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# COMPANY PRESENTATION

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12TH ODDO BHF GERMAN CONFERENCE

21<sup>ST</sup> & 22<sup>ND</sup> FEBRUARY, 2018



# OUR EXECUTIVE BOARD

Dr. Rothweiler and Dr. Gollwitzer are experienced industry managers.



Dr. Dirk Rothweiler  
CEO

since Jan. 1, 2017

- 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

- 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, DaimlerChrysler Belgium/Luxembourg NV/SA
- 2002 Director Research and Technology, Daimler AG
- 1999 CEO, Temic Sprachverarbeitung GmbH
- 1995 Director Division Controlling, Telefunken Systemtechnik GmbH
- 1992 Expert Adviser Finance/Controlling, Deutsche Aerospace AG

# FIRST SENSOR AT A GLANCE

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# OUR COMPETENCE

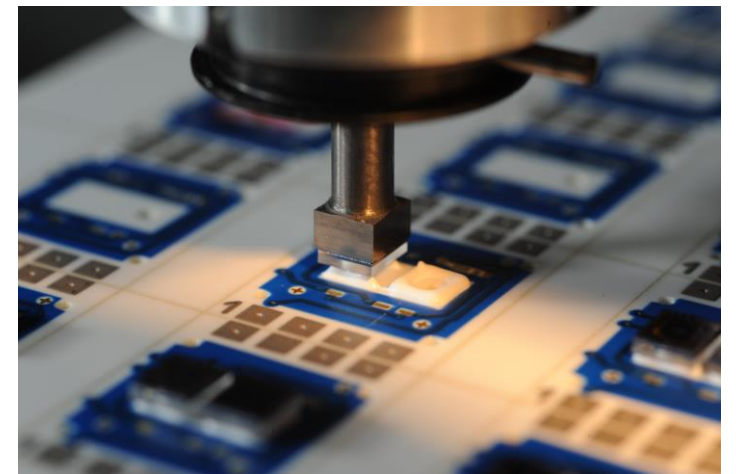
We are an expert for semiconductor production.





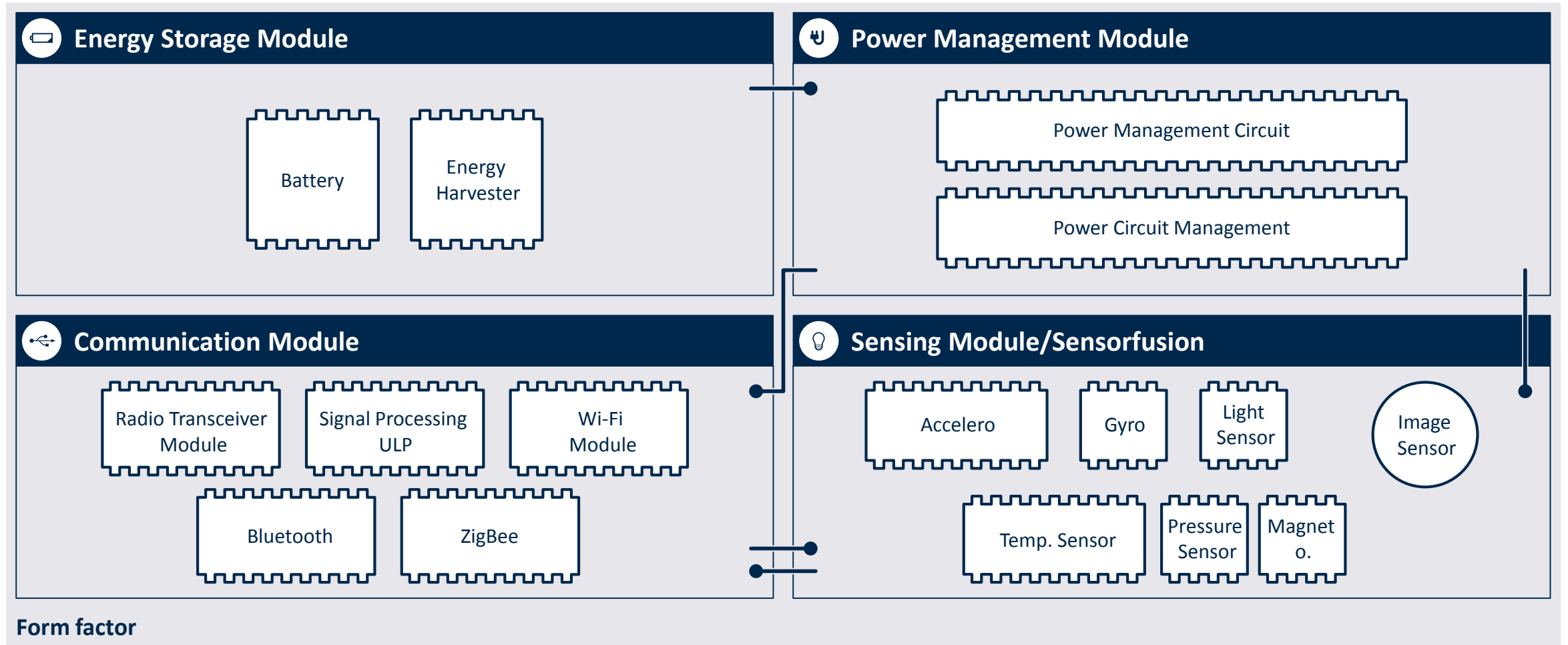
# OUR COMPETENCE

And possess extensive experience in micro systems technology.



# OUR COMPETENCE

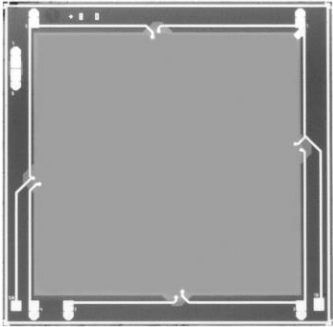
We combine these competences with profound system expertise.



# OUR COMPETENCE

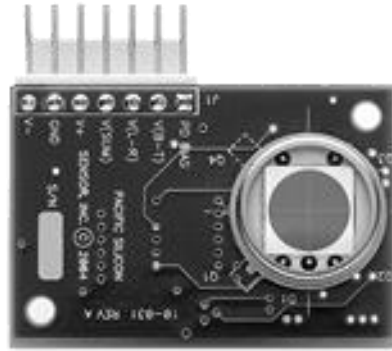
Thereby, we cover the entire value chain of sensor technology.

## Sensor chip



- Silicon based
- converts physical parameters into electrical signals

## Packaging



- Connecting microelectronic and non-electronic micro components to a housing

## Sensor



- Consists of a sensor chip, a housing and electronics
- The measurement signal can be calibrated

## Sensor system



- Measures and preprocesses data
- communicates with other systems

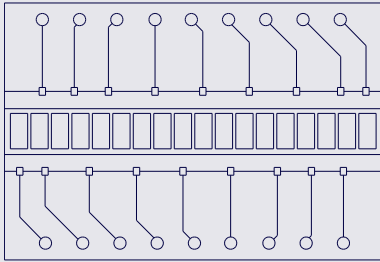
Detect

Detect & Understand

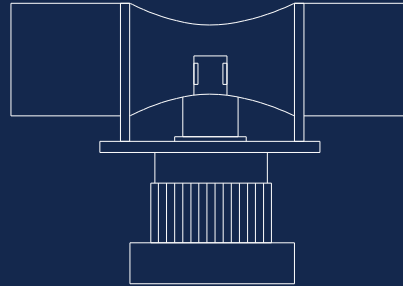
# OUR RANGE OF SERVICES

We develop and produce standard products and sensor solutions.

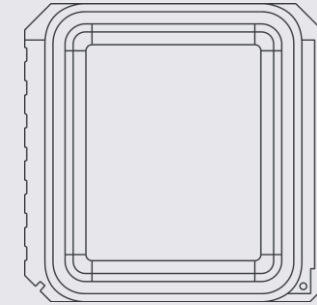
Radiation



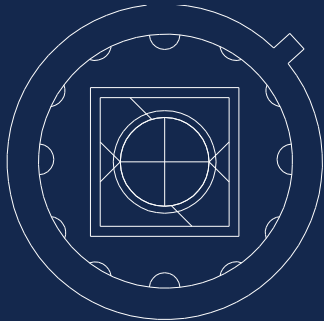
Flow



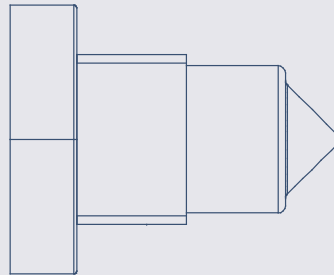
Acceleration



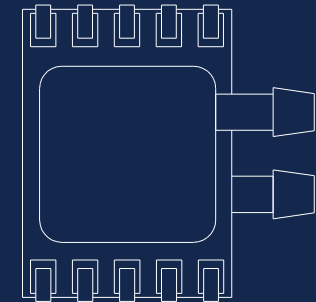
Light



Level



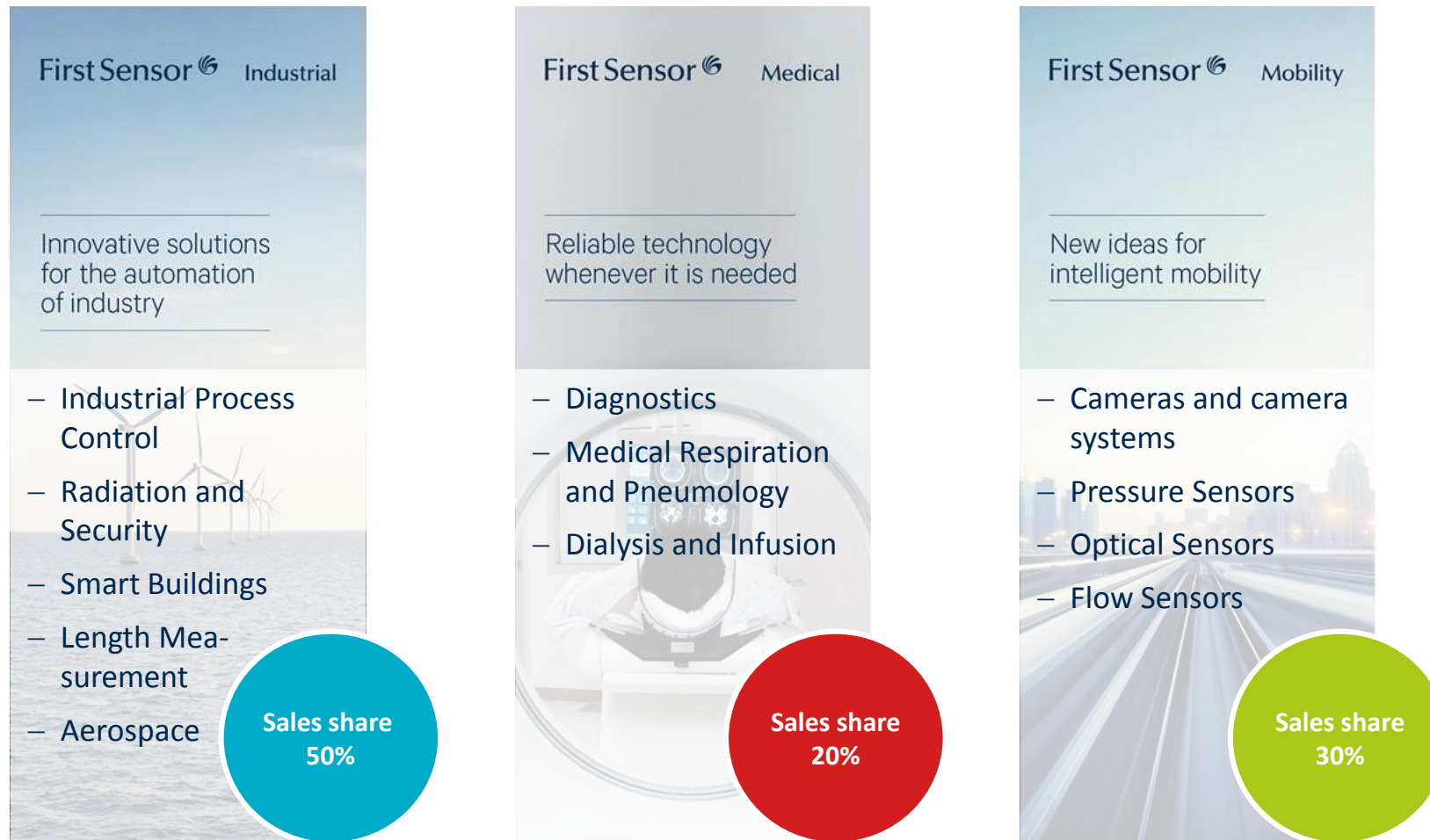
Pressure





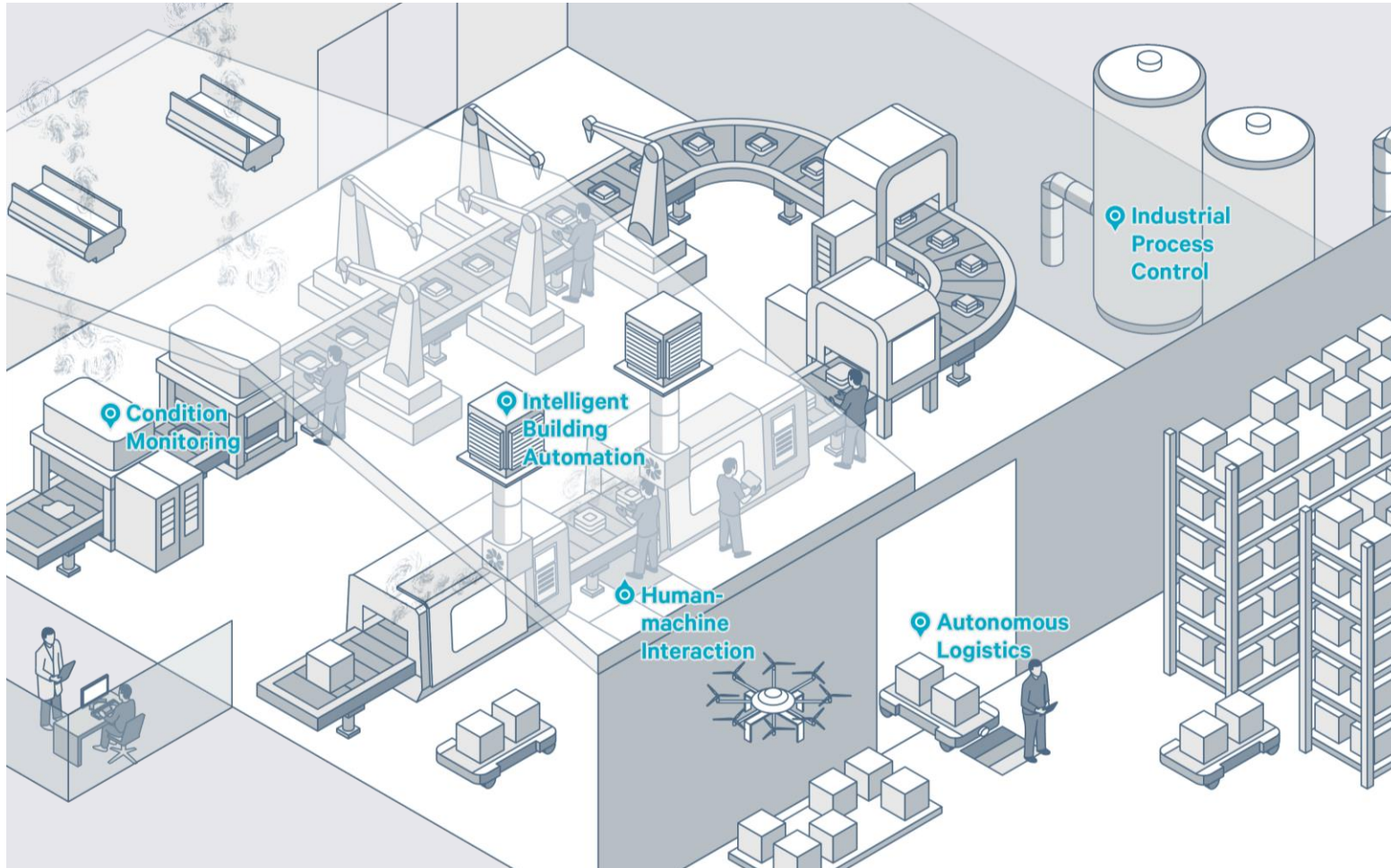
# OUR MARKETS

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

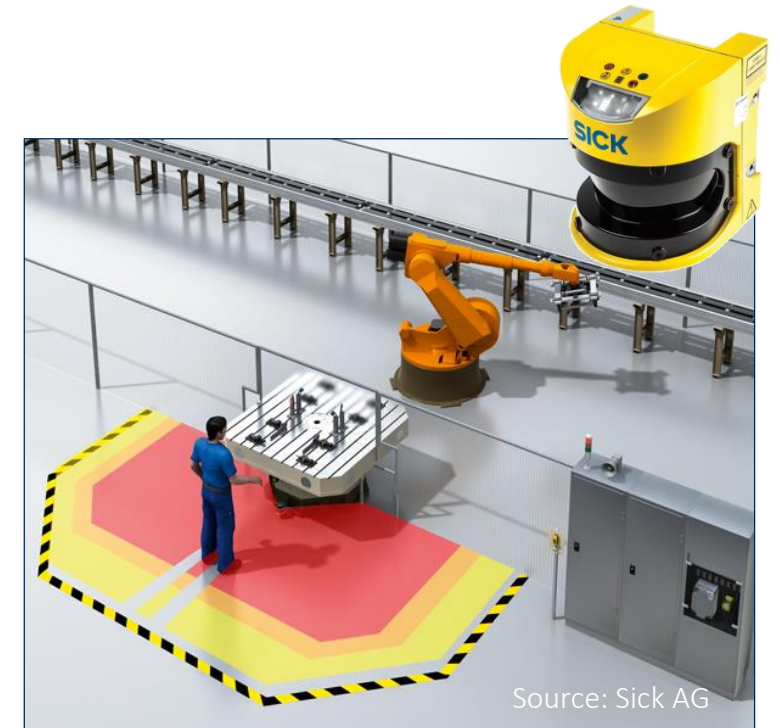


# OUR MARKETS

The industrial market is marked by smart processes.



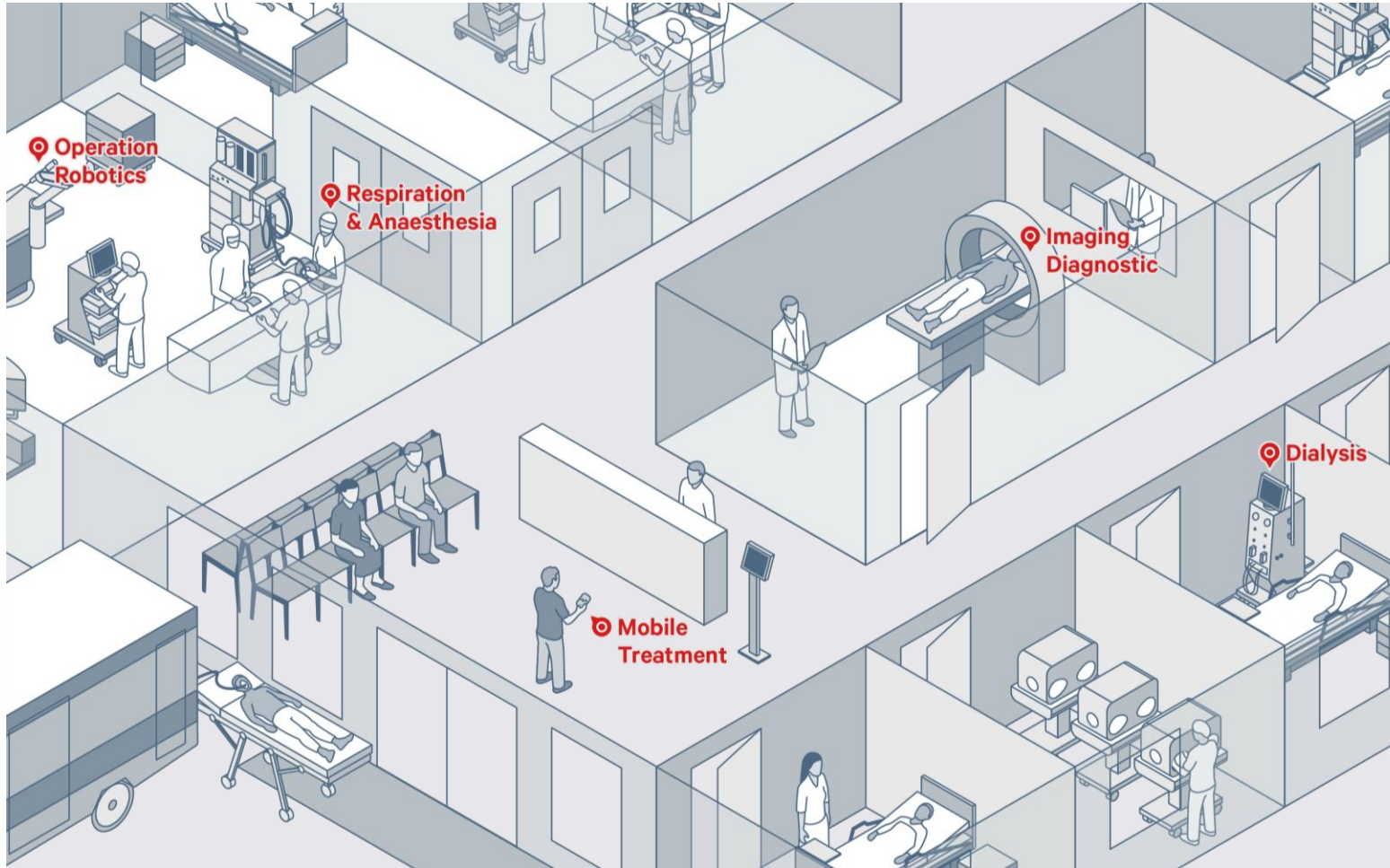
Intelligent sensor systems control applications such as condition monitoring, predictive maintenance or human-machine collaboration.



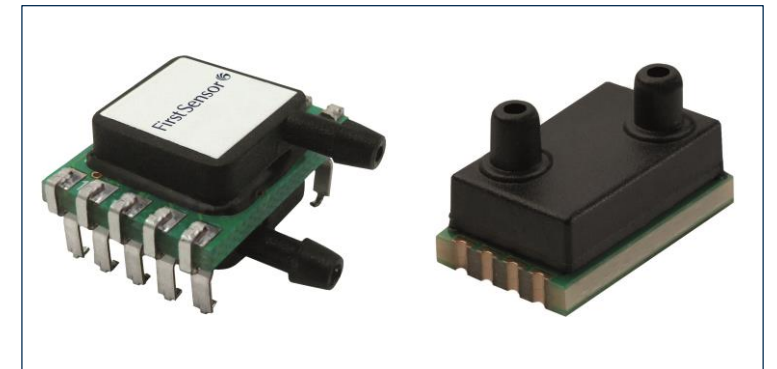


# OUR MARKETS

The medical market is characterized by miniaturization & digital health.

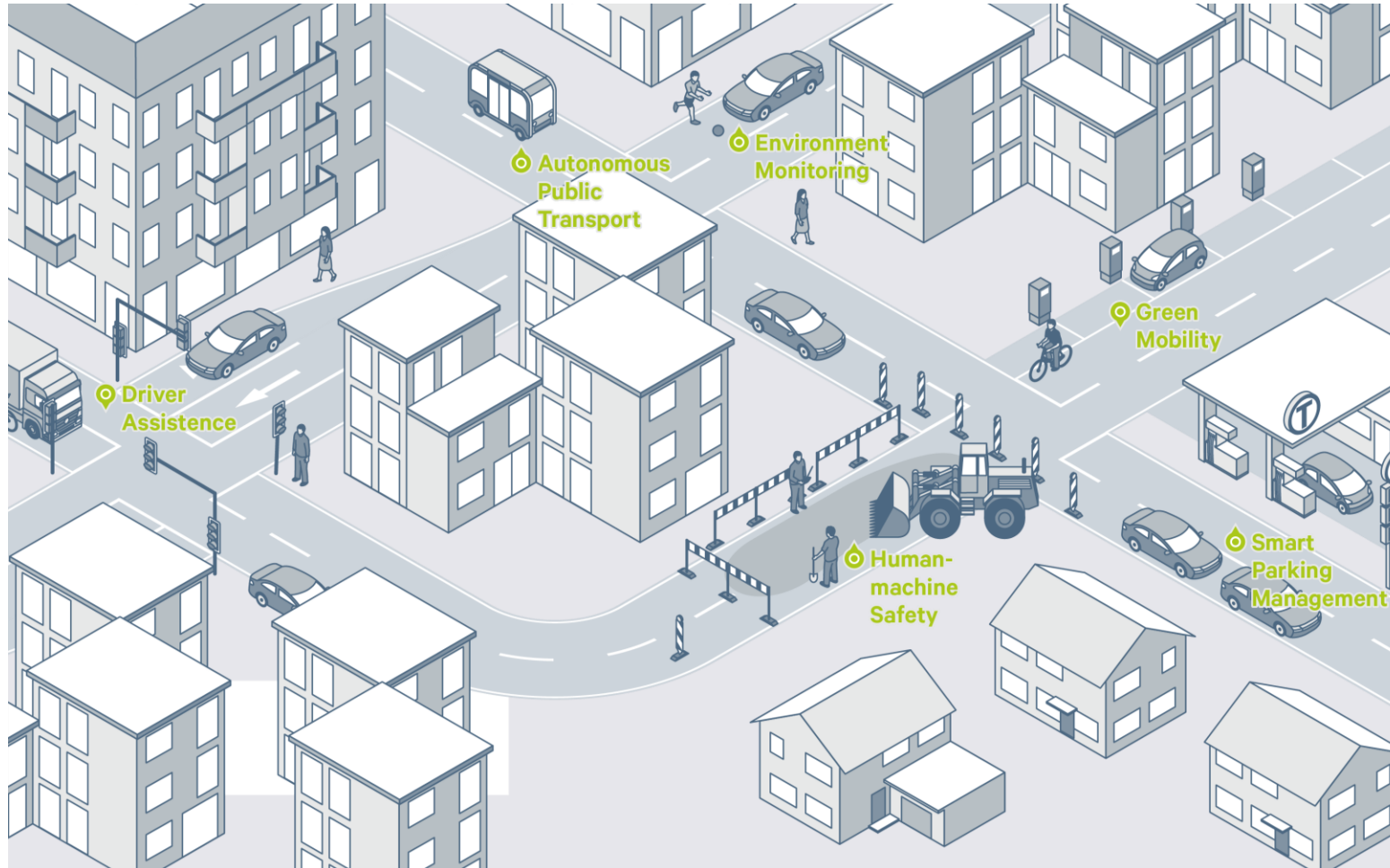


Devices in the nanometer range for new applications, e.g. ventilators for home use, are no longer merely visions of the future.

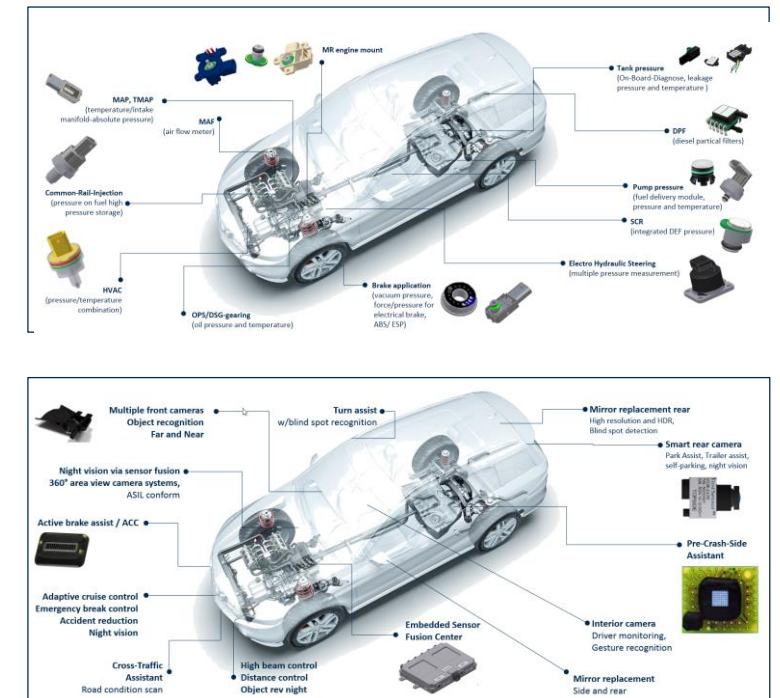


# OUR MARKETS

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.





## OUR PRESENCE

We grow in our core market as well as in high potential sales regions.



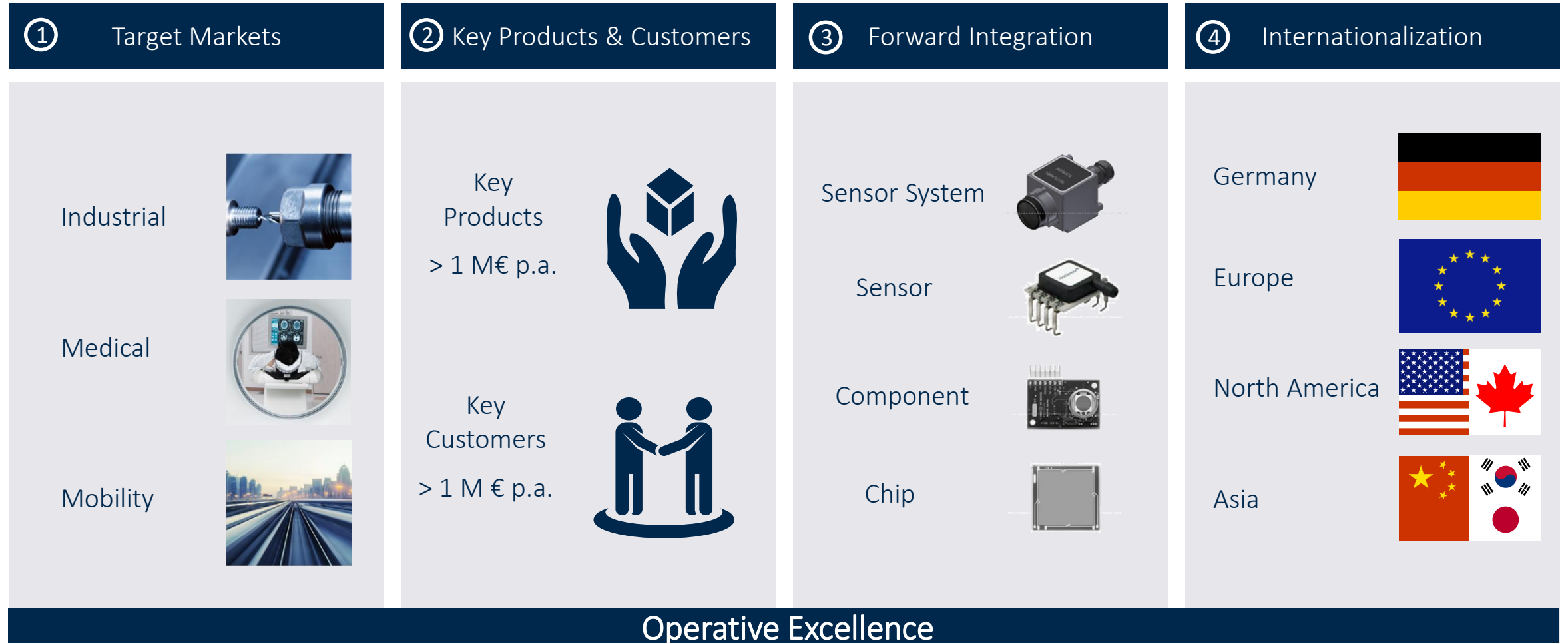
\*Q3 2017

# STRATEGIC PERSPECTIVE FOR PROFITABLE GROWTH

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# OUR STRATEGY FOR PROFITABLE GROWTH

We generate and utilize economies of scale in 4 dimensions.



# OUR STRATEGY FOR PROFITABLE GROWTH

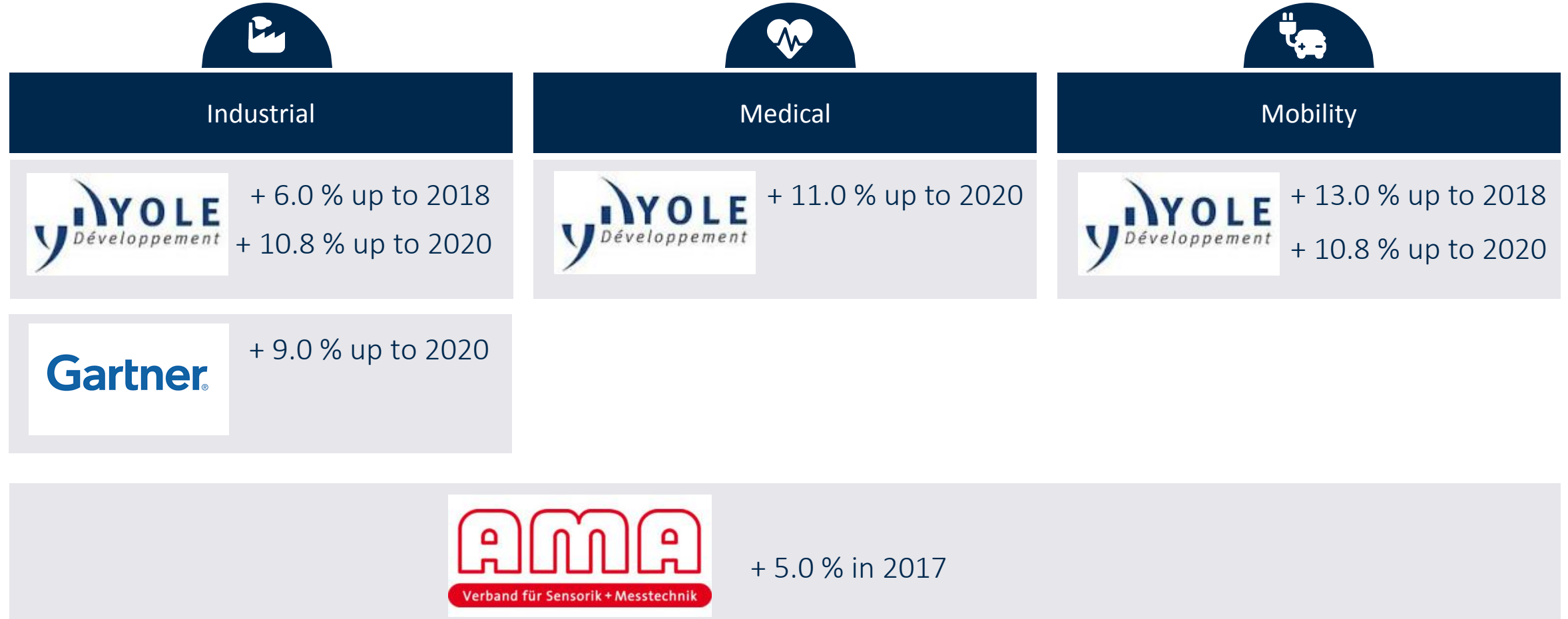
We generate and utilize economies of scale in 4 dimensions.





# DIMENSION 1: CLEAR FOCUS ON OUR TARGET MARKETS

We participate in above average growth markets.



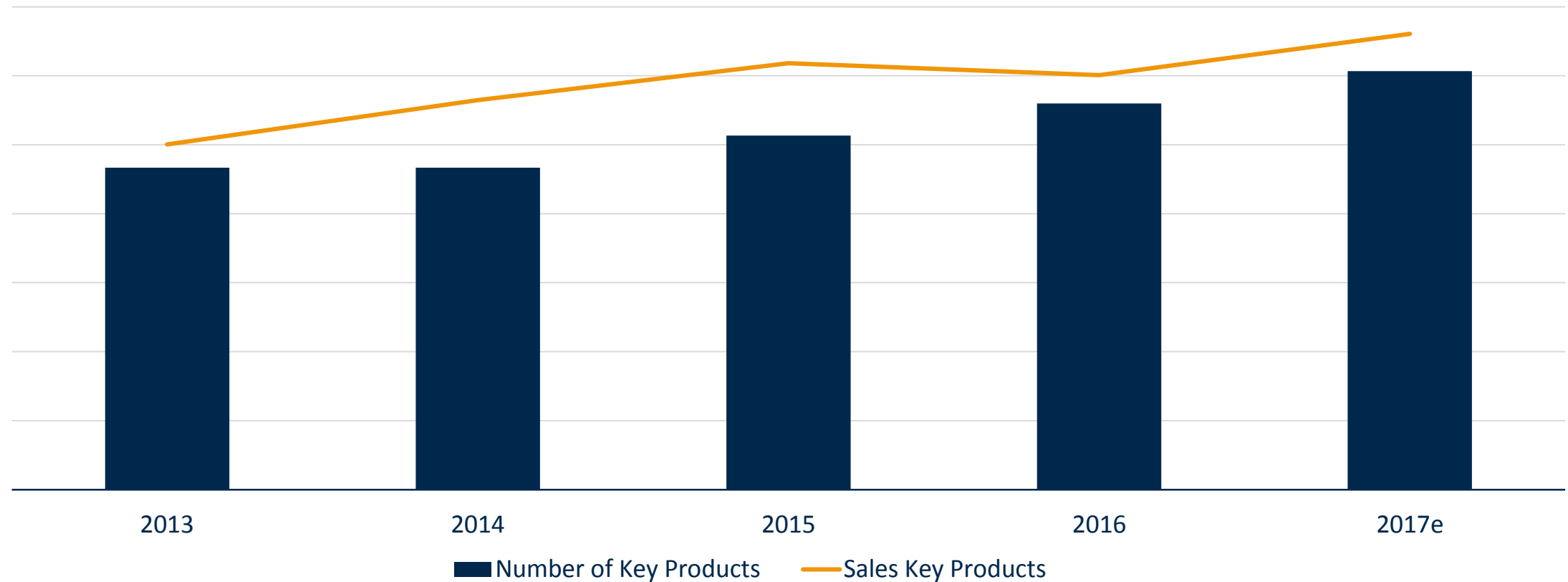
# OUR STRATEGY FOR PROFITABLE GROWTH

We generate and utilize economies of scale in 4 dimensions.



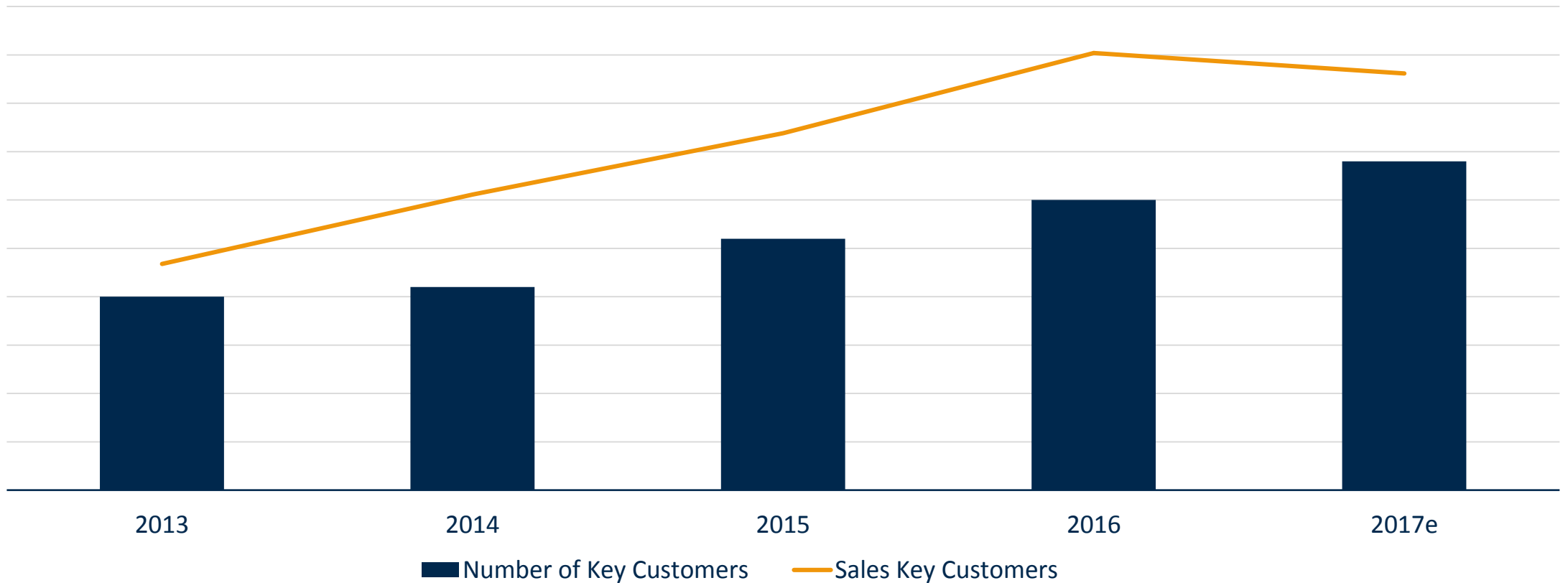
## DIMENSION 2: CLEAR FOCUS ON KEY PRODUCTS

In the next years, we will grow with existing and new key products.



## DIMENSION 2: CLEAR FOCUS ON KEY CUSTOMERS

In the next years, we will grow with existing and new key customers.





## DIMENSION 2: CLEAR FOCUS ON KEY PRODUCTS & CUSTOMERS

### Why is this efficient?

#### Key Products

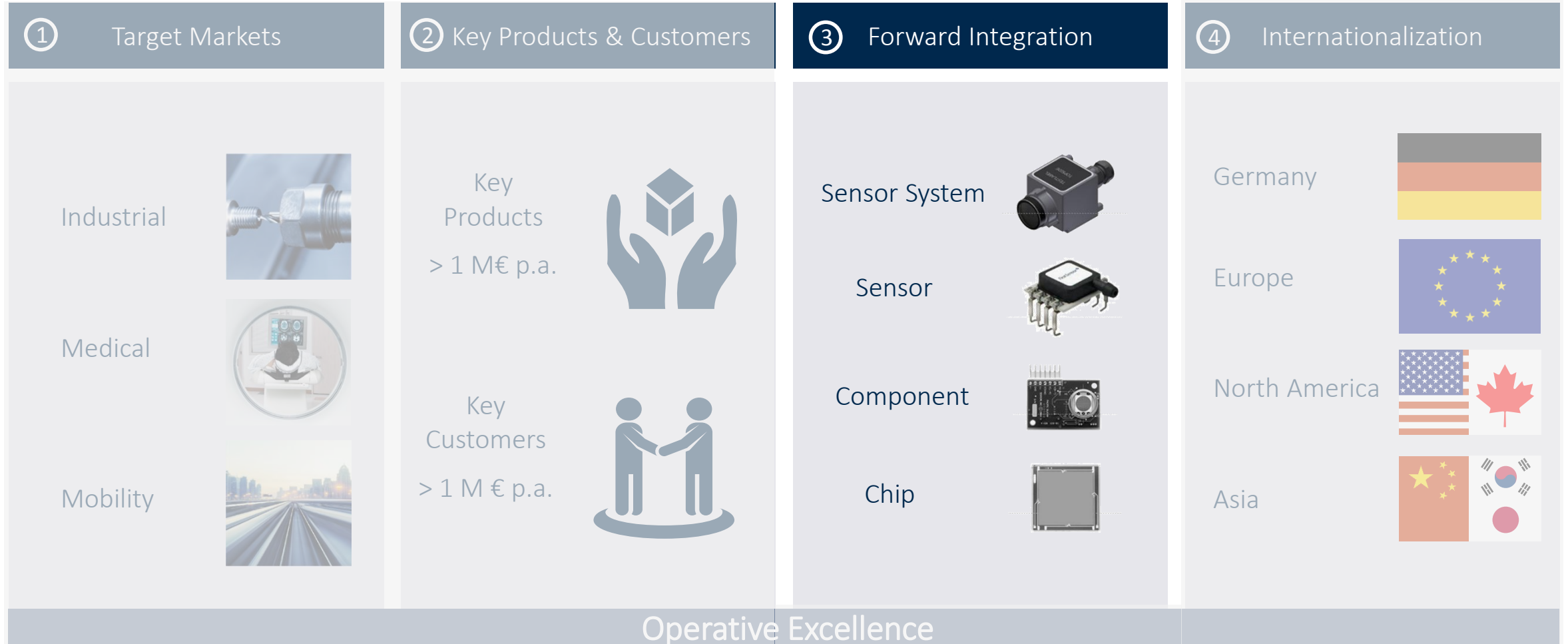
#### Key Customers

- ▶ 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.

# OUR STRATEGY FOR PROFITABLE GROWTH

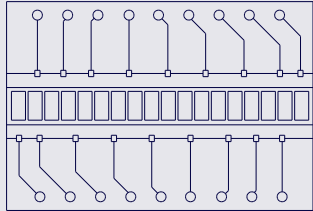
We generate and utilize economies of scale in 4 dimensions.



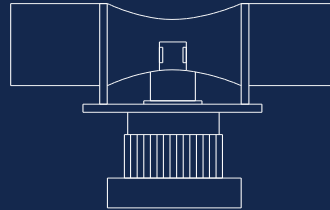
# DIMENSION 3: CLEAR FOCUS ON FORWARD INTEGRATION

We base our forward integration initiatives on clear product roadmaps.

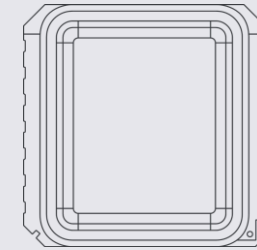
Radiation



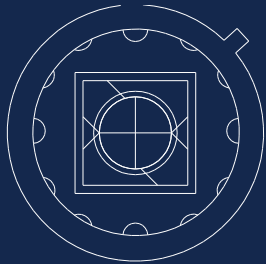
Flow



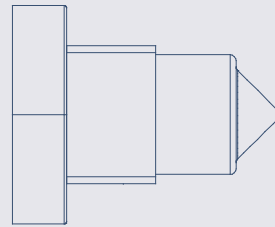
Acceleration



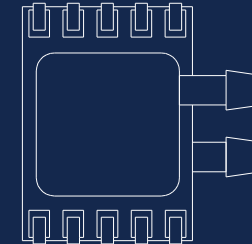
Light



Level



Pressure



Integrated Manufacturing Services



Multi Sensor Systems



# OUR STRATEGY FOR PROFITABLE GROWTH

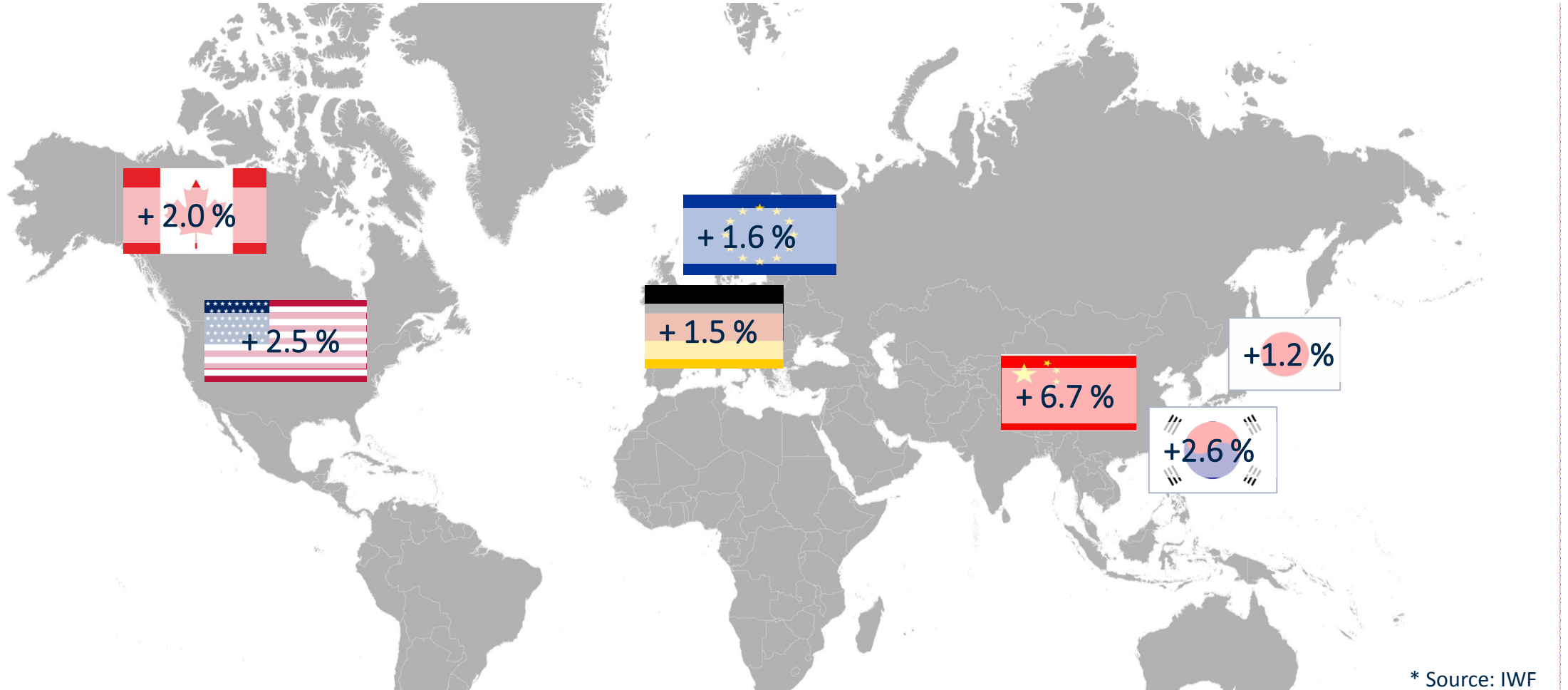
We generate and utilize economies of scale in 4 dimensions.





## DIMENSION 4: CLEAR FOCUS ON INTERNATIONALIZATION

We will participate in the solid growth\* of our targeted sales regions.



# OUR STRATEGY FOR PROFITABLE GROWTH

We generate and utilize economies of scale in 4 dimensions.



# THE FUNDAMENT: FOCUS ON OPERATIVE EXCELLENCE

## We concentrate on five core initiatives.

### Top Initiatives

- ▶ Lead Time, On-Time Delivery, Quality
- ▶ Core Processes
- ▶ OneERP
- ▶ T's & C's Harmonization
- ▶ Portfolio Optimization

WITH THIS APPROACH TOWARDS PROFITABLE GROWTH WE  
ALREADY EXCEEDED OUR TARGETS FOR 2017.

Guidance 2017

Result 2017

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Sales	140 - 145	M €
EBIT-Margin	5 - 6	%

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Sales	147.5	M €
EBIT-Margin	7.1	%

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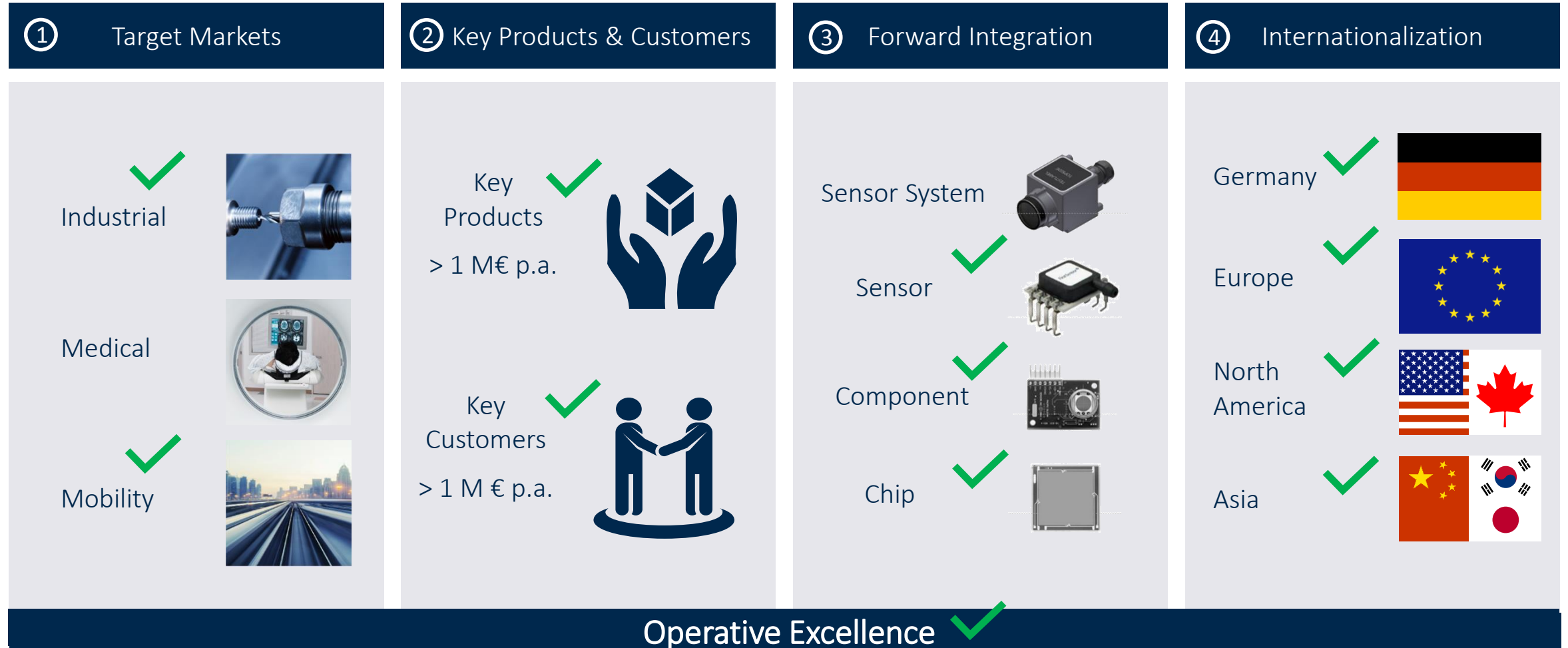
# GROWTH DRIVER LIDAR

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# GROWTH DRIVER LIDAR

LiDAR is a relevant factor within our strategy for profitable growth.



# GROWTH DRIVER LIDAR

Main reason for accidents are preventable human mistakes.

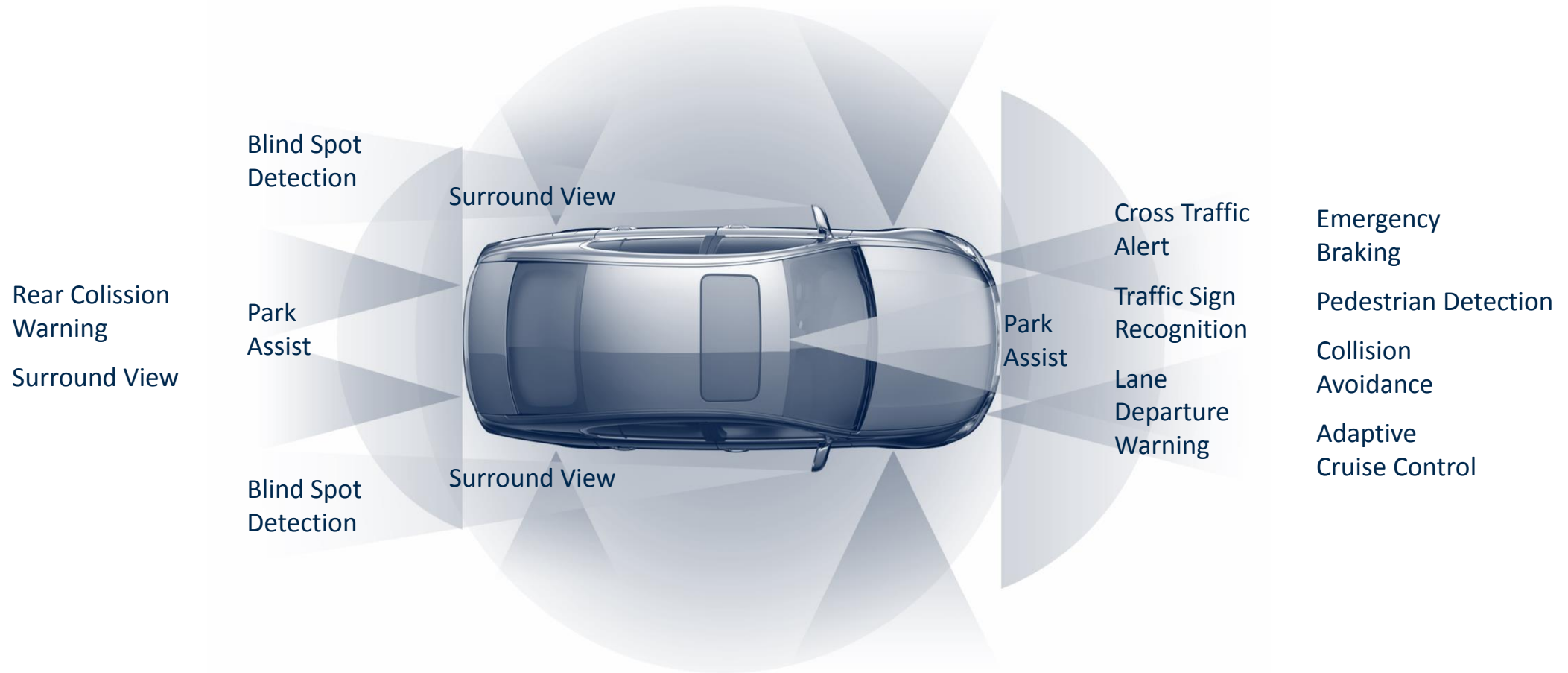


1	Mistakes of car drivers	63.9 %
2	Mistakes of bicyclists	13.5 %
3	Bad road conditions	7.7 %
4	Mistakes of motorbike riders	7.2 %
5	Mistakes of truck drivers	5.7 %
6	Mistakes of pedestrians	3.5 %
7	Technical issues	0.9 %

Source: German Federal Statistical Office 2016

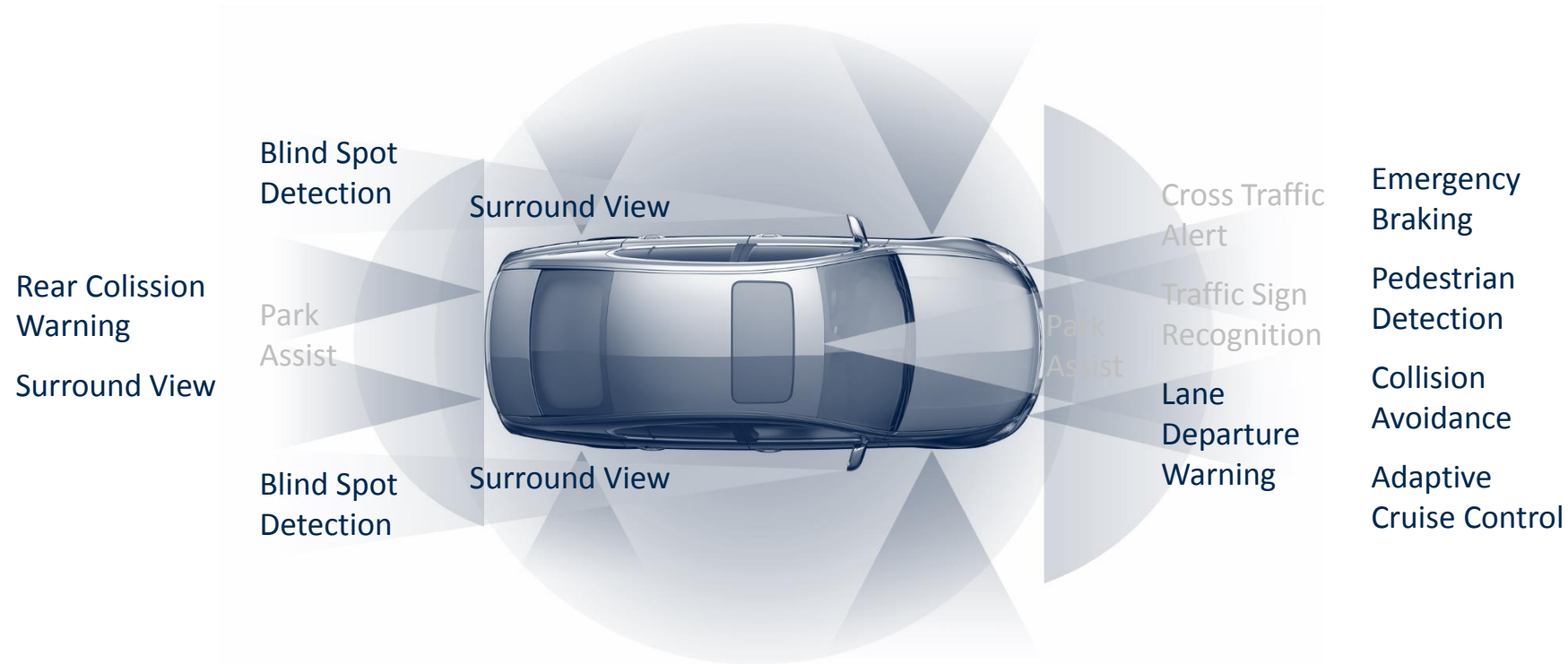
# GROWTH DRIVER LIDAR

Sensors in vehicles assist the drivers and provide more road safety.



# GROWTH DRIVER LIDAR

LiDAR is an important technology for many of these safety applications.



# GROWTH DRIVER LIDAR






Reason: LiDAR provides the highest resolution even for large distances.

Criteria	LIDAR (pulsed ToF)	Radar		Ultra-sonic	Cameras		PMD
		Short distance	Long distance		Mono	Stereo	
Max range (m)	150 - 250	55 - 100	150 - 200	2 - 4	40 - 60 (120 coarse)	60	7 - 10
Min range (m)	1	0,25 - 1	1	0.25	0.3	0.3	0.3 – 0.8
Precision (m)	0.1 (newer: 0.04)	0.25 – 0.75	0.3 – 3.75	Very good	3	0.2 – 0.3	good
Velocity measurement	Indirectly via distance t1-t0	directly via Doppler effect		hardly	hardly	Indirect via dist.	Indirect via dist.
Horizontal field of view	30° - 180°	55° Scan: 120°	16°, Scan: 60°	60°	45° - 190°	45°	40 - 69°
Horizontal resolution	0.01° - 1°	10.5°	3.5°	bad	< 0.1° - 0.3°	< 0.1°	0.2°
Vertical field of view	3° - 16°	3° - 13°	3° - 13°	30°	45°	45°	40 - 56°
Vertical resolution	0.8° - 1°	4.5°	4.5°	bad	< 0.1°	< 0.1°	0.2°



# GROWTH DRIVER LIDAR

Besides LiDAR, cameras are irreplaceable for a safe surround view.

On Board Sensor Capability			 <b>LIDAR</b> (Detection & ranging)	 <b>Camera</b> (Monitoring & classification)	 <b>RADAR</b> (Detection & ranging)	 <b>V2X &amp; Cellular*</b> (Information)	 <b>Map &amp; Location</b> (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	★ ★	★	★ ★		
Robustness	360° View		★ ★ ★	★ ★ ★			
	Rain/Snow		★ ★	★	★ ★ ★	★ ★ ★	★ ★ ★
	Fog				★ ★ ★	★ ★ ★	★ ★ ★
	Night		★ ★ ★		★ ★ ★	★ ★ ★	★ ★ ★

\* Depends on coverage

# GROWTH DRIVER LIDAR

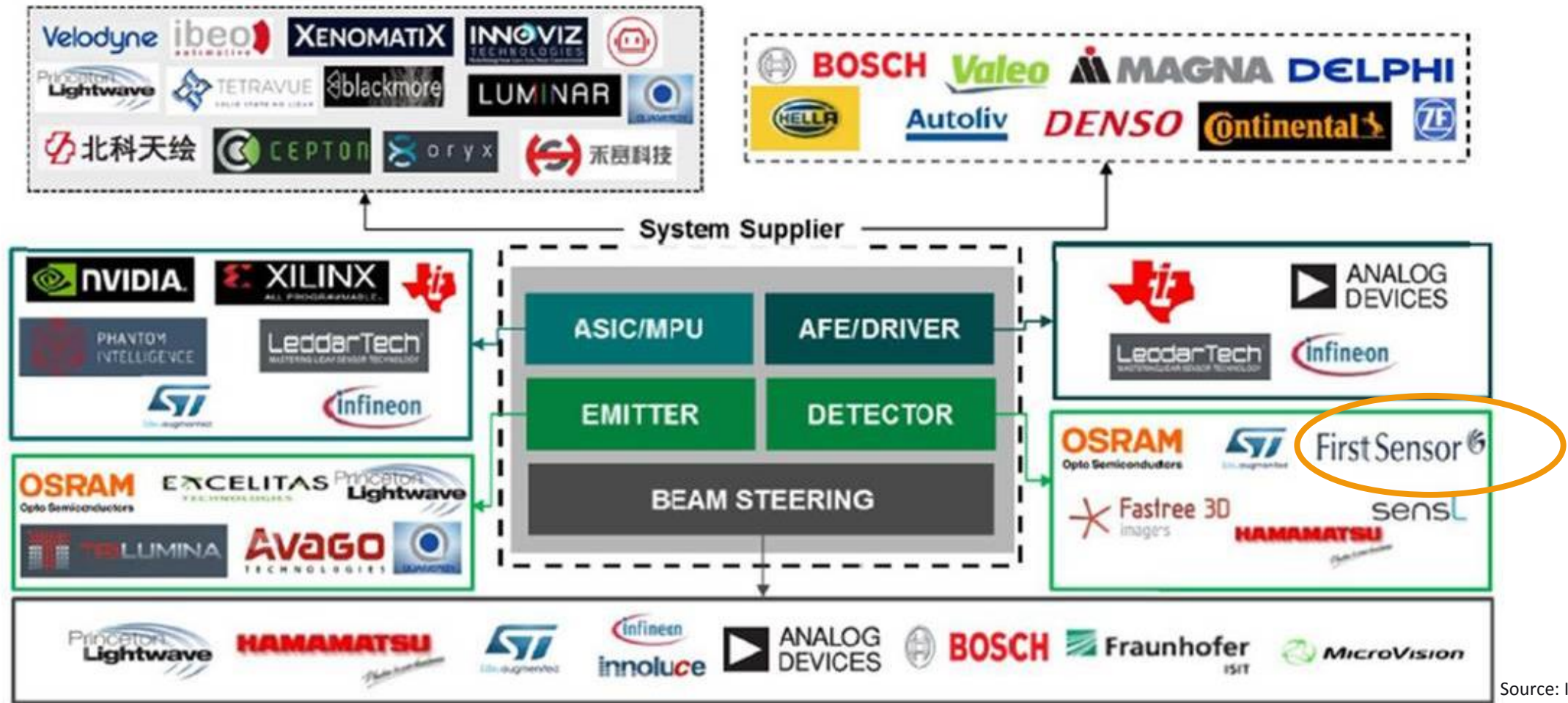
In LiDAR systems different components work hand in hand.



Source: Velodyne

# GROWTH DRIVER LIDAR

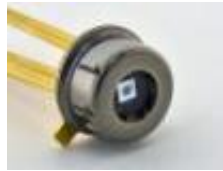
First Sensor is an important supplier for the detectors in LiDAR systems.



Source: IHS Markit

# GROWTH DRIVER LIDAR

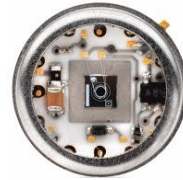
With our APD we have captured a leading share for more than 10 years.



Single APD with amplifier



DARPA Urban Challenge; First Sensor APDs in all winning teams



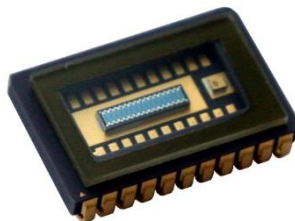
Industrial hybrids (APD+TIA in one package)



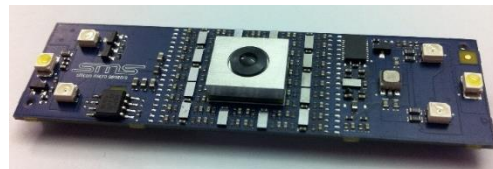
Few Pixel APD-Array in SMD package for ACC / AEC-Q 101 qualified by FIS



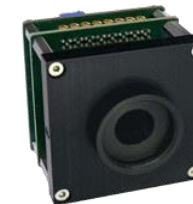
12 Pixel APD-Array in ceramic package for ACC



Gesture recognition with 64 pixel APD-Array



Receiver module with APD-Array, HV, TIA, MUX, Timing discriminator

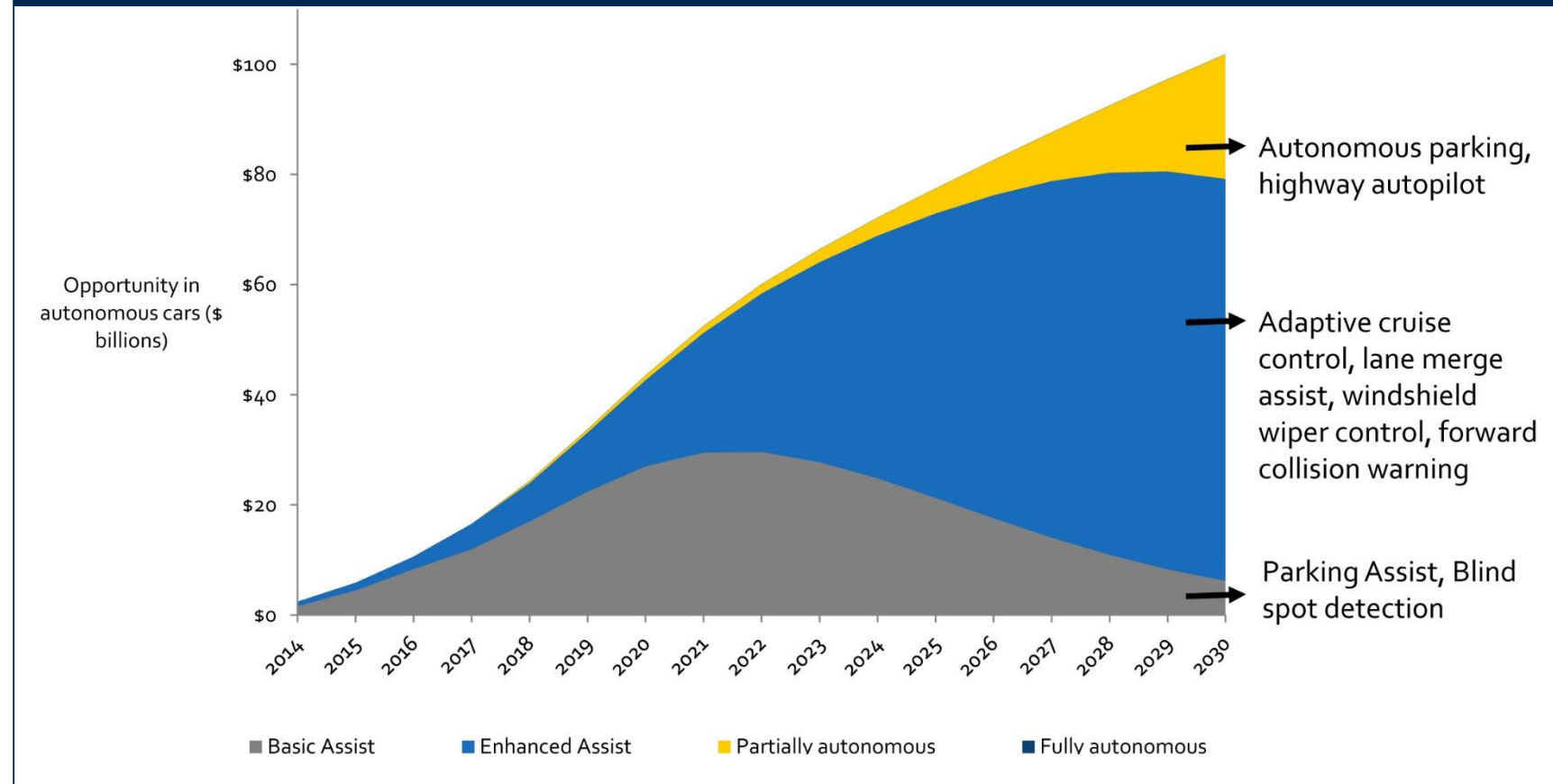


Receiver module with APD and electronics integrated in one package

# GROWTH DRIVER LIDAR

Therefore we will participate in the growth of the driver assist market.

Global driver assist market will grow to \$102 billion by 2030



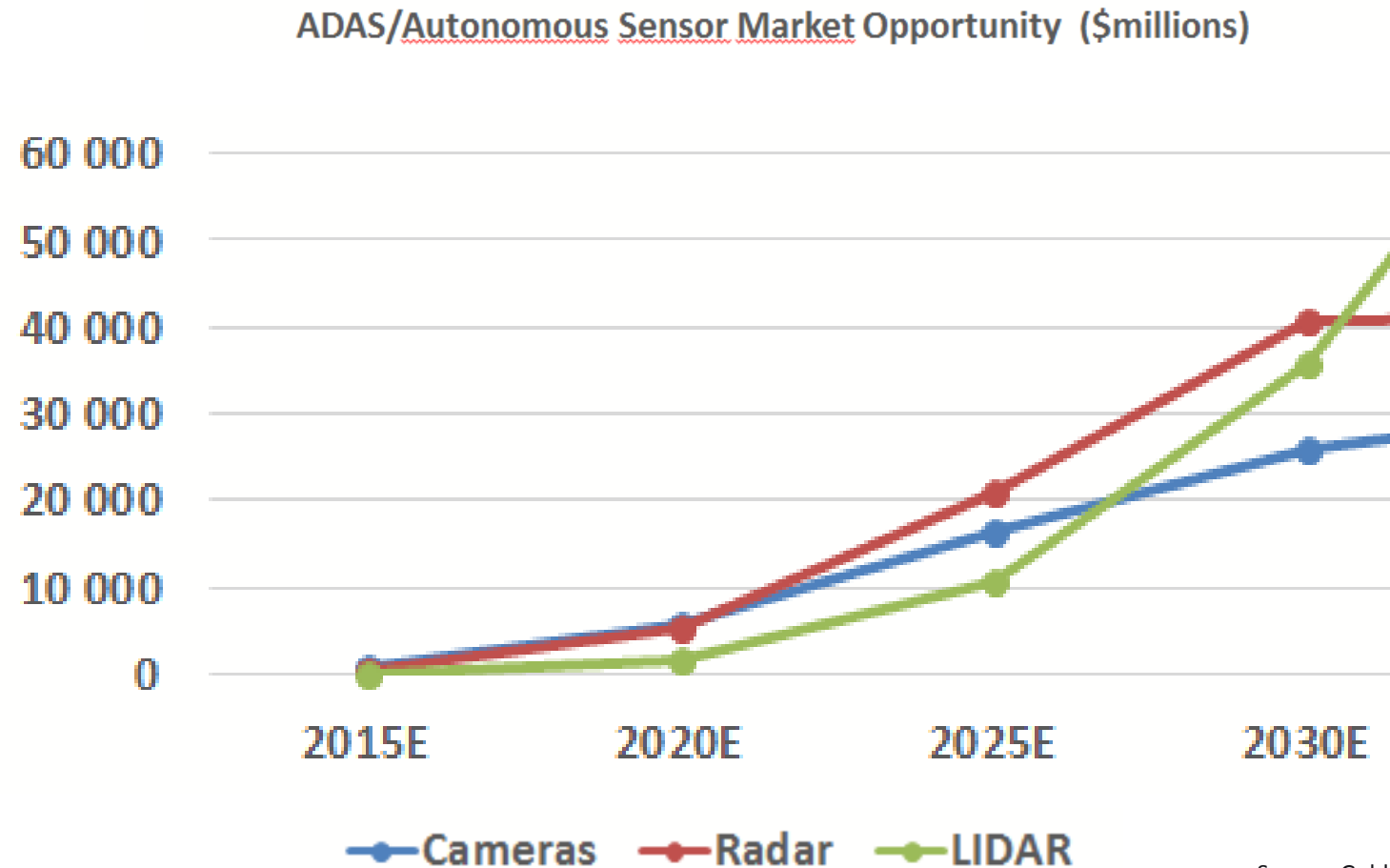
- 2017: 94 m vehicles produced (2.2% CAGR 17-22, 2017 IHS Markit)
- Automotive semiconductor revenue for ADAS grows with 20.9% (CAGR 17-22, 2017 IHS Markit)
- Estimates as high as 10% of new cars with self-driving features in 2020

Source: Lux Research 2017



## GROWTH DRIVER LIDAR

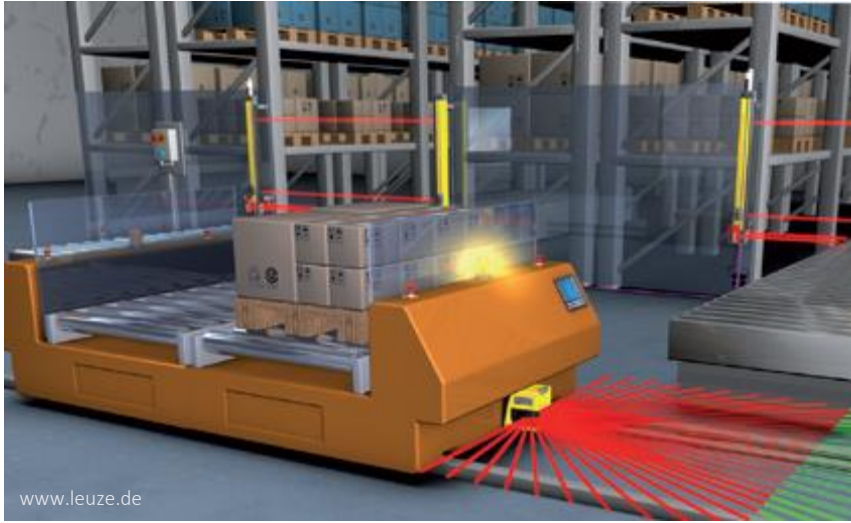
In this growing mobility market LiDAR will play the most important role.



Source: Goldman Sachs Global Investment Research

# GROWTH DRIVER LIDAR

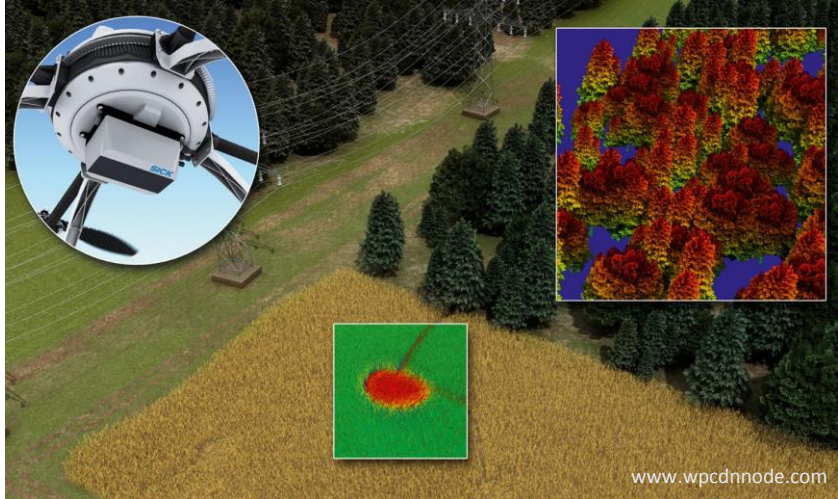
But LiDAR also has applications in the industrial market, e.g. logistics...





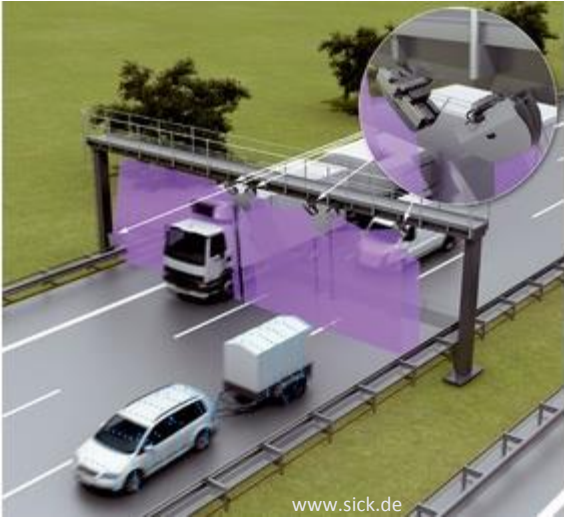
# GROWTH DRIVER LIDAR

...mapping and construction...





# GROWTH DRIVER LIDAR ...and traffic control & security.



# THE SHARE

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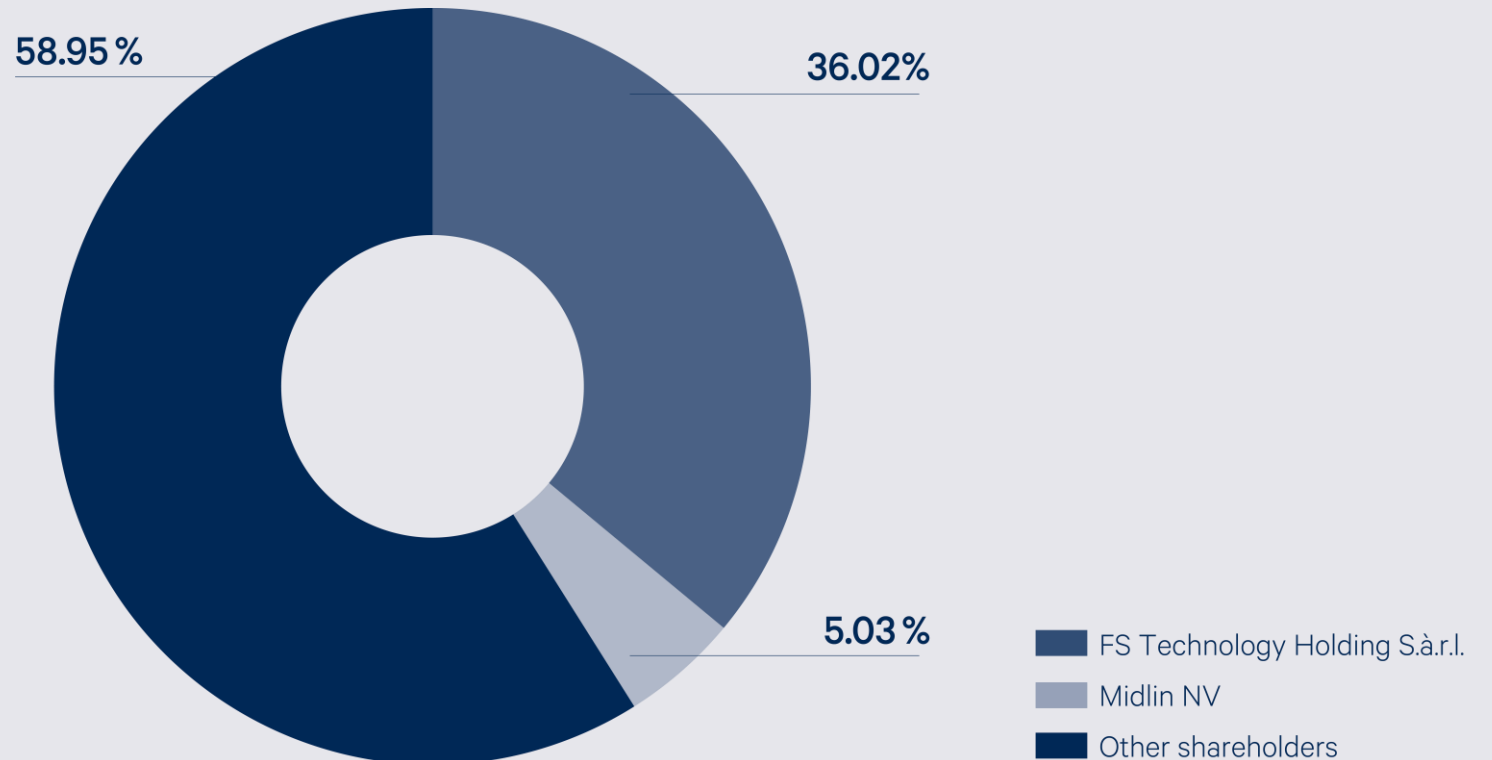
# FIRST SENSOR SHARE

Currently, our free float amounts to nearly 59 percent.

## Key facts\*

Market Cap:	€ 214.54 m
Traded stocks/day:	28,754
30 Day High:	25,5
30 Day Low:	20,5
Index Ranking Free Float Market Capitalization:	53
Index Ranking Turnover:	53

\* January 31, 2018



# FIRST SENSOR SHARE

Increase of 50% while the DAX increased by 13% over the year 2017.



# FINANCIAL CALENDAR

## Financial Press Conference & Capital Market Day: Meet us on March 22.

When?	What?
March 22, 2018 8.00 a.m.	Annual Report 2017
March 22, 2018 10.00 a.m.	Financial Statement Press Conference & Capital Market Day
May 14, 2018	Interim Report Q1 2018
May 23, 2018	Annual General Meeting 2018, Penta Hotel, Grünauer Str. 1, 12557 Berlin
August 13, 2018	6-Month Financial Report 2018
November 12, 2018	Interim Report Q3 2018
November 26-28, 2018	German Equity Forum 2018

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# FIRST SENSOR AG

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## **Contact**

Corinna Krause, Director Corporate Communications & Investor Relations

Phone: + 49 30 639923 571

Mail to: [corinna.krause@first-sensor.com](mailto:corinna.krause@first-sensor.com)