and MRI scans as a core service
- The imaging devices transmit their image data via an innovative workflow solution to vRad direct, where they are automatically forwarded to suitable specialists who analyse them and generate the corresponding reports

### BENCHMARKING SOLUTION



- vRad uses the resulting volume of data from more than 30 m case analyses and aggregates it into individual benchmark systems for hospitals
- The benchmarks serve as the basis for offering hospitals targeted efficiency, optimisation and training measures

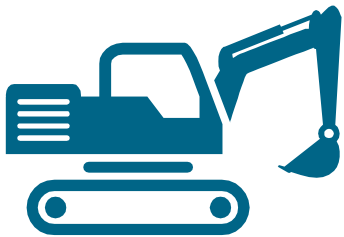
▷ **50 m** [in US\$]

Investment volume for the digital workflow system, improvement of diagnostics and creation of the benchmark database by vRad

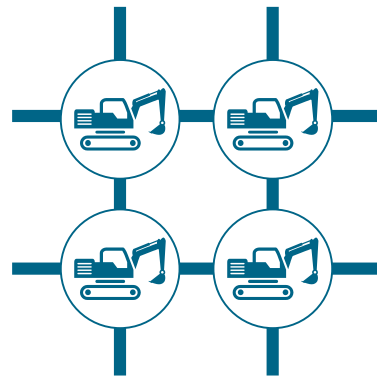
# Mining machines automatically sync with other machinery to improve overall efficiency

**BEST PRACTICE**  
**JOYGLOBAL**

## MACHINE SYSTEMS



- Smart sensor technology in all mining machines monitors operational profiles and operating conditions, safety parameters and aggregated maintenance indicators
- The connected Smart Service Centre from Joy Global analyses the data and automatically coordinates any maintenance work that may be needed



- The individual mining machines no longer act independently of one another. They are networked up and coordinate their work processes and intersection points autonomously to improve the efficiency and safety of extraction activities
- Joy Global focuses not only on optimising the performance of individual machines but of the entire work system



- For benchmarking and optimisation purposes, the Smart Control Centre collects data from all mines world-wide
- Based on this insight, mine operators' processes can be optimized and new products adapted even more precisely to the needs of customers

## AT A GLANCE

The leading company for mining machines controls the physical condition of its products through sensor technology.

But Joy Global not only monitors individual machines and vehicles, it also creates a smart machine system by coordinating the entire fleet within a mine.

The data collected is analyzed in Joy Global's own Smart Service Centre, needs-based maintenance cycles are defined and suggestions for optimisation are passed on to the operator, thereby significantly increasing extraction volumes and safety in mines.

# IoT services can help industrial companies to achieve significant revenue & EBIT improvements

## AT A GLANCE

The best-practice examples presented here underline the enormous amount of leverage that IoT products and services can have on an industrial company's bottom line.

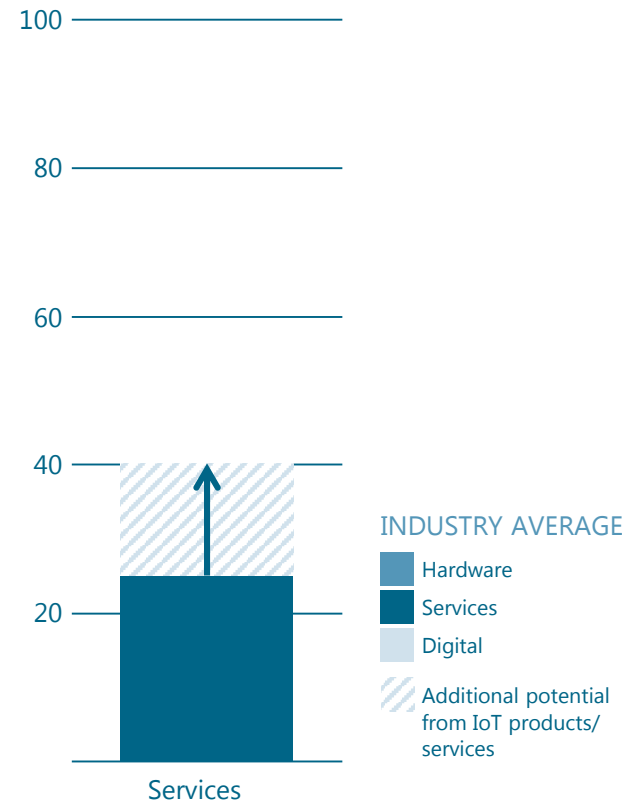
The much more profitable service business in particular can be significantly expanded through IoT and can bring additional, recurring revenues.

IoT services can also serve as a vehicle to increase sales of core industrial product offerings – thus improving profitability in the hardware business.

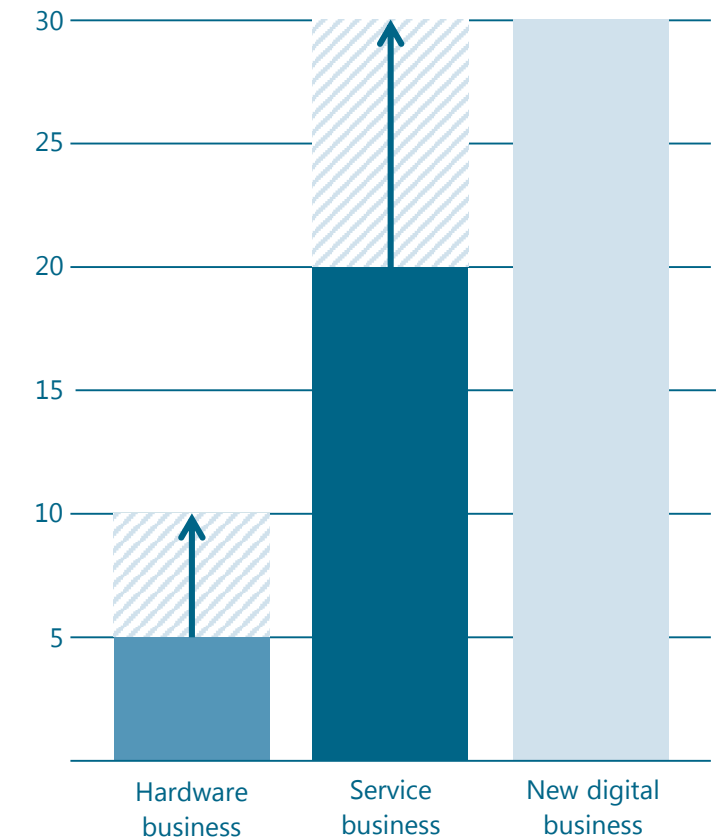
Furthermore, IoT services can be successfully positioned in the market as stand-alone, purely software-based offerings (see GE example).

## UNTAPPED GROWTH AND MARGIN POTENTIAL FROM IOT

SHARE OF SERVICES IN % OF TOTAL REVENUE



EBIT MARGINS IN INDIVIDUAL BUSINESS SEGMENTS IN %

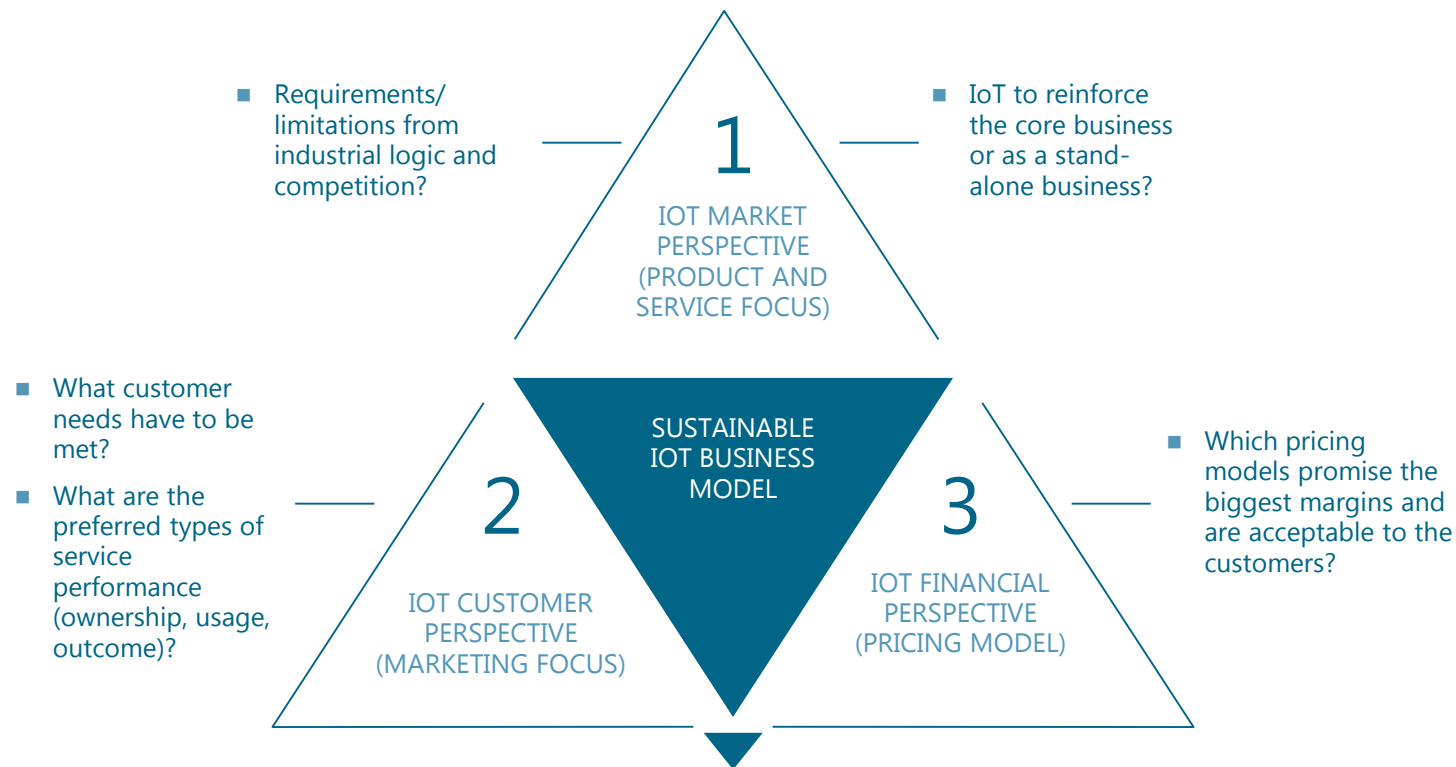


Source: goetzpartners' project experience in the industrials sector, benchmark analyses



# Develop a successful IoT model by combining the market, customer & financial perspectives

## GOETZPARTNERS' IOT BUSINESS MODEL FRAMEWORK



EVALUATION AND PRIORITIZATION – BESIDES ROI POTENTIAL – ON THE BASIS OF FEASIBILITY, NECESSARY BUILD-UP OF EXPERTISE, ACQUISITIONS AND REQUIRED PARTNERSHIPS

## AT A GLANCE

goetzpartners has defined an integrated business model framework for the development of sustainable IoT business models. Numerous projects in the industrials sector formed the basis for this, alongside in-depth analyses of the business models of successful players in the IoT market.

The more the companies take account of all perspectives that can influence future business models when developing their models, the more likely it is that the new business models will be sustainable.

The three most important perspectives are the market/competitor perspective, the customer perspective and the financial perspective. These are entered into in more detail on the following pages



# 1. IoT business model development: IoT value creation degrees from a market perspective

## AT A GLANCE

Business models that make use of the potential of IoT can be classified according to their degree of IoT value creation:

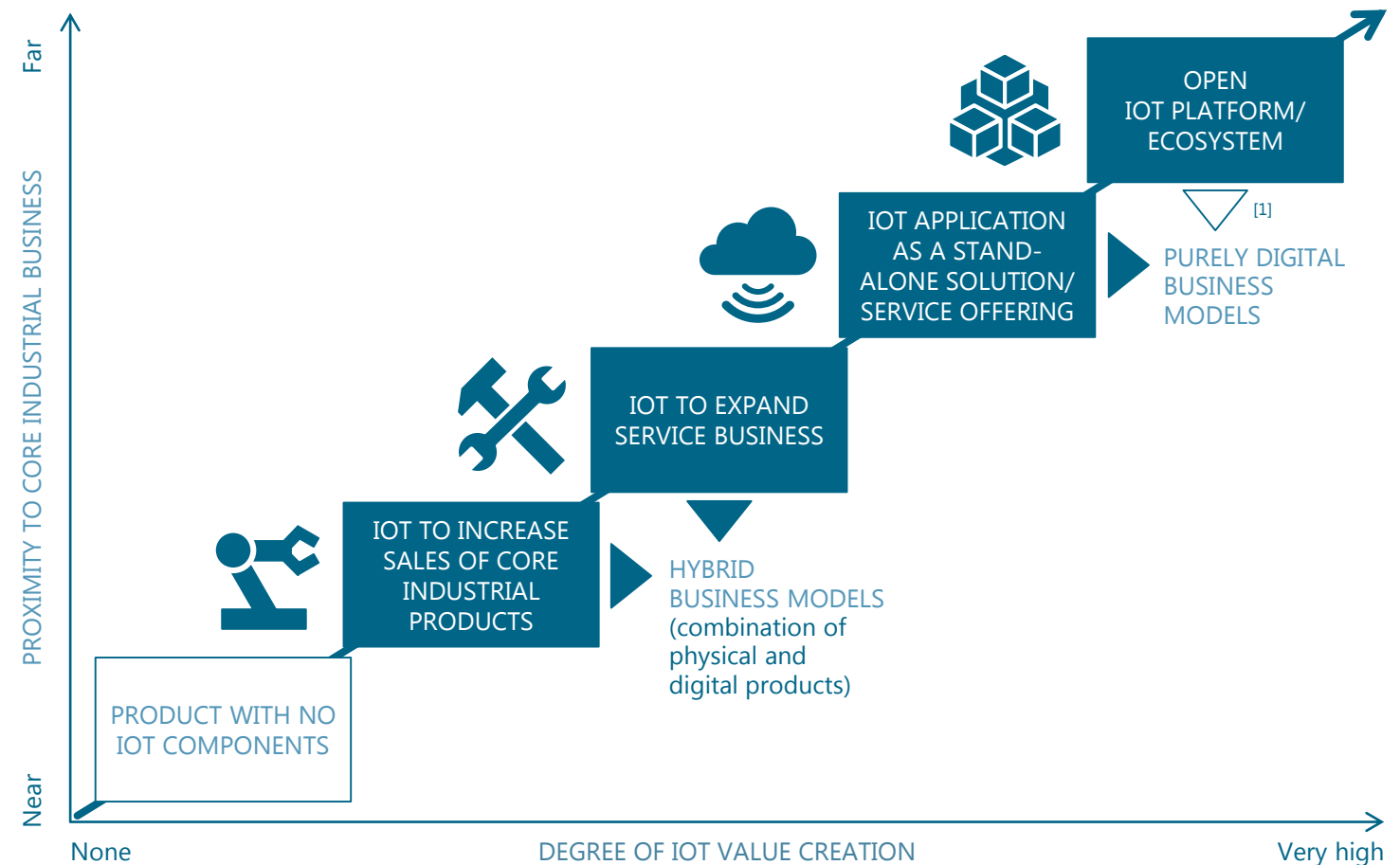
**IoT to increase sales of the core industrial products:** Here, the IoT solution serves as a means of differentiation against competing products.

**IoT to expand the service business:** IoT-based solutions as part of the (higher-margin) service business.

**IoT application as a stand-alone offering:** Solutions and services independent of a core industrial product.

**Open IoT platform/ecosystem:** Standardized analytics platform on which IoT applications from third parties can also be integrated.

## IOT BUSINESS MODEL PATH

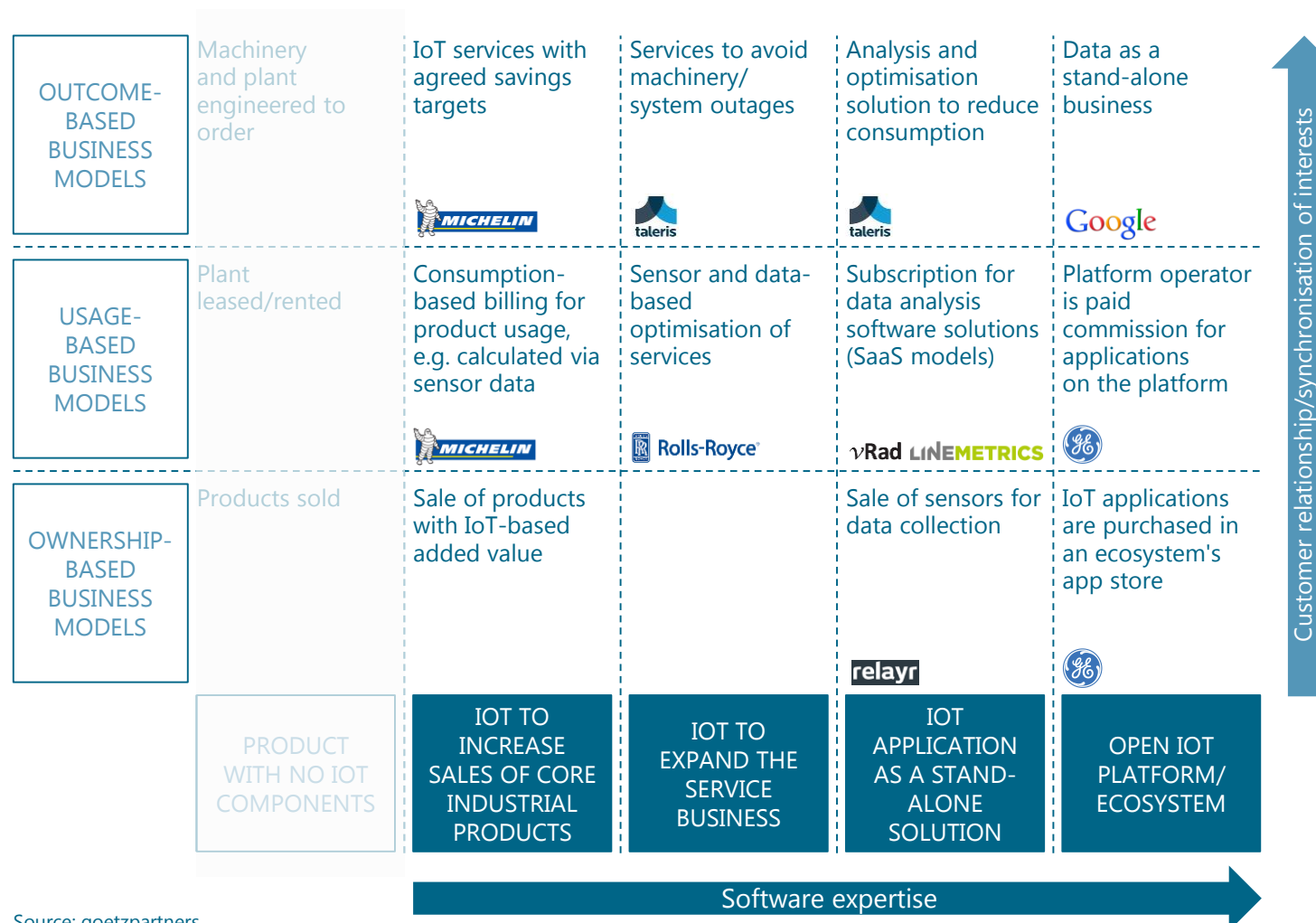


[1] IoT platforms can fundamentally also be combined with analogue product lines and corresponding service businesses (as at GE)  
Source: goetzpartners

## 2. IoT business model development: Types of service performance from the customer perspective



### IOT BUSINESS MODEL FRAMEWORK



### AT A GLANCE

In the context of industrial IoT applications, increasing numbers of business models are becoming established that are more closely related to digital business models than traditional industrial models.

Usage and outcome-based models place the focus firmly on actual customer needs.



### 3. IoT business model development: Alternative pricing model configurations

#### AT A GLANCE

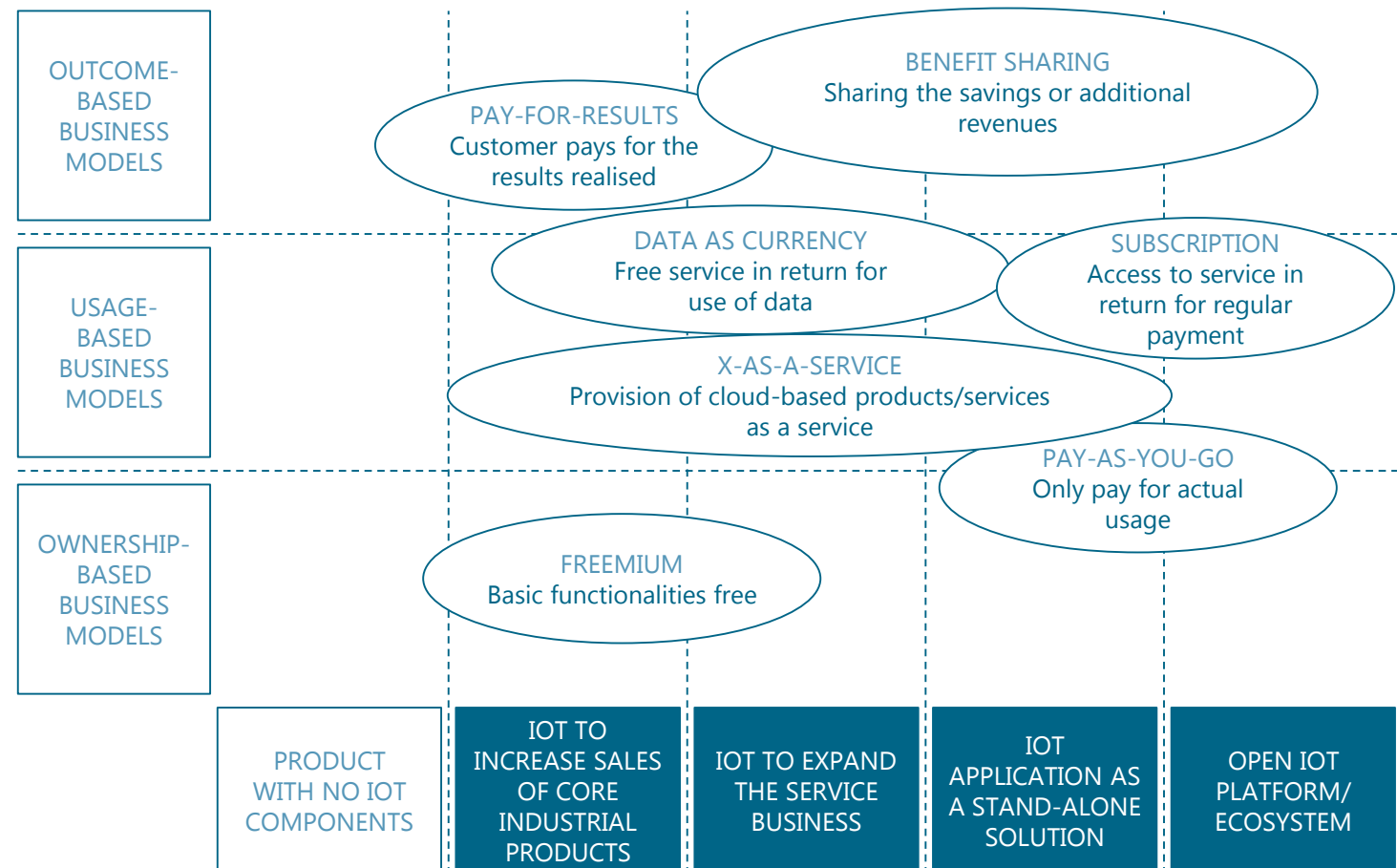
Pricing models are also changing owing to the possibilities offered by the Internet of Things.

Models from the digital industry are becoming more relevant.

There is a general trend towards recurring payments and away from large, one-time investments (pay-as-you-go, subscription, X-as-a-service).

Models that reduce perceived risk are also gaining popularity (freemium, pay-for-results, benefit sharing).

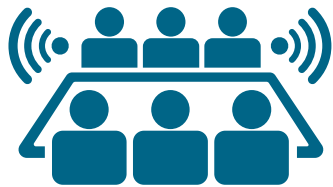
#### IOT PRICING MODELS – EXAMPLES



Source: goetzpartners

# If you're in the process of evolving your IoT business models we'd be happy to support you

## GOETZPARTNERS' IOT BUSINESS MODEL WORKSHOP – APPROACH & RESULTS



### 1 WORKSHOP PREPARATION

- Outside-in IoT readiness check
- Development of IoT business model ideas/approaches
- IoT benchmarks
- goetzp partners' IoT business model framework

### 2 WORKSHOP EXECUTION

- Introductory presentation including outside-in estimate of potential, ideas, challenges and opportunities
- Inside-out estimate and initial ideas from your company
- Joint identification of new IoT business models
- Focusing of the business model ideas and initial classification, reflected in market challenges and expertise
- Discussion of next steps

### 3 WORKSHOP SUMMARY

- Documentation of workshop results

▷ OUTCOME: At least two new, reliable business model ideas

## AT A GLANCE

goetzp partners has developed a workshop format in which we work with experts from your company to generate new and reliable IoT business models efficiently and effectively.

# About goetzpartners

## ADVISERS FOR STRATEGY, M&A AND TRANSFORMATION

goetzpartners is an independent advisory firm for all key issues of entrepreneurial activity: strategy, M&A and transformation. This unique approach makes clients measurably more successful. The combination of corporate finance and management consulting creates sustainable added value when determining valid courses of action, reaching decisions and implementing them. Boasting a vast wealth of business experience, goetzpartners advises clients in all key industries world-wide: Energy, Financial Institutions, Healthcare, Industrials & Automotive, Retail & FMCG and TMT.



## CHALLENGERS WITH PERSONALITY

For the key business issues of strategy, M&A and transformation, standard solutions are rarely the right answer. On every project, goetzpartners ensures that there is always sufficient scope for proven methods to be combined with individual and client-specific approaches. Our consultants lay the foundations for excellent results by trusting their own opinions and experience and taking a strong stance on the entrepreneurial challenges to be resolved.

## NETWORKERS AT THE HIGHEST LEVEL

Our far-reaching network of contacts, grown over decades, involves top decision makers in business and politics, and produces extraordinary advisory outcomes. Our close working relationship with prominent members of society opens up wide-ranging new perspectives. goetzpartners thinks beyond borders and connects the right people with the right ideas. That way, goetzpartners creates valuable synergies for all involved.

## EXPERTS ON COURSE FOR SUCCESS

Founded in 1991 by Dr Stephan Goetz and Stefan Sanktjohanser, goetzpartners today ranks among the 10 largest advisory firms in Germany (Lünendonk® list 2014). In WirtschaftsWoche magazine's "Best of Consulting 2014" awards, goetzpartners took first place in the "Project Excellence" category. Internationally, the company operates out of 9 countries with 12 offices and a total of 250 professionals.

# Disclaimer

March 2015

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