Global Automotive Supplier Study 2018

Transformation in light of automotive disruption

LAZARD

Roland Berger

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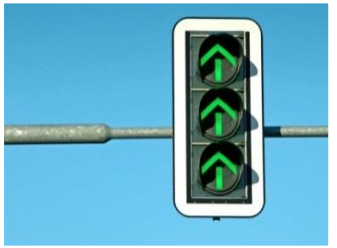

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Automotive suppliers need to transform their business models

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Roland Berger and Lazard Automotive teams

Executive Summary (1/2)

> The automotive industry has seen a **continuation of global growth** in 2017 – However, **first signs of weakening are visible** with softening of growth in China and Europe and a slight volume decline in the US

> In this still favorable environment, the **global supplier industry is expected to increase its revenues by 3%** and **maintain its profitability level** with an average EBIT margin of ~7% in 2017
  - **Chinese and NAFTA** suppliers are currently **more profitable** than the global average
  - **Exterior, chassis and tire** suppliers are on track to **improve their EBIT margin profile** in 2017
  - **Powertrain** suppliers continue to see their **margins under pressure** due to intensified competition and the cost of innovation

> **For 2018**, we expect **continued growth** for the global supplier base, but at a slower pace with stable **EBIT margins**

> The **four automotive megatrends** Mobility, Autonomous driving, Digitization and Electrification will continue to change the automotive industry, causing **disturbance in all supplier domains**
  - **New mobility business models** are poised to disrupt car ownership, personal mobility and goods logistics: The share of new vehicle sales for application in the field of new mobility (e.g. ride hailing, car sharing) may range between 10-15% in the US and Europe and up to 35% in China by 2025
  - The timeline for **level 4/5 autonomous keeps accelerating** as necessary economics, regulations and technology fall into place: Penetration rates for autonomous cars (SAE level 4/5) may reach a level between 5% and 26% in ~15-20 years
  - In digitization, **artificial intelligence offers almost limitless possibilities** while connectivity-enabled technologies are reaching mainstream application: Within the next 10 years almost all cars in mature markets will have some form of connectivity
  - **Momentum for electrification is building among OEMs** due to increasing regulatory pressure and accelerating technology advancement: Scenarios for the share of EV cars in 2025 range from 8-20% in the US, 20-32% in Europe and 29-47% in China

Source: Lazard, Roland Berger

Executive Summary (2/2)

> Suppliers are expected to face **five main challenges** going forward
  - **Slowing growth** will put pressure on margins and create a need to find new ways to grow
  - **Accelerated change** of technological focus requires further investment into new technologies such as ADAS and electrification, putting an undue burden without a promise of quick returns
  - **Emergence of software** as key differentiator will make many existing competencies obsolete and create more intensive competition from new tech players
  - **Commoditization of hardware** parts and disaggregation of systems will exert additional pressure to reduce cost and increase operational efficiency
  - **Potential downswing of valuations for commoditized suppliers** in the midterm might go along with growing investor pressure to increase shareholder value

> In order to succeed in the new automotive environment, suppliers will have to **transform their existing business models**
  - Rethink **overall strategy** in order to either capture new growth opportunities or consolidate the market around the existing portfolio
  - Define a **long term technology roadmap** and strategic positioning in the value chain regarding both product and service offering
  - Implement a **lower operating cost base** and ensure sufficient financing for the upcoming transition at the same time
  - Adapt **organizational structure and governance model** to successfully manage new emerging technologies and competencies alongside old declining technologies under one roof
  - Create a **new company mindset and culture** to foster innovation which is of paramount importance to compete in the new technology areas
  - Build up **new partnerships** and leverage this ecosystem to find new ways to innovate

Source: Lazard, Roland Berger

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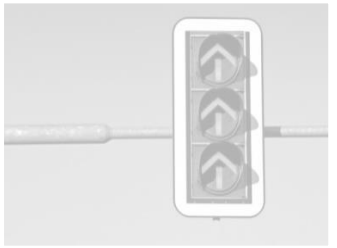


The automotive industry recently has been more in the public eye than ever before

Recent notable automotive headlines

Record 2016 for U.S. Auto Industry; Long Road Back May Be at End
- The New York Times

After Years of Growth, Automakers Are Cutting U.S. Jobs
- The New York Times

U.S. Electric Vehicle Sales Soared In 2016
- Forbes

NHTSA seeks ways to clear the road for self-driving cars
- ZDNet

How a Trump tariff could sideswipe U.S. auto industry
- Associated Press

Auto industry tells Trump 'We're winning with NAFTA'
- Reuters

Europe's vehicle sales reach post-crisis high
- Automotive News Europe

Why 2017 will go down as the beginning of the end of the internal combustion engine
- The Washington Post

European sales of gasoline-powered cars overtake diesel: ACEA
- Reuters

Diesel sales fall in key Europe markets
- Automotive News Europe

Premium midsize SUVs overtake sedans, wagons in key European segment
- Automotive News Europe

Merkel says car industry must work to rebuild trust
- Reuters

China's Car Sales Have Been on a 26-Year Record Streak
- Bloomberg News

Global automakers call on China to ease "impossible" electric car rules
- Reuters

IN THE AGE OF TRUMP, CHINA EYES ELECTRIC CAR DOMINANCE
- Wired

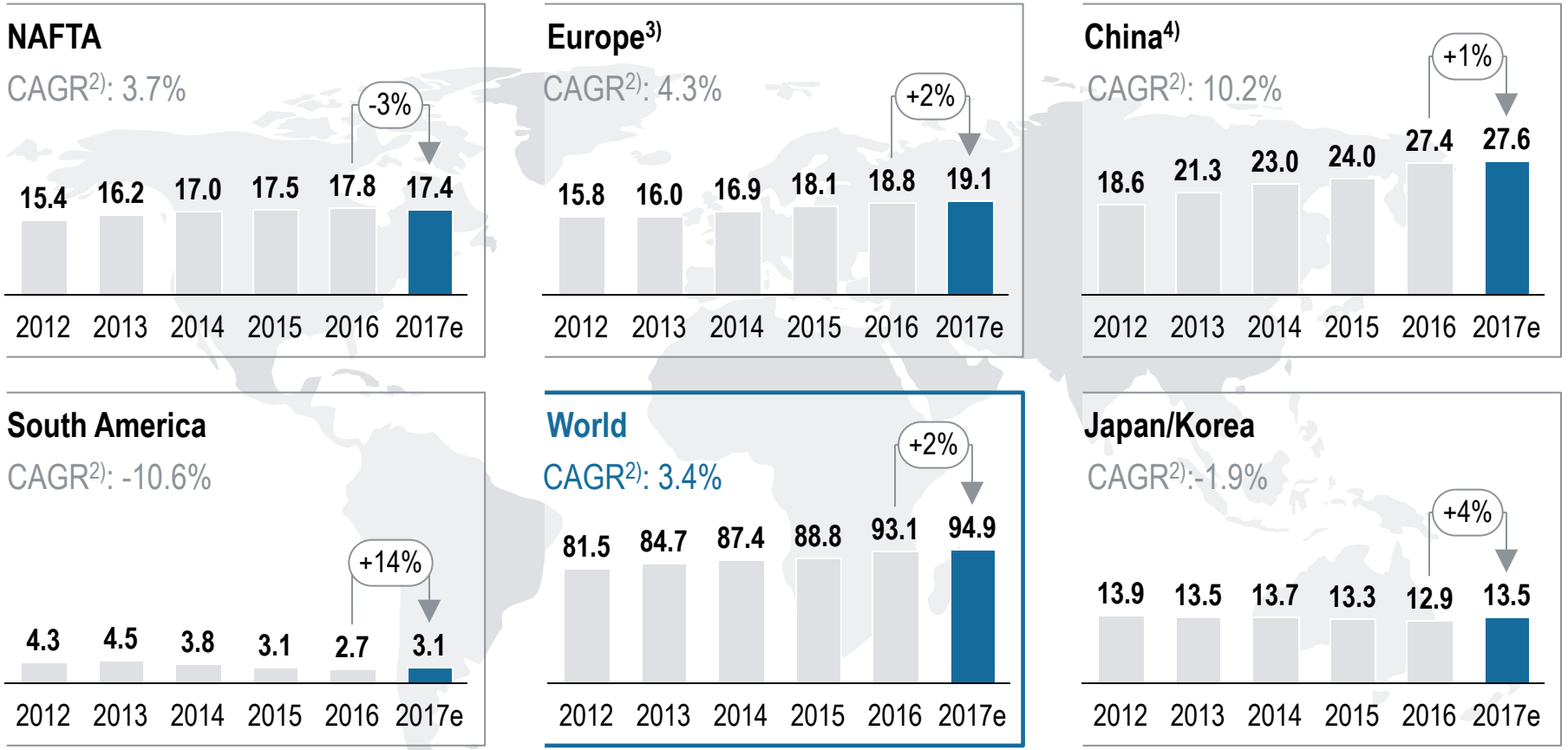
Electric car sales in China set to reach record-breaking 700,000 units in 2017
- Autocar

China Sends a Jolt Through Auto Industry With Plans for Electric Future
- The Wall Street Journal

Source: Lazard, Roland Berger

The industry had another year of record volumes, however slowing growth on global level with North America on the decline

Global light vehicle production volume[1] by region, 2012-2017e [m units]

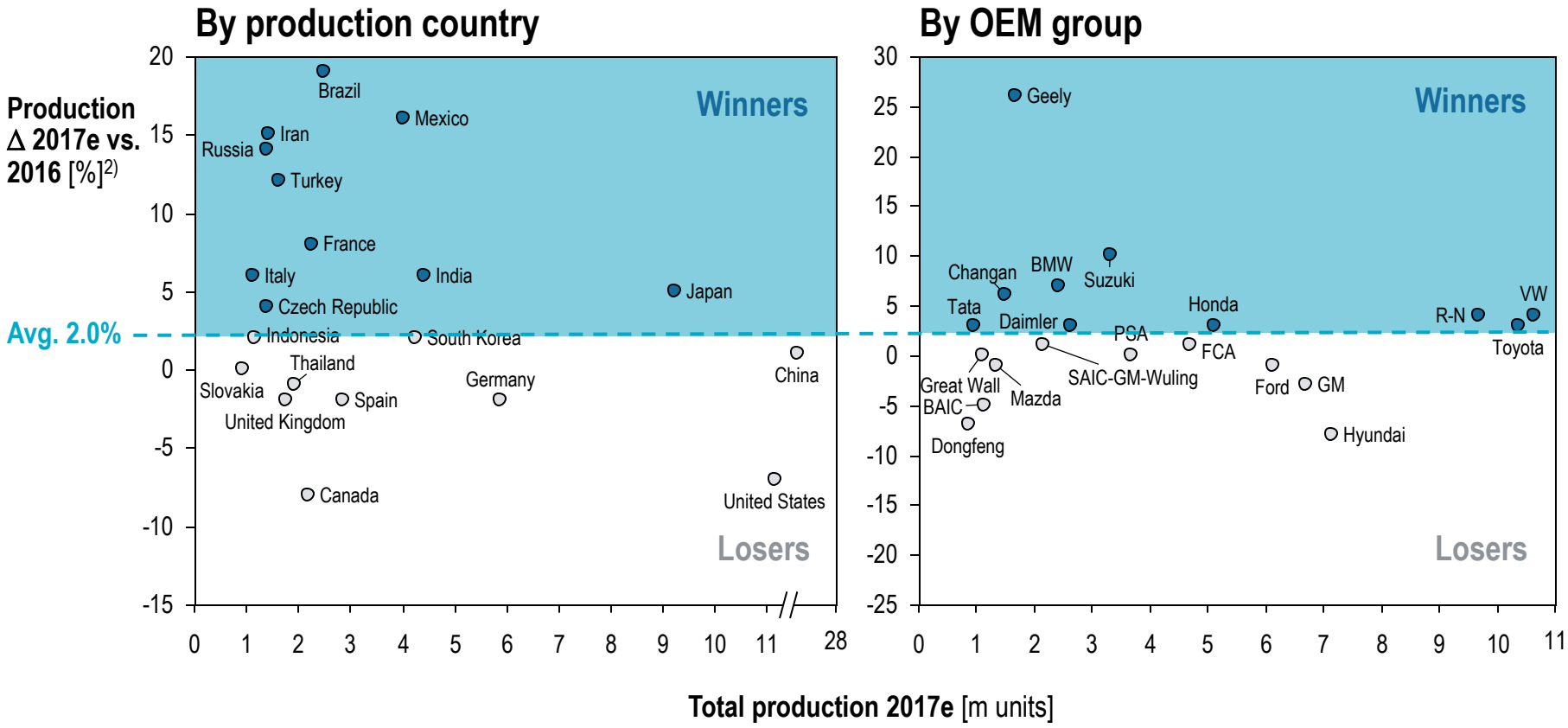


1) Incl. light commercial vehicles; 2) CAGR 2012-2016; 3) Excluding CIS and Turkey; 4) Greater China

Source: IHS, Lazard, Roland Berger

In 2017, the U.S. and Canada experienced significant declines – Mexican and Japanese production driving global production growth

Top 20 by country and by OEM group, light vehicle production[1)]



1) Incl. light commercial vehicles; 2) Year-on-year growth rate

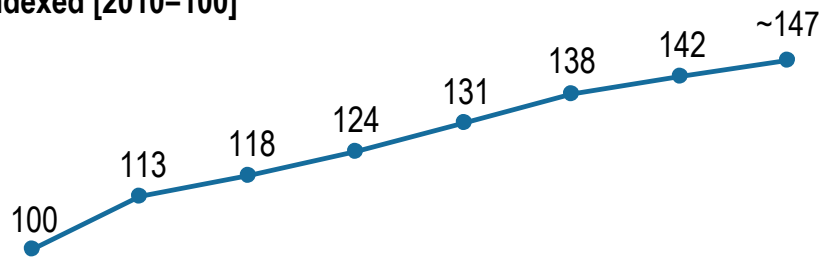
Source: IHS, Lazard, Roland Berger

2017 was another good year for suppliers with moderate growth and margins comparable to previous years

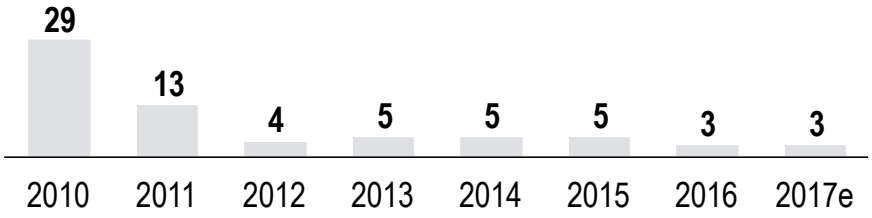
Key supplier performance indicators, 2010-2017e (n=~650 suppliers)

Revenue growth

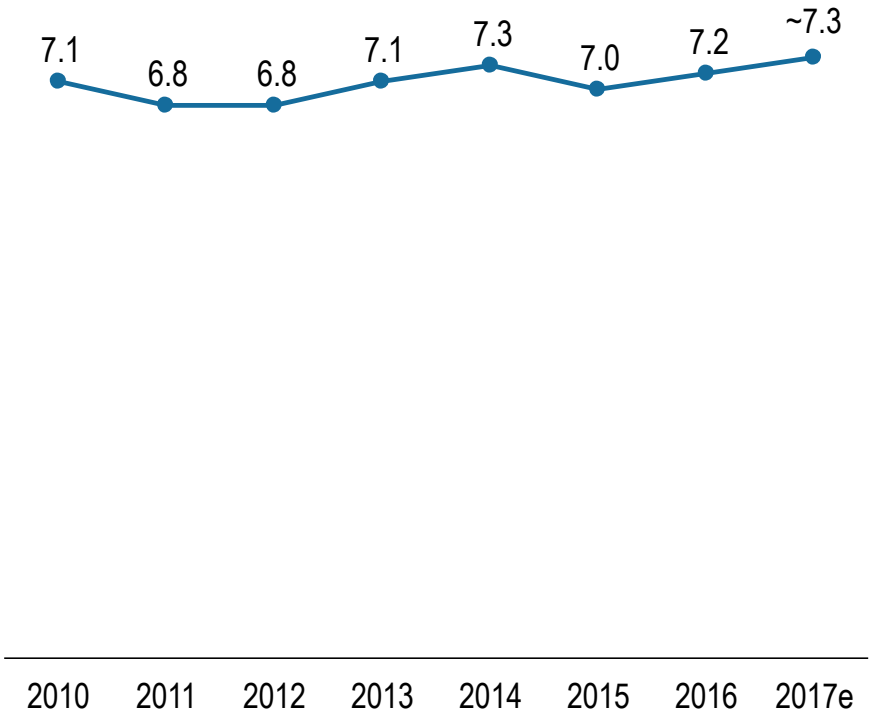
Indexed [2010=100]



YoY [%]



EBIT[1] margin [%]

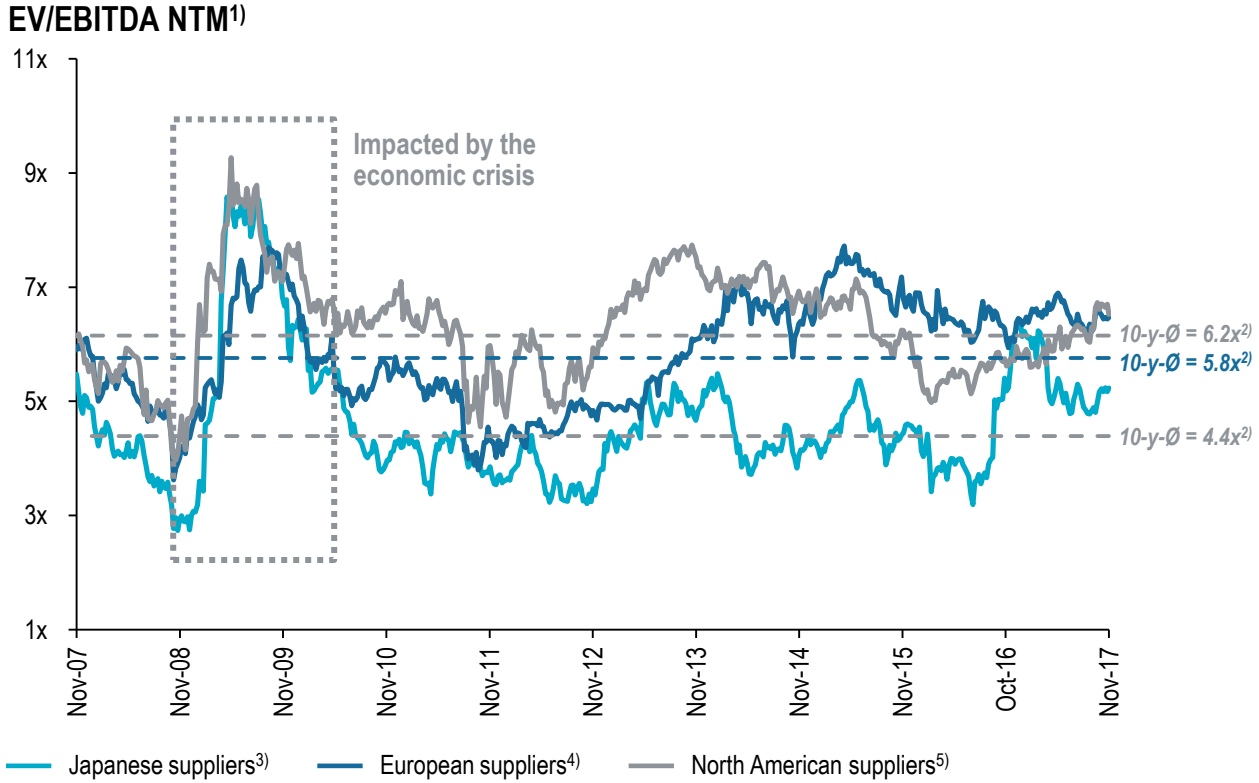


1) EBIT after restructuring items

Source: Company information, analyst forecasts, Lazard, Roland Berger

The overall positive sentiment was also reflected in the supplier valuation levels that still trade above their long-term average

Evolution of automotive supplier valuations



- Valuation multiples of publicly listed automotive suppliers are **above their long-term average** values, however, **below peak values** observed during the last two to three years
- High valuation levels are supported by an **abundance of cheap liquidity** on the global stock markets as well as **profitable growth of automotive suppliers**. More recently, the question around the impact of a **changing automotive environment** had a muting effect on valuations
- While **European and North American** suppliers trade at **similar valuation** levels, **Japanese** companies continue to trade **at a discount**, reflecting the stagnation in their home market

1) NTM = Next twelve months; 2) Excluding the distorting impact of the economic crisis (Jan-Dec 2009 multiples); 3) Aisin Seiki, Bridgestone, Calsonic Kansei, Denso, Exedy, JTEKT, Keihin, Koito, Mitsuba, NHK Spring, NSK, Stanley Electric, Showa, Sumitomo Riko, Takata, Tokai Rika, Toyoda Gosei, Toyota Boshoku and TS Tech; 4) American Axle, BorgWarner, Cummins, Dana, Delphi, Federal-Mogul, Iochpe Maxion, Johnson Controls, Lear, Magna, Martinrea, Meritor, Tenneco, Tower, Visteon and Wabco; 5) Autoliv, Autoneum, Brembo, CIE, Continental, ElringKlinger, Faurecia, Georg Fischer, Grammer, Haldex, Hella, Leoni, Norma, Plastic Omnium, PWO, SHW, SKF, Stabilus, and Valeo

Source: Factset, Lazard, Roland Berger

Financial performance of suppliers varies greatly depending on region, company size, product focus and business model

Profitability trends in the global automotive supplier industry – 2010 vs. 2017e

1 Region

+

> **Chinese**-based suppliers currently achieve the highest margins with ~9% EBIT
> **NAFTA**-based suppliers profit from their previous restructuring efforts and re-focusing on technology

–

> **European** supplier margins have increased only marginally and are currently close to the average supplier universe values
> **Japanese/Korean** suppliers remain at a low margin level of ~6% EBIT

2 Company size

> **Large suppliers** with >EUR 10 bn revenues maintain strong margins of ~7.5% EBIT
> **Midsized suppliers** (EUR 1.0 to 2.5 bn revenues) show strong and very profitable growth

> Upper **midsized suppliers** (EUR 2.5 to 5 bn revenues) below average regarding profitability
> **Small suppliers** (below EUR 0.5 bn revenues) lag behind in terms of growth and profitability

3 Product focus

> **Chassis suppliers** clearly improved margins to ~8% EBIT driven by ADAS and active safety
> **Tire suppliers** maintained strong margins due to favorable raw material costs

> **Powertrain** suppliers gradually lost ground and achieve below-average margins in the meantime
> **Interior** suppliers still trail their peers, with recently even lower margins

4 Business model

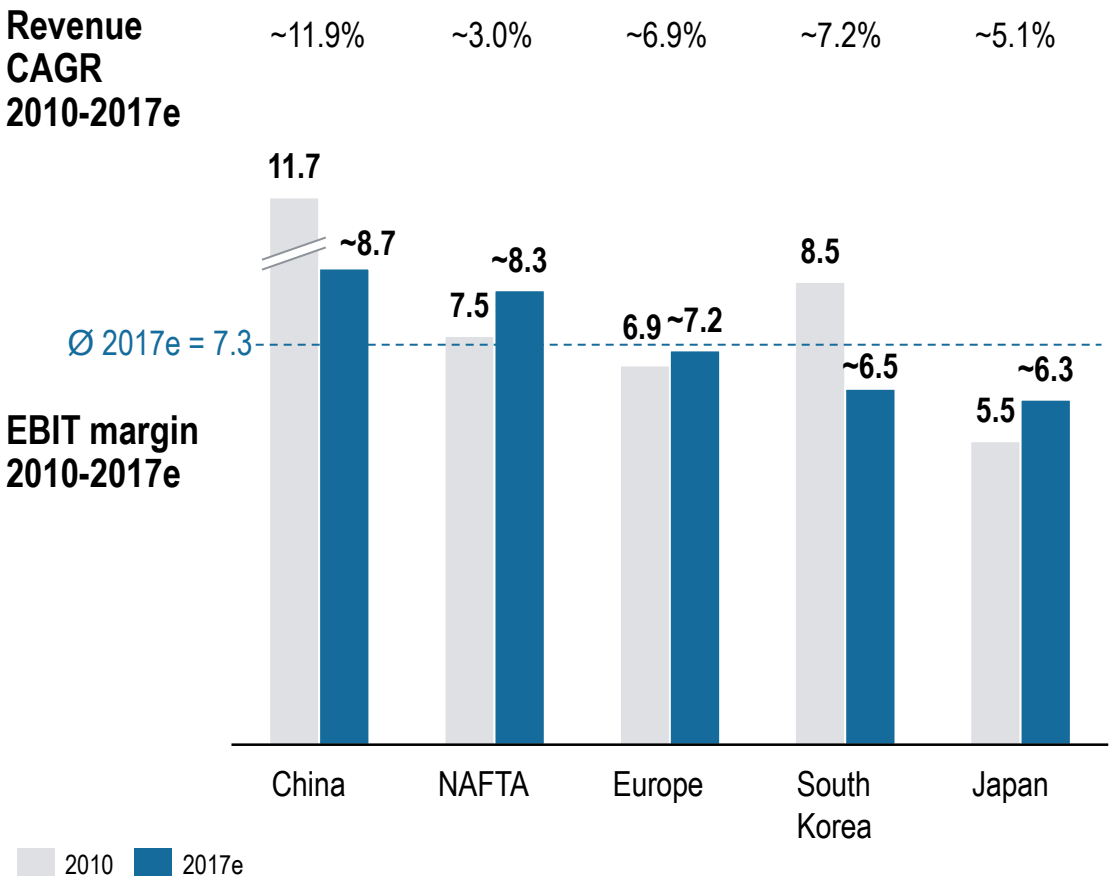
> **Product innovators** are strongly growing and generating stable above-average margins of >7% EBIT based on technology leadership translated into higher prices

> **Process specialists** continue to face below average margins of ~6-7% EBIT due to a lower innovation level and higher competitive pressure

Source: Company information, Lazard, Roland Berger

China- and NAFTA-based suppliers are currently more profitable than the average – China-based suppliers recently on the decline

Key supplier performance indicators by region, 2010 vs. 2017e [%]

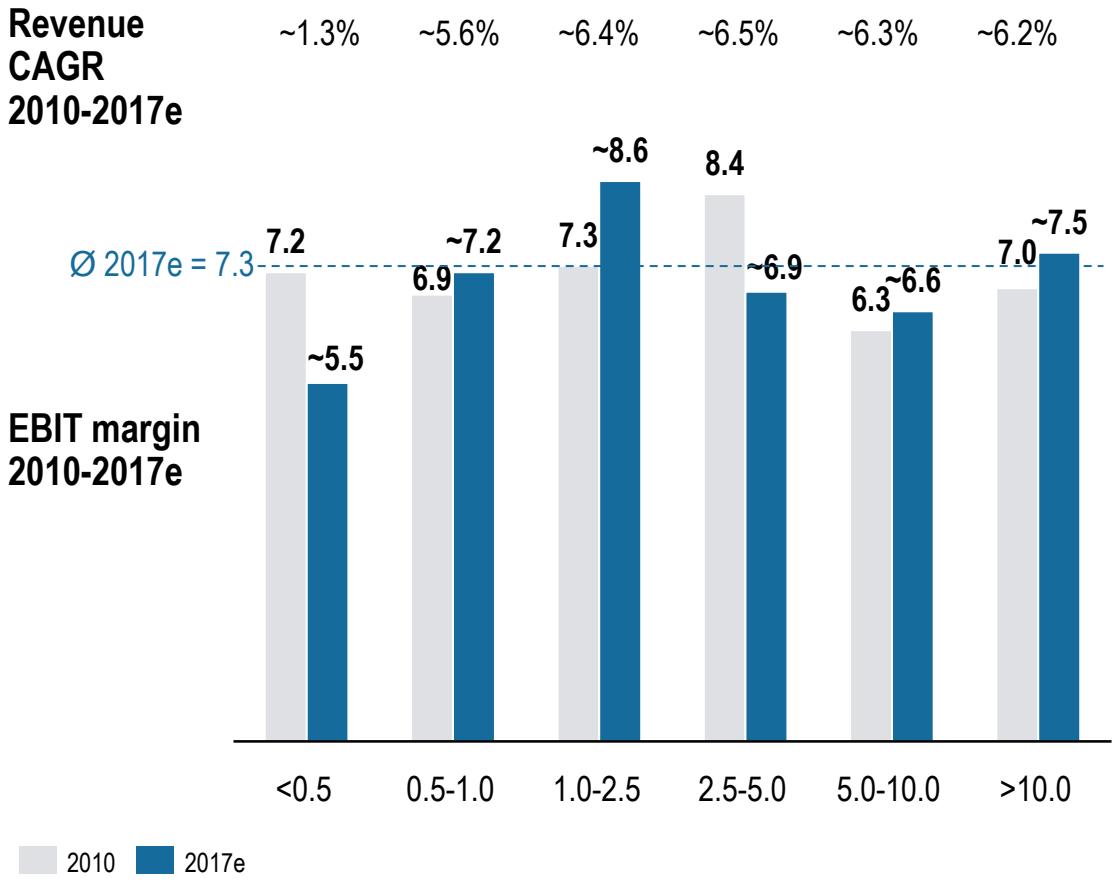


- **China**-based suppliers have seen a decline in margins in recent years from a very high level due to **intensified competition** in their home market, but **still achieve above average growth and profitability**
- **NAFTA**-based suppliers are still leveraging the effects from their **substantial restructuring** during the 2008/2009 auto crisis and the subsequent **re-focusing on technology**
- **Europe**-based suppliers largely benefit from **leading technology** positions in many segments and a **favorable customer mix**
- **South-Korea**-based suppliers' margins have come under pressure recently
- **Japan**-based suppliers have seen a slight recovery in terms of profitability, reducing the gap to other regions

Source: Company information, Lazard, Roland Berger

Profitability levels are currently in line across different company sizes – Only very small suppliers substantially lag behind

Key supplier performance indicators by company size (EUR bn sales), 2010-2017e [%]

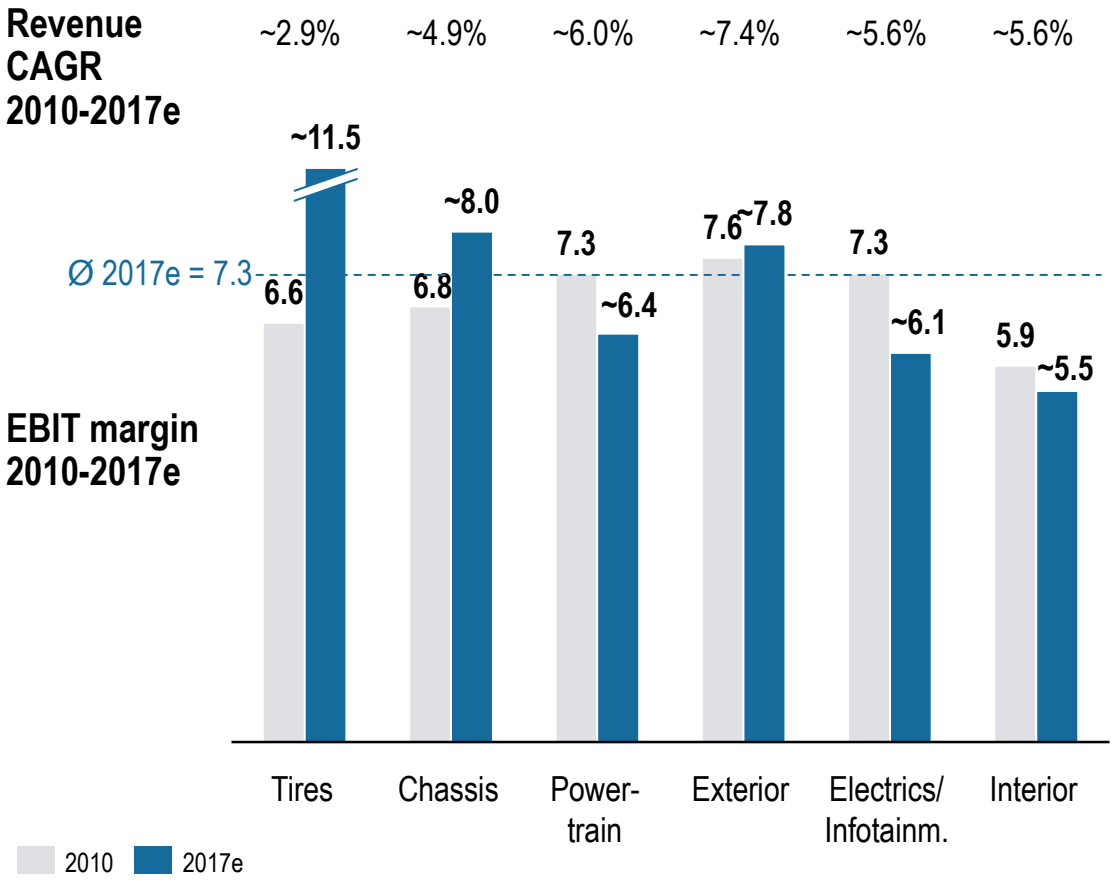


- **Large multinational suppliers** (above EUR 10 bn revenues) grew in line with the average, but have been able to achieve **above average profitability**
- **Large** suppliers (EUR 2.5-5 bn revenues) gave up profitability to continue strong revenue growth
- **Midsize suppliers** (EUR 1.0-2.5 bn revenues) increased profitability, mostly on the back of a very focused and technology-enabled product portfolio
- **Very small suppliers** lag behind in terms of growth and profitability due to limited resources for innovation and expansion

Source: Company information, Lazard, Roland Berger

Powertrain suppliers face increasing pressure on profitability – Exterior suppliers strongly grow at attractive margins

Key supplier performance indicators by product focus, 2010 vs. 2017e [%]

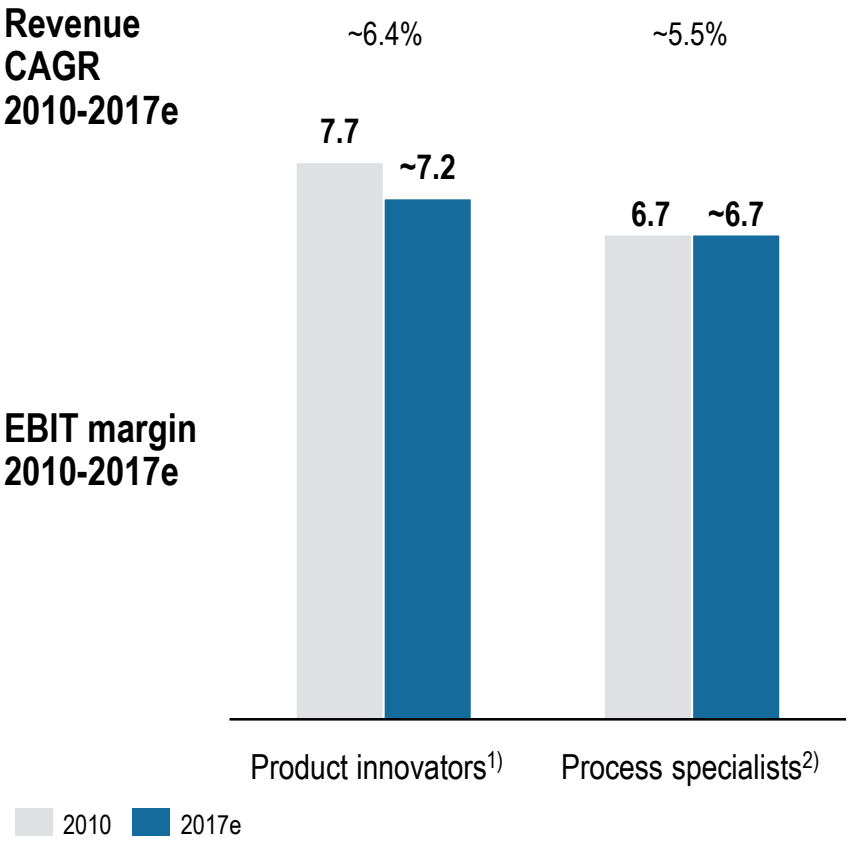


- **Tire** suppliers grew at a slower rate, but benefited from **recently favorable raw material costs**
- **Chassis** suppliers clearly improved margins over time – development increasingly driven by **advanced driver assistance** and **active safety**
- **Powertrain** margins pressurized by **intensified competition**, **the cost of (multiple) innovations** and the **rise of electric vehicles**
- **Exterior** suppliers have been strongly growing while continuing to be profitable above average due to **growing lightweight focus**
- **Electrics/Infotainment** suppliers face changing customer requirements and increased competition, reducing profitability
- **Interior** suppliers' margins continue to stay under pressure

Source: Company information, Lazard, Roland Berger

Product innovators outpace process specialists in terms of profitability and growth

Key supplier performance indicators by business model, 2010 vs. 2017e [%]



- On average, innovative products feature **higher differentiation potential** and greater OEM willingness to pay higher prices
- High **entry barriers** through **intellectual property** in many innovation-driven segments
- **Competitive structure** more consolidated in innovation-driven segments
- **Higher fragmentation** in many process-driven segments puts pressure on prices
- Product innovators grow slightly above process specialist due to **increasing demand for innovative products and solutions**

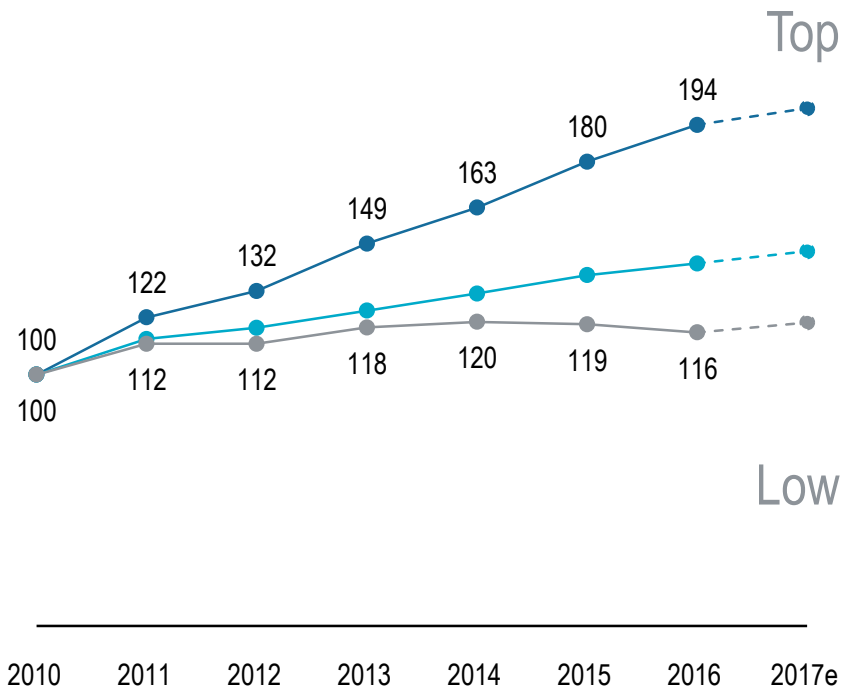
Note: Analysis excludes tire suppliers; 1) Business model based on innovative products with differentiation potential; 2) Business model based on process expertise (while product differentiation potential is limited)

Source: Company information, Lazard, Roland Berger

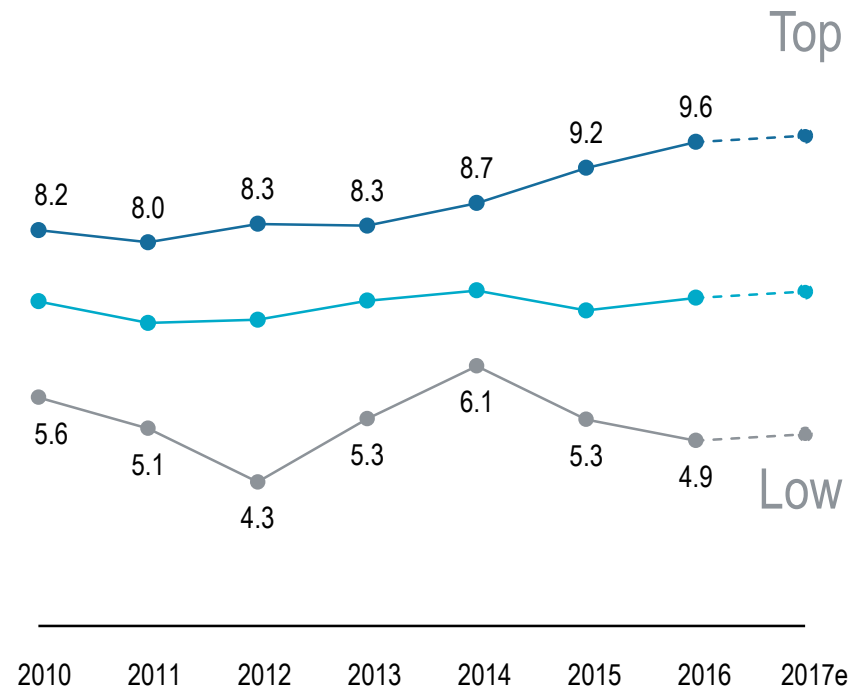
Margins of top-performing suppliers expected to stay at previously high levels – Low-performing peers still significantly lagging behind

Key performance indicators of top vs. low performing suppliers[1)]

Revenue growth [2010=100]



EBIT[2)] margin [%]

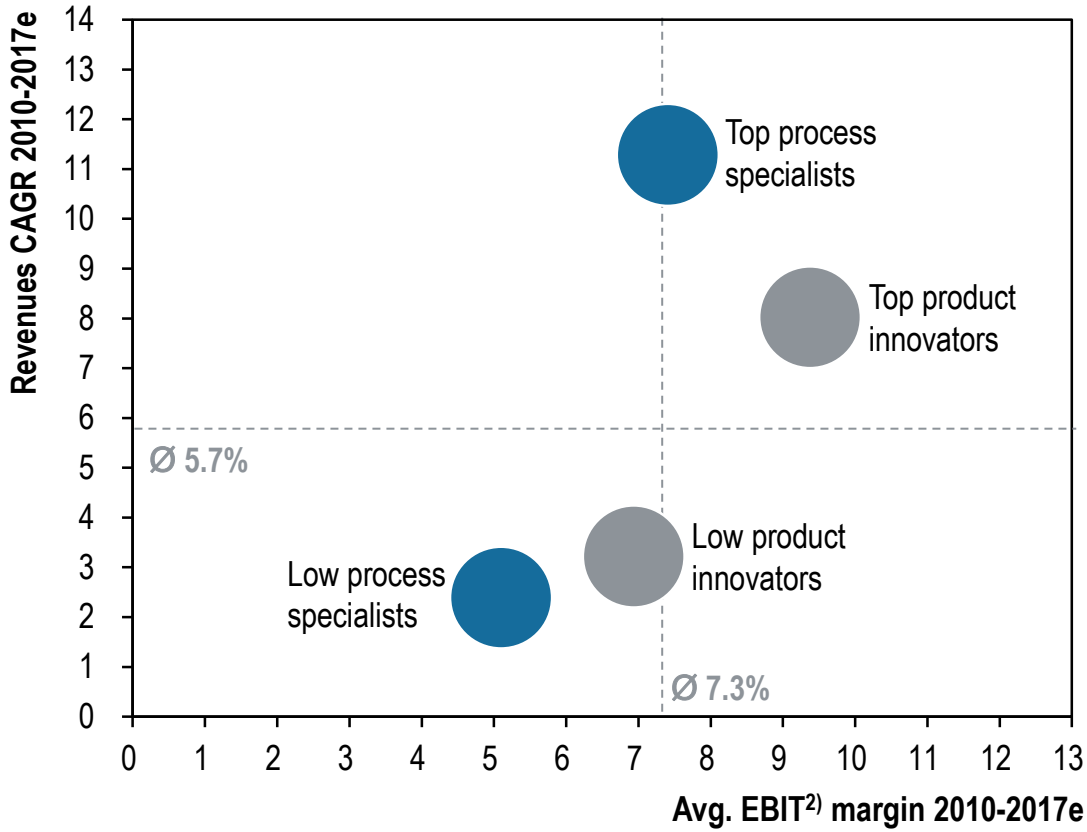


1) Top (low) performance based on above- (below-) average revenue growth 2010-2016, ROCE 2010-2016 and ROCE 2016; 2) EBIT after restructuring items

Source: Company information, Lazard, Roland Berger

However, top performance is not necessarily related to (product) innovation only

Key performance indicators of top vs. low performing suppliers[1)]



- **Product innovators** outperform process specialists in terms of **average profitability**
- **Top process specialists**, though, achieve average revenue **growth that is above the top product innovators**
- Large **difference in growth rates** between top and low performing process specialists indicates the **relevance of scale economies**
- Increased **difference in growth rates** between top and low performing product innovators indicates the **relevance of profitable innovation**

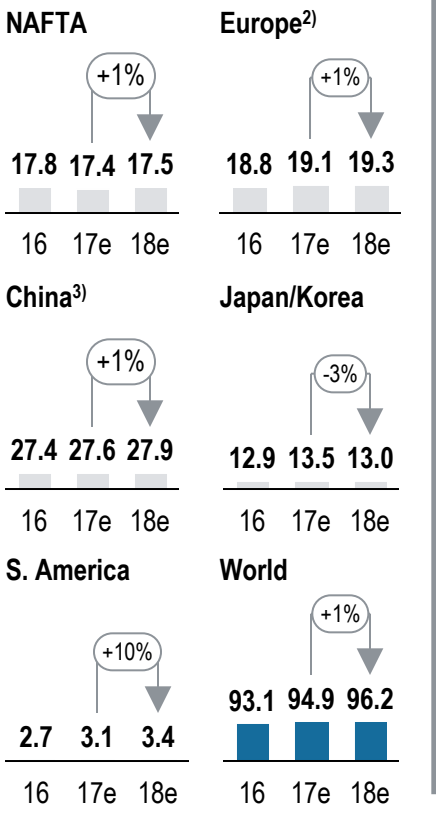
1) Top (low) performance based on above- (below-) average revenue growth 2010-2016, ROCE 2010-2016 and ROCE 2016; 2) EBIT after restructuring items

Source: Company information, Lazard, Roland Berger

Short term, we expect continued, but slower revenue growth and comparable margins to 2017e

Supplier global revenue and margin outlook 2017e/2018e

Production volume [m units]

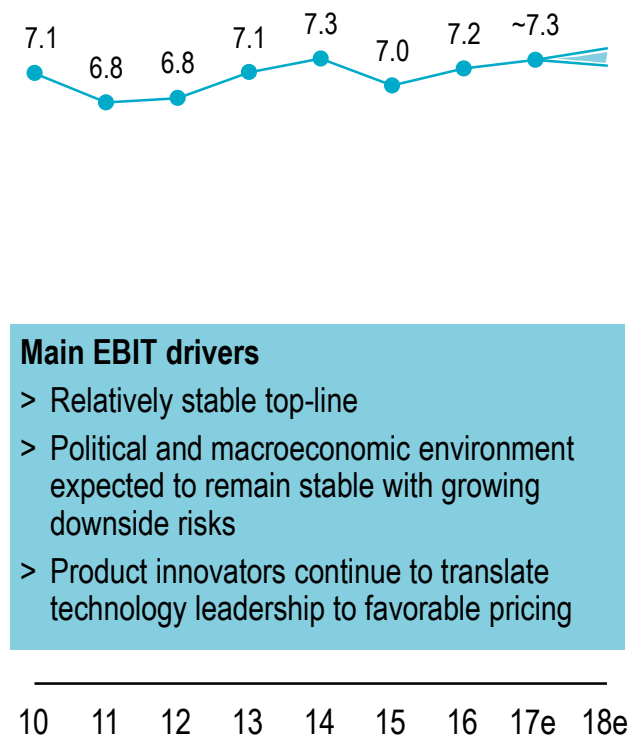


Revenue growth [2010 = 100]

Main revenue drivers

- Slowing growth in mature markets (US, Europe, Japan/Korea)
- Continued softening of growth in China
- Strong growth in South America, Russia, Turkey and Middle East partially counteract slowdown in major markets

EBIT[1] margin [%]



Main EBIT drivers

- Relatively stable top-line
- Political and macroeconomic environment expected to remain stable with growing downside risks
- Product innovators continue to translate technology leadership to favorable pricing

1) EBIT after restructuring items; 2) Excluding CIS and Turkey; 3) Greater China

Source: IHS, company information, Lazard, Roland Berger

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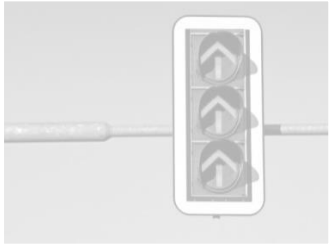
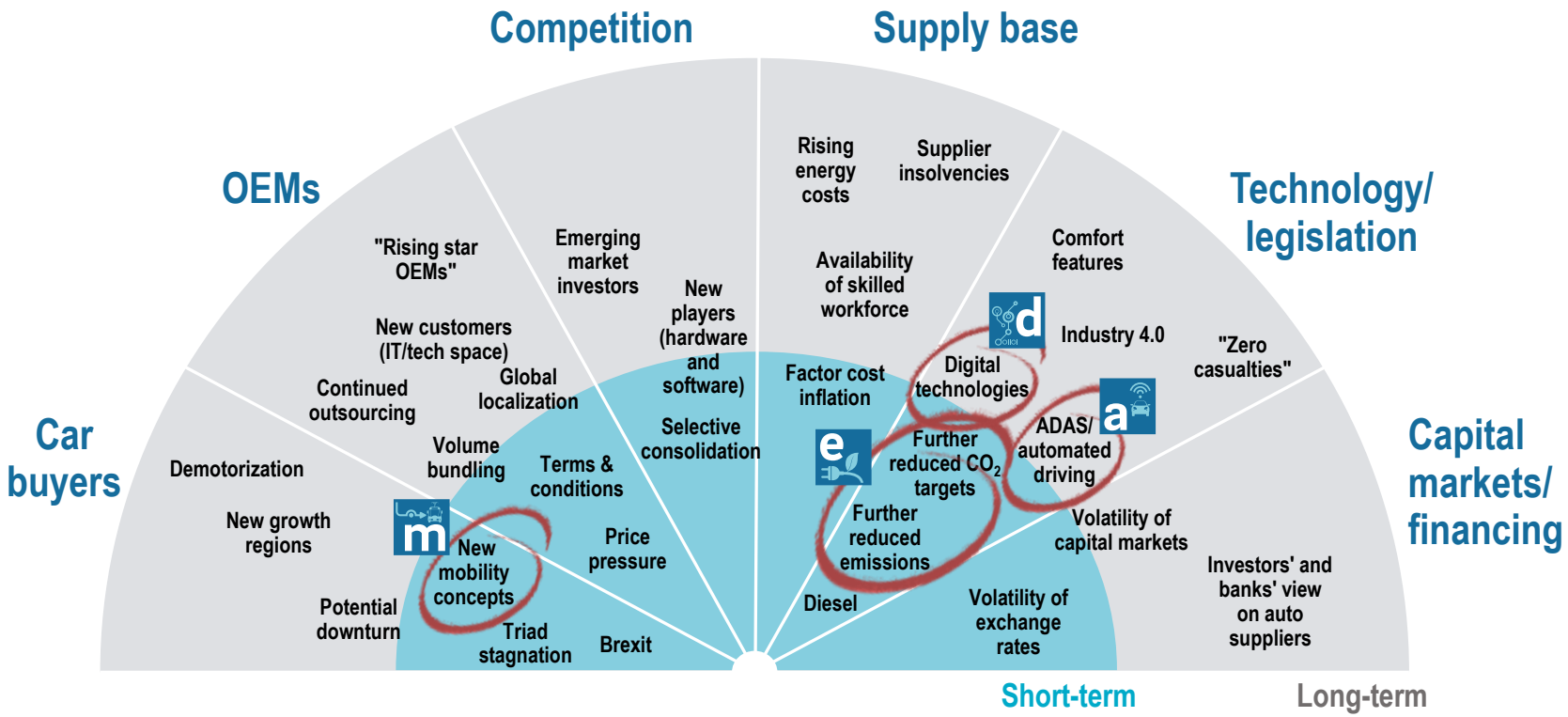



Looking ahead: Several industry trends are influencing the automotive industry in the short and long term

Automotive industry trend radar



Note: Excluding product segment specific technology and operational issues

Source: Lazard, Roland Berger

Ride sharing services are forecast to continue to grow at a fast pace, attracting massive capital paired with high valuations

State of the ride hailing industry

Capital raised by industry leaders [USD bn][1)]

Didi Chuxing	15.7	> USD 5 bn raised in latest round led by Softbank > Expanding internationally as a strategic investor
Uber	11.6	> USD 10 bn potential investment led by Softbank > Ride requests up 150% YOY
Lyft	3.6	> USD 1 bn raised in latest investment round led by Alphabet's CapitalG > 1H 2017 saw as many rides as all of 2016

Latest reported valuation (pre money) [USD bn]

44.5	> Based on its April 2017 equity investment round led by Softbank
59.0	> Based on the last equity investment round in June 2016 > However, secondary market interest pegged the value closer to USD 50 bn in June 2017
10.0	> Based on its October 2017 investment round led by CapitalG

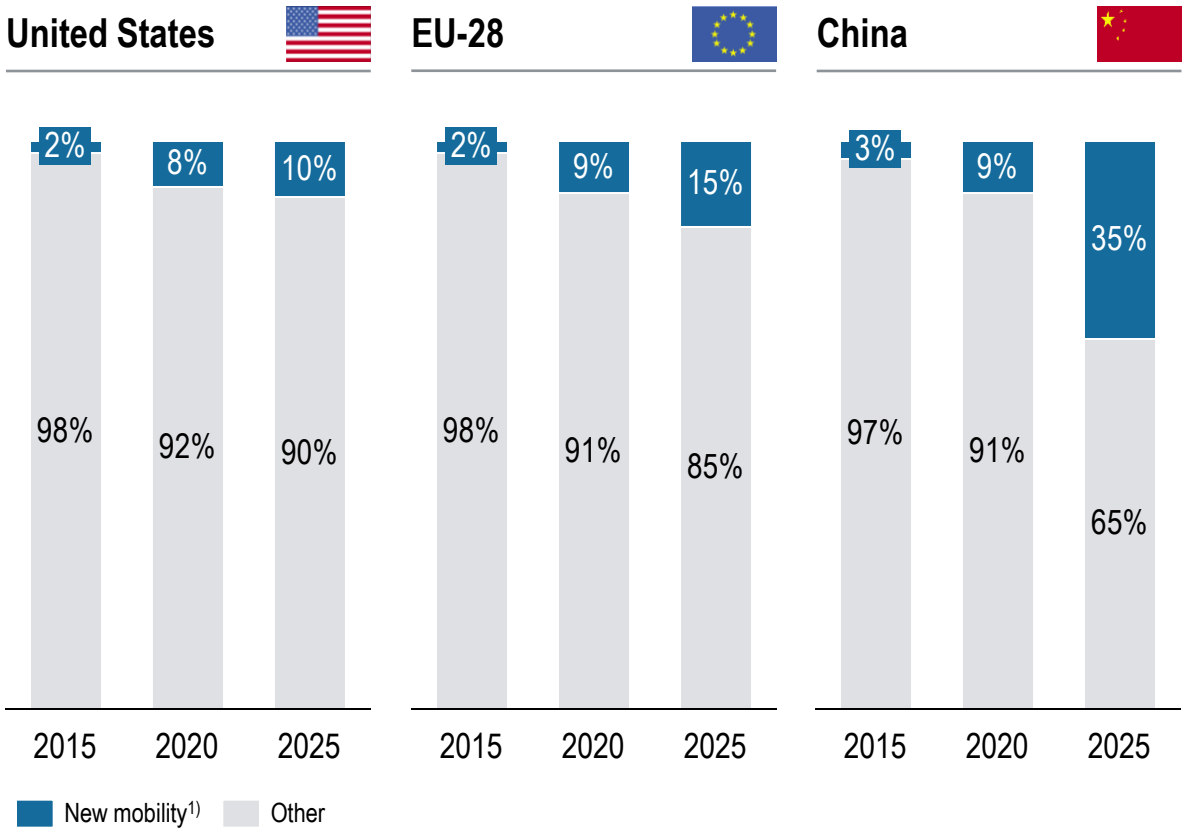
Combined valuation: 114 bn

1) Announced investments as of November 2017

Source: Crunchbase, desktop research, Lazard, Roland Berger

Vehicle sales for new mobility services are expected to exceed 10% of new car sales by 2025 in the US and the EU

Share of vehicle sales for New Mobility[1] [% passenger car sales]



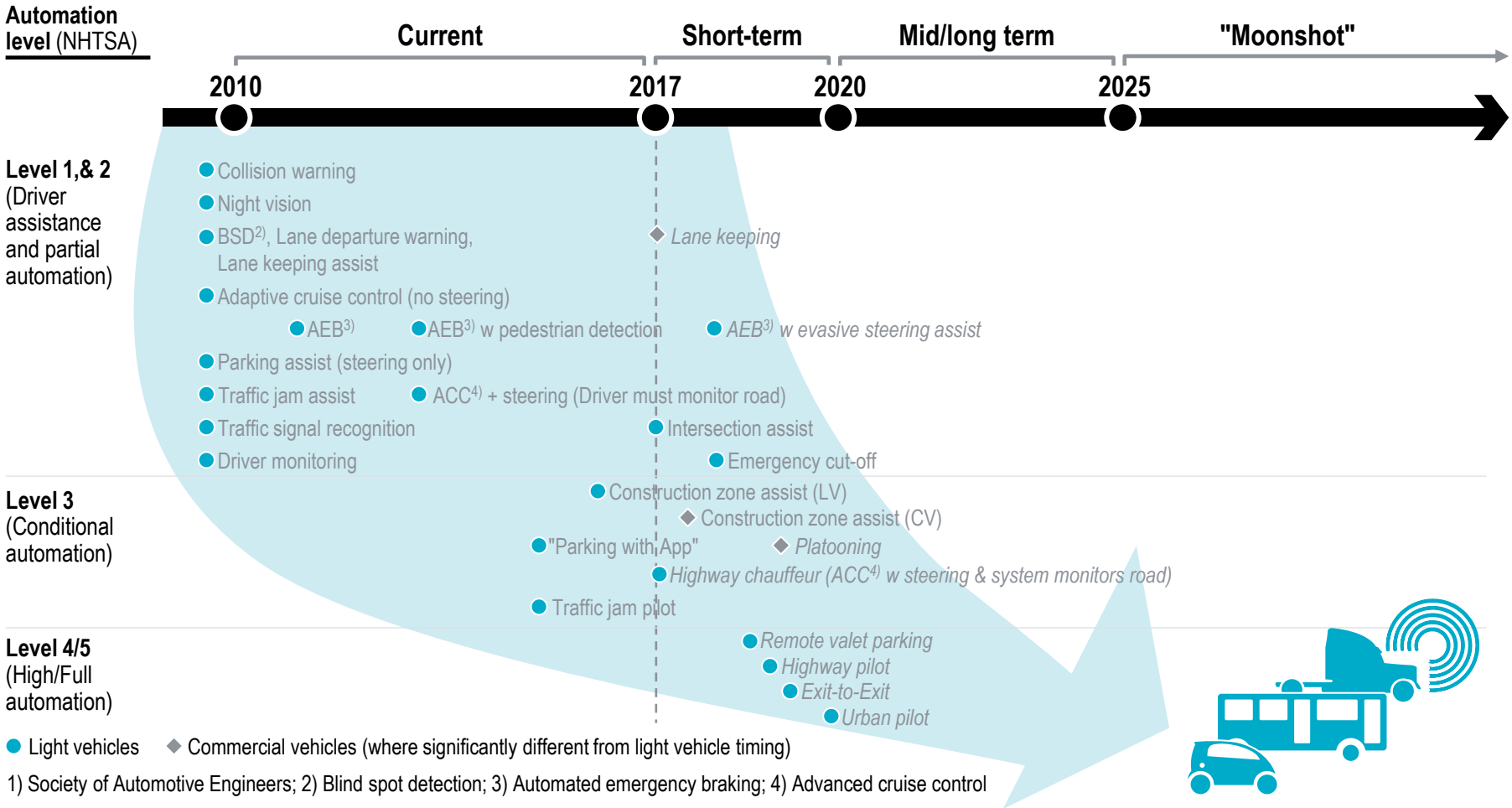
- New mobility sales are expected to grow through 2025 due to:
  - Changes in car ownership patterns
  - Growing urbanization
  - Enhancements in technology & mobility business models
- The disruption potential in China is higher due to its relatively lower base of ownership levels today (1 car for 7 people vs. 1 for 2 in EU and 1 for 1.25 in US)
- Post 2025, the introduction of RoboCabs could drive a significantly larger share of sales to new mobility

1) Includes forecast for car sharing, ride hailing, ride sharing, and Robocabs. Does not include sales for conventional taxis or rental car fleets

Source: Global RB Mobility Revenue and Profit Pool Model, Lazard, Roland Berger

Automated driving is set to arrive at fast pace – With new entrants and real-life pilots already under way

Commercialization timeline of automated driving functionality by SAE[1] levels

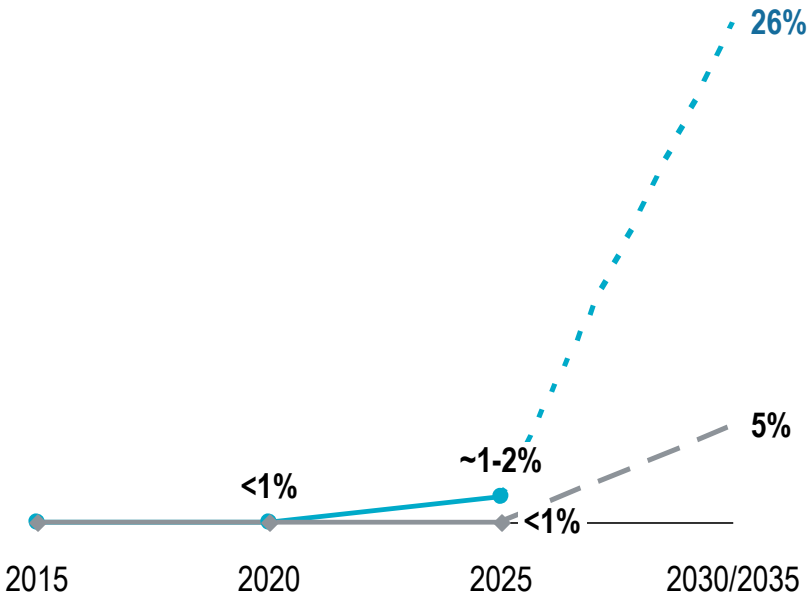


1) Society of Automotive Engineers; 2) Blind spot detection; 3) Automated emergency braking; 4) Advanced cruise control

Source: Lazard, Roland Berger

Future penetration of highly automated vehicles will depend on overcoming current hurdles and convergence on shared mobility

Autonomous driving – Penetration rate of highly automated cars (SAE Levels 4/5)[1)]



Disruptive/High scenario

- Sharing proliferates with high acceptance of car/ride sharing services
- High penetration of autonomous vehicles in shared fleets and privately owned premium and volume vehicle segments
- Autonomous, shared vehicles, called RoboCabs provide on-demand mobility services to consumers and businesses
- High use of autonomous vehicles by ride sharing services drives down costs significantly

Low scenario

- Shared mobility confined to early adopters in dense urban areas
- Automated driving penetration primarily in flagship premium models
- Continued use of human drivers renders ride sharing services' business models mostly unsustainable

1) In % passenger car sales; includes RoboCabs and private autonomous cars

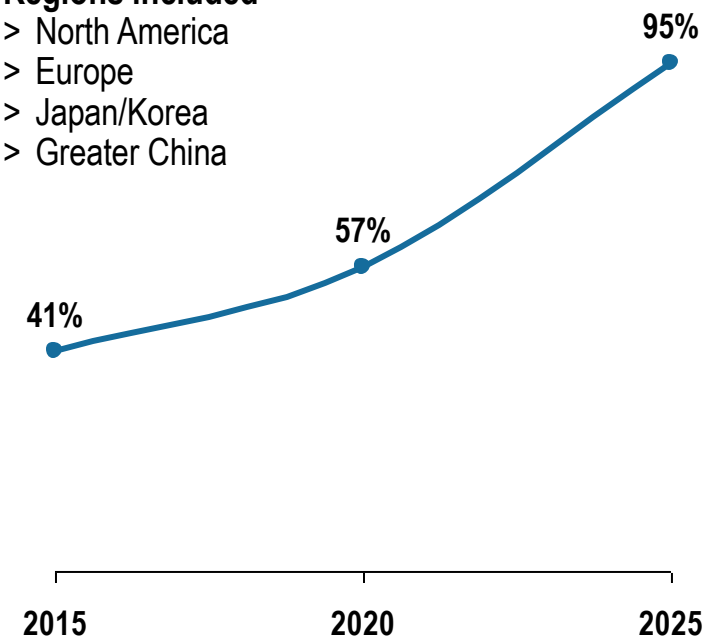
Source: Global RB Mobility Revenue and Profit Pool Model, Lazard, Roland Berger

An increasing share of vehicles will be connected globally – Digitization as enabler for new business models and technologies

Connected vehicles

Connected vehicle forecast
[selected markets; % of vehicles sold][1)]

Regions included
> North America
> Europe
> Japan/Korea
> Greater China



Connectivity types

Type	Calc.[2)]	Data
Smartphone-based > Connectivity and calculation power provided by smartphone	✓	✓
Tethered > Connectivity provided by smartphone	✓	✓
Embedded > Car with build-in telematics unit	✓	✓

Drivers of growth

> Safety enhancement (E-Call)
> Infotainment (entertainment, info, navigation services)
> Advanced HMI (speech recognition)
> Integration of virtual personal assistants
> Over the air updates
> New OEM service offerings
> New business models
> Autonomous driving

1) Including embedded (SIM card on the car, ~50% of volume), tethered (SIM card on the smartphone, ~20% of volume) and smartphone-based (calculating power in the smartphone, ~30 % of volume) systems, excl. OBD dongle-based connectivity – Share considers only North America, Europe, Japan/Korea and Greater China; 2) Calculation power/functionality

Source: Auto2X, IHS, Lazard, Roland Berger

However, improved internal & external connectivity will make modern vehicles vulnerable to an increasing number of cyber threats

Cybersecurity threat vectors

Illustrative

Internet based attacks
> 4G/5G
> E-Call

Hardware attacks
> OBD II port
> Direct ECU attacks

Sensor attacks
> GPS sensor
> Radar sensor
> Other sensors

Near-field wireless attacks
> Bluetooth
> WiFi
> DSRC
> Remote key

- Threat vectors span all connected vehicle components and systems
- Suppliers must design E/E architectures to prevent component-level attacks and understand the design implications for integration into vehicle sub-systems
- Organization structures and design processes must adapt accordingly
- Evolving legal and regulatory requirements for data security & protection and product safety must be addressed as well

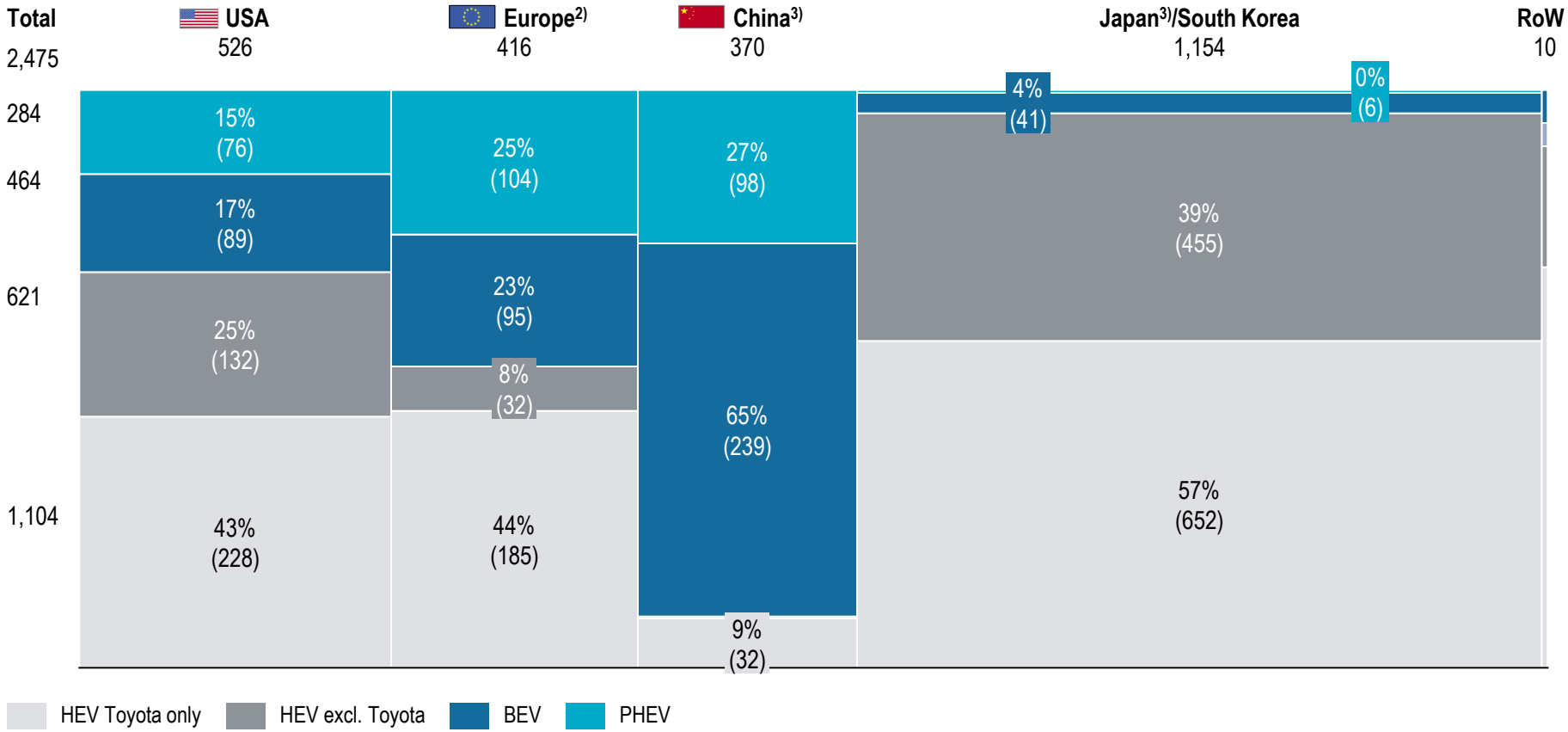
Action items for holistic security concept

Secure processing (secure boot, run-time integrity, OTA updates)	**Secure network** (message authentication, CAN ID killer, distributed intrusion detection)	**Secure gateway** (domain isolation, firewalls/filters, centralized intrusion detection)	**Secure interfaces** (secure M2M authentication, secure key storage)

Source: Company information, Interviews with market participants, Lazard, Roland Berger

Electrification in Japan and North America mainly achieved through HEV technology so far, whereas China more focused on BEV/PHEV

Global light vehicles xEV[1] sales volume by region, 2016 ['000 units]



HEV – Mild and full hybrid electric vehicles; BEV – Battery electric vehicles; PHEV – Plug-in hybrid electric vehicles; xEV – Class of electrified vehicles from mild hybrids to battery electric;
1) Excludes fuel cell electric vehicles; 2) Including Russia and Turkey; 3) China/Japan sales data includes only domestically produced xEVs

Source: MarkLines, Press Research, RB xEV forecast model, Roland Berger

Powertrain electrification adoption will be influenced by push and pull factors that have different levels of influence by region

Drivers for global powertrain electrification[1)]

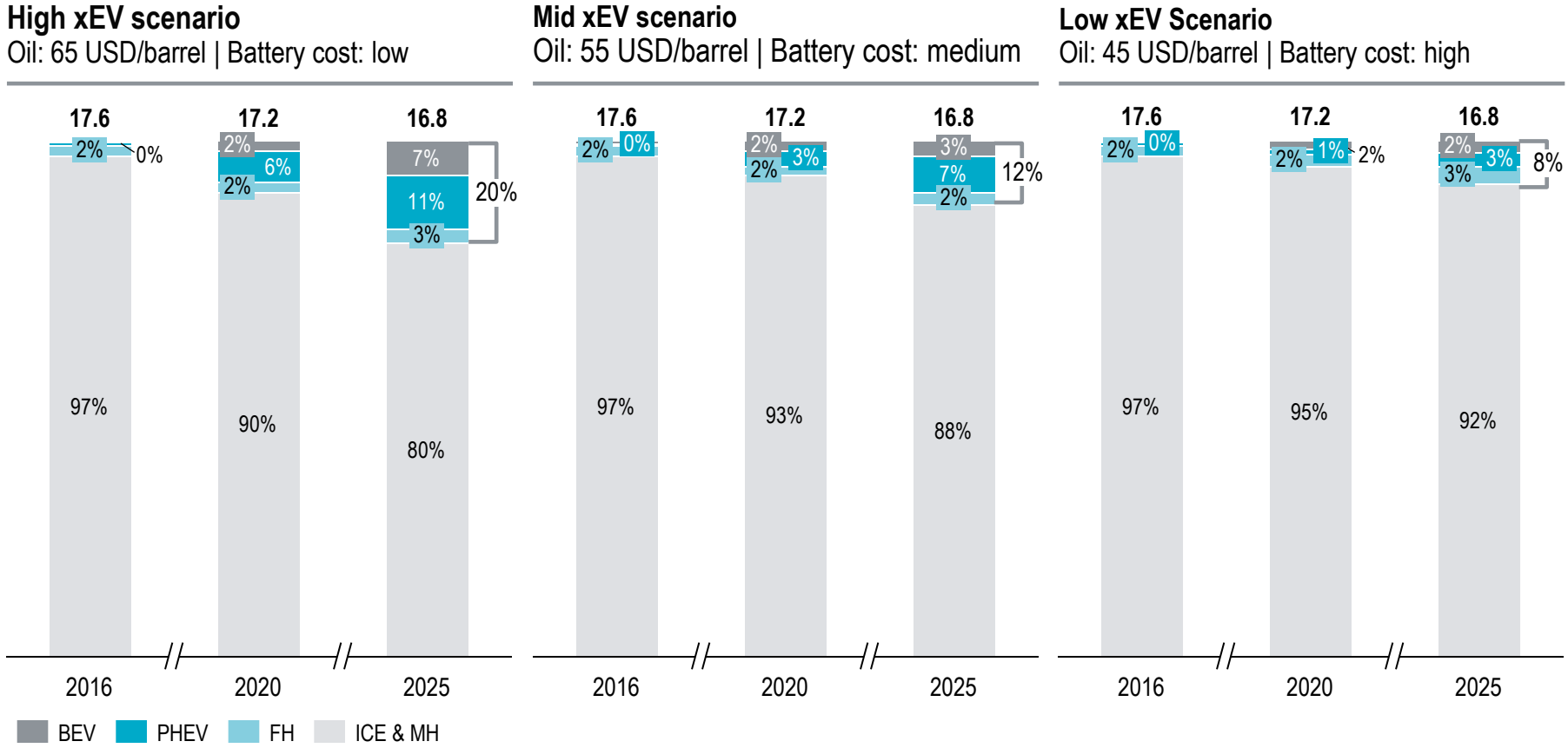
	United States	Europe	China
	> Future widespread adoption of xEVs to be driven primarily through a TCO[2)] advantage compared to ICE vehicles > Depends on the evolution of fuel and battery prices, taxes, incentives, etc. > Increasing offer of desirable electrified vehicles in premium segments > Tightening regulations will be the dominant factor in CARB 177 states > City level emissions regulations not yet a major contributing factor	> Tightening CO2 fleet emissions targets > ICE registration bans (e.g., Norway, Netherlands) > Environmental city access restrictions permitting only low- or zero-emission vehicles (e.g., London, Paris) > TCO[2)] advantage only becomes a dominant factor from 2030 onward > Incentives and tax advantages are present but declining	> xEV adoption will largely follow China's announced targets for NEV[3)] and FH/MH[4)] > Environmental concerns drive city-level plate limitations for ICE > TCO[2)] advantage only becomes a dominant factor from 2030 onward > Subsidies to promote market development are present but declining
Main driver	Economics/ Total cost of ownership	Regulation	Regulation
Scenario variable(s)	> Oil price > Battery cost	> CO_2/km target in 2025 > Phase-in percentage	> CAFC[5)] and NEV[3)] balances > FH/MH[4)] target

1) Besides shown factors, all regions will be influenced by the emergence of automated driving with convergence on mobility (especially electrified RoboCabs) and appeal to consumers through performance and image 2) Total cost of ownership 3) New energy vehicle 4) Full Hybrid / Mild Hybrid 5) CAFC - Corporate average fuel consumption

Source: Lazard, Roland Berger

Lower battery costs and potentially rising oil prices may drive electrification penetration in the United States to ~ 20% by 2025

USA – New sales[1] propulsion share [2016-2025; m units; % of sales]

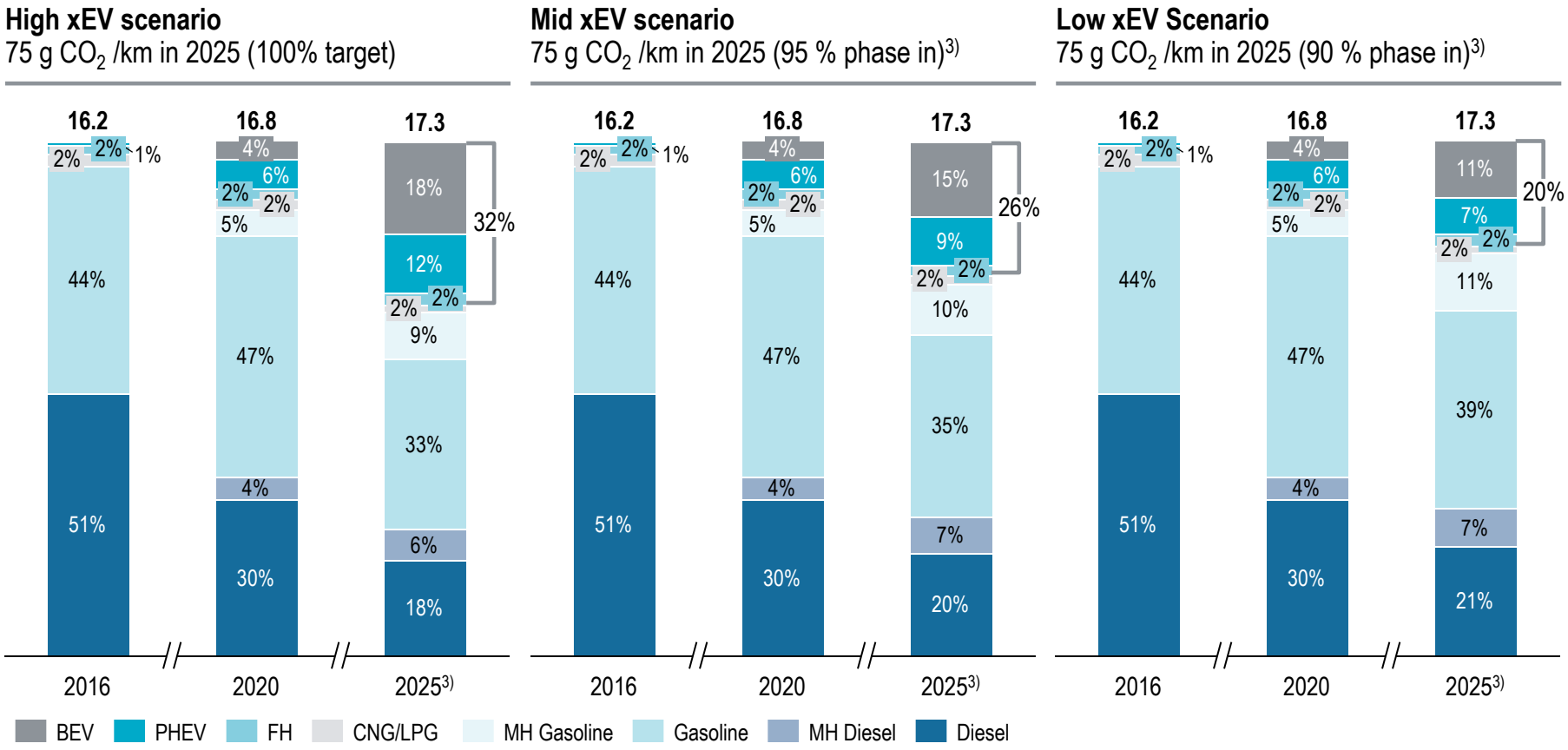


BEV – Battery electric vehicles; PHEV – Plug-in hybrid electric vehicles; FH – Full hybrid vehicles; ICE & MH – Internal combustion engine & mild hybrid vehicles;
xEV – Class of electrified vehicles from mild hybrids to battery electric
1) Passenger cars and light duty trucks

Source: US EPA, IHS, RB xEV forecast model, Roland Berger

Electrification in Europe varies depending on CO_2 emission targets – Share could reach between 20% a. 32% for 2025

EU28[1] – New sales[2] propulsion share [2016-2025; m units; % of sales]



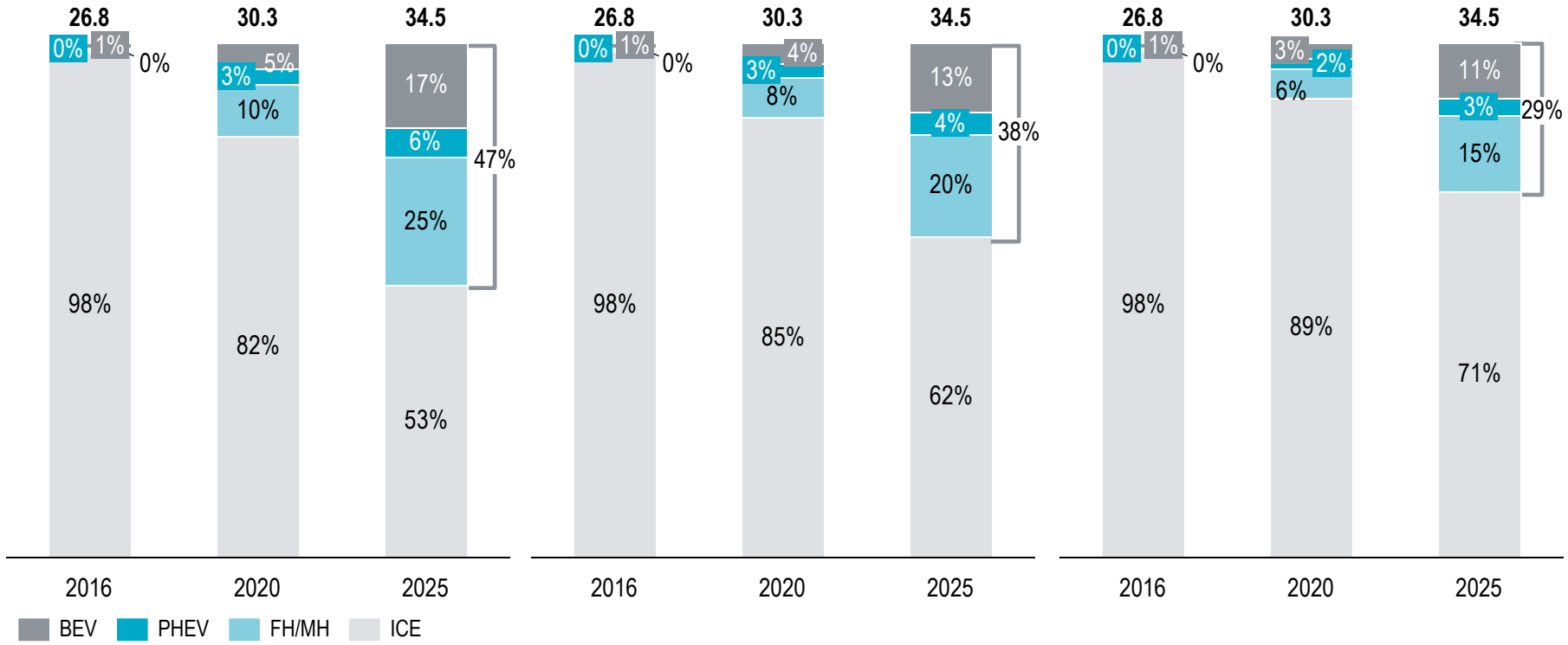
BEV – Battery electric vehicles; PHEV – Plug-in hybrid electric vehicles; FH – Full hybrid vehicles; CNG/LPG – Compressed natural gas/liquefied petroleum gas vehicles; MD – Mild hybrid vehicles; xEV – Class of electrified vehicles from mild hybrids to battery electric

1) Incl. UK; 2) Passenger cars and light commercial vehicles; 3) The top 95/90% of the fleet need to meet the target; 95 % ≈ 80 g CO2/km; 90 % ≈ 85 g CO2/km

Source: EEA, IHS, RB xEV forecast model, Roland Berger

China NEV market with significant growth forecasted; neutral NEV and CAFC balance with a 13% BEV and 4% PHEV share in 2025

China – New sales propulsion share [2016-2025; m units; % of sales]



BEV – Battery electric vehicles; PHEV – Plug-in hybrid electric vehicles; FH/MH – Full and mild hybrid electric vehicles; ICE – Internal combustion engine vehicles; xEV – Class of electrified vehicles from mild hybrids to battery electric; CAFC – Corporate average fuel consumption; NEV – New energy vehicle

1) Within FH/MH, a significantly higher share is expected for 48V mild-hybrids

Source: MIIT, IHS, RB xEV forecast model, Roland Berger

Recent developments point towards an acceleration of the disruption caused by the four automotive megatrends

New **mobility** business models are poised to disrupt car ownership, personal mobility and goods logistics

The timeline for level 4/5 **autonomous** keeps accelerating as necessary economics, regulations and technology fall into place

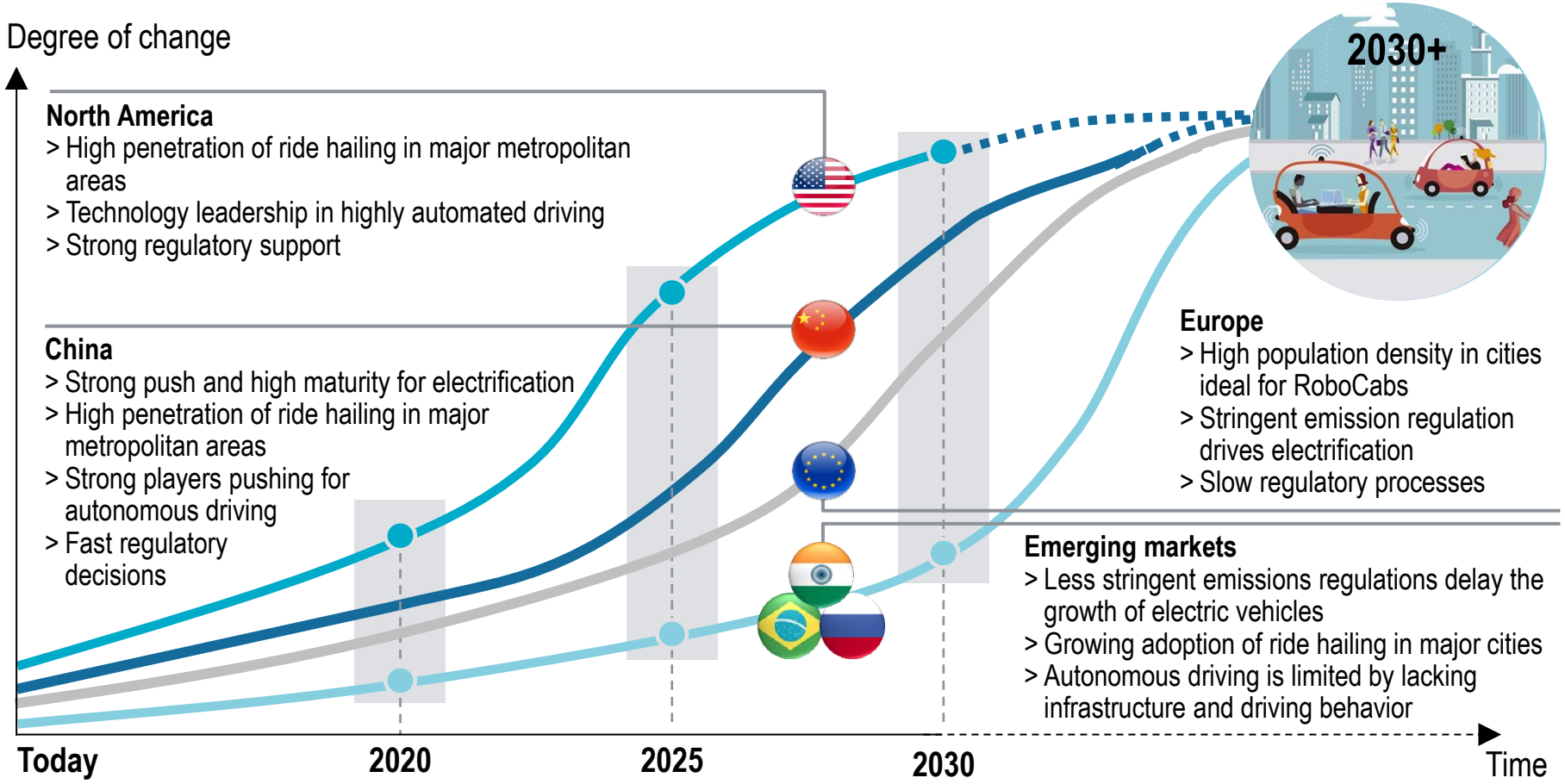
In **digitization**, artificial intelligence offers almost limitless possibilities, while connectivity-enabled technologies reach mainstream application

Momentum for **electrification** is building among OEMs due to increasing regulatory pressure and accelerating technology advancement

Source: Lazard, Roland Berger

The automotive "end game" appears inevitable, yet the transition period is marked by a high level of uncertainty

Scenario development (applicable to light vehicle)



Source: Lazard, Roland Berger

Automotive suppliers will need to prepare for five distinct changes that will emerge on the road to the "end game"

Emerging changes impacting automotive suppliers

Automotive End game zone

1 Vanishing growth
> Stagnation in mature markets
> Increased usage of shared mobility solutions

2 Accelerated change of technologies in focus
> Increasing proliferation of electrified powertrains
> Strong industry push for ADAS and connectivity solutions

3 Emergence of software as a key differentiating factor
> Digital features determine value to the end-customer
> Digitization offers new monetization options

4 OEMs encounter increasing investment needs and margin pressure
> New technologies require substantial investments
> OEMs challenged by new competitors

5 Valuation levels of commoditized suppliers might come under pressure
> Outperformance of OEM valuation multiples might come to an end
> Outlook of commoditized supplier sub-sectors might be seen more critical by equity investors as well as creditors

Source: Lazard, Roland Berger

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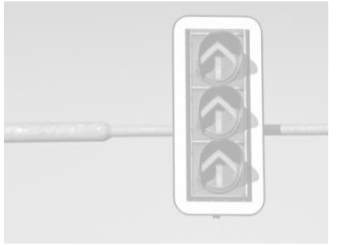



The automotive disruption is creating specific challenges for automotive suppliers

Challenges for the global supplier base

	Impact on suppliers
1 Vanishing growth	Vanishing growth will put current supplier business models at stake
2 Accelerated change of technologies in focus	Technology shifts require suppliers to invest in new and old technologies in parallel
3 Emergence of software as a key differentiating factor	Suppliers need to build up competencies fast
4 OEMs encounter increasing investment needs and margin pressure	Suppliers will face even higher cost pressure
5 Valuation levels of commoditized suppliers might come under pressure	Commoditized suppliers will be under increasing pressure from their investor base to increase shareholder value

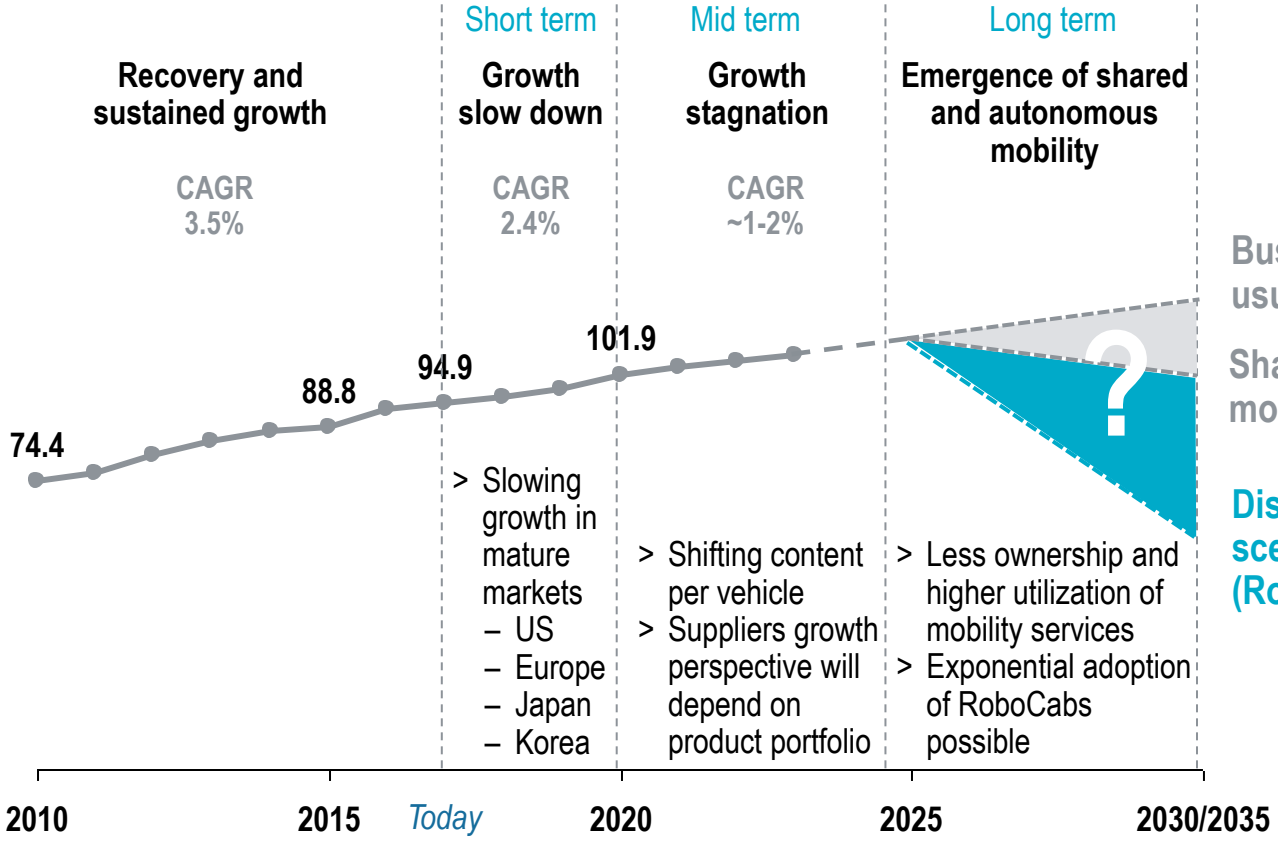
Source: Lazard, Roland Berger

1

Vanishing growth will put current supplier business models at stake

Overall growth is expected to stagnate and volumes might even decline in the long term in a shared autonomous world

Short to long term growth perspectives [LV production; m units]



> Growth has recently being slowing down in mature markets

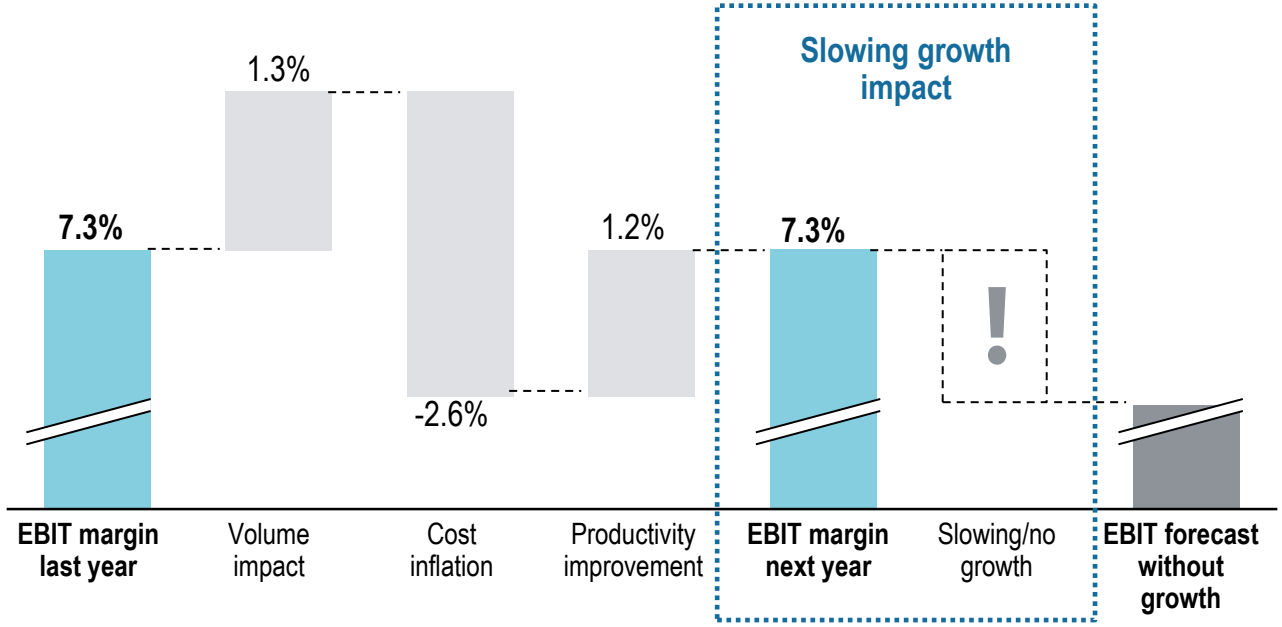
> In the future, supplier revenue growth will be determined more by the product portfolio and content per vehicle than by underlying production volume growth

> After 2025, a decline of overall production volumes might occur in a disruptive scenario

Source: IHS, Global RB Mobility Revenue and Profit Pool Model, Lazard, Roland Berger

The current supplier business model of compensating negative cost impacts with volume growth will no longer work

Potential impact on typical supplier EBIT development [%]



Assumptions

Average supplier EBIT 2017e	**3.5% growth** at contribution margin of 35%	1.2 %LTA adjustment, material (1%), labor (2.5%) & other (1%) cost inflation	At **5% of own value add**	At **2.5% of total** labor cost	At **1%** of other cost	At **1% of total** material cost

As volume growth stagnates, suppliers will not be able to sustain their profitability through traditional means

Source: Lazard, Roland Berger

As a consequence, suppliers will need to look for different growth areas – Consolidation pressure will increase

Impact and consequences for suppliers

Global production volume growth may decline in the long term

> Suppliers need to ensure future growth by increasing their content per vehicle/expanding their product portfolio or by diversifying into other related or non-related areas

Compensating cost increases with growth will no longer work

> Suppliers traditionally used growth to compensate for cost inflation and price decreases (LTAs)
> However, overall growth might stagnate and global production volumes might decline in the long term with adoption of disruptive technologies

Competitive pressure in growth areas will be high

> Many suppliers put focus on technologies with growth potential, increasing competitive pressure in these segments
> Not all suppliers have the capability or competence or financial leeway to develop growth areas

New growth areas needed

Business model review necessary

Further consolidation pressure

Source: Lazard, Roland Berger

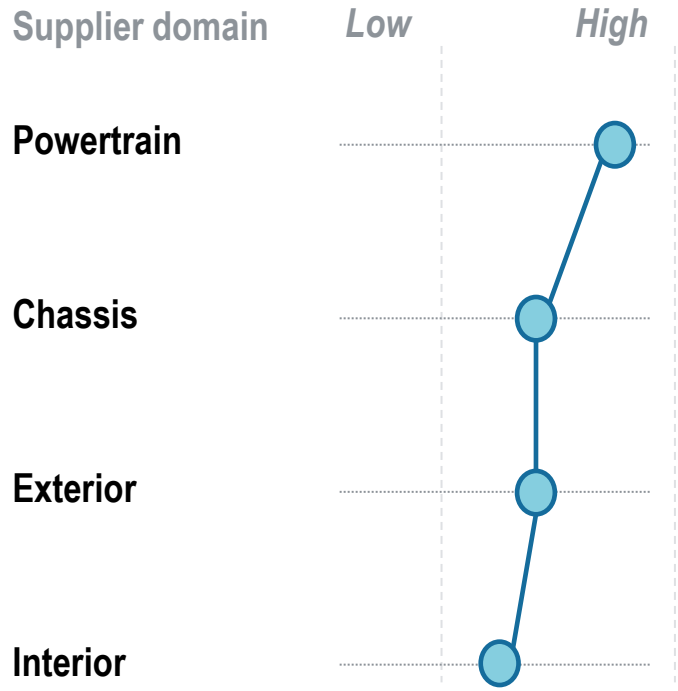
2

Technology shifts require suppliers to invest in new and old technologies in parallel

Almost all vehicle domains will see a shift in growth focus over the next years – Disruption impact particularly high in powertrain

Impact of technology shifts by domain

Disruption impact on current business



Next generation vehicle concept

Powertrain

- E-motors and power electronics
- Battery systems
- Simple 1-2 step reduction gears

Chassis

- Advanced driver assistance systems and autonomous features
- Adaptive suspensions
- Active steering and braking systems

Exterior

- Shifting material focus and growing importance of multi-material applications
- Growth of non-structural composites

Interior

- New HMI / display technologies
- Extended Infotainment solutions
- Increased interior insulation (NVH)
- Integration of electronics and surfaces

Substantial new requirements for the supply base

Source: Lazard, Roland Berger

Electric powertrain components to experience high growth rates at the expense of many traditional ICE components

Technology shifts – Powertrain

Background

> Increasing cost of ICE/exhaust treatment
> Mild and full hybrids aid in emissions improvement and enable ICEs with downgraded requirements
> BEV penetration rates increase driven by regulation, incentives and consumer demand

Technology trends – Winners

> Future powertrain architectures are electrified resulting in several fast growing domains:
  – E-motors
  – Inverters/power electronics
  – Battery
  – Battery cooling
  – 1-2 step reduction gears
  – Charging components

Technology trends – Losers

> Consequently, traditional ICE components and systems to experience below average growth rates:
  – Engine, camshafts, crankshafts, valves, lubricants
  – Exhaust, oil filters, alternators, ignition
  – Transmission, clutch gearbox, propeller shaft

Implications for suppliers

> ICE hardware commoditization
> Battery systems and electronics provide differentiation opportunities
> Limited potential in e-motors in part due to lower complexity vs. ICE

Source: Lazard, Roland Berger

The ADAS and AD component market will strongly grow providing an increasing revenue pool mainly for software focused suppliers

Technology shifts – Chassis

Background

> ADAS offers several benefits to society and industry, including accident mitigation, congestion reduction, increased driving comfort and fuel efficiency gains

Technology trends – Winners

> Advanced vehicle control and sensor systems are the main benefactors of the shift to greater advanced driver assistance systems:
  - Advanced driver assistance systems and autonomous features
  - Adaptive suspensions
  - Active steering + braking actuators
  - E-Axles (as part of electrified powertrain)
  - Vision sensors (LiDAR, cameras)

Technology trends – Losers

> Meanwhile, traditional vehicle control systems are at risk for reduced market share:
  - Hydraulic steering systems
  - Traditional axles
  - Conventional suspensions

Implications for suppliers

> Hardware standardization / commoditization of traditional chassis components and systems
> Intelligent systems integrated with ADAS are expected to offer growth potential within respective domains (e.g., steering, suspension, vision systems, passenger safety systems)

Source: Lazard, Roland Berger

Emissions regulations push OEMs for increased lightweighting of body structures while ADAS and connectivity create new use cases

Technology shifts – Exterior

Background

> Shifting material focus and growing importance of multi-material applications
> New technology integration potential for enhanced safety
> New design possibilities due to missing ICE powertrain

Technology trends – Winners

> Advanced material components and advanced safety features offer potential in exterior components:
  – Non-structural composites
  – Increased usage of plastics
  – Side and rear view cameras and screens
  – Driving mode indication (autonomous vs. human driver)
  – Lock systems using cell phones

Technology trends – Losers

> Traditional materials and exterior components most at risk for lost share include:
  – Cast parts
  – Non-structural steel parts
  – Traditional side and rear view mirrors

Implications for suppliers

> Shifting materials competencies for non-structural components suppliers
> New use cases for intelligent exterior systems may offer differentiation potential particularly when paired with ADAS solutions

Source: Lazard, Roland Berger

Autonomous driving will drastically change interior designs and provide innovation and growth potentials

Technology shifts – Interior

Background

> Growing importance of non-driving-related activities, such as infotainment, completing tasks while driving automated, eating and drinking
> Interior provides huge potential for innovation and continued growth

Technology trends – Winners

> New possibilities to design the interior of a vehicle by electric powertrain, connectivity and automated driving
  – New HMIs[1] (Augmented reality head up displays, gesture recognition, haptic feedback) and integration of electronics and surfaces (OLED[2] panels, curved screens)
  – Extended infotainment solutions
  – New design possibilities/requirements, e.g. luxury lounge seating or increased interior insulation (NVH[3])

Technology trends – Losers

> Traditional interior components that might face lower demand
  – Analog instrument clusters
  – Buttons and switches
  – Conventional valves, pumps and compressors

Key success factors

> Successful translation of customer needs in product innovation
> Product differentiation
> Integration of E/E to ensure value creation

1) Human-machine interfaces; 2) Organic light emitting diode; 3) Noise, vibration and harshness

Source: Lazard, Roland Berger

Suppliers will need to commit resources to emerging technologies and in parallel navigate investments into current business

Impact and consequences for suppliers

Investments in existing technology are still necessary

> ICE advancement is indispensable for reaching emission targets
> Emerging markets still require conventional technologies
> Risk of losing market share too early and hence the ability to generate enough resources for impactful investments in new technology

Strategies for non-growth business areas are needed

> Harvesting/"Last man standing" strategies potentially including consolidation plays

Expensive investments into new technologies

> Limited availability of attractive targets with many potential suitors drives up the cost to pursue inorganic growth opportunities
> Many new technologies require extensive additions to suppliers' existing capability set with limited specific talent and experience available for organic development
> New entrants from the consumer electronics space are committing extensive resources into developing new solutions, which increases the investment required to develop competitive offerings

High financial burden

No immediate return on investment

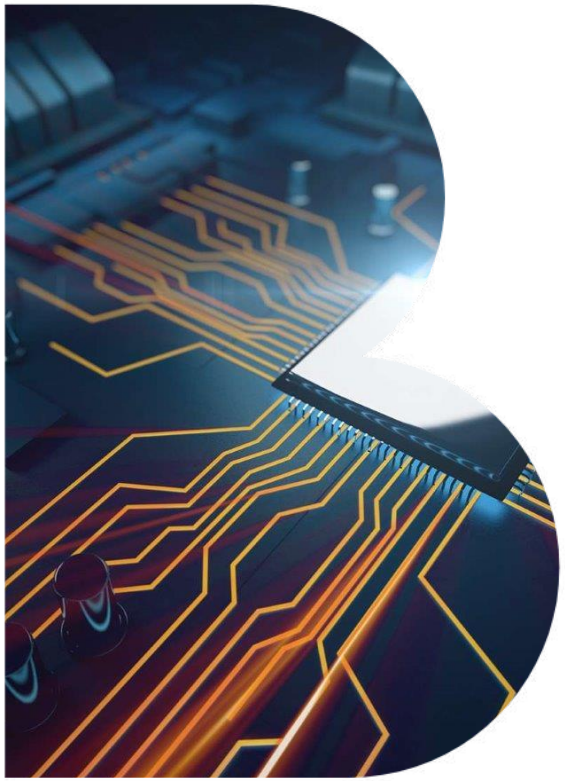
M&A with increased importance

New competitive landscape

Source: Lazard, Roland Berger

3

Suppliers need to build up competencies fast



With a vastly different set of features compared to today's vehicles, future cars will depend increasingly on software

Software reliance of future vehicles [# of lines of software code]

18 m – Boeing 787

18 m – Google Chrome

45 m – Microsoft Office 2013

62 m – Facebook (excludes back-end code)

100-150 m – Modern premium vehicle

~300 m – Future vehicle (2030+)

> Some of the hardware components will be replaced with more streamlined design and improved software functionality
  – E.g. infotainment console

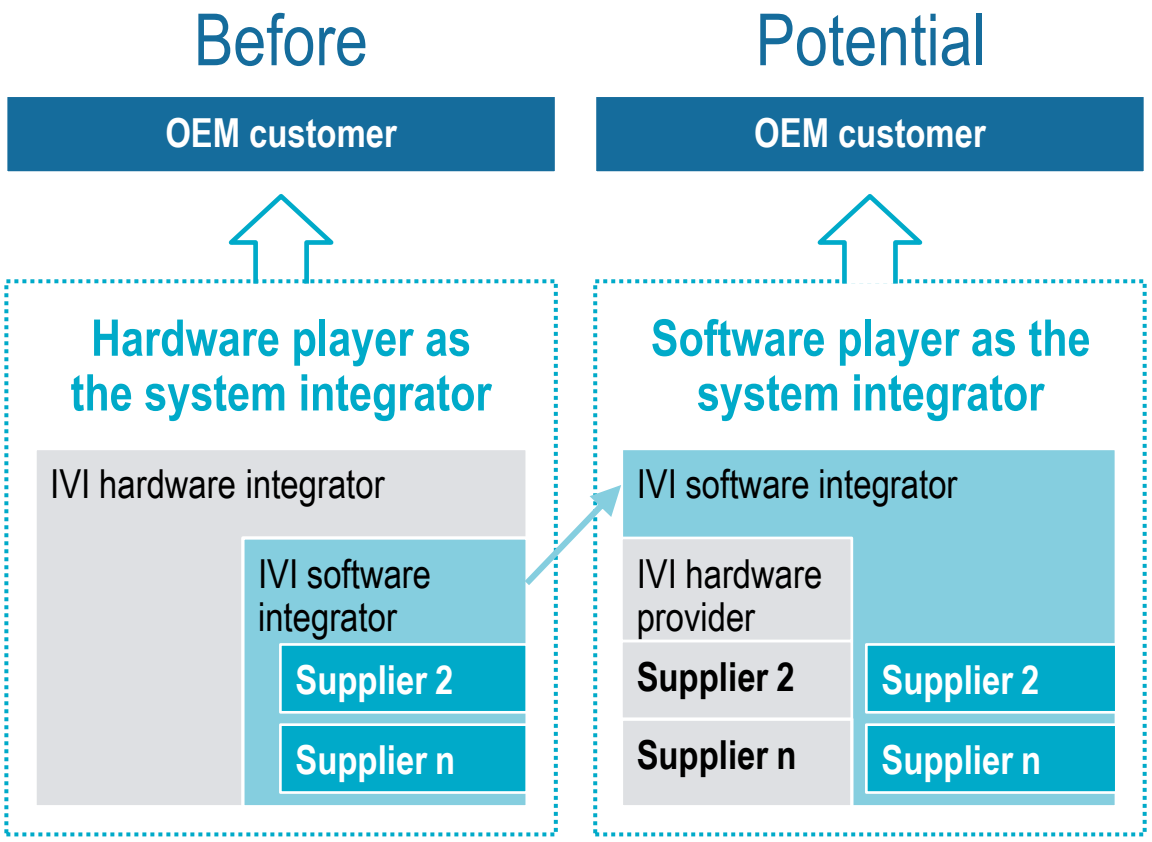
> The convergence of consumer electronics and the automotive industry leads to increased number of lines and higher complexity of the software code

> As vehicle software becomes the main differentiator, suppliers need to build up the necessary competencies to ensure future competitiveness

Source: Git repository, Company websites, IEEE, Press research, Lazard, Roland Berger

Software companies are aiming at taking over ownership of the OEM interface by acting as system integrators

Case study of software players as IVI[1)] integrators



- In the past, IVI hardware providers largely played the system integrator role, buying IVI software from external parties and interacting directly with OEMs
- With the rise of importance of software, hardware suppliers are in danger of losing their system integrator status
- Today, IVI software players have capabilities to act as system integrators, managing OEM client interface and simply sourcing hardware from other companies
- As a consequence, traditional suppliers have taken steps to invest in software and build integration capabilities to replace external software providers

1) In-vehicle infotainment

Source: Industry interviews, Lazard, Roland Berger

The new competencies are difficult to acquire and suppliers have to compete for talent with high tech giants and Silicon Valley start ups

Impact and consequences for suppliers

Software has become a main differentiation factor

> Software related functions have become main differentiation criteria for car buyers
> Ascending technologies around ADAS heavily rely on software
> Software functionality increasingly substitutes hardware solutions

Hiring of talent already very difficult for suppliers

> IT and consumer electronics giants as well as start ups compete for similar (software) engineering talent
> OEMs are currently building up their capabilities around new technologies, increasing the fight for talent

New culture necessary to successfully integrate new competencies

> IT and consumer electronics industries with different innovation approach and product development processes

Old competencies will often not work anymore

New competencies hard to build up

Cultural mindset change required

Source: Lazard, Roland Berger

4

Suppliers will face even higher cost pressure

OEMs will search for ways to cope with competitive pressure and upcoming investment needs, many of them affecting suppliers

Cost and investment reduction efforts from OEMs

	OEM cost reduction levers (Selection)	Relevance	Implications for suppliers	Impact
Classic levers	> **Procurement:** OEMs will continue to expect price downs/LTAs	●	> Strong OEM position, as many hardware parts will commoditize even more	-
	> **Structural setup:** OEMs will optimize their footprint and overhead structure	●	> No direct implications	n/a
	> **Complexity reduction**: OEMs may reduce their model ranges and variants	●	> Part standardization and volume bundling as consequence	-
New levers	> **Disaggregation**: OEMs move towards selective sourcing on component level	◕	> Increased transparency > Margin for system integration under risk	-
	> **Joint development:** OEMs will reduce development efforts for certain technologies like Diesel	◑	> R&D budgets at suppliers affected	-
	> **Outsourcing**: OEMs may outsource captive production of non-differentiating hardware parts	◔	> Potential for additional business > Additional business might be declining in the long term	+/-

● High relevance ○ Low relevance - Negative + Positive

Source: Lazard, Roland Berger

Some OEMs move towards more selective sourcing on component level in order to benefit from hardware commoditization

Example: Disaggregation of systems

OEM control of design
> Fit product design language
> Reduce cost, raise quality

Rise of software content
> New features are SW driven
> Opportunity to differentiate

Hardware commoditization
> Limited differentiation
> Low cost of components

Disaggregation of systems
> OEMs moving from sourcing full systems to individual components
> Some European OEMs lead push for disaggregation, others expected to follow

Integration of systems
> Enables E/E architecture integration across vehicle systems
> Modularization of software supports possible convergence of different systems (e.g., IVI and ADAS)
> Possibly move towards software-as-a-service
> Interchangeability of suppliers increases
> OEMs may integrate or outsource the activity to Tier 1 suppliers

OEM benefit to disaggregate

Increase cost transparency | Build up competency | Enable platform development
Direct access to expert tier 2 suppliers | Reduce time to market

Source: Lazard, Roland Berger

The changing competitive environment and shifting differentiation criteria will challenge suppliers and increase cost pressure

Impact and consequences for suppliers

OEM face competitive pressure and high investment needs

> OEMs will look for options to reduce their cost base and redirect investments into new technologies
> New cost levers like standardization or disaggregation will increase pressure on suppliers
> OEMs may decide to develop/produce future growth areas in-house (to protect their workforce)

End consumer differentiation criteria are changing

> End customers value connectivity and other digital features
> Fleet customers aiming at Mobility as a Service have different requirements than private customers

New competitors are emerging and aiming at new growth pockets

> Consumer electronics giants have set their sight on the automotive industry
> Start ups from Silicon Valley and Israel are moving fast in technology development

Further growing pressure on component prices

Competitive pressure from disaggregation & standardization

Lower room for differentiation

Difficult access to data driven business models

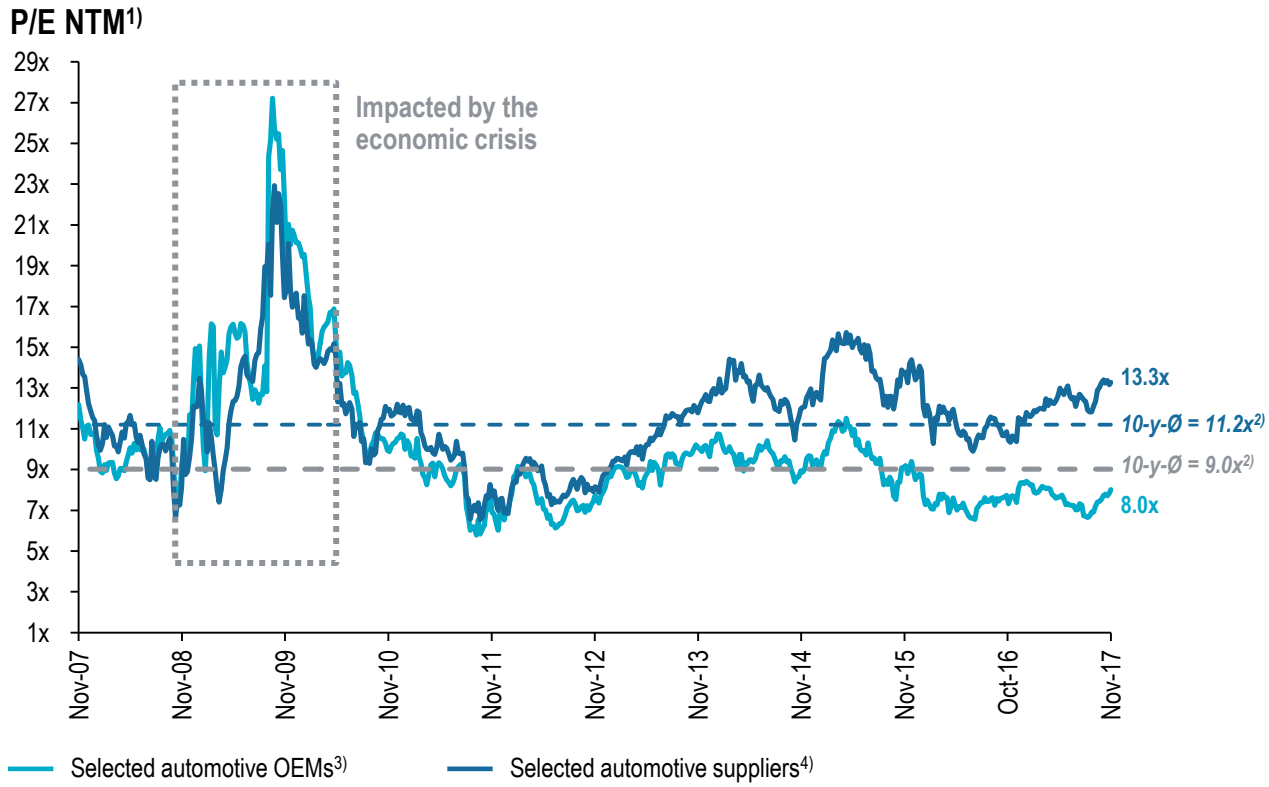
Source: Lazard, Roland Berger

5

Valuation levels of commoditized suppliers might come under pressure

Over the past five years, the gap between the valuation of automotive OEMs and suppliers has widened in favor of suppliers

Evolution of automotive OEM and supplier valuations



- **Supplier valuation multiples** have clearly **outperformed OEMs** over the past years
- The **valuation spread** is currently at an **all-time high** – suppliers nearly trade at 2x the valuation of OEMs
- OEM valuations appear to have **factored in risks from disruptive trends** – in contrast to supplier valuations

1) NTM = Next twelve months; 2) Excluding the distorting impact of the economic crisis (Jan-Dec 2009 multiples); 3) BMW, Daimler, Ford, General Motors, Honda, Toyota and Volkswagen; 4) American Axle, Autoliv, BorgWarner, Brembo, Continental, Dana, Delphi, Faurecia, Hella, Johnson Controls, Magna, Norma and Valeo

Source: Factset, Lazard, Roland Berger

Today's valuation multiples of suppliers are on average nearly twice the level of OEMs – However, this trend may reverse mid-term

Impact and consequences for suppliers

Equity investors do not give traditional OEMs credit for their "Terminal Value"

> Risk of market share loss to (potential) new competitors (e.g. Tesla, Chinese EV OEMs, Uber, et al.)
> Risk to lose profit pool share to new entrants from technology/software space
> Risk of too large workforce that is no longer fully utilized (e.g. component manufacturing)

Suppliers on average unaffected so far – some even benefitting from disruptions

> Changing OEM structure does not negatively affect suppliers
> New technologies required offer additional business potentials

However, trend may reverse for commoditized suppliers in the medium-term due to several risks

> Increasing insourcing from OEMs to protect in-house work force/alleviate impact from required restructuring in traditional technologies
> Increasing price pressure
> Further share gain of new market entrants from the tech/electronics industry
> Worsening financing terms/interest rates

Increasing pressure from investor base to maintain high valuation

Increasing risk of activists joining investor base

Need to re-think value-maximizing portfolio actions

Potentially worsened re-financing conditions mid-term

Source: Lazard, Roland Berger

Lazard | Roland Berger

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The consequence

Automotive suppliers need to transform their business models

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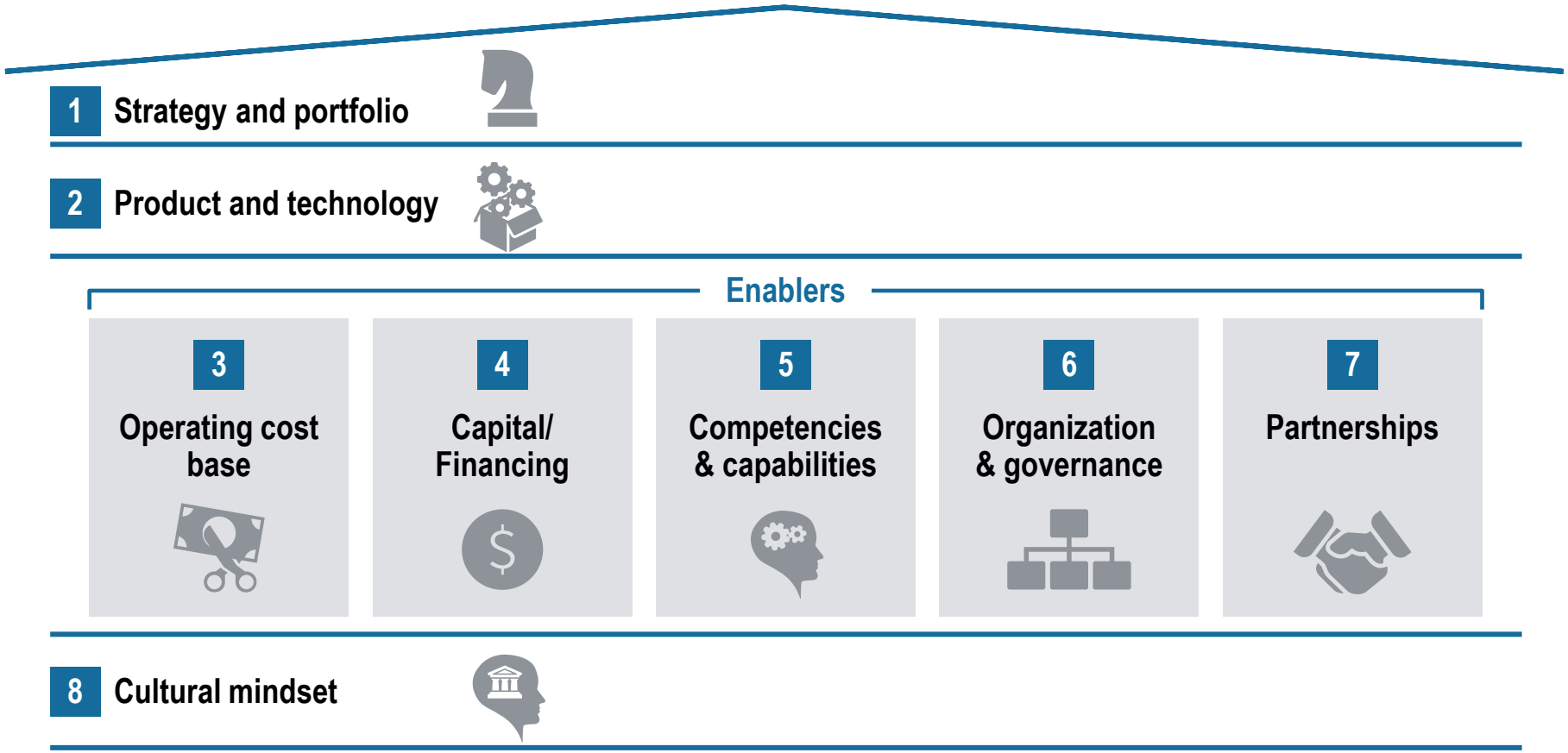
Roland Berger and Lazard Automotive teams

Automotive suppliers can consider 8 key elements in order to transform their business model

Automotive supplier transformation toolbox



Source: Lazard, Roland Berger

Suppliers need to define their end-game strategy and rethink their product portfolio in order to capture future growth opportunities

Key questions and key takeaways for suppliers

Key questions for suppliers

> What is the impact of the disruptive trends Mobility, Autonomous driving, Digitization and Electrification on the current business?

> With the emergence of new technologies, will the current product portfolio still be balanced and provide sustainable growth in the long term?

> As growth prospects are going to differ by segment and even by component, which products will continue to grow and which will decline?

> Which new segments can provide growth opportunities that fit well with the essence of the current business, and are resilient to expected shifts in the competitive environment?

> Can a ramp-down strategy for a decreasing segment be financially viable?

Key takeaways

> Clear understanding of the impact of disruptive trends on the current business

> Product portfolio decisions have become key strategic topics

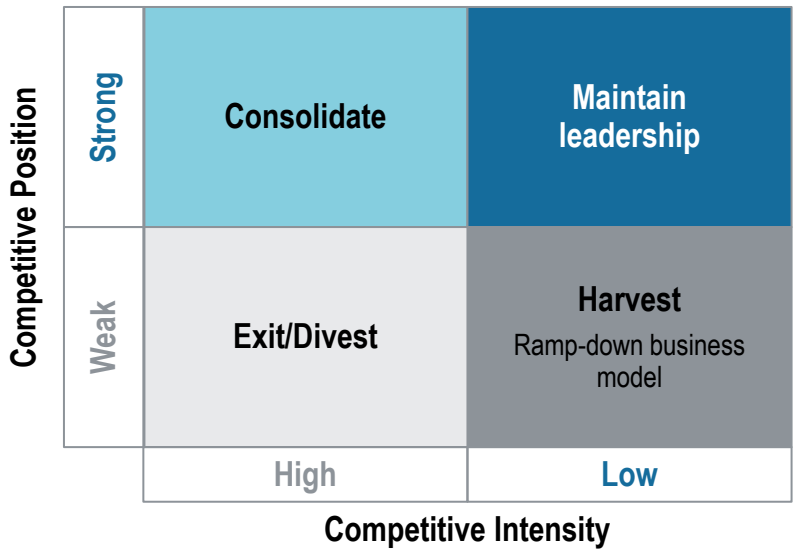
> Applicable generic strategies include
  – Diversification into growth
  – Divestment
  – Harvesting in shrinking areas ("Last man standing")

Source: Lazard, Roland Berger

Active consolidation and harvesting are often financially viable strategies – Future sources for growth have to be identified

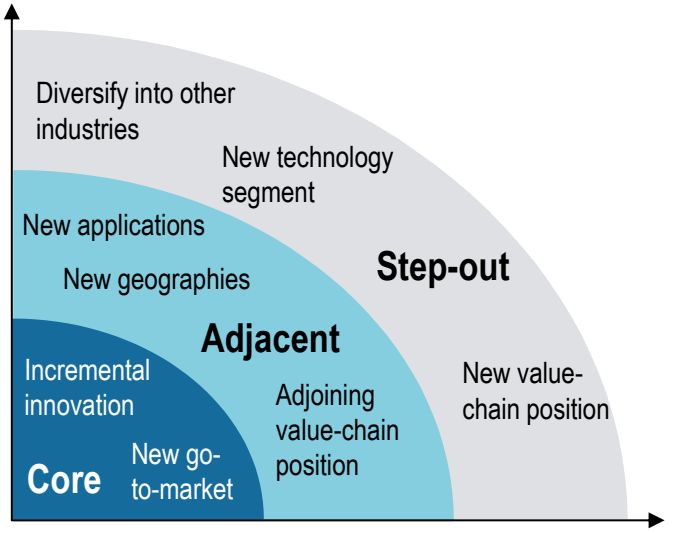
Strategic decision matrix and portfolio growth options

1. Strategic responses to declining segments



> Before the industry disruption reaches a tipping point, suppliers should consider end-game strategies for their declining business areas

2. New sources for growth



> Suppliers can expand into new offerings and end markets to provide outlets for growth

> Diversification into other industries leveraging current core competencies as an alternative

Source: Lazard, Roland Berger

Also in 2017 many suppliers have streamlined their portfolio or invested into further growth through M&A

Selected automotive supplier acquisitions, 2012-2017 (YTD)

2012	2013	2014	2015	2016	2017
Bohong / Wescast Industries	**Amtek /** Neumayer Tekfor	**Amtek/** Kaiser	**AVIC Automotive/** Henniges	**Freudenberg/** TBVC	**Motherson Sumi Systems /**PKC Group
Bosch/ SPX	**BorgWarner/** Wahler	**Amtek/** Kuepper Group	**BorgWarner/** Remy International	**Illinois Tool Works/** TRW Auto. Elec. & Comp.	**Lear/**Grupo Antolin (Seating & Metal Business)
Continental/Freudenberg molded brake parts	**Gentex/** JCI HomeLink	**AUNDE/** Fehrer	**China National Tire/** Pirelli	**Musashi Seimitsu/** Hay	**Intel/** Mobileye
Continental/ Parker Hannifin MCS	**Gentherm/** W.E.T. Automotive	**AVIC/** Hilite	**Continental/** Elektrobit	**Megatech/** Boshoku Europe	**Superior Industries/** Uniwheels
Delphi / FCI MVL	**Grammer/** Nectec	**AVIC/** KOKI Technik	**Delphi/** HellermannTyton	**Ningbo Joyson/** KSS	**ZMJ/CRCI /** Bosch SMG
Faurecia/ ACH Interiors	**Halla/** Visteon climate business	**Bosch /** ZF Lenksysteme	**Grupo Antolin/** Magna interior business	**Plastic Omnium/** Faurecia exterior bus.	**BorgWarner/** Sevcon
Grupo Antolin/ CML	**Huayu Auto. Systems /** Yanfeng Visteon JV	**Delphi/** Unwired Technology	**Harman/** Symphony Teleca/Redbend	**Yinyi Group/** Punch Powertrain	**Luxshare /** ZF Body Controls
Hebei Lingyun / Kiekert	**Mahle/** Behr	**Federal-Mogul/** TRW valves business	**Johnson Electric /** Stackpole	**Valeo/** FTE Automotive	**Fountain West/**Bosch Mahle Turbo Chargers
Lear/ Guilford Mills	**Nidec/** Honda Elesys	**Lear/** Eagle Ottawa	**Linamar/** Montupet	**CIE Automotive /** Grupo Amaya Telleria	**KSS/** Takata
Magna/ Ixetic	**Ningbo Huaxiang /** HIB Trim Parts	**MAHLE/** Letrika	**Magna/** Getrag	**Samsung/** Harman	**TE Connectivity/** Hirschmann Car Comm.
Metalsa / ISE Automotive	**TMT /** ZF Boge	**Sensata/** Schrader	**MAHLE/** Delphi thermal business	**Valeo/** Ichikoh	**Fuxin Dare Automotive/** Carcoustics
Nemak / JL French Automotive	**Tokai Rubber/** Anvis	**Shanghai Prime Machinery/**Nedschroef	**Mann+Hummel /** Affinia	**VBP Group/** Mobile Climate Ctrl. Group	**Genuine Parts/** Alliance Automotive
Tupy / Cifunsa	**Wangfeng/** Meridian Lightweight	**Visteon/** JCI auto. electronics bus.	**NGK Spark Plug/** Wells Vehicle Electronics	**American Axle/** Metaldyne	**CIE Automotive/** Newcor
Wuhan Iron & Steel/ThyssenKrupp TB	**Wanxiang Group/** A123	**ZF/** TRW	**Valeo/** Peiker Acustic	**Mecaplast/** Key Plastics	**WABCO/** RH Sheppard

Key: Acquirer/Target
Note: Excluding financial sponsor led transactions. Some 2017 transactions are signed, but not yet closed

Source: Capital IQ, Thomson, Dealogic, Merger Market, press research, Lazard, Roland Berger

In addition, there is a trend towards spinning-off or separating businesses to reduce complexity and increase focus

Corporate spinoffs – Selected examples

Honeywell Set to Spin Off 2 Units, but Keep Aerospace Division

Announcement date: 10-Oct-2017

"Honeywell Plans to Spin **Homes and the ADI Global Distribution Business**, a ~USD 4.5B Business, and **Transportation Systems**[1], a ~USD 3.0B Business, into Two Independent, Publicly-Traded Companies by **End of 2018** […] Prospective Honeywell Portfolio Consists of High-Growth Businesses with Strong Operational and Technology Synergies, **Focused on Six Key End Markets** […] **Independent Investment Decisions** Will Position Spins to Thrive in Evolving End Markets."

Honeywell press release (10-Oct-2017)

Delphi to spin off powertrain business, focus on autonomy and EVs

Announcement date: 03-May-2017

"**Delphi Automotive** PLC today announced its intention to execute a **tax-free spin-off of its Powertrain Systems segment** into a new, independent publicly traded company ("Powertrain") […] the transaction, which is expected to be **completed by March 2018** […] represents an exciting opportunity for our businesses by creating two independent companies, each with a **distinct product focus**, a proven business model, and the **flexibility to pursue accelerated investments** in **advanced technologies.**"

Delphi Automotive press release (03-May-2017)

Autoliv eyes split of business into two listed companies

Announcement date: 14-Sep-2017

"Autoliv initiates **strategic review** of separating its business segments, **Passive Safety and Electronics** […] the intent is to create two publicly traded companies capable of **addressing two distinct, growing markets** with leading product offerings […] the strategic review process will evaluate this and other options […] if the separation takes place, the process is estimated to **take around one year** under most separation scenarios."

Autoliv press release (14-Sep-2017)

Johnson Controls to Spin Off Automotive Business

Announcement date: 24-Jul-2015

"Johnson Controls announced today that it plans to pursue a **tax-free spin-off of its Automotive Experience** business. Following the separation, which is expected to **close in approximately 12 months**, the Automotive Experience business will operate as an independent, publicly traded company."

Johnson Controls press releases (24-Jul-2015)

"As two distinct publicly traded companies, **Johnson Controls** and **Adient** will be **better positioned to capitalize on significant growth opportunities** and **focus resources** on their respective businesses and strategic priorities."

Johnson Controls press releases (03-Oct-2016)

1) Refers to turbocharger business

Source: Press, Company information, Lazard, Roland Berger

Once the target product portfolio is selected, suppliers must reassess their long-term product and technology roadmaps

Key questions and key takeaways for suppliers

Key questions for suppliers

> How do the product and technology roadmaps need to change to ensure differentiating innovations for selected growth areas, especially given that traditional hardware is increasingly becoming commoditized?

> Does the roadmap include new electronics and software driven features as key differentiators?

> Which new product and service offerings or business models that are enabled by new technologies and features should be included?

> How might the product portfolio decision change the company's value chain role?

> Should the company deliberately seek to cover different parts of the value chain to extract critical differentiation value?

Key takeaways

> Articulation of differentiating vs. non-differentiating product factors is of critical importance

> Electronics and software are key differentiators in future growth areas

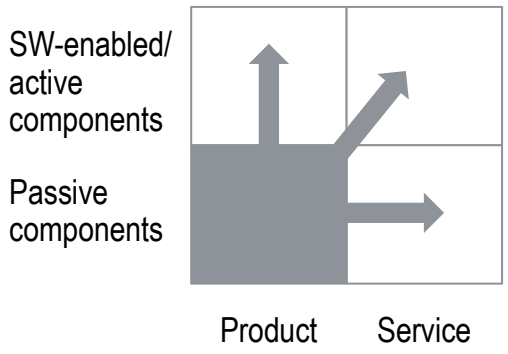
> Value chain shifts may involve competitors becoming customers or development partners

Source: Lazard, Roland Berger

The disruption offers a unique opportunity for traditional suppliers to expand from selling hardware only to selling features and services

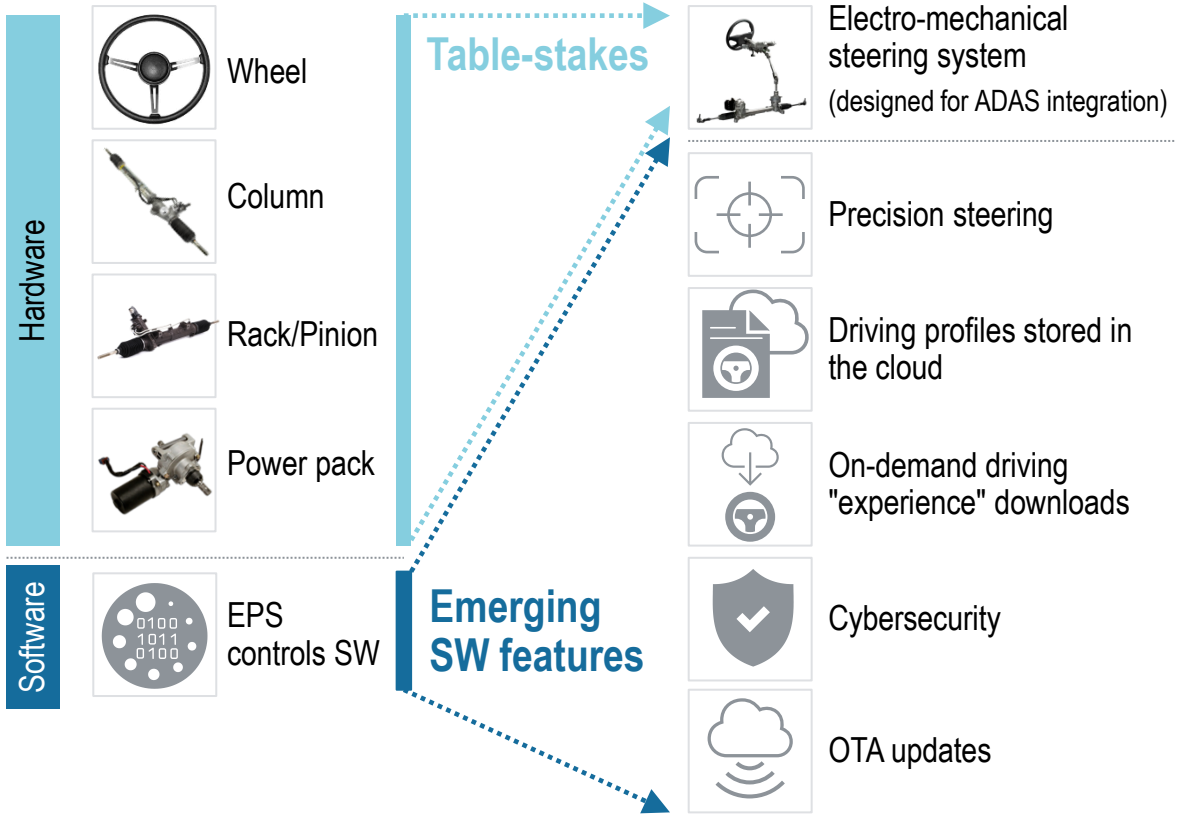
Shift from hardware-only to software-enabled & service offering

Expansion options from traditional business models



Example: Steering Systems

Traditional mechanical system → **Future BEV autonomous system**



Source: Lazard, Roland Berger

A lower operating cost base is necessary to cope with increasing competitive pressure, especially for decreasing segments

Key questions and key takeaways for suppliers

Key questions for suppliers

> To what extent will pricing be impacted by increasing competitive pressure from OEMs and new competitors?

> Will today's structural cost (overhead, footprint, etc.) still be required in the future?

> Is the current product design or manufacturing setup appropriate given the decreasing differentiation on hardware parts?

> In the future, which activities will be core and which will be non-core?

> What new possibilities are available to lower operating costs (e.g., Industry 4.0)?

Key takeaways

> Cost efficiency as the only remaining differentiator in commoditized segments

> Complexity reduction is a main lever to unlock new cost saving potentials

> Strong cash flow generation will be important to finance future strategic moves

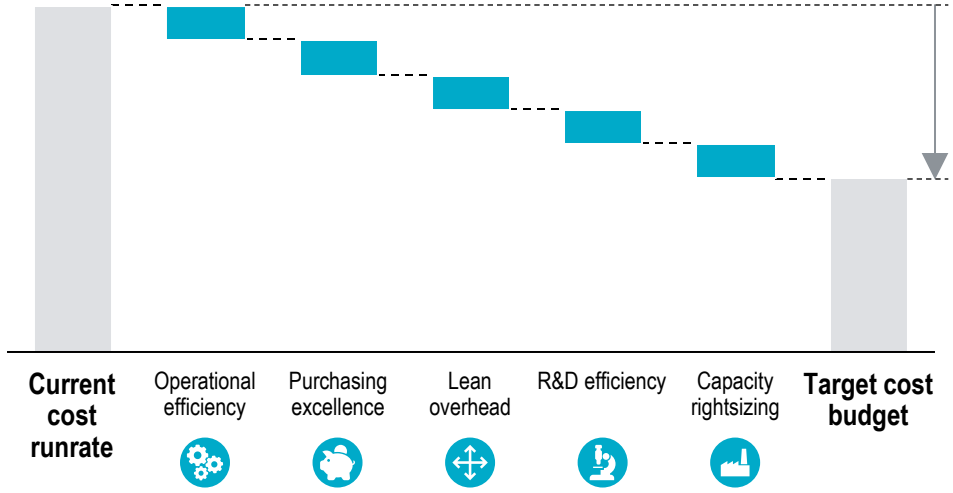
Source: Lazard, Roland Berger

Suppliers need to maximize cash generation from operations and rethink their investments into R&D and assets

Supplier performance improvement – Main levers and budget impact

Maximize resource generation (efficiency)

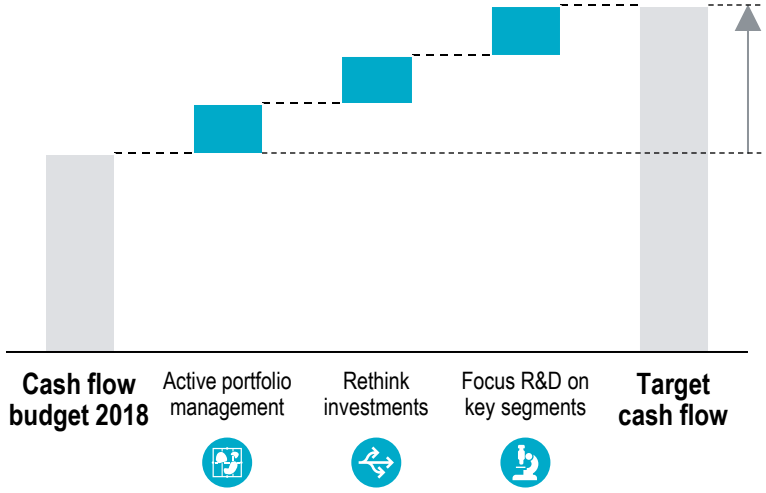
Reduce cost and improve output adapting to lower volumes and higher competitive pressure



Reduce operational cost base

Strategically allocate resources (effectiveness)

Generate additional cash by strategically focusing spending on the right products, investments and R&D activities



Strategically rethink cash allocation

Source: Lazard, Roland Berger

Additional financing needs for new growth areas and diverging business strategies demand a review of the current financing plan

Key questions and key takeaways for suppliers

Key questions for suppliers

> What is the best option to finance the pursuit of new growth areas?

> Does the financing plan consider any M&A transactions that are planned in order to build up new competencies and/or capabilities?

> Does the current financing structure provide enough leeway to allow investments into both existing technology and new technology at the same time?

> Are current lenders willing to provide financing for new growth areas?

> Are current lenders willing to finance ramp-down business segments?

Key takeaways

> A clear view on future financing needs is important

> Different end game strategies may exhibit unique financing requirements and distinct risk/return profiles

> Alignment of lender interests with business strategy is necessary

> New/additional pools of financing should be considered

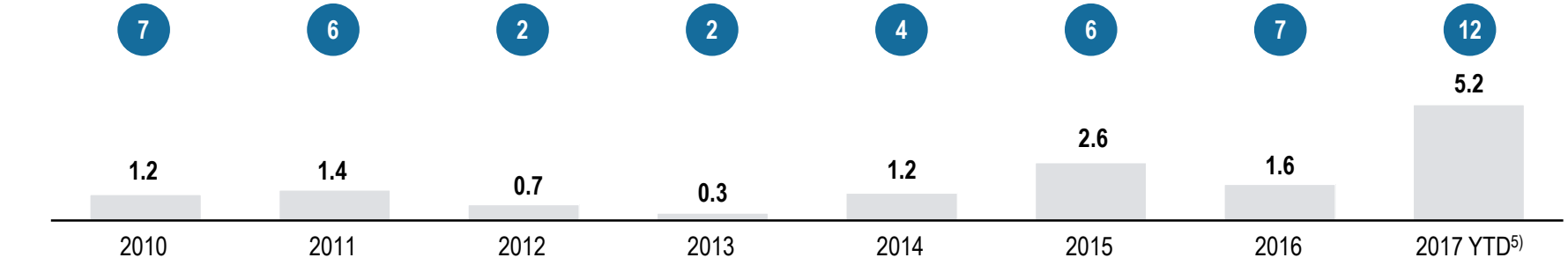
Source: Lazard, Roland Berger

Suppliers increasingly consider IPOs to get access to new capital pools

Selected European automotive supplier IPOs in 2017

IPO Date	Company	Business Description	Country	Market Capitalization [EUR bn][1]	Primary Tranche[2]	Secondary Tranche[3]
25-Oct-2017	TI Fluid Systems	Fluid systems manufacturer		~1.5	✓	✓
13-Oct-2017	Voltabox	Battery systems manufacturer		~0.4	✓	✓
04-Oct-2017	Pirelli	Tire manufacturer		~6.8		✓
20-Jul-2017	Jost	Truck components manufacturer		~0.7	✓	✓
07-Apr-2017	Gestamp	Body and structural parts manufacturer		~3.2		✓

Development of global automotive supplier IPO volume [EUR bn][4]



1) As of 19-Nov-2017; 2) Primary tranche refers to the sale of newly issued shares during an IPO (i.e. in order to raise capital); 3) Secondary tranche refers to the sale of existing shares during an IPO; 4) Including transactions with an IPO volume of >EUR 100 m; 5) As of 24-Nov-2017

Source: Bloomberg, CapitalIQ, Dealogic, company information, Lazard, Roland Berger

Success in new growth areas will require a new set of competencies and capabilities

Key questions and key takeaways for suppliers

Key questions for suppliers

> What competencies and capabilities will be needed in new technology growth areas that are driven by sensors, electronics and software?

> What are the current core competencies and capabilities of the organization?

> Which aspects of company fundamental knowledge or physical capabilities can be leveraged or bundled throughout the organization to develop future products and technologies?

> What are the remaining competency and capability gaps?

> What is the best set of options available to close these gaps: Building up competencies in-house, establishing one or more partnerships, and/or acquiring a company with the necessary competencies and capabilities?

> What is a feasible timeline to build up the required competencies and capabilities and how will this impact the company's product and technology roadmaps?

Key takeaways

> New technology growth areas are driven by sensors, electronics and software

> Understanding the gaps between current and needed competencies and capabilities is vital

> Evaluation of internal vs. external options to close competency gaps should be on the corporate agenda

> External options like M&A and partnerships may provide time and cost advantages

Source: Lazard, Roland Berger

As an example, future leadership in vehicle dynamics requires closing gaps on new electronics and software capabilities

Conventional vs. advanced vehicle dynamics skills and capabilities required

Illustrative

	Conventional body controls	Advanced body controls
Fundamental knowledge	Motion control	Motion control
	Fluid management	Fluid management
		Electro-mechanical actuation
		ADAS systems design
		…
Physical capabilities	System design	System design
	Manufacturing efficiency	Manufacturing efficiency
	NVH management	NVH management
		Software modelling
		Mechatronics implementation
		ECU integration & sensor fusion
		Sensors
		Cybersecurity
		…

New knowledge and capabilities required to build advanced vehicle body controls

> Leading vehicle dynamics systems and component suppliers of the future will be those who develop expertise in both conventional and emerging technologies

> Gaining the competencies required may take on different forms, including:
- Investment to develop applicable skills already available in-house
- M&A
- Partnerships and alliances

Source: Lazard, Roland Berger

Organizational structure needs to accommodate the requirements of new business models

Key questions and key takeaways for suppliers

Key questions for suppliers

> Where should the organization allocate new technology development to have the strongest impact?

> What is a reasonable size for the new technology organization, considering new competencies and capabilities are required?

> Is a new business unit or even company necessary to separate the old from the new, as startups and new competitors act faster than the traditional supply base?

> Could an in-house "Think-tank" or start-up fund be viable alternatives to a new organizational unit?

> How does governance need to change in order to oversee new technology developments?

> Are traditional KPIs still valid in order to provide the necessary freedom and achieve the right results under the new circumstances?

Key takeaways

> Organizational structure is a key enabler for competency and capability build up

> New competitors and startups are shifting competitive dynamics and will challenge traditional organization structures and governance

> An in-house "Think tank" or an internal startup fund can be viable options

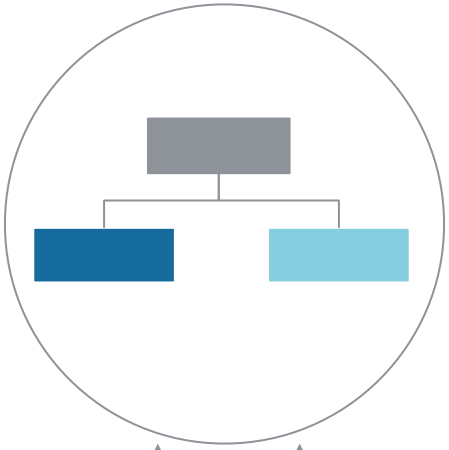
Source: Lazard, Roland Berger

Many suppliers will have to manage two fundamentally different business models under one roof – Organizational structure is key

Emergence of differing organizational requirements

New technologies/"Start-up"

- **High visibility to senior leadership/CEO** to ensure fast decision making and necessary support
- Bundling of necessary **internal competencies in** one place in the organization
- Facilitate **add-on of additional external competencies**
- Implement an **innovation culture** with agile principles
- **Right growth focused governance model** with new business metrics and objectives
- **Shield the business** from the "old way" of operating



Old technologies/"Harvest"

- **High levels of product standardization** to minimize the required investment levels for product development
- **Target high levels of centralization** of certain functions to reduce OPEX
- **Create a culture focused on streamlined processes** built around commoditized product
- **Choose a governance model** to optimize cash generation
- **Export transferrable competencies** to the New BU and legacy BUs that will be pillars for new growth

Source: Lazard, Roland Berger

Traditional suppliers will have to be more open to partnerships to effectively close competency gaps and enable innovation

Key questions and key takeaways for suppliers

Key questions for suppliers

> Which competencies or capabilities can be best provided by a partner in order to develop a new product or technology?

> Which products and technologies are only technically and commercially feasible when jointly developed?

> How can innovation and product development be accelerated by teaming up with others and forming an innovation ecosystem?

> Who can be a suitable partner, considering that sought after competencies often lie outside the traditional automotive industry?

> Is the organization ready to work with external partners on innovation?

> What is a suitable governance model for a partnership?

Key takeaways

> The complexity of new systems require a variety of capabilities rarely controlled by a single player

> Shortened innovation cycles and the possibility to share investment costs make partnerships increasingly attractive alternatives to traditional in-house R&D

> Time is critical, as many partnerships have formed already

Source: Lazard, Roland Berger

Many traditional suppliers have already formed partnerships to jointly develop new technologies

Example of recent supplier partnerships

Companies	Strategic rationale	Areas
Mahle/Faurecia	Collaboration on thermal management technologies for the cockpit of the future	Interior thermal mgmt.
Bosch/ Nikola Motor Company	Joint development of a powertrain based on truck eAxle technology	Powertrain eAxle
ZF/Hella/Nvidia	Collaboration to deliver self-driving technology with the NCAP safety certification	ADAS AI technology
Delphi/Intel[1)]/BMW	Joint development to create an autonomous driving platform	Full autonomous car
ZF/Faurecia	Partnership to develop disruptive and differentiating interior and safety systems	ADAS safety & interiors
Paccar/Nvidia	Collaboration on autonomous truck platform and artificial intelligence	ADAS AI technology
Continental/Nexteer	Develop advanced motion control, esp. braking and steering system integration	ADAS motion controls

1) Including MobilEye, acquired by Intel

Source: Press research, company information, Lazard, Roland Berger

A new cultural mindset enables the business model transformation

Key questions and key takeaways for suppliers

Key questions for suppliers

> Is the organization operating at the right level of risk and with enough focus on innovation to compete with new – and often more nimble – non-traditional competitors?

> Do teams have the necessary freedom and agility to pursue new technology topics, given that future automotive product development cycles will be much shorter than today?

> Is the current company culture attractive for new talent in future business areas?

> Has the company already transformed from functional silos towards cross-functional collaboration?

> Is company leadership at the forefront of a new cultural mindset?

Key takeaways

> Software and consumer electronics players have a different cultural mindset as compared to traditional automotive suppliers

> Providing the right company culture is important to attract talent in emerging technology areas

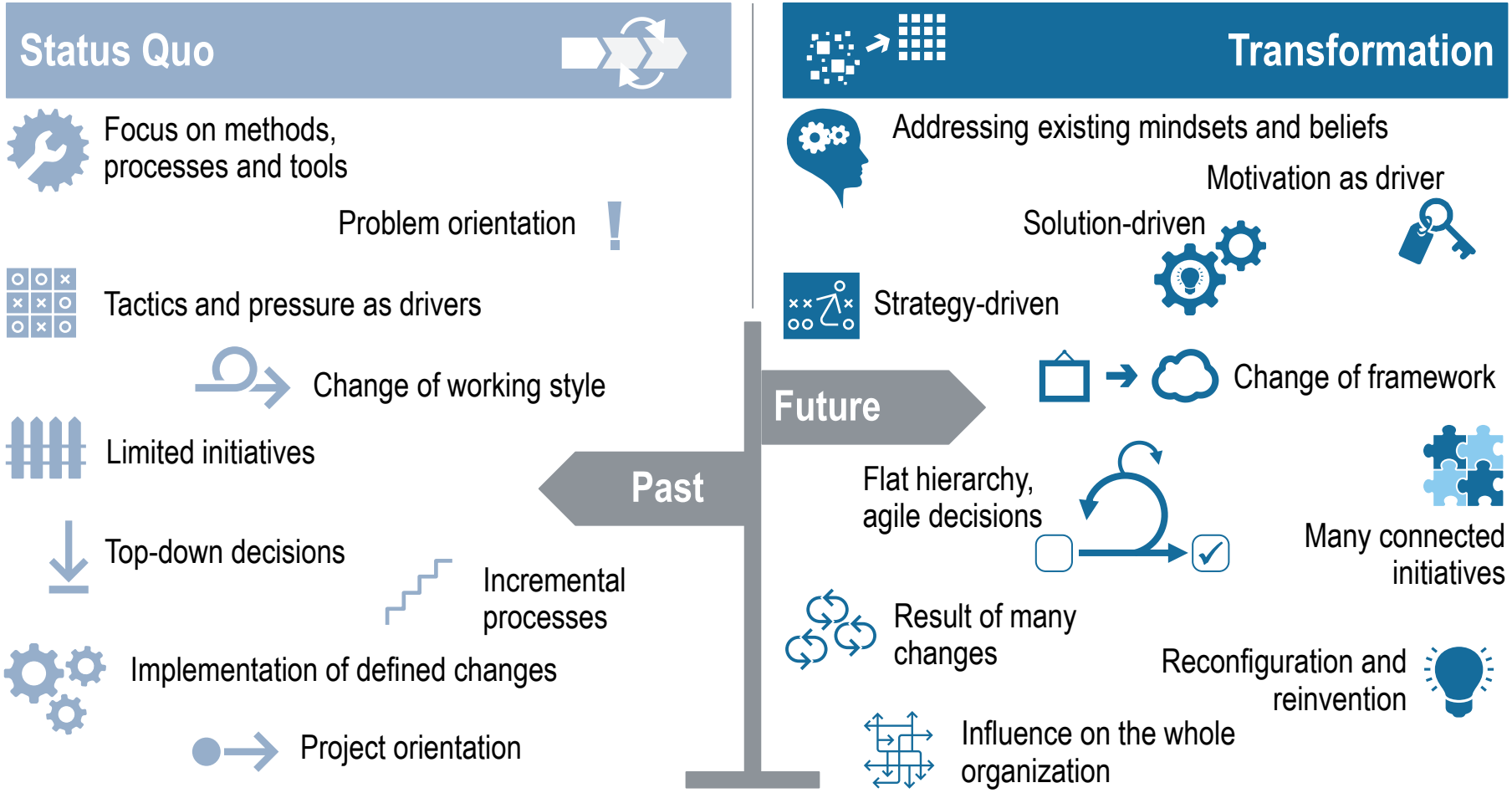
> Cultural mindset forms a critical foundation for any transformation efforts

Source: Lazard, Roland Berger

The cultural mindset has to be rethought along with the transformation of the business model

Cultural mindset transformation

Illustrative



Source: Lazard, Roland Berger

Suppliers need to rethink their business model in order to be successful in the future

Summary: Key actions for automotive suppliers

1 Suppliers need to **rethink their strategy and product portfolio** in order to capture growth opportunities or consolidate the market around their existing portfolio

2 Suppliers need to define a **long term technology roadmap** as well as their **strategic positioning in the value chain** regarding their product and service offering

3 Suppliers need to implement a **new and lower operating cost base** and at the same time **ensure sufficient financing** for the upcoming transition

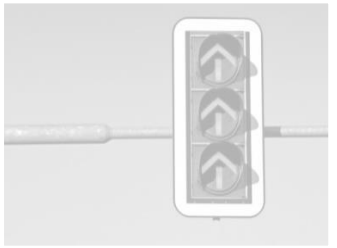
4 Suppliers need to **build up new competencies and capabilities** and adapt their **organizational structure & governance** as well as **cultural mindset** to compete in the new technology areas

5 Suppliers need to **build up new partnerships and leverage this ecosystem** to find new ways to innovate

New business model

Source: Lazard, Roland Berger

Contents



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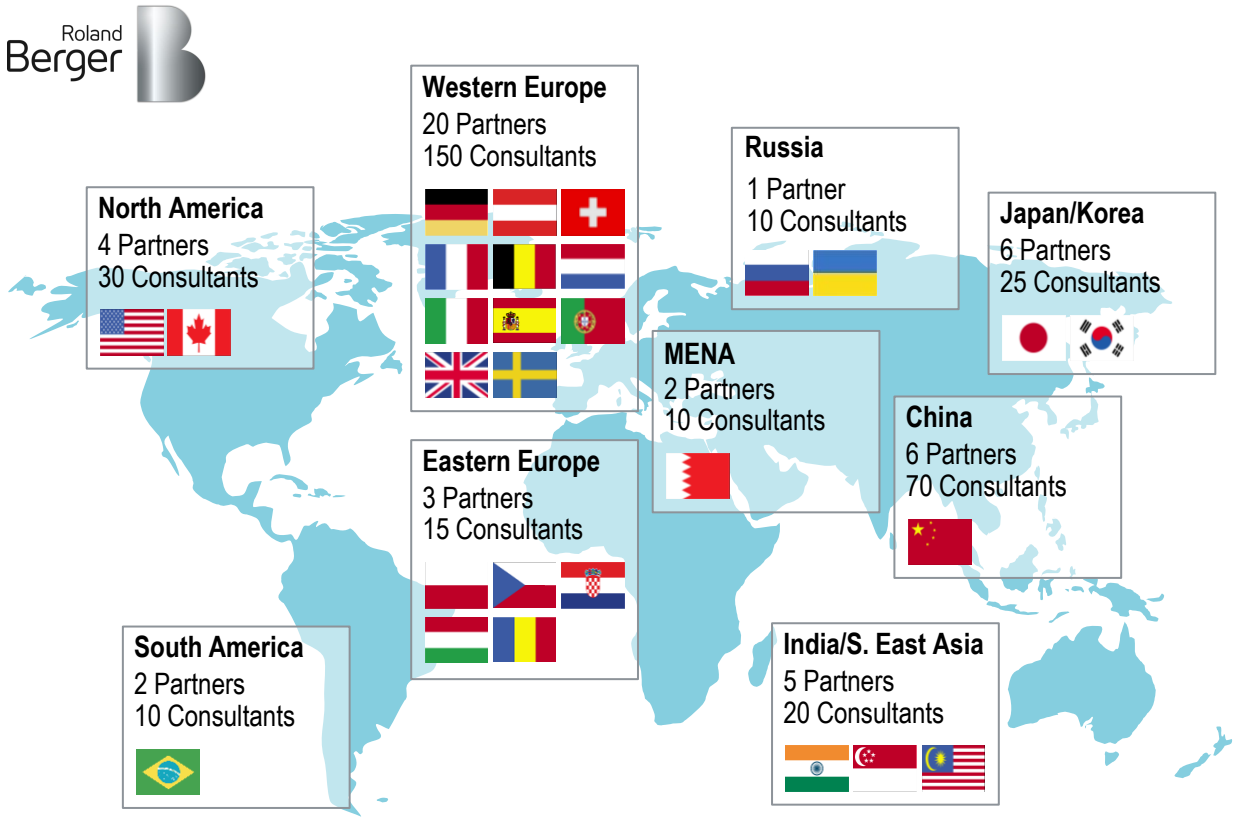
Source: Lazard, Roland Berger

Roland Berger Automotive: A strong global team with more than 350 consultants dedicated to clients in the automotive industry

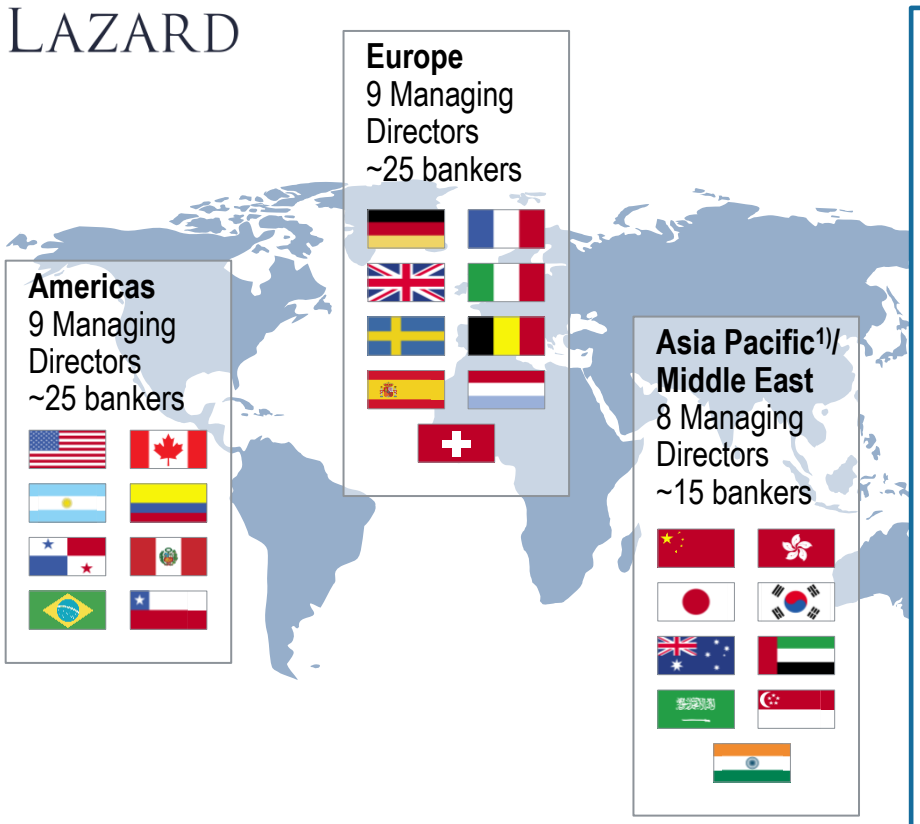
Roland Berger Automotive: More than 350 dedicated consultants globally



- Global team of **more than 350 dedicated automotive consultants**
- Over **400 clients** in the automotive industry
- More than **2,000** successful **projects** since 2000
- Proven **leading-edge tools** and methodologies
- **Thought leadership** in the worldwide automotive community, producing highly regarded studies and top quality research

Lazard Automotive Practice: Unparalleled coverage of the global automotive sector

Lazard Automotive: ~65 bankers with strong senior expertise in the automotive sector



Selected closed transactions with Lazard involvement

- Anvis: Sale to Tokai Rubber Industries
- Chassix: Restructuring of the company
- Delphi: IPO of the company
- Dongfeng: Acquisition of a minority stake in PSA
- Fiat: Acquisition of remaining equity in Chrysler
- Gestamp: IPO of the company
- Harman: Sale to Samsung
- Honsel: Sale to Martinrea/Anchorage
- KPS Capital: Acquisition of Bosch Foundation Brakes
- Opel: Advising the German Ministry of Economics
- Pirelli: IPO of the company
- Pirelli: Sale of Camfin stake to ChemChina
- TBVC: Acquisition of remaining 50% stake by Freudenberg
- TI Fluid Systems: IPO of the company
- UAW: Restructuring of OPEB liabilities of GM, Ford, Chrysler
- Uniwheels: Sale to Superior Industries
- US Treasury: IPO of GM
- US Treasury: Sale of Chrysler stake to Fiat
- Via: Strategic investment from Daimler
- Volkswagen: Acquisition of a 49.9% stake in Porsche
- Wahler: Sale to BorgWarner
- ZF Friedrichshafen: Acquisition of TRW Automotive

1) In Korea, strategic alliance with Lazard Korea

Our global automotive supplier database encompasses the financial performance of ~650 companies – Valuable tool for benchmarking

Global Automotive Supplier Database

2000-2017e

Supplier_Cockpit

Company selection

			Average	2000A	2001A	2002A	2003A	2004A	2005A	2006A	2007A	2008A	2009A	2010A	2011A	2012A	2013A	2014A	2015A	2016A	2017E
Revenues																					
Revenues	Revenues	EUR m		2508.6	2220.5	2589.3	2909.9	3342.5	4070.9	4347.4	5052.0	4990.7	3760.8	5559.6	6746.7	6805.3	7049.0	7872.9	7608.1	8600.2	8856.6
Revenue growth	[Revenues t/Revenues t-1]-1	%	8.3%	n.a.	(11.5%)	16.1%	12.4%	14.9%	21.8%	6.8%	16.2%	(1.2%)	(24.5%)	42.2%	25.9%	0.9%	3.6%	11.7%	(3.4%)	13.0%	3.0%
Costs																					
Costs of sales	[Costs of sales/Revenues]	%	76.3%	75.7%	76.6%	74.7%	75.6%	76.5%	74.2%	75.9%	77.2%	78.6%	78.9%	76.3%	76.2%	75.8%	74.9%	74.9%	74.9%	74.4%	78.2%
SG&A expenses	[SG&A expenses/Revenues]	%	6.7%	5.0%	5.5%	11.1%	6.5%	6.1%	7.8%	6.8%	6.0%	6.5%	7.4%	6.7%	5.3%	5.1%	4.5%	4.4%	4.7%	5.2%	9.2%
R&D expenses	[R&D expenses/Revenues]	%	3.9%	4.2%	4.4%	n.a.	3.9%	3.5%	3.7%	4.1%	4.0%	3.9%	3.9%	3.3%	3.4%	3.7%	4.1%	4.0%	3.8%	3.8%	4.1%
Profitability																					
EBITDA margin	[EBITDA/Revenues]	%	14.8%	15.1%	13.4%	14.2%	14.0%	13.9%	14.3%	13.3%	12.8%	11.1%	9.8%	13.7%	15.1%	15.4%	16.5%	16.7%	16.0%	16.6%	16.9%
EBIT margin	[EBIT/Revenues]	%	10.0%	9.6%	7.2%	9.2%	8.8%	8.8%	8.3%	7.7%	7.8%	5.7%	3.2%	9.2%	11.1%	11.4%	12.4%	12.7%	12.0%	12.5%	12.6%
ROCE	[EBIT/Capital employed]	%	16.4%	13.5%	7.4%	11.5%	10.8%	12.2%	11.1%	10.9%	12.4%	9.1%	4.0%	14.8%	20.2%	20.3%	21.8%	23.1%	18.1%	20.7%	30.7%
Investments																					
Capital expenditures	[Capital expenditures/Revenues]	%	6.0%	6.3%	6.0%	6.1%	7.0%	7.2%	6.8%	5.9%	5.5%	7.0%	4.3%	4.9%	5.5%	5.7%	5.6%	6.8%	7.2%	5.5%	5.6%
Reinvestment level	[Capital expenditures/Depreciation]	%	145.0%	163.5%	155.2%	153.7%	172.2%	181.8%	130.7%	112.2%	120.9%	142.4%	73.3%	123.2%	156.1%	156.6%	153.2%	185.7%	191.8%	142.6%	132.6%
Net working capital																					
Working capital	[Working capital/Revenues]	%	8.6%	n.a.	5.3%	6.3%	9.0%	9.4%	10.5%	11.3%	9.7%	9.2%	8.8%	8.7%	8.3%	8.0%	7.3%	8.8%	11.3%	8.4%	n.a.
Days sales	[Receivables/Revenues]*360	days	48.7	n.a.	26.1	32.7	43.9	51.0	47.5	52.3	48.8	55.7	57.4	54.7	52.5	50.9	51.7	52.0	63.8	57.4	n.a.
Days payables	[Payables/(Revenues-EBITDA)]*360	days	49.9	56.9	41.8	39.5	40.9	46.5	44.0	48.4	50.6	57.7	60.1	59.0	55.6	52.9	57.1	51.0	65.9	63.0	n.a.
Days sales in inventories	[Inventories/Costs of sales]*360	days	33.8	29.0	28.7	31.8	31.2	29.8	37.5	40.0	39.2	39.2	36.1	35.9	30.2	29.6	29.6	29.3	43.4	34.2	n.a.
Financing																					
Equity ratio	[Equity/Total assets]	%	42.2%	37.4%	37.5%	34.1%	41.5%	43.5%	40.2%	40.9%	46.8%	43.2%	45.4%	40.7%	40.1%	48.2%	51.5%	50.0%	40.3%	36.4%	40.7%
Leverage	[Net debt/EBITDA]	multiple	1.9x	2.0x	3.8x	3.1x	2.8x	2.1x	2.6x	2.2x	1.6x	2.2x	2.6x	1.6x	1.4x	0.9x	0.6x	0.7x	1.5x	1.4x	n.a.
Gearing	[Net debt/Equity]	%	65.2%	71.9%	107.5%	121.1%	97.4%	67.2%	95.5%	71.4%	45.7%	64.5%	46.6%	53.4%	63.6%	30.7%	19.5%	26.5%	57.4%	67.5%	n.a.

- Comprehensive detailed supplier financial information clustered by product/**domain focus, HQ regions, company size** and **business model**
- Historical data back to the year 2000 on **~650** automotive **suppliers** from triad markets as well as from emerging countries
- Evaluation of historical performance against industry in **more than 50 relevant financial KPIs**
- Identification of **best-in-class performance** and ability to set relevant profitability targets within relevant **peer group**

Source: Lazard, Roland Berger

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