First Sensor

WE LEAD THE FUTURE
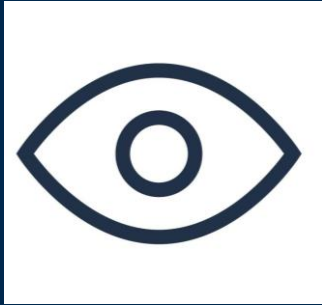
COMPANY PRESENTATION

Pattern recognition is our very first core competence.

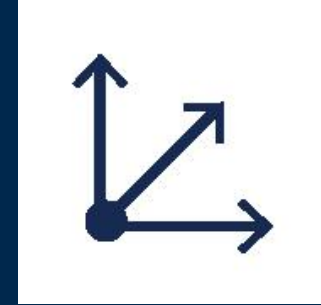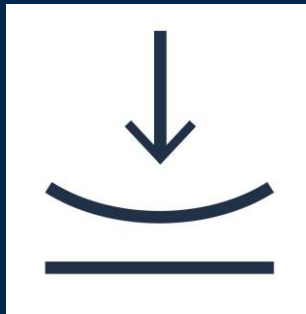Light

Radiation

Acceleration
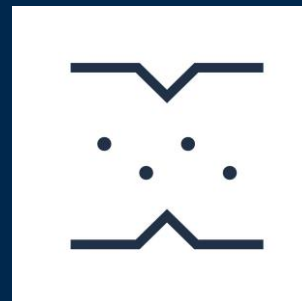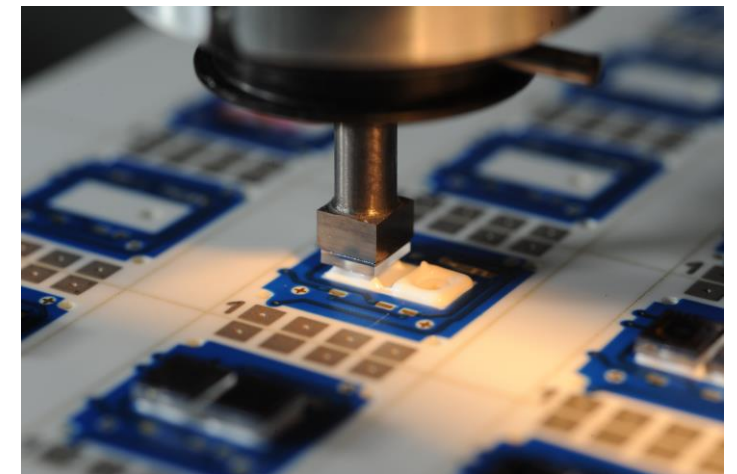
Pressure

Flow

Level

Semiconductor production puts this competence into products.

Microelectronic technology comprises our second core competence.
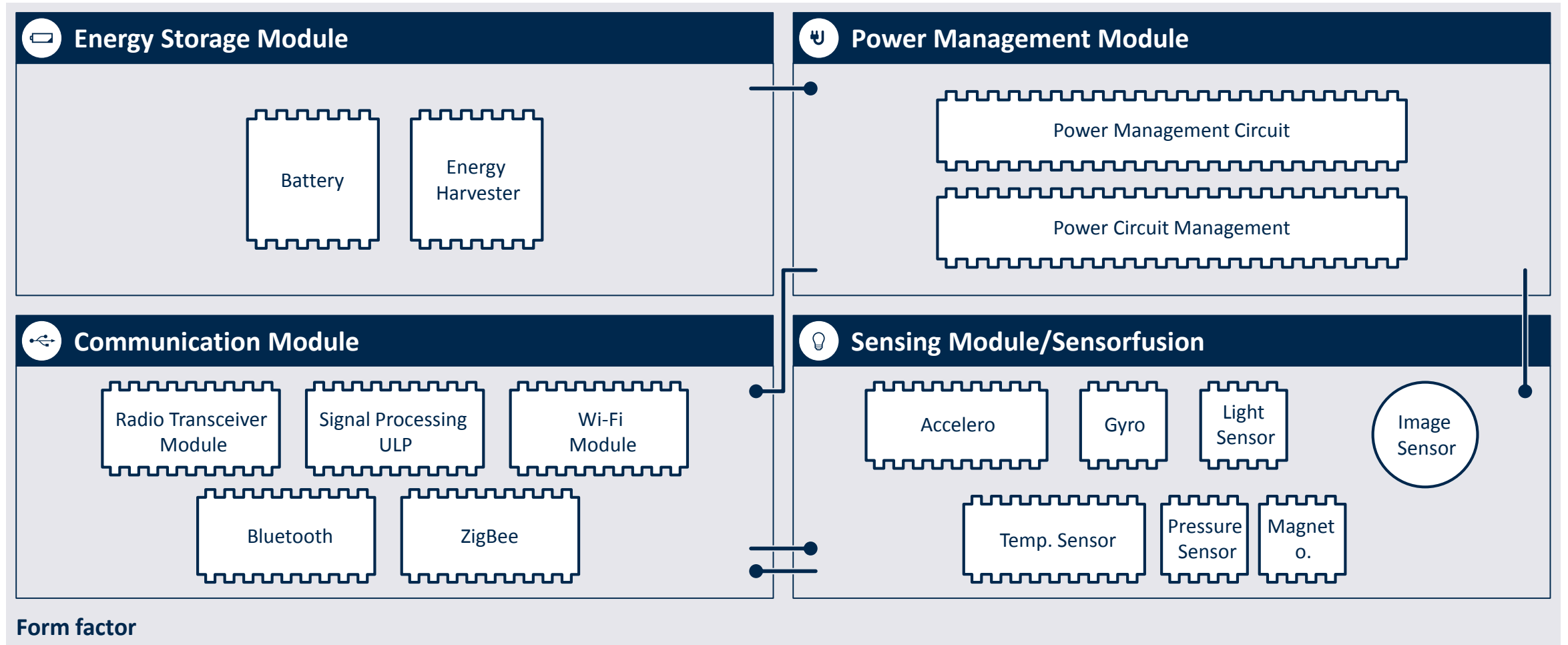
OUR COMPETENCE
Thereby, we cover the entire value chain of sensor technology.
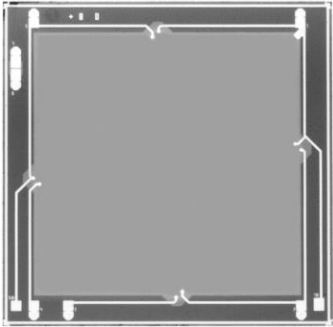
Sensor chip	Packaging	Sensor	Sensor system
– Silicium based – converts physical parameters into electrical signals	– Connecting microelectronic and non-electronic micro components to a housing	– Consists of a sensor chip, a housing and electronics – The measurement signal can be calibrated	– Measures and preprocesses data – communicates with other systems
Detect			Detect & Understand
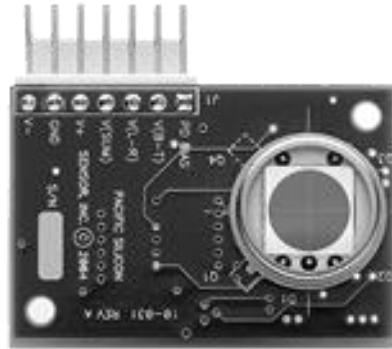
We grow in our core market as well as in high potential sales regions.

Sales share
North America
10 %

Sales share
Europe
80 %

Sales share
Asia
10 %

*Q3 2017

First Sensor

OUR PRESENCE
We focus on the growth markets Industrial, Medical and Mobility.

First Sensor — Industrial

Innovative solutions for the automation of industry

– Industrial Process Control
– Radiation and Security
– Smart Buildings
– Length Measurement
– Aerospace

Sales share 50%

First Sensor — Medical

Reliable technology whenever it is needed

– Diagnostics
– Medical Respiration and Pneumology
– Dialysis and Infusion

Sales share 20%

First Sensor — Mobility

New ideas for intelligent mobility

– Cameras and camera systems
– Pressure Sensors
– Optical Sensors
– Flow Sensors

Sales share 30%

The industry needs sensors for autonomous interaction between products and processes.
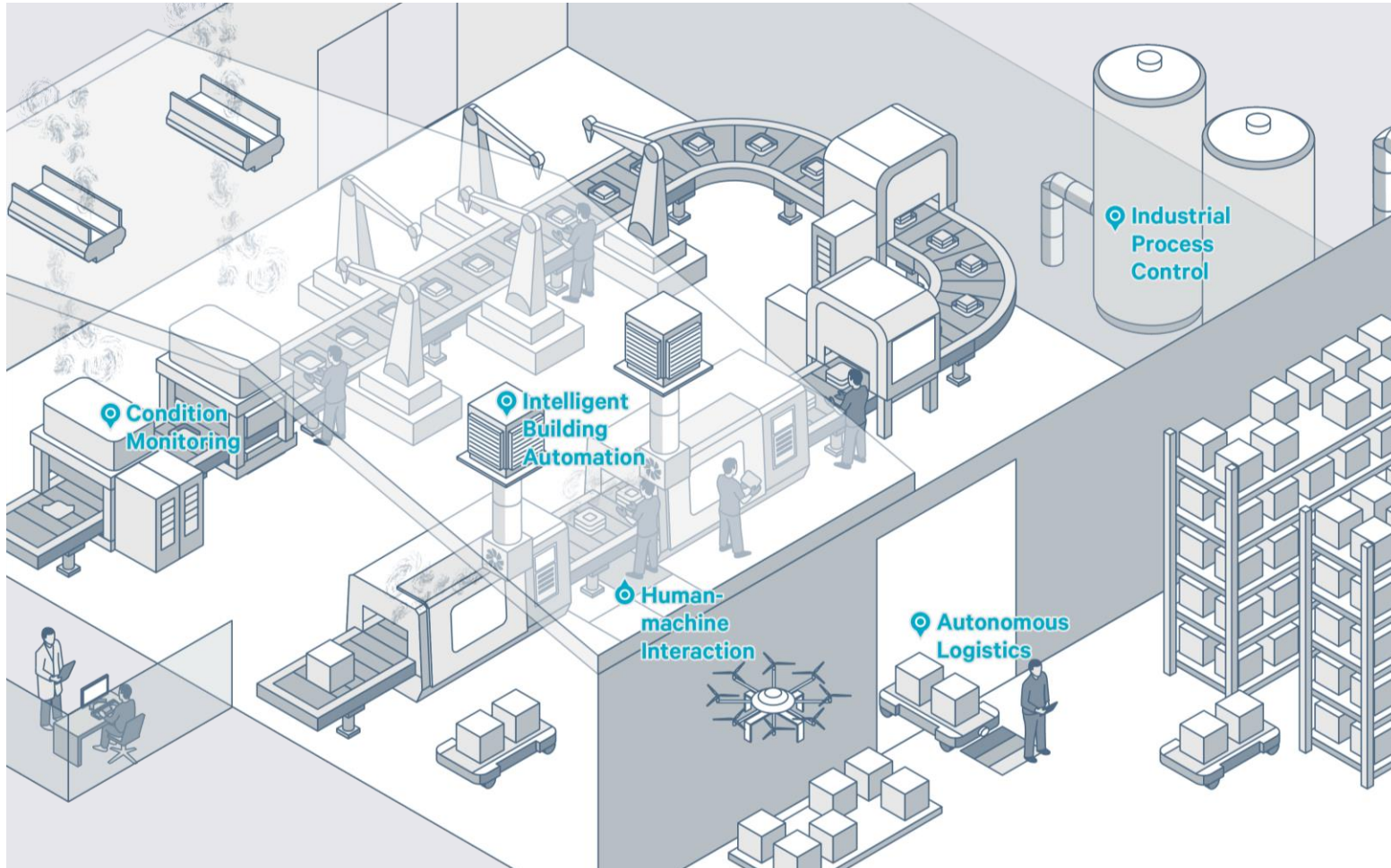
Intelligent sensor systems control applications such as condition monitoring, predictive maintanance or human-machine collaboration.

Industrial Process Control

Condition Monitoring

Intelligent Building Automation

Human-machine Interaction

Autonomous Logistics

Source: Sick AG

First Sensor
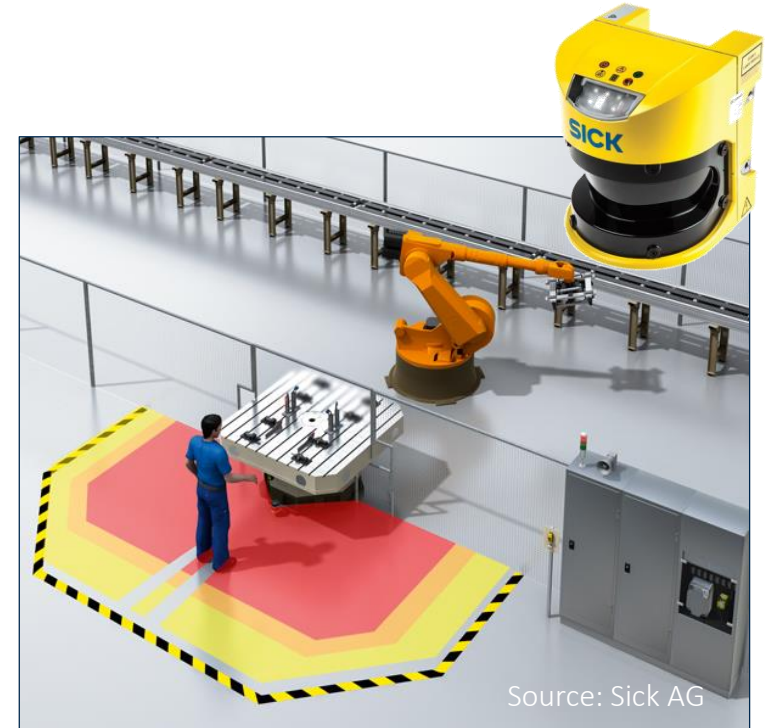
The medical market is characterized by miniaturization & digital health.
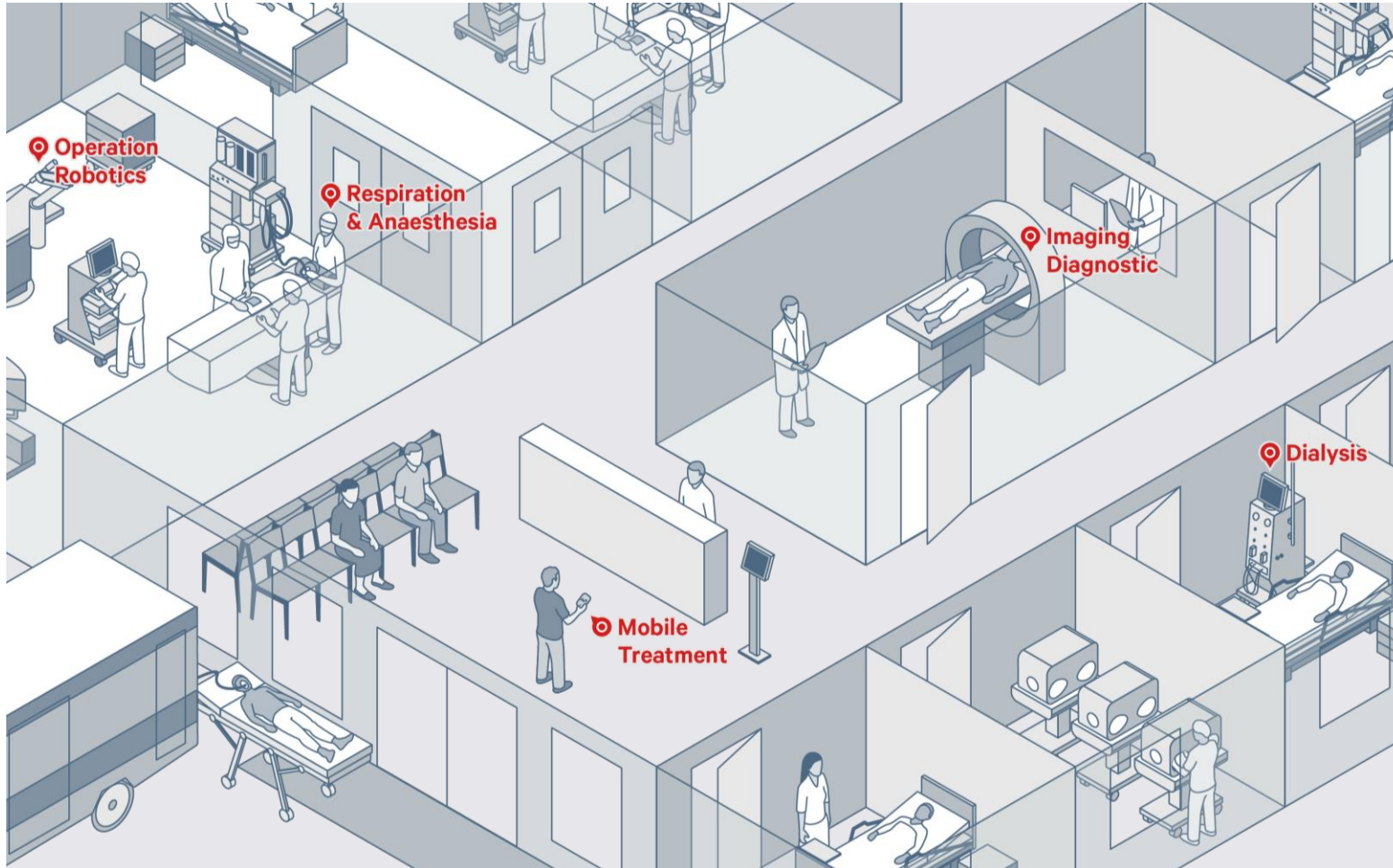
The trend is toward ever more intelligent solutions that connect data in the cloud prior to communicating with the control technology, thereby enabling semi-automated diagnosis.
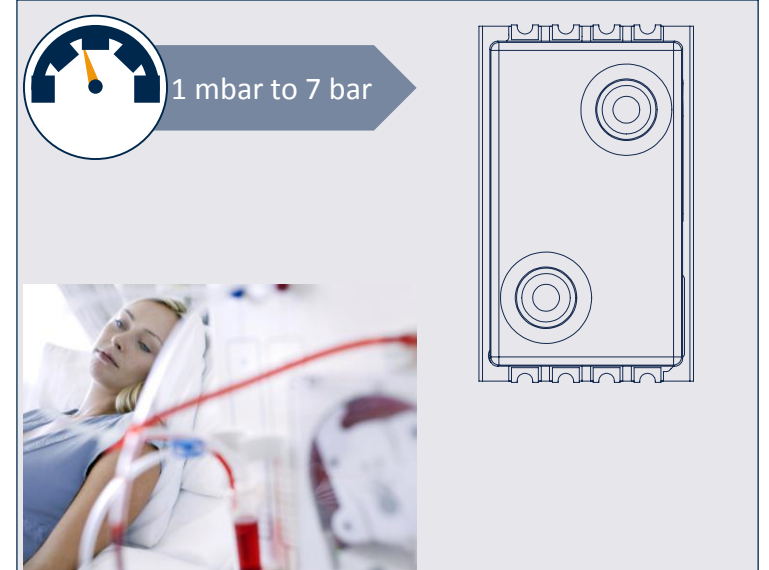
The mobility market is driven by a new idea of transportation.
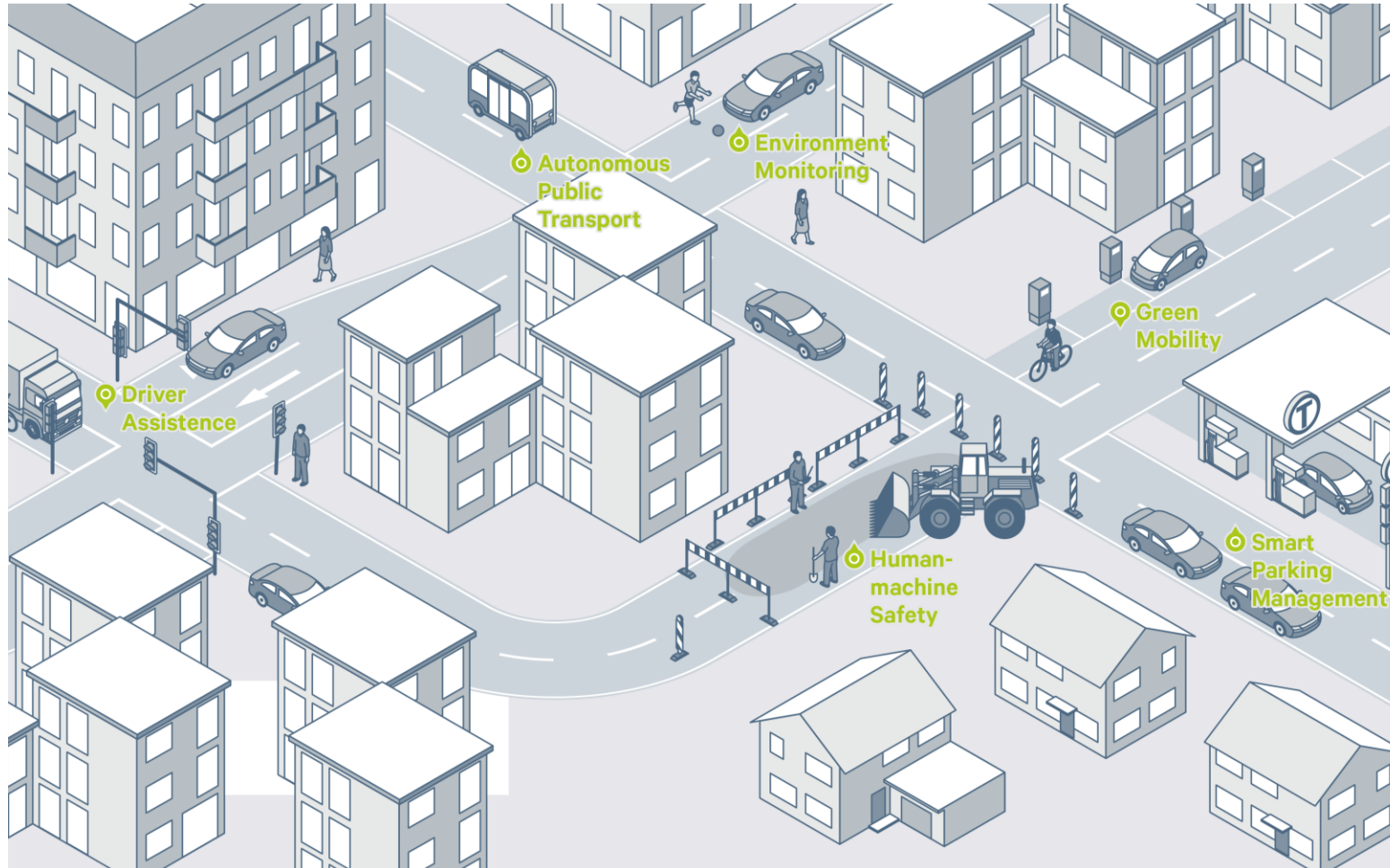
The trend towards partially and fully autonomous vehicles is possible only thanks to sensor-based driver assistance systems.
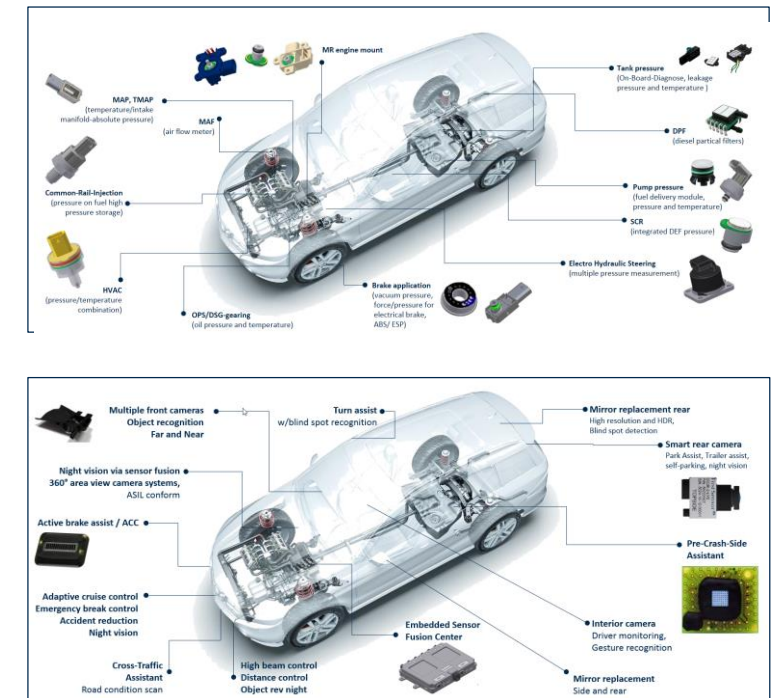
Pressure sensors are important for driver assist systems.

MR engine mount

MAP, TMAP
(temperature/intake manifold-absolute pressure)

MAF
(air flow meter)

Common-Rail-Injection
(pressure on fuel high pressure storage)

HVAC
(pressure/temperature combination)

OPS/DSG-gearing
(oil pressure and temperature)

Brake application
(vacuum pressure, force/pressure for electrical brake, ABS/ ESP)

Tank pressure
(On-Board-Diagnose, leakage pressure and temperature)

DPF
(diesel partical filters)

Pump pressure
(fuel delivery module, pressure and temperature)

SCR
(integrated DEF pressure)

Electro Hydraulic Steering
(multiple pressure measurement)

First Sensor

Optical sensors are irreplaceable for autonomous driving.

Multiple front cameras
Object recognition
Far and Near

Turn assist
w/blind spot recognition

Mirror replacement rear
High resolution and HDR,
Blind spot detection

Smart rear camera
Park Assist, Trailer assist,
self-parking, night vision

Night vision via sensor fusion
360° area view camera systems,
ASIL conform

Active brake assist / ACC

**Pre-Crash-Side
Assistant**

Adaptive cruise control
Emergency break control
Accident reduction
Night vision

**Embedded Sensor
Fusion Center**

Interior camera
Driver monitoring,
Gesture recognition

**Cross-Traffic
Assistant**
Road condition scan

High beam control
Distance control
Object rev night

Mirror replacement
Side and rear

First Sensor

GROWTH DRIVER
AUTONOMOUS DRIVING

GROWTH DRIVER AUTONOMOUS DRIVING

Main reason for accidents are preventable human mistakes.

1	Mistakes of car drivers	63.9 %
2	Mistakes of bicyclists	13.5 %
3	Bad road conditions	7.7 %
4	Mistakes of motorbike riders	7.2 %
5	Mistakes of truck drivers	5.7 %
6	Mistakes of pedestrians	3.5 %
7	Technical issues	0.9 %

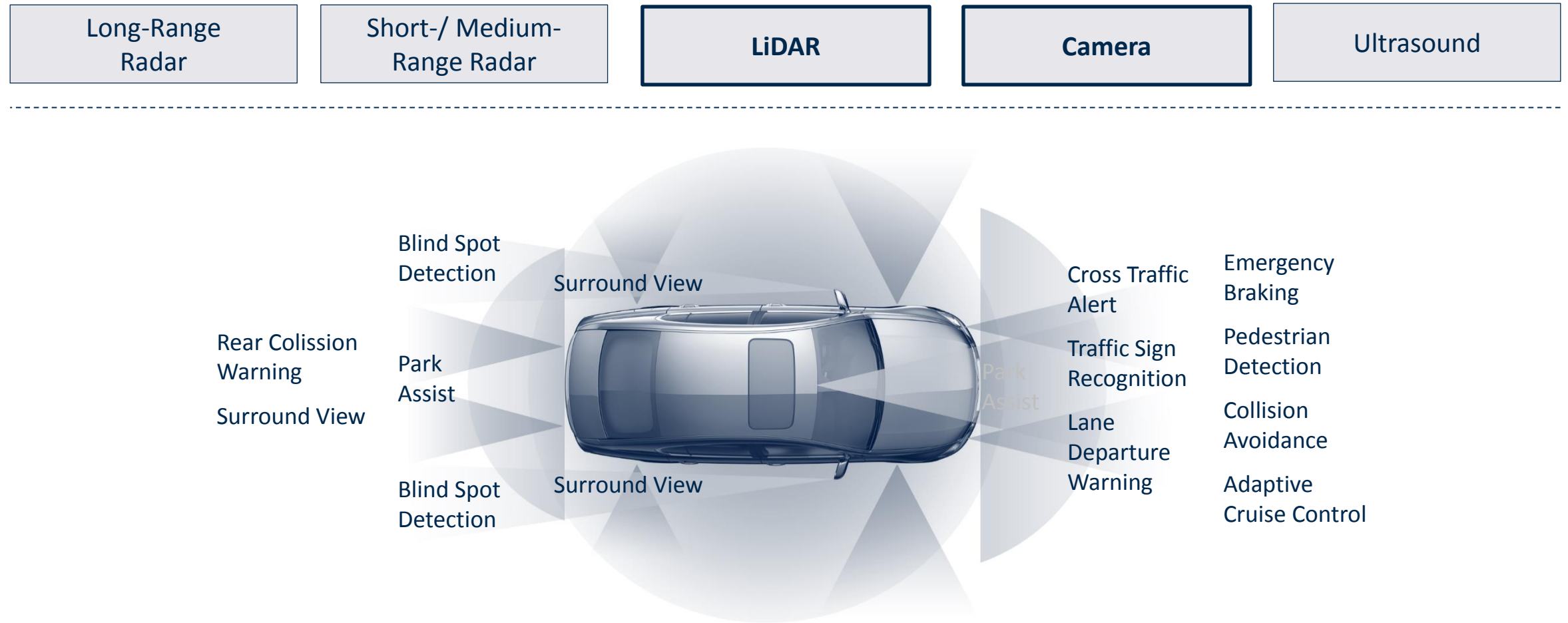Source: German Federal Statistical Office 2016

First Sensor

GROWTH DRIVER AUTONOMOUS DRIVING
Therefore cars become more and more autonomous.

Autonomous Levels	Level 1 Assisted Driving	Level 2 Partly Automated	Level 3 Highly Automated	Level 4 Fully Automated	Level 5 Driverless
Fuctionality	Active Cruise Control (ACC) Lane departure warning system (LDWS)	Lane Keep Assist (LKA) Park Assist (PA)	Automatic Emergency Brake (AEB) Driver Monitoring (DM) Traffic Jam Assist (TJA)	Autopilot on Highway (AP)	Autopilot everywhere
Sensors	Ultrasonic Radar (long range) Front Camera	Surround Camera	Radar (short range) Driver Camera LIDAR	SENSOR Fusion	SENSOR Fusion

GROWTH DRIVER AUTONOMOUS DRIVING
LiDAR and Cameras are irreplaceable for autonomous cars.

Long-Range Radar	Short-/ Medium-Range Radar	LiDAR	Camera	Ultrasound

Blind Spot Detection

Surround View

Cross Traffic Alert

Emergency Braking

Rear Colission Warning

Park Assist

Traffic Sign Recognition

Pedestrian Detection

Surround View

Park Assist

Collision Avoidance

Lane Departure Warning

Blind Spot Detection

Surround View

Adaptive Cruise Control

They provide a good detection performance and a safe surround view.

On Board Sensor Capability			LIDAR (Detection & ranging)	Camera (Monitoring & classification)	RADAR (Detection & ranging)	V2X & Cellular* (Information)	Map & Location (Information)
Detection Performance	Traffic objects	Car/Trucks	★ ★	★	★ ★ ★	★	
		Motorcycle	★ ★	★	★ ★	★	
		Bicycle	★ ★	★	★	★	
		Pedestrian	★ ★ ★	★	★	★	
		Animal	★ ★	★			
		Debris	★ ★	★			
	Infrastructure traffic constraints	Road marking	★	★ ★			★ ★
		Traffic signs		★ ★			★ ★ ★
		Traffic lights		★ ★		★ ★ ★	★
	Path/Road structure	Curve	★	★			
		Guard rails	★ ★		★ ★		
		Wall/Obstacle	★ ★		★ ★		
			← Dynamic →				← Static →
	360° View		★ ★ ★	★ ★ ★			
Robustness		Rain/Snow	★ ★	★	★ ★ ★	★ ★ ★	★ ★ ★
		Fog			★ ★ ★	★ ★ ★	★ ★ ★
		Night	★ ★ ★		★ ★ ★	★ ★ ★	★ ★ ★

* Depends on coverage

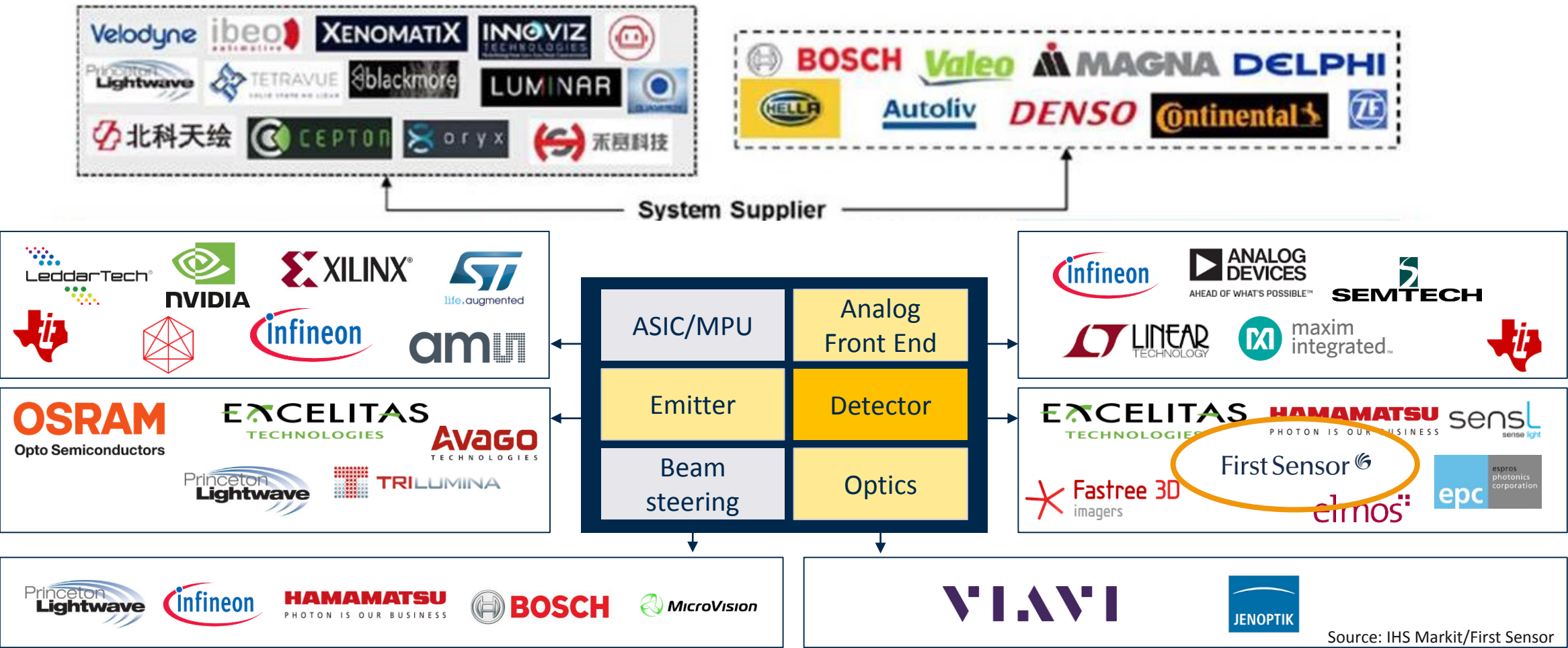# In LiDAR systems different components work hand in hand.

Source: Velodyne

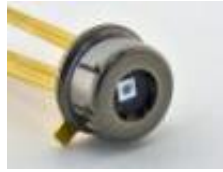# First Sensor is an important supplier for the detectors in LiDAR systems.

Source: IHS Markit/First Sensor

With our APD we have captured a leading share for more than 10 years.

Single APD with amplifier

DARPA Urban Challenge; First Sensor APDs in all winning teams
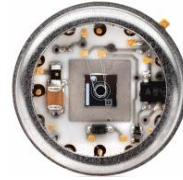
Industrial hybrids (APD+TIA in one package)
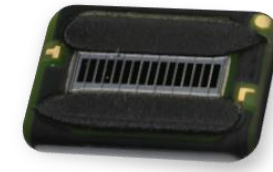
Few Pixel APD-Array in SMD package for ACC / AEC-Q 101 qualified by FIS

... 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018

12 Pixel APD-Array in ceramic package for ACC
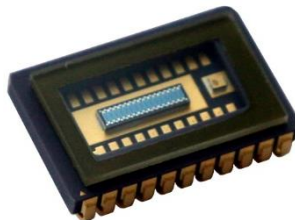
Gesture recognition with 64 pixel APD-Array
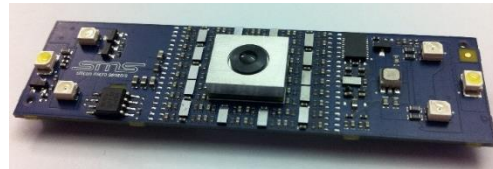
Receiver module with APD-Array, HV, TIA, MUX, Timing discriminator

Receiver module with APD and electronics integrated in one package

First Sensor

GROWTH DRIVER AUTONOMOUS DRIVING
This advantage drives automotive and industrial applications.

Automotive

www.megatechnews.com   http://www.driverless-future.com

- Safety, comfort and cost reduction infrastructure drive development of partly or fully autonomous vehicles

- First adaptation: special vehicles

- Large volume: passenger car

Industrial

www.sick.de   www.sick.de   www.geospatialworld.net

- Mix of mature and emerging applications

- Industrial applications include

  → Unmanned guided vehicles UGV

  → Security scanners

  → Mapping applications

  → Range finding (point measurement)

First Sensor

STRATEGIC PERSPECTIVE FOR PROFITABLE GROWTH

OUR STRATEGY FOR PROFITABLE GROWTH
We generate and utilize economies of scale in 4 dimensions.

① Target Markets	② Key Products & Customers	③ Forward Integration	④ Internationalization
Industrial	Key Products > 1 M€ p.a.	Sensor System	Germany
Medical		Sensor	Europe
Mobility	Key Customers > 1 M € p.a.	Component	North America
		Chip	Asia

Operative Excellence

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Operative Excellence
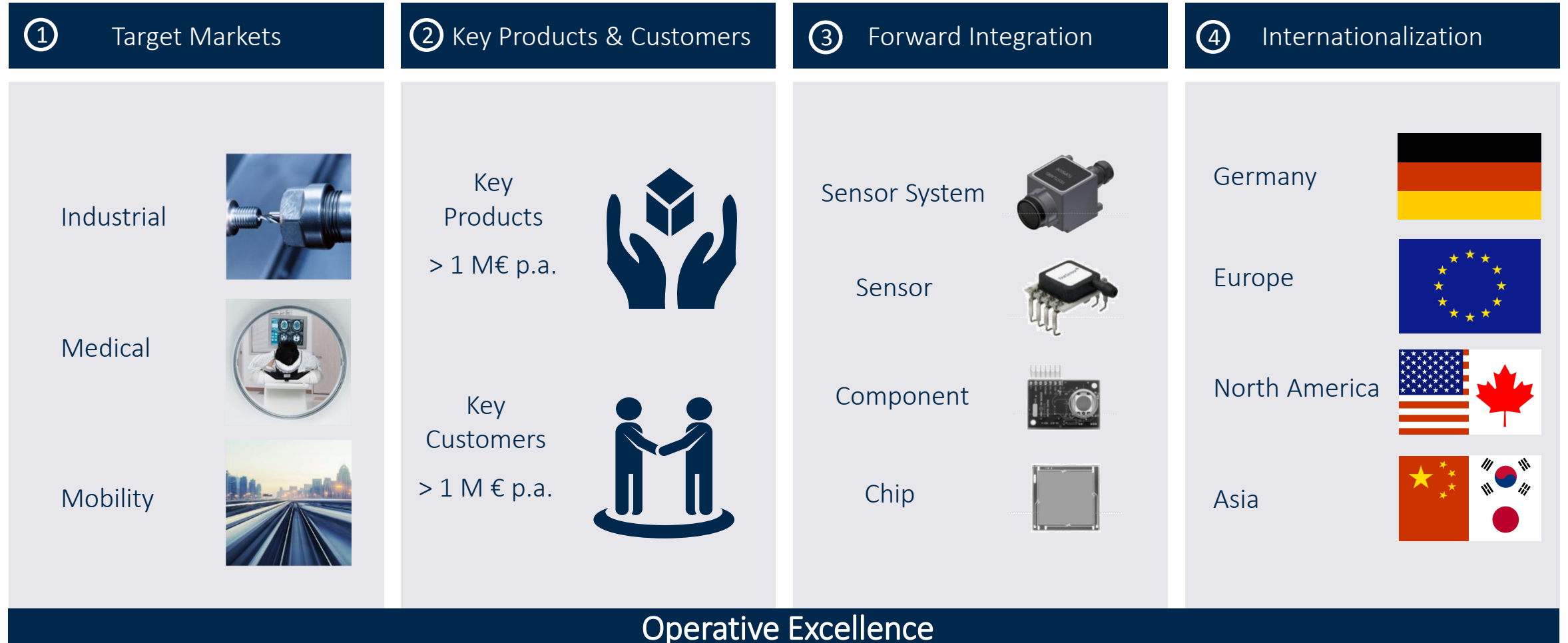
DIMENSION 1: CLEAR FOCUS ON OUR TARGET MARKETS
Our target markets are growth markets
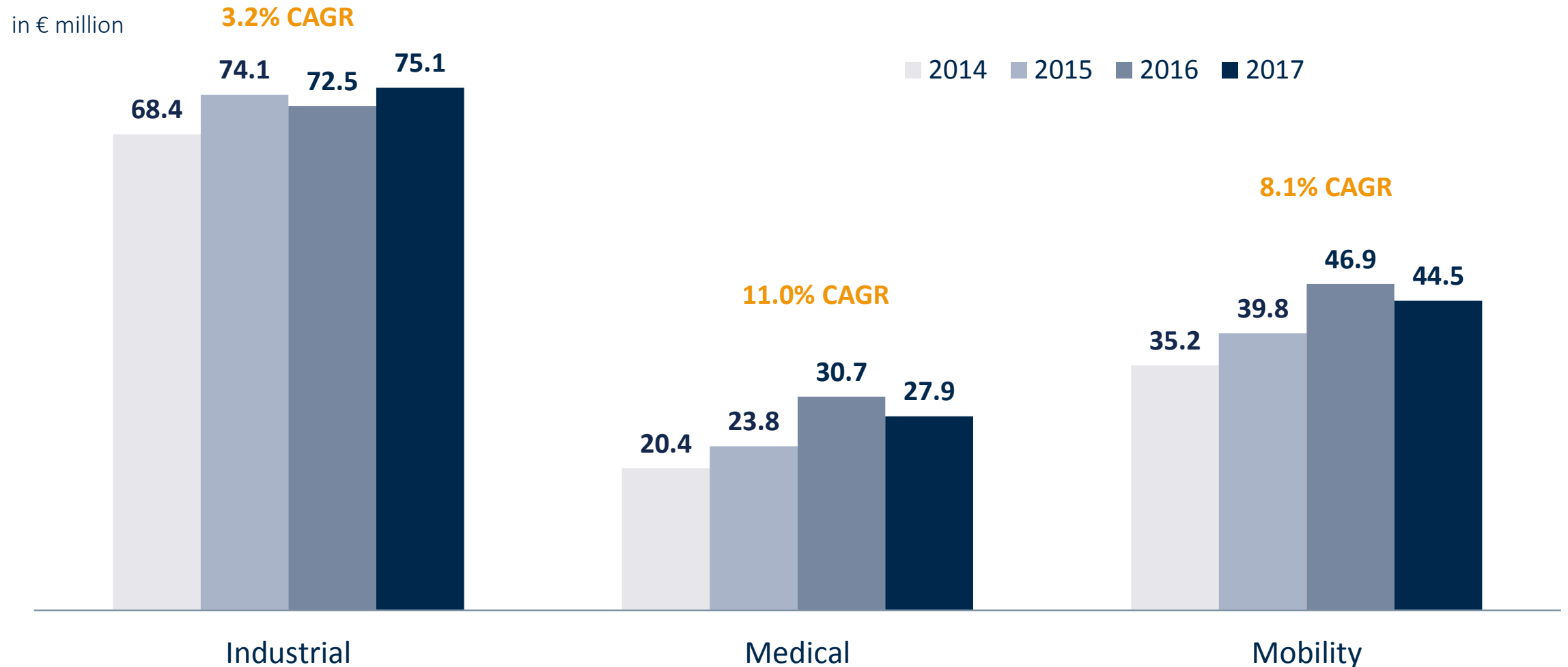
Industrial	Medical	Mobility
YOLE Développement + 6.0 % up to 2018 + 10.8 % up to 2020	**YOLE** Développement + 11.0 % up to 2020	**YOLE** Développement + 13.0 % up to 2018 + 10.8 % up to 2020

AMA Verband für Sensorik + Messtechnik   + 8.0 % in 2018

Gartner   + 7.5 % in 2018

First Sensor

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	Key Customers > 1 M € p.a.	Component	North America
Mobility		Chip	Asia

Operative Excellence

DIMENSION 2: CLEAR FOCUS ON KEY CUSTOMERS & PRODUCTS
Why is this efficient?

Key Customers	Key Products

- ▶ Single respective product developments result in relatively large quantities and therefore sales volumes.
- ▶ Sales per head in both sales and engineering increases – our existing team will be able to handle larger revenue streams.
- ▶ „Mix & Noise" in operations are decreased due to reduced parts variety and transactions per revenue.
- ▶ Our supply chain and own production will gain in productivity and can be managed with fewer resources per revenue.
- ▶ With higher quantities per part our purchasing power will increase.
- ▶ With more varietal purity we increase the stability of our value creation process.
- ▶ Lead time, on time delivery and quality will improve as a result.

Our growth becomes more scalable and our profitability increases.

First Sensor
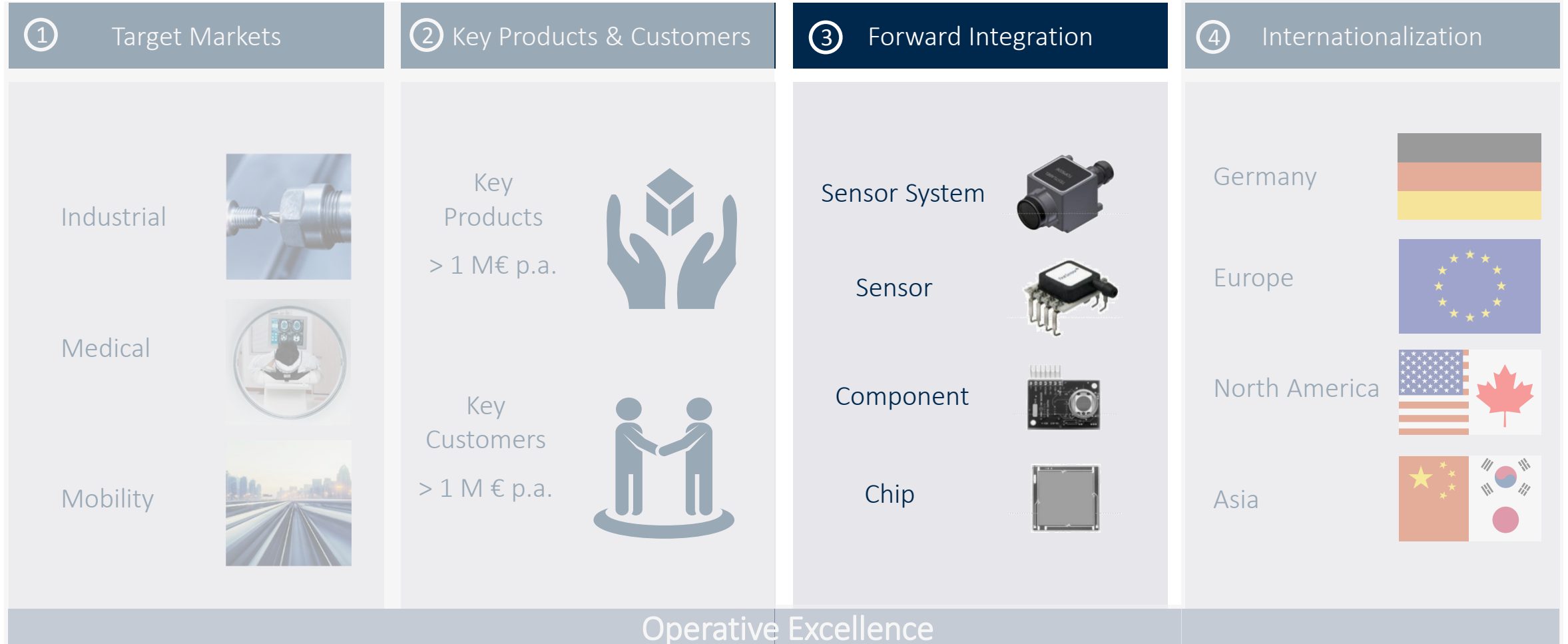
We base our forward integration initiatives on clear product roadmaps.

Radiation
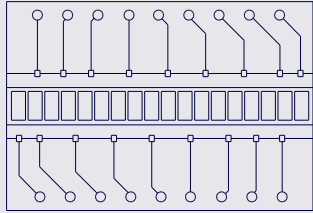
Flow
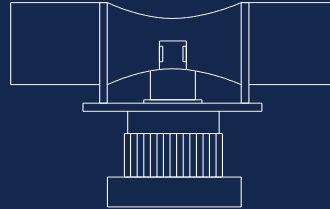
Acceleration
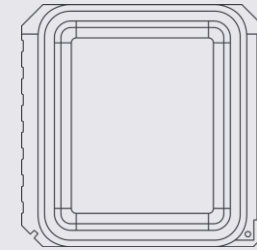
Light
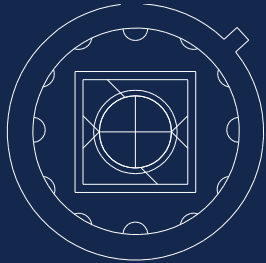
Level
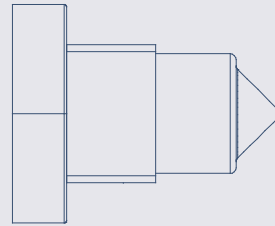
Pressure
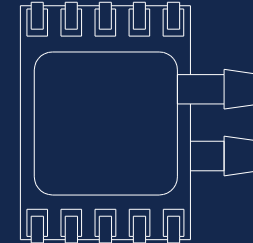
Integrated Manufacturing Services

Multi Sensor Systems

One example is a multi sensor system for HVAC applications
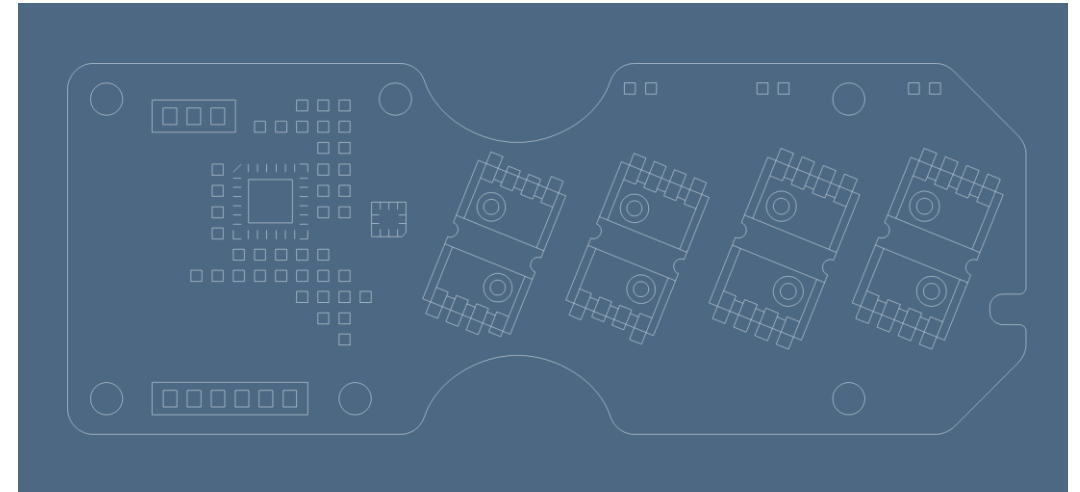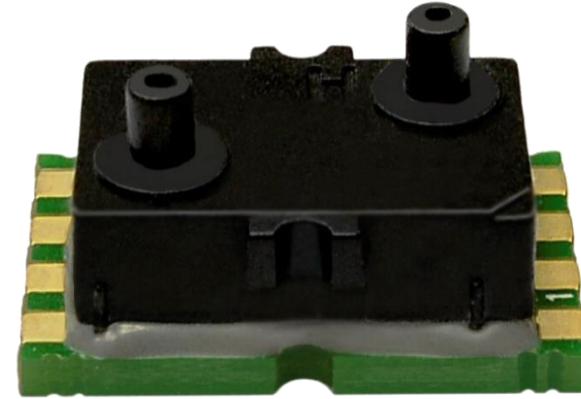
OUR STRATEGY FOR PROFITABLE GROWTH
We generate and utilize economies of scale in 4 dimensions.

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Industrial	Key Products > 1 M€ p.a.	Sensor System	Germany
Medical		Sensor	Europe
Mobility	Key Customers > 1 M € p.a.	Component	North Amerika
		Chip	Asia

Operative Excellence

DIMENSION 4: CLEAR FOCUS ON INTERNATIONALIZATION
We generated further growth in our key sales regions

in € million
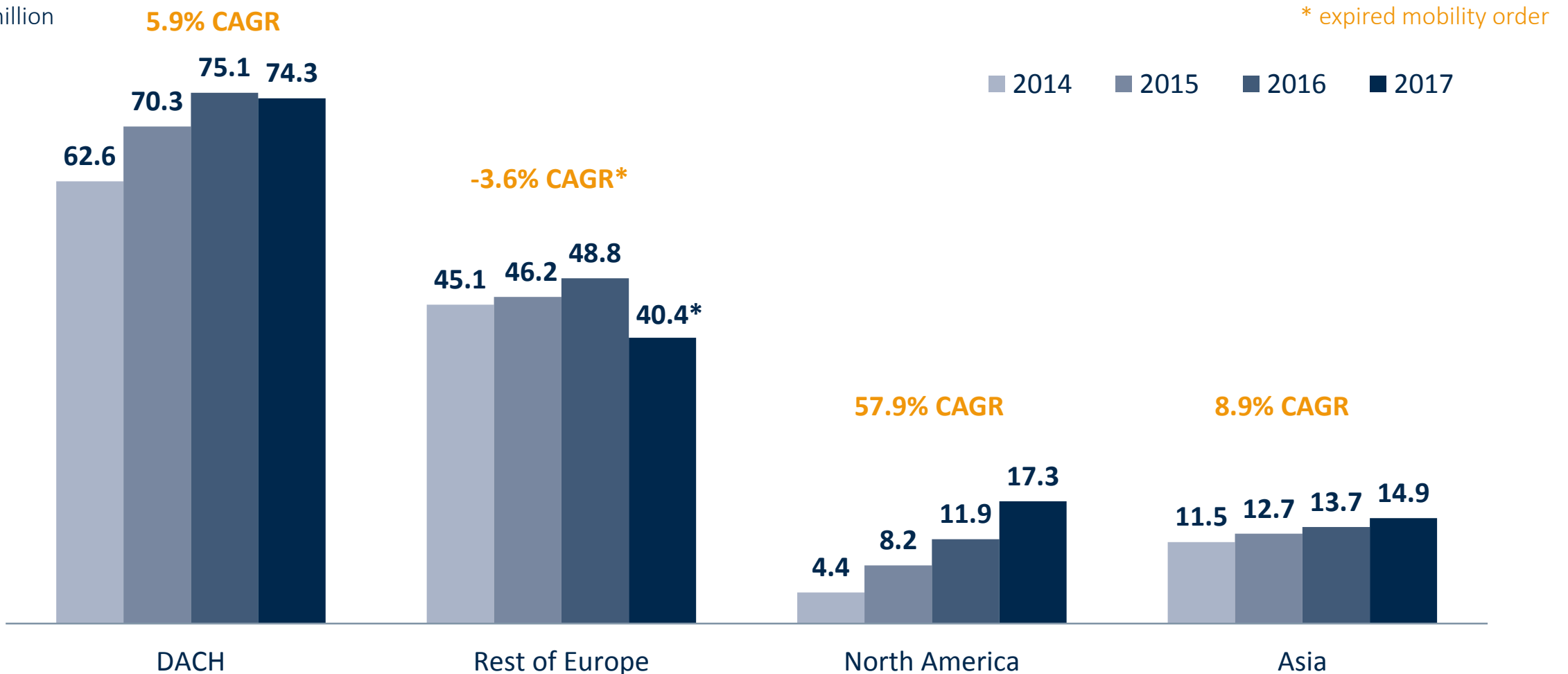
5.9% CAGR

* expired mobility order

2014　2015　2016　2017

DACH
62.6　70.3　75.1　74.3

Rest of Europe
-3.6% CAGR*
45.1　46.2　48.8　40.4*

North America
57.9% CAGR
4.4　8.2　11.9　17.3

Asia
8.9% CAGR
11.5　12.7　13.7　14.9

First Sensor

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Medical		Sensor	Europe
Mobility	Key Customers > 1 M € p.a.	Component	North Amerika
		Chip	Asia

Operative Excellence

Our current core initiatives

Top Initiatives	
▶ T's & C's Harmonization	✅
▶ Harmonized Core Processes	✅
▶ OneERP	✔ progressing
▶ Lead Time, On-Time Delivery, Quality	✔ continuous
▶ Portfolio Optimization	ongoing
▶ Portfolio Consolidation	ongoing

FINANCIAL KEY FIGURES

FINANCIAL KEY FIGURES
We are clearly on a path of growth

sales in € million

* Guidance 2018
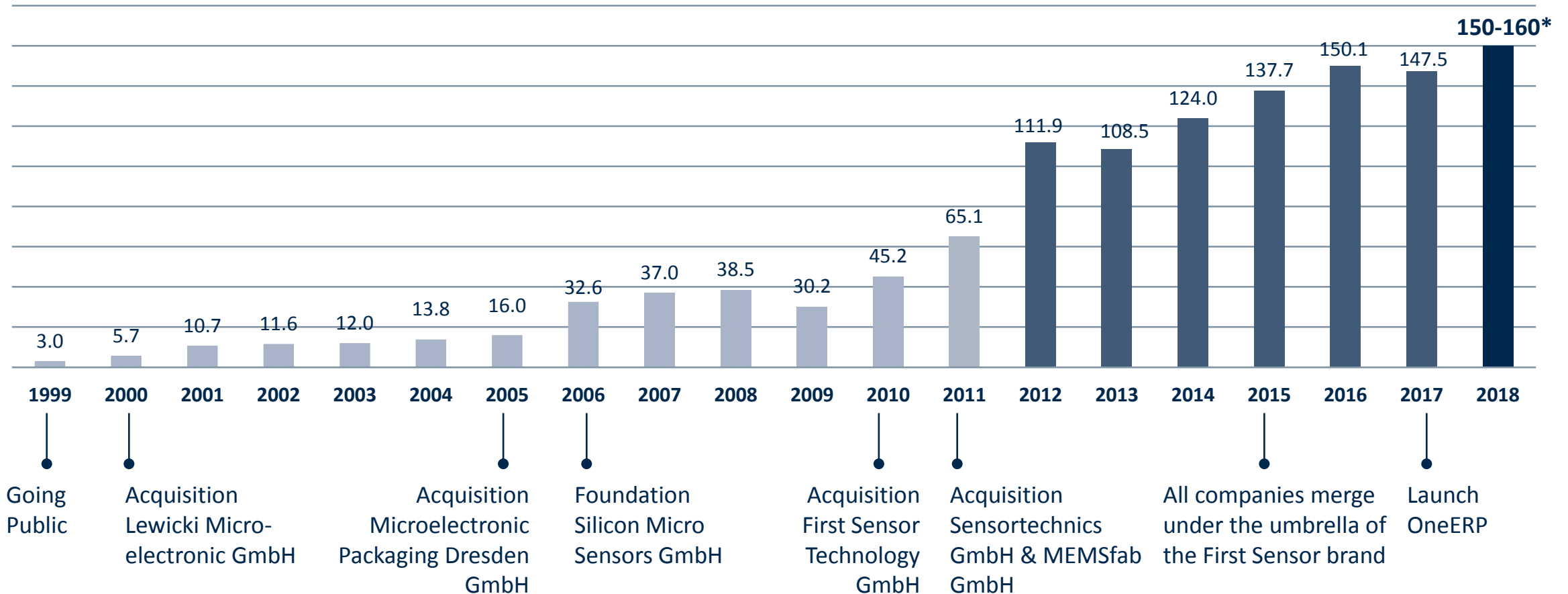
150-160*

Year	Sales	Event
1999	3.0	Going Public
2000	5.7	Acquisition Lewicki Micro-electronic GmbH
2001	10.7	
2002	11.6	
2003	12.0	
2004	13.8	
2005	16.0	Acquisition Microelectronic Packaging Dresden GmbH
2006	32.6	Foundation Silicon Micro Sensors GmbH
2007	37.0	
2008	38.5	
2009	30.2	
2010	45.2	Acquisition First Sensor Technology GmbH
2011	65.1	Acquisition Sensortechnics GmbH & MEMSfab GmbH
2012	111.9	
2013	108.5	
2014	124.0	
2015	137.7	All companies merge under the umbrella of the First Sensor brand
2016	150.1	
2017	147.5	Launch OneERP
2018	150-160*	

First Sensor
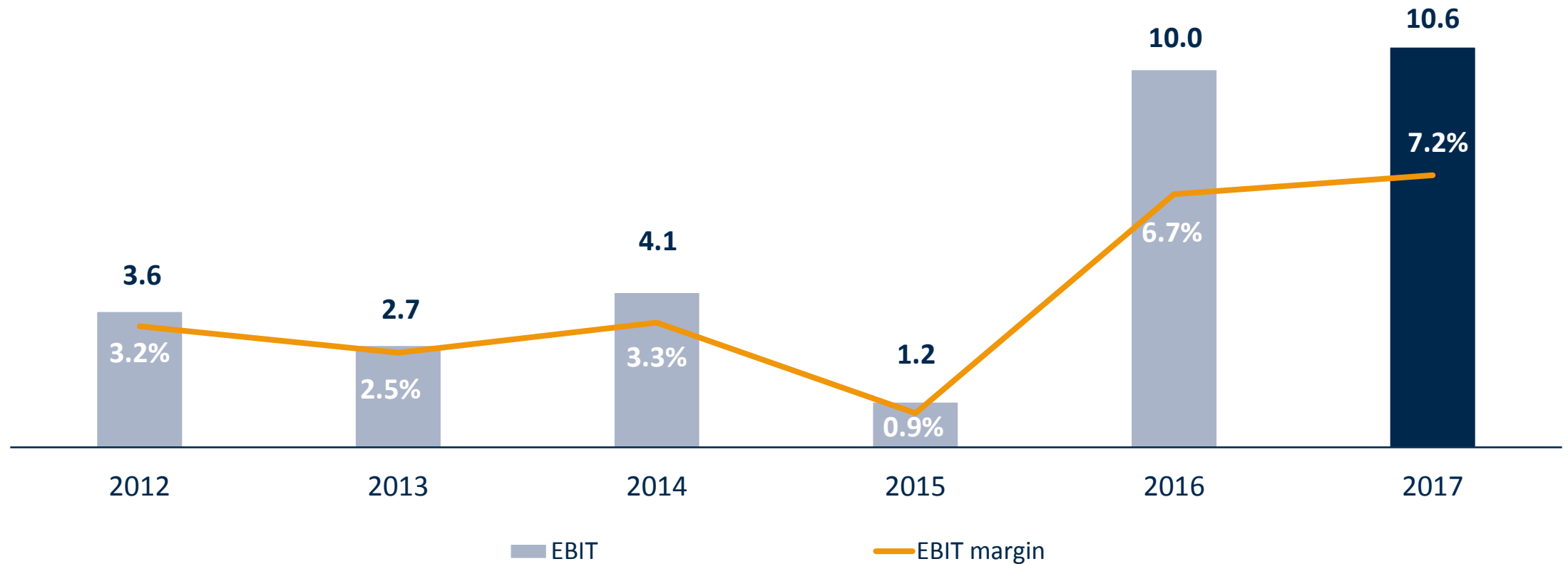
FINANCIAL KEY FIGURES
Q1 sales with € 34.5 million on level of previous year

Total sales in € million

Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018
35.4	34.3	34.6	39.3	39.3	34.5
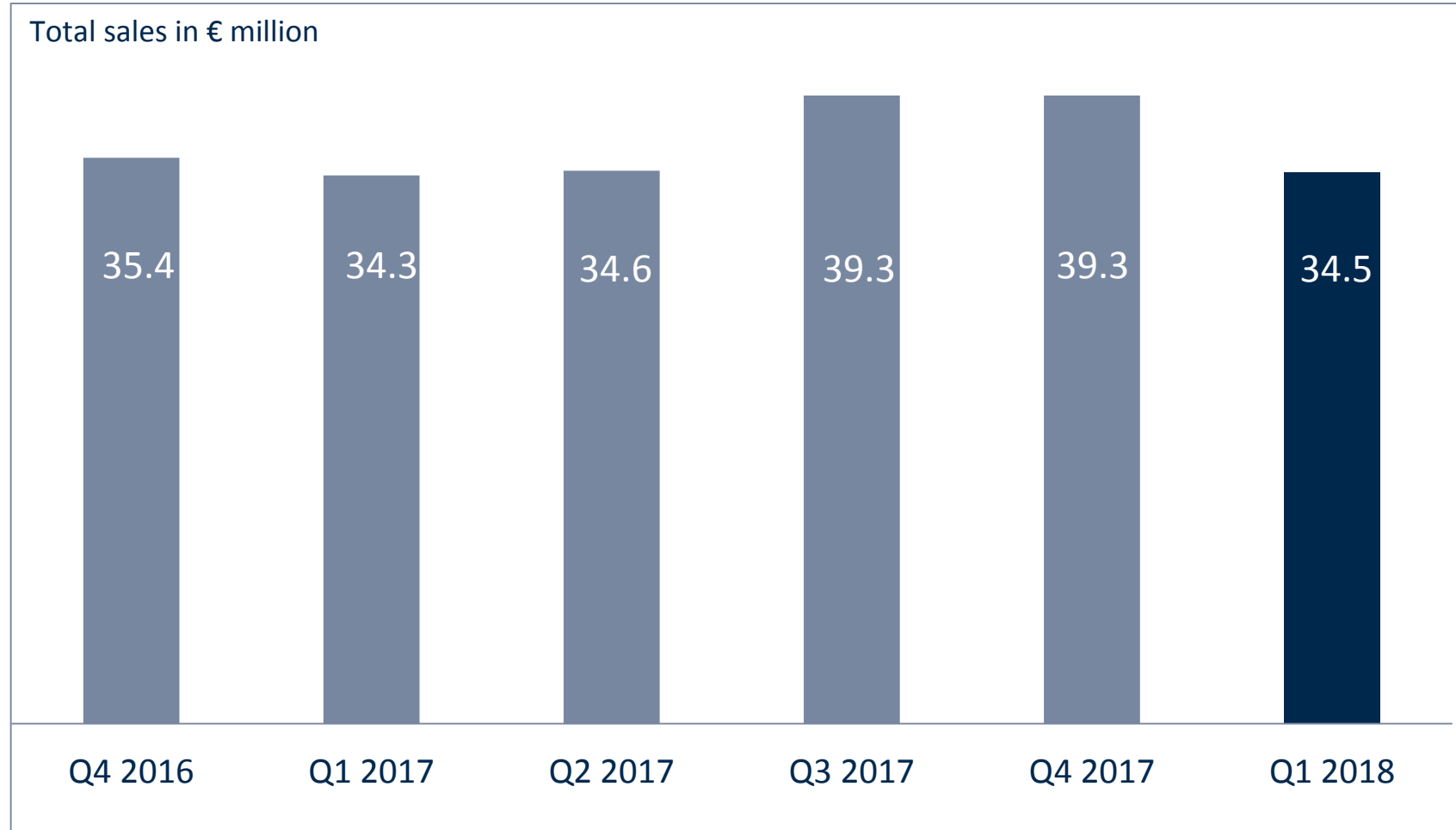
Comments

Production recorded decreased output due to the introduction of a new ERP system for company management.

As a result the booked order volume was not produced in full.

This is also evident in our order backlog, which at €97.3 million is €4.8 million up on the fourth quarter of 2017.

First Sensor

FINANCIAL KEY FIGURES
Reduced output is evident in order backlog of €97.3 million

in € million

orders on hand ■ sales ■

	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018
orders on hand	82.2	88.9	90.7	96.5	92.5	97.3
sales	35.4	34.3	34.6	39.3	39.3	34.5

Comments

Order backlog with €97.3 million €4.8 million up on the fourth quarter of 2017; € 8.4 million up on the first quarter of 2017
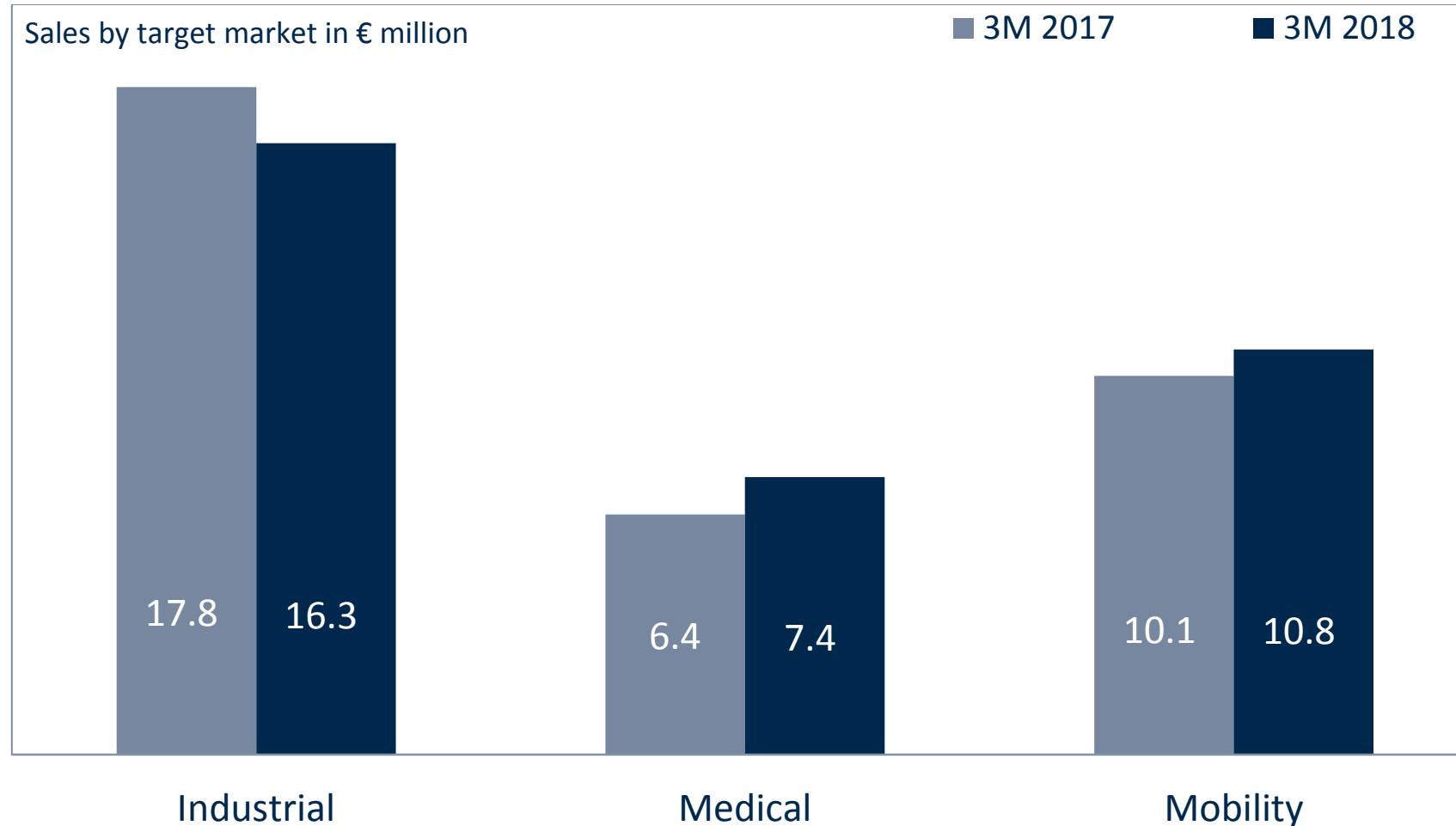
First Sensor ✺

Further growth in all target markets over the course of the year

Sales by target market in € million | ■ 3M 2017 | ■ 3M 2018

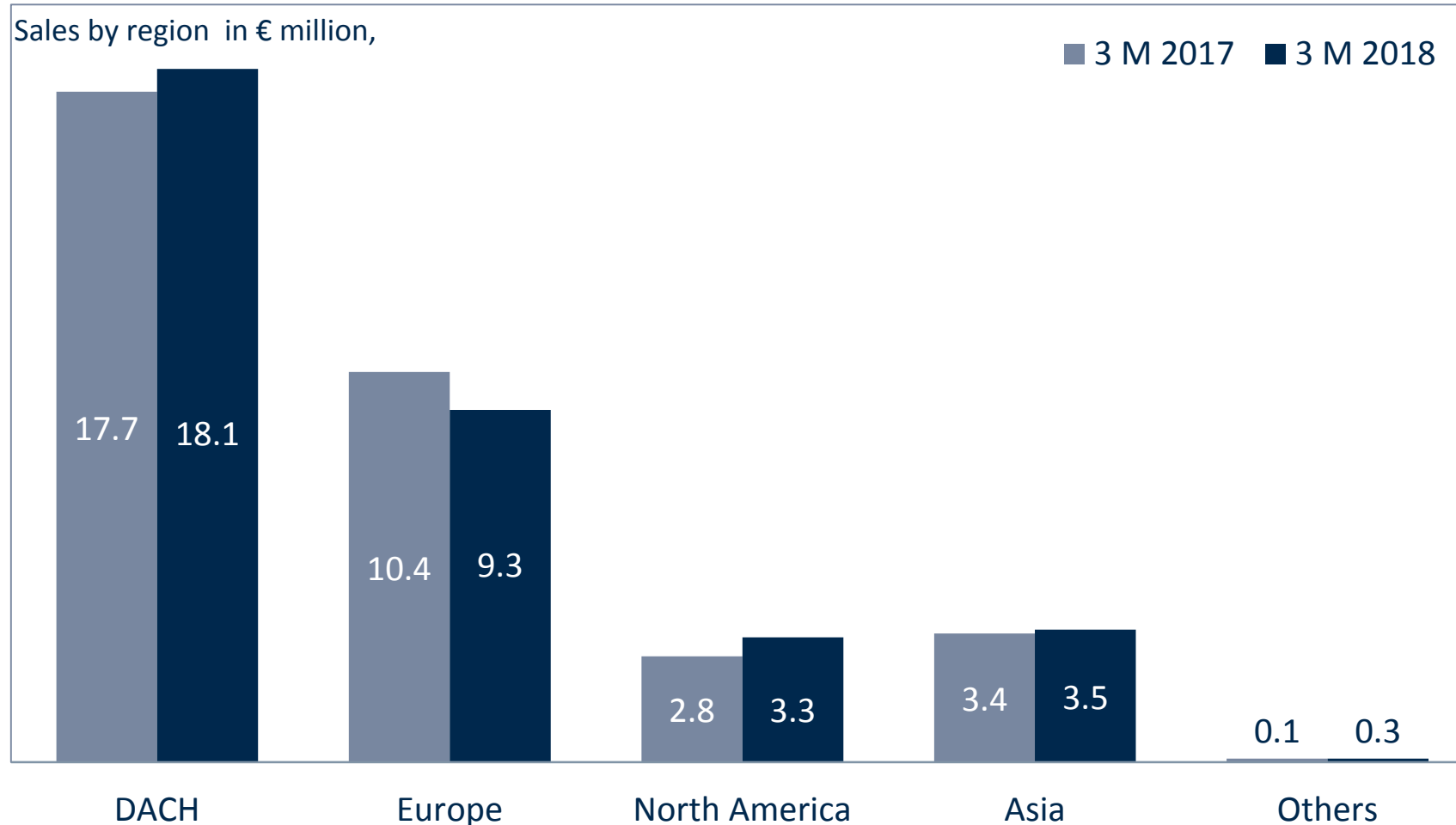| Target market	3M 2017	3M 2018
Industrial	17.8	16.3
Medical	6.4	7.4
Mobility	10.1	10.8

Comments

IND: lower sales volume closing date related; sales share 47.3%

MED: sales increase primarily due to optical diagnostics customers; sales share 21.3%

MOB: increase primarily due to greater demand in the area of pressure sensor technology; sales share 31.4%

First Sensor

FINANCIAL KEY FIGURES
DACH region still the most important market

Sales by region in € million,

■ 3 M 2017 ■ 3 M 2018

Region	3 M 2017	3 M 2018
DACH	17.7	18.1
Europe	10.4	9.3
North America	2.8	3.3
Asia	3.4	3.5
Others	0.1	0.3

Comments
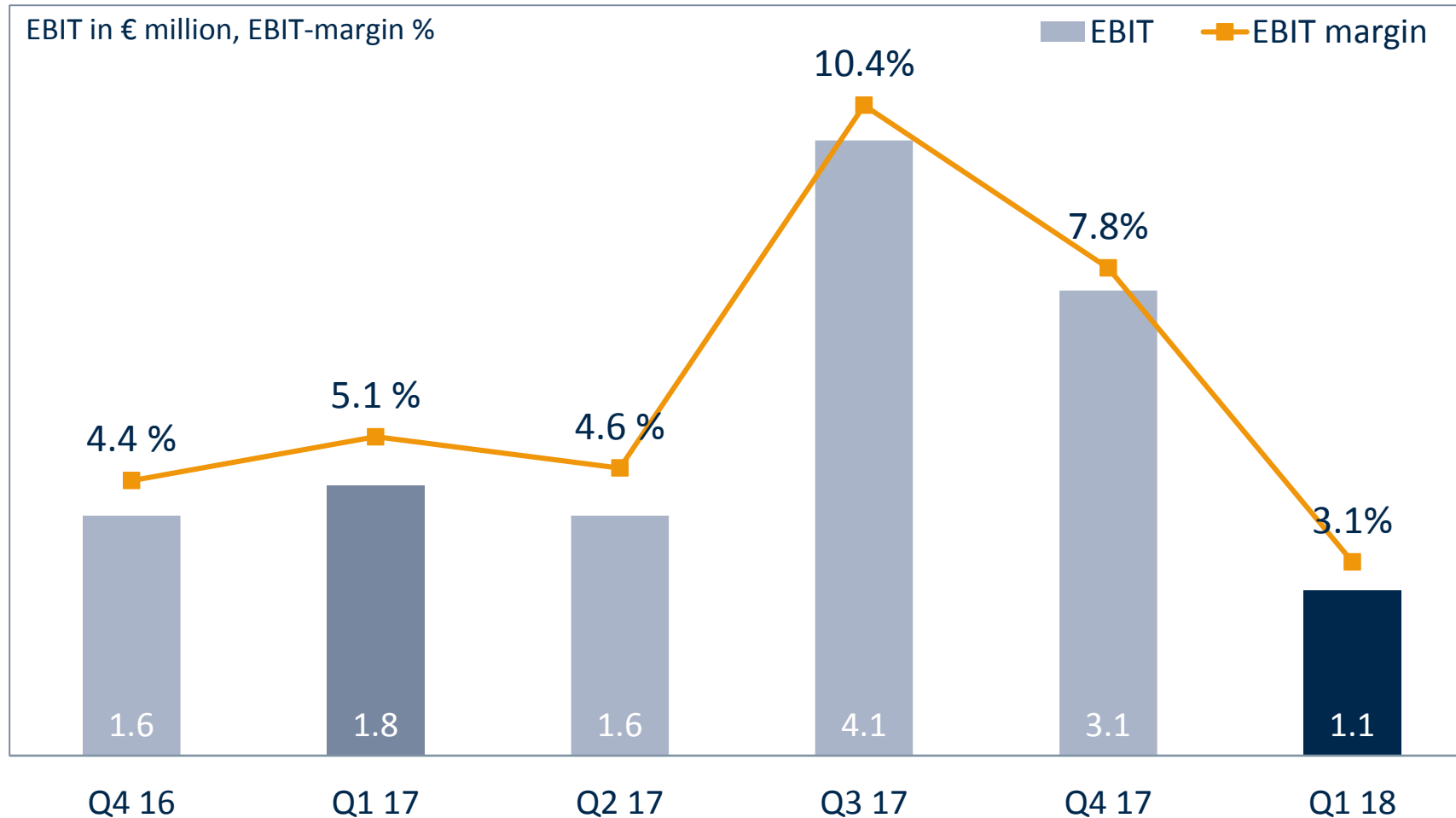
No mayor changes in sales split by regions

German-speaking area with 53.0% still the most important market

Rest of Europe: sales share 27.0%; decrease due to shifts in supplier countries on the part of customers

Sales share North America and Asia increased further to 9.6% and 10.1%

First Sensor ✦

Cash flow items improve slightly year-on-year

in € million

Operating Cash Flow

0.1

-0.2

3M 2017   3M 2018

Free Cash Flow

-2,5

-1.9

3M 2017   3M 2018
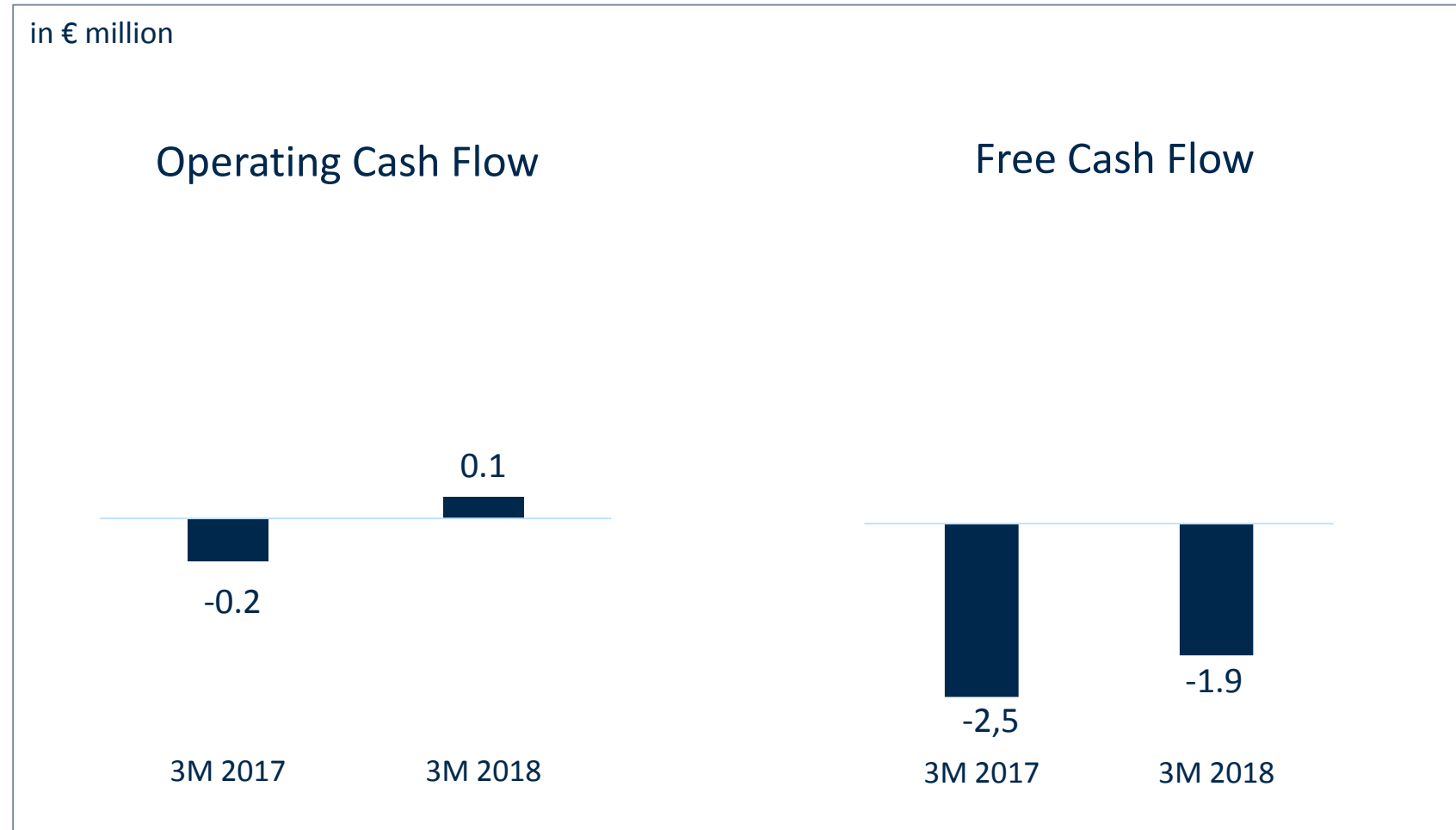
Comments

With roughly constant sales and a significant increase in inventories, operating cash flow improved slightly

Moderate additions to investments curbed the outflow of cash

Negative cash flow from financing activities with €-0.6 million also lower

FINANCIAL KEY FIGURES
Consolidated balance sheet almost unchanged

in € million

	159.6	159.2	159.6	159.2

Assets

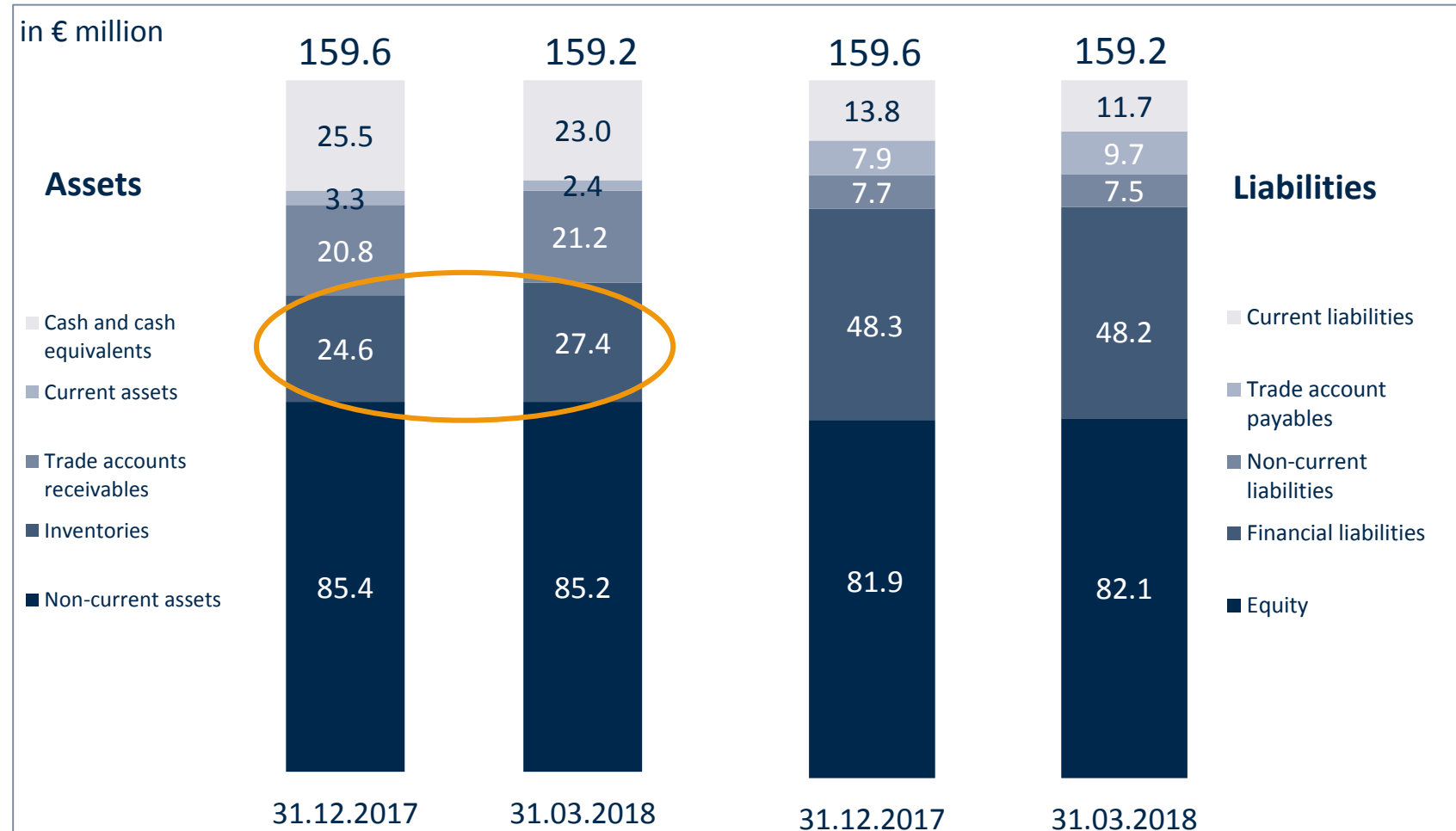| 31.12.2017	31.03.2018	31.12.2017	31.03.2018
25.5	23.0	13.8	11.7
3.3	2.4	7.9	9.7
20.8	21.2	7.7	7.5
24.6	27.4	48.3	48.2
85.4	85.2	81.9	82.1

Liabilities

Assets legend:
- Cash and cash equivalents
- Current assets
- Trade accounts receivables
- Inventories
- Non-current assets

Liabilities legend:
- Current liabilities
- Trade account payables
- Non-current liabilities
- Financial liabilities
- Equity

Comments

increase in inventories of around €2.8 financed with cash and cash equivalents to allow improvement in delivery capability
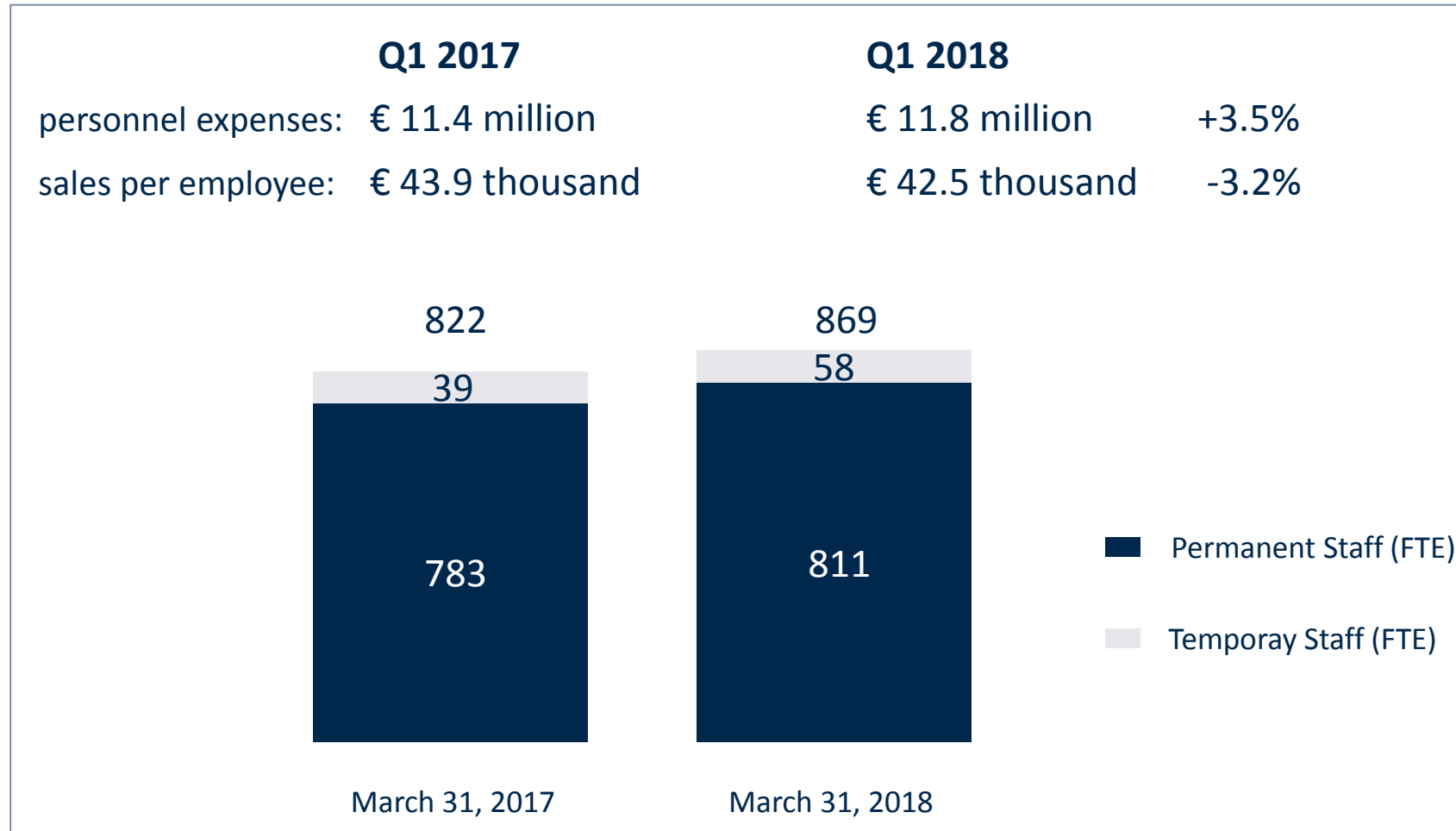
Net debt with €25.2 million slightly lower than in the previous year (PY: €27.3 million)

Equity increased to €82.1 million (PY: €78.7 million)

Equity ratio 51.5% (PY: 50.9%)

Growth-driven investments in expanding personnel levels

	Q1 2017	**Q1 2018**	
personnel expenses:	€ 11.4 million	€ 11.8 million	+3.5%
sales per employee:	€ 43.9 thousand	€ 42.5 thousand	-3.2%

822

39

783

March 31, 2017

869

58

811

March 31, 2018

■ Permanent Staff (FTE)
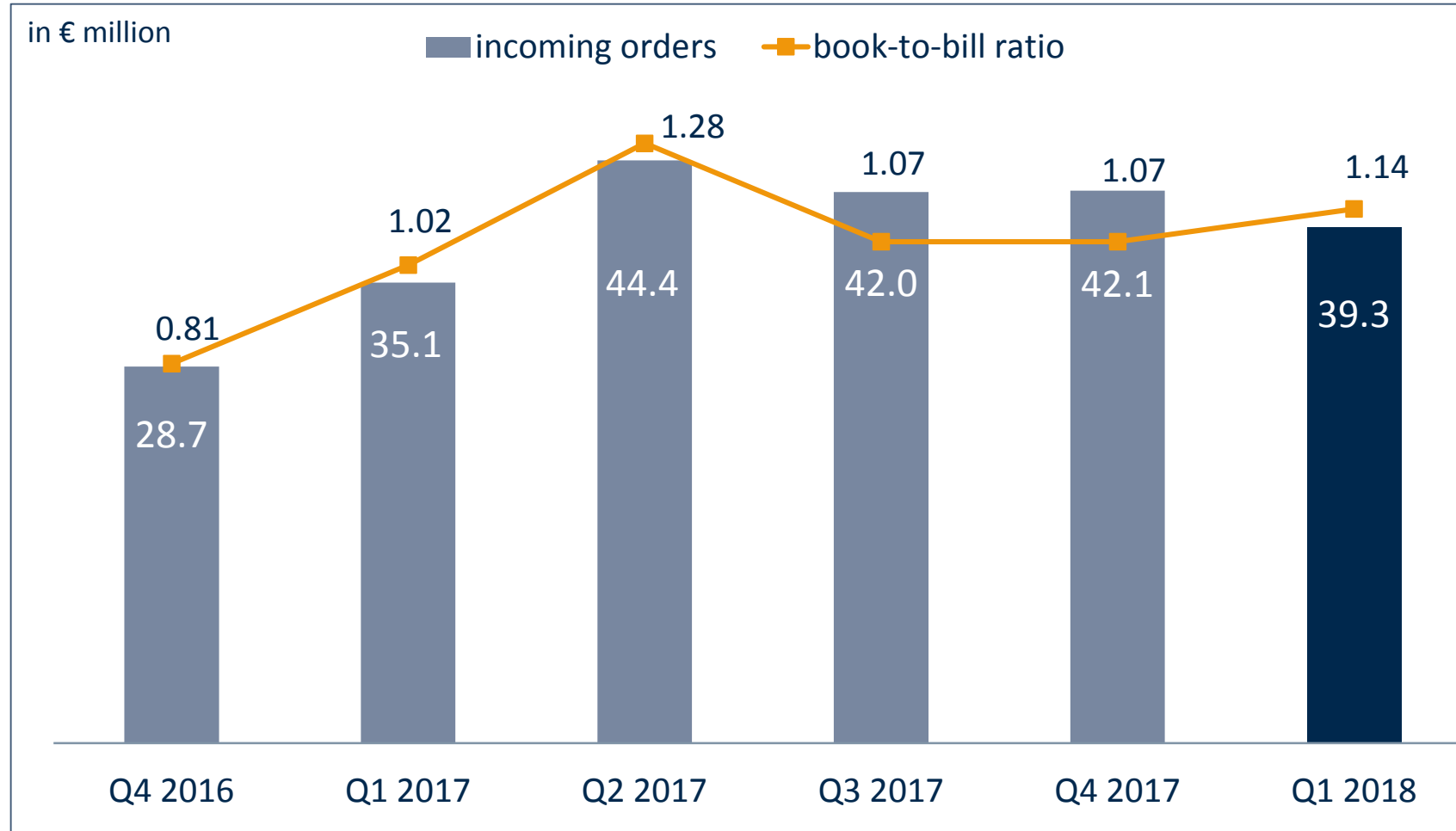
▢ Temporay Staff (FTE)

Comments

The increase in employees is attributable to additional requirements for services to be performed in the current fiscal year and to drive further growth

Focus of new hires: Sales and production

First Sensor

Management confirms guidance 2018

SALES REVENUES	**150 - 160**	MILLION EURO
EBIT MARGIN	**7 - 9**	PERCENT

FURTHER INFORMATION

FURTHER INFORMATION
Executive Board

Dr. Dirk Rothweiler
CEO

since Jan. 1, 2017

Year	Role
2017	CEO, First Sensor AG
2008	Executive Vice President Optical Systems, Jenoptik AG
2005	Vice President Sales and Service, TCZ
2000	Managing Director Asia-Pacific, Süss Microtec Co. Ltd.
1999	Director Sales & Marketing, Süss Microtec AG
1995	Project Manager for the Semiconductor Technology Division, Carl Zeiss
1995	Doctorate from the Department of Engineering, RWTH Aachen

Dr. Mathias Gollwitzer
CFO

since Aug. 10, 2015

Year	Role
2015	CFO, First Sensor AG
2012	Vice President Group Controlling, EnBW Energie Baden-Württemberg AG
2008	CFO, Mercedes-Benz France SAS
2006	Director Corporate Controlling, DaimlerChrysler AG
2005	CFO, DaimlerChrylser Belgium/Luxembourg NV/SA
2002	Director Research and Technology, Daimler AG
1999	CEO, Temic Sprachverarbeitung GmbH
1995	Director Division Controlling, Telefunken Systemtechnik Gmb
1992	Expert Adviser Finance/Controlling, Deutsche Aerospace AG

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FURTHER INFORMATION
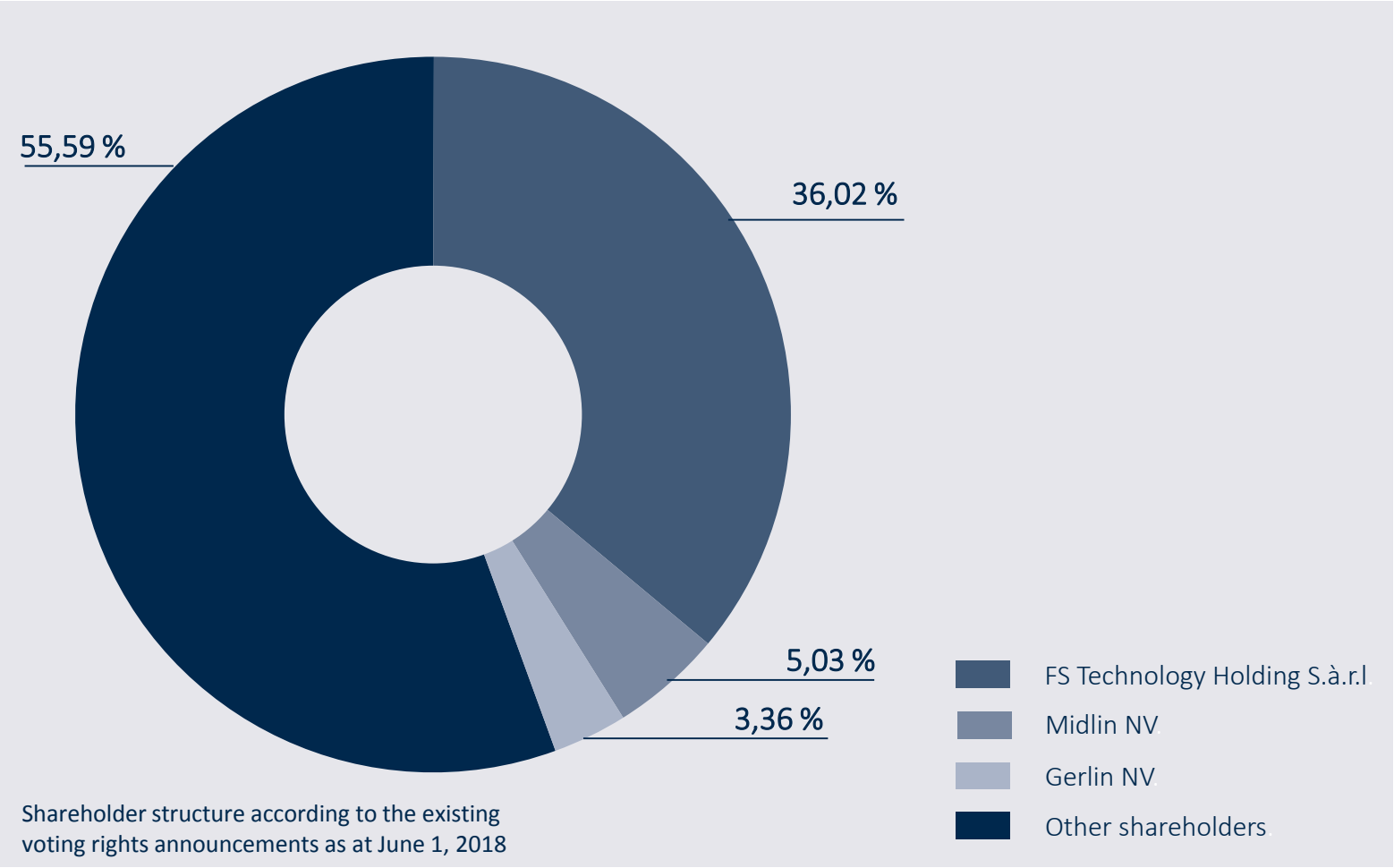## Financial Calendar 2018

When?	What?
13.08.2018	6-Month Financial Report, https://webcasts.eqs.com/firstsensor20180813
12.11.2018	Q3 Interim Report, https://webcasts.eqs.com/firstsensor20181112
26./27.11.2018	Analyst' Conference: German Equity Forum, Sheraton Airport Hotel, Frankfurt am Main

First Sensor ✆

First Sensor Share

Key facts*

Market Cap:	€ 219,65 m
Traded stocks/day:	15,073
30 Day High:	25,4
30 Day Low:	20,5
Index Ranking Free Float Market Capitalization:	50
Index Ranking Turnover:	44

* May 31, 2018

55,59 %
36,02 %
5,03 %
3,36 %

Shareholder structure according to the existing voting rights announcements as at June 1, 2018

- FS Technology Holding S.à.r.l
- Midlin NV
- Gerlin NV
- Other shareholders

First Sensor

WE LEAD THE FUTURE

Company Presentation

This presentation contains forward-looking statements. This presentation does not represent any solicitation to purchase shares of First Sensor AG. Rather it is intended exclusively for information purposes with regard to possible future developments at the company. All future-oriented information in this presentation was produced on the basis of probability-based planning and represents statements regarding the future which cannot be guaranteed. Rounding differences may occur.

First Sensor AG, Investor Relations
T +49 30 63 99 23 760
E ir@first-sensor.com