

McKinsey  
& Company

# Semiconductors for the Autonomous Age

## Market and Trend outlook

In collaboration with the  
GSA (Global Semiconductor Alliance)



General overview for the GSA Automotive Interest Group | January 2021

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# Autonomous applications will possibly disrupt semiconductor value chain – potential impact is assessed in collaboration project

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## Autonomous applications will potentially disrupt the semiconductor industry

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**Autonomous applications** will create demand for **new specialized semiconductors** (e.g., special ASIC)

Positioning of **traditional semiconductor** players will be **challenged** as **OEMs** start developing **own silicon** (e.g., Tesla self driving chip)

Other industries have seen similar development of **backward integration** (e.g. Apple iPhone chips, iMAC chips starting 2021), with **Tesla leading** the trend in **automotive**

This trend may have a **profound impact on the future of the semiconductor industry and players in the ecosystem** due to:

- **Demand for new** types and quality of **specialty silicon**
- **Shifts in value chain as OEMs** starting to develop **own silicon**

These developments have the **potential to disrupt the value chain** around automotive electronics with a **severe impact on current and potentially new players** – with both potential **upsides and risks** through new market dynamics



## Objectives of the collaboration project

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In a **joint collaboration project**, **McKinsey** and the **GSA** will develop:

- Assessment of **use cases** and **application areas** with high potential for backward integration
- Detailed view on **competitive dynamics**, i.e. strategic directions of different players in the ecosystem and resulting impact on value chain
- A **quantitative market model** assessing the autonomous application silicon market size with potential for backward integration
- Develop view on future **partnership** and **ecosystem network** including impact on different players in the ecosystem (e.g., OEMs, Tier 1, Tier 2) and strategic recommendations

The **target audience** of the results includes all **players in the automotive industry**, e.g. OEMs, tier-1 suppliers, semiconductor suppliers, as well as **companies beyond** that are **interested to enter the automotive semiconductor market**

The results of the project will be summarized in an **article available to GSA members** as well as in supporting formats like **keynote speeches** on conferences and dedicated **panel/workshop discussions** (including intermediate reviews)

# Workshop on 11.02. will focus on refinement and validation of our initial hypothesis based on interviews and analysis

## Preliminary agenda and timing

Timing: 11.02.2021, 16:00 - 19:00 CET / 07:00 - 10:00 PT


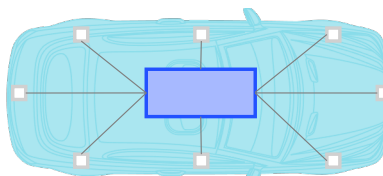

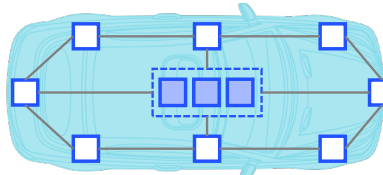

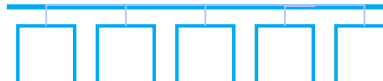

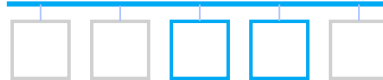
Agenda item	Duration	Setting
Opening and introduction	30min	Plenary session
Topical deep-dive sessions	120min	Breakouts with different topical focus
Summary / Conclusion	30 min	Plenary session

### Preliminary deep dive topics<sup>1</sup>

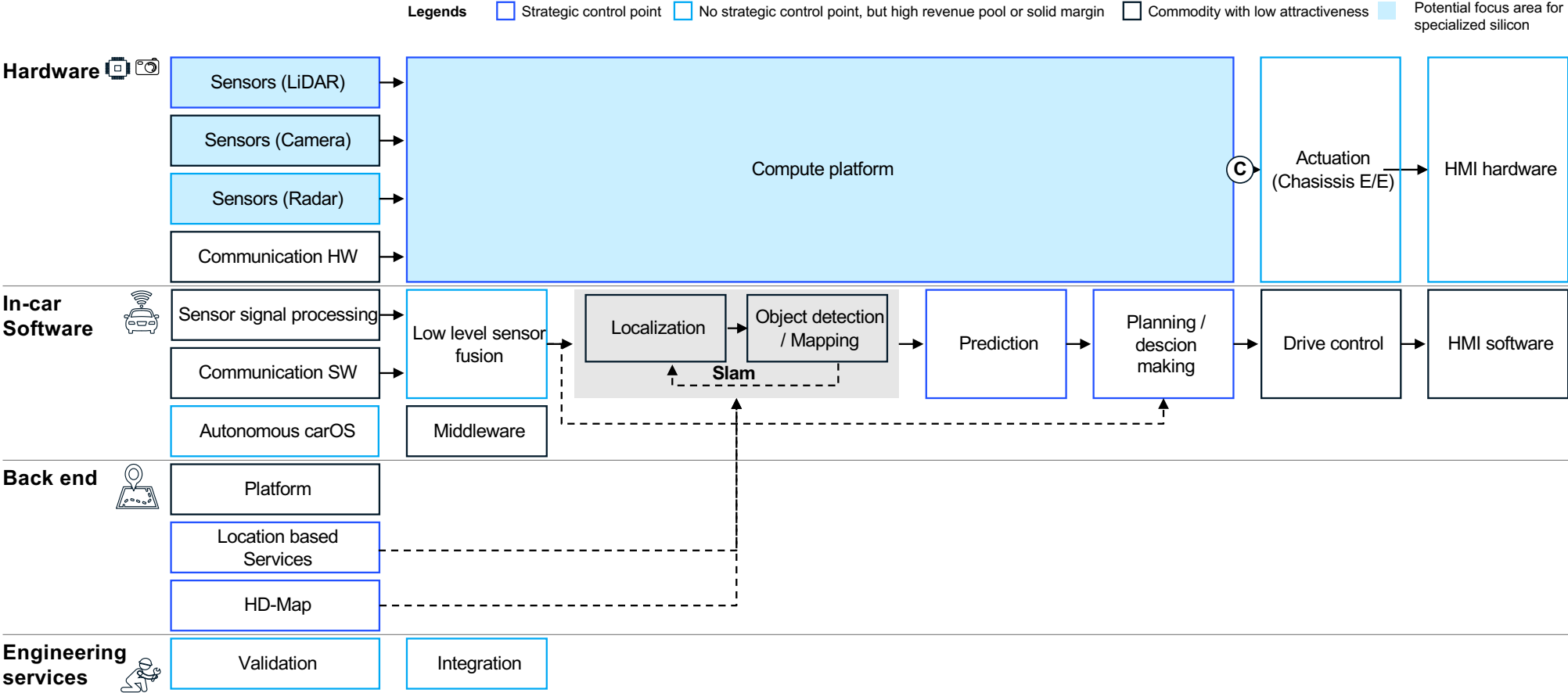
1. Autonomous use cases and technologies
2. Emerging player archetypes
3. Market development of special semiconductors
4. Potential strategic opportunities for different value chain participants

1. Number and scope of deep dives will depend on number of registered participants

# Players will use different archetypes in generations 4 and 5 with wide range of requirements creating demand for new specialized silicon

Generation	Archetypes	Description	Examples	<input type="checkbox"/> ECU <input type="checkbox"/> DCU <input type="checkbox"/> Zone computer <input checked="" type="checkbox"/> Central computer
5 <sup>th</sup> Generation Vehicle centralized	<b>Central Brain</b>	Powerful <b>central general purpose processing</b> unit with mostly unprocessed inputs from ECUs  Optimized for camera and deep-learning based <b>approach to HAD</b> incl. <b>special purpose silicon</b> (e.g. Tesla with own chip design)		
	<b>Zone Computing</b>	Majority of domains are controlled by <b>central virtual domain</b> units based on a general purpose compute cluster  Backed by <b>distributed zone computers</b> across the vehicle  Best for OEMs with limited number of platforms/variants	• APTIV •  	
4 <sup>th</sup> Generation Domain centralized	<b>Full domain centralization</b>	All domains use DCU architecture  Well-suited for multiple platforms  Suitable for <b>Level 3 AD</b>	VOLKSWAGEN GROUP  	
	<b>Selected domain centralization</b>	Selective domains using DCU (typically starting with infotainment and ADAS)  Good for cost minimization		

# Detailed view of autonomous vehicle value chain shows focus areas with high potential need for specialized silicon



# Results of the project will be translated into concrete publications and presentations available to GSA members

## End products of the collaboration (Timeframe: end of Q2 2021)



### Semiconductor market model for autonomous applications

Granular market model for semiconductors in autonomous applications (automotive) allowing to drill down into different application areas and taking into account several scenarios



### Assessment of competitive dynamics and value chain disruptions

Qualitative assessment of competitive dynamics across players with an outlook on expected disruptions on the value chain



### Analysis of moves for ecosystem participants

Perspective on development of the value chain and ecosystem  
Summary of potential strategic plays, recommendations and partnership opportunities for ecosystem participants

## Formats for publication and dissemination (Timeframe: Q1 and Q2 2021)



### GSA expert workshops: **February 11, 2021 (virtual)**

Involvement of GSA members in detailed expert workshops held virtually on **February 11<sup>th</sup>, 2021**



### Keynote on conference: **April 21 & June 16, 2021**

Summary of intermediate discussed at a dedicated event for this topic on **April 21<sup>th</sup>** and final results at European Executive Forum in Munich on **June 15<sup>th</sup> and 16<sup>th</sup>, 2021**



### Published article: **end of Q2 2021**

Publication of an article/a brochure summarizing qualitative and quantitative findings of the collaboration: end of Q2 2021