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#### 401 – Software-Defined Vehicle: E/E Architecture Guide

The Software-Defined Vehicle: E/E Architecture Guide evaluates today's state of the art architectures while supporting planners and engineers on the journey to enable a software-defined vehicle (SDV). It provides insight into key SDV trends and technologies as well as the decisions enabling yearon-year delivery with optimal utility and cost to each vehicle made. An accompanying Excel version offers the latest data to encourage strong decision-making, with thousands of data points presented with every release.



# Software-Defined Vehicle: **Organization & Strategies**

Connected & Autonomous

CON

The transition towards software-defined vehicles is already providing car makers with many opportunities that, would not have been possible to capitalize on before the industry's uptake of new technologies. At the center of this innovation is the opportunity to leverage these technologies to shift feature monetization from point-of-sale to after-sales.

Embedding these new experiences into the vehicle, with room to develop and expand them over its lifecycle, will require a strategic realignment for companies across the industry. Here, OEMs, vehicle brands, and new automakers will increasingly need to consider the overall ecosystem - understanding how best to adapt their individual organizations toward the SDV's technological promises and stance as a potential 'third living space'.

In this report, our experts map out the different strategies used to incorporate software-defined vehicles into new vehicle line-ups. In doing so it understands how key industry players are organizing themselves as they prepare for SDV development, while identifying the products, services, and business models being pursued by stakeholders today. It likewise highlights the challenges and constraints of SDV development from an organizational perspective.

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FREQUENCY

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110

PAGES



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## Key questions answered

- > How are OEMs, suppliers, and other software/technology stakeholders more broadly incorporating the transition to software-defined vehicles into their broader corporate strategies?
- > How are these companies organizing themselves to support software-defined vehicle development, including corporate governance, subsidiaries, and regional/distributor entities?
- > What types of products, services, and business models are stakeholders pursuing as an outcome of their transition to softwaredefined vehicles?





Product Planners



Engineering

 $\bigcap$ 

C-Suite





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Software-Defined Vehicle: Organization & Strategies One-Off Report for 2023





June 2023 403-23 Software-Defined Vehicle: Organization and Strategies Request price

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## Introduction

## Introduction

The transition towards software-defined vehicles is already providing car makers with many opportunities that would not have been possible to capitalize on before the industry's uptake of new technologies. The transition is creating new opportunities for OEMs to break established automotive paradigms (such as 'Build vs Buy' or 'Waterfall vs Agile') to deliver benefits such as rapid pace of deployment and better customer experiences.

At the center of this innovation is the opportunity to leverage these technologies to shift feature monetization from point-of-sale to after-sales and requires a strategic realignment for car makers, which will increasingly need to consider the overall ecosystem and how to adapt their own organizations to fit the new world of 'a smartphone on wheels'.

Embedding these new experiences into the vehicle, with room to develop and expand them over its lifecycle, will require a strategic realignment across the industry.

OEMs, vehicle brands, and new automakers will increasingly need to consider the overall ecosystem – understanding how best to adapt their individual organizations toward the SDV's technological promises and stance as a potential 'third living space'.

In this report, our experts map out the different strategies used to incorporate softwaredefined vehicles into new vehicle line-ups. In doing so it understands how key industry players are organizing themselves as they prepare for SDV development, while identifying the strategies and business models being pursued by stakeholders today. It likewise highlights the challenges and constraints of SDV development from an organizational perspective.

Rather than focusing on head-count or reporting hierarchies, SBD's analysis focuses on the required culture shifts and a holistic focus on outcomes.

Section	Content
Bird's Eye View	In September 2023 (following the release of the Securing the Software Defined Vehicle Report), and again in December 2023 (following the release of the Software Defined Vehicle Forecast Report), this report shall be updated on the SBD Automotive Portal with an additional 'Bird's Eye View' chapter which pulls out the key points from across the layers of the Software Defined Vehicle.
Executive Summary	Consideration of the struggles of today's ways of working and steps to take to shift to new ways of working.
The Basics	What do you need to know about Software Defined Vehicles?
Case Studies	Examples from across OEMs and the supply base on today's state of the art of organization & strategy to deliver SDVs.
Analysis	Nine paradigms are considered in terms of today's way of working and how this spectrum of options will be opened-up with the introduction of SDVs
Recommendations	Detailed steps for OEMs and partners to deliver the five key benefits of a Software Defined Vehicle



## **External Perspectives**

To increase the impact of SBD Automotive's report on Organization and Strategies for the Software Defined Vehicle, we've asked for some external perspectives from some experts outside of SBD, and have included their viewpoints at times in the report.

## **change**maker



#### Jason Craker – Transformation Director and Automotive Sector Lead

Jason has significant experience as a hands-on, global CDIO operating in fast moving, customer focused environments. He has as a significant interest in how this traditional industry is transforming into an emerging mobility sector, addressing the shift to sustainable transport with digital enabled customer services at its core.

Jason leads Changemaker's Automotive Practice having previously been responsible for establishing the global digital eco-system for Polestar as their Chief Digital Information Officer.



#### Himanshu Khandelwal - Partner & Managing Director

Himanshu has over 25 years in management consulting and automotive industry with a focus on value driven approach to complex transformations in product development, manufacturing, sales, and service. Prior to joining AlixPartners, Himanshu served as Automotive Partner and Managing Director at EY and IBM Global Business Services.



#### Florian Rohde – Managing Partner



Florian worked for several years in the "classic" automotive world at Siemens and Continental before he implemented a continuous validation concept at Tesla in his role as senior manager of the vehicle firmware validation.

After Tesla, Florian served as director of system integration and validation at NIO.

Florian joined iProcess as Managing Partner in 2019 as an acknowledged SDV expert supporting the industry transition to the vehicle 4.0.



#### Shea Burns - Partner

Shea has more than 20 years of experience in management consulting, engineering, manufacturing, and guality in the global light-vehicle, commercial-vehicle, and off-highwayequipment industries. Before joining AlixPartners he was vice president of consulting at AVL.

Many industries and organization have consumed extensive effort to deliver Digital transformations programs, the Automotive industry is no different. The major difference is that the Automotive industry is in the process of digitalizing its internal (enterprise), external (customer journey) and also their product (vehicle). Without doubt the most complex transformation being to deliver a true digital product with the delivery of a SDV. The question is have we got a well defined and common view of what is a SDV and what does the future look like...

A convergence of data-driven experiences, consumers desiring unique and personalized services and influenced by subscriptions, the rise of electrification, accelerated adoption of ADAS (Advanced Driver Assistance Systems), AI, cloud computing, and analytics has created a perfect storm that has firmly impacted the automotive sector, with no signs of fading away. While the concept of an SDV has been in development for several years, there has never been a stronger impetus to propel its advancement. SDV involves the integration of software systems to control various vehicle functions, including powertrain, security, safety, connectivity, and infotainment. SDV has the potential to deliver personalized experiences not only at the point of sale but also throughout the vehicle's lifespan via software updates. While SDV offers significant long-term value to customers, OEMs are also eyeing the potential benefits, such as increasing and retaining market share, cost reduction through software reuse across multiple platforms, shorter product development cycles, potential increases in residual value, and upselling opportunities to drive new revenue streams. This shift necessitates the collaboration of OEMs, auto suppliers, technology partners, and other ecosystem stakeholders to fulfill the promises that SDV holds. The shift also forces OEMs to reset their operating model, organizational boundaries, make vs buy decisioning, insourcing vs outsourcing, and investment prioritization.

We are seeing the automotive industry on the largest quantum leap since electronics changed cars from a pure mechanical product to an ECU based system. Software defined vehicles bring so many opportunities for engineers to shape the mobility of the future, yet it requires adaptation of the players involved, and it also welcomes new players. At iProcess we are working closely with established OEMs and suppliers looking to make the transition as well as with newcomers starting their automotive journey.

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## Birds Eye View

This report is one of four 2023 reports that look at different layers and enablers of the Software Defined Vehicle. In September 2023, and again in December 2023, the report shall be updated on the SBD Automotive Portal with an additional 'Bird Eye View' chapter which pulls out the key points from across the layers of the Software Defined Vehicle.





#### **SDV Forecast**

Forecasting the alignment of the enablers for the different layers of the Software Defined Vehicle

Coming December 2023



# Example slides from the report



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## NIO's battery as a service

**₩ When ►** 2020

**The Approach** > Battery as a service – battery rental to customers

#### 8 **Overview**

Case Studies

Car owners have the option to independently purchase ownership of the vehicle shell without the battery and then use the battery through a leasing arrangement. In simple terms, it means treating the battery as an asset and allowing a large number of users to lease it.

Nio's battery as a service is **initiated by the Nio commercial team**, the aim is to reduce the threshold of purchasing a Nio and better interact with the battery swapping service for customers. Currently, Nio has 30,000+ BaaS customers. The main feature of NIO's BaaS (Battery as a Service) model is the joint establishment of a battery asset management company with battery manufacturers (such as CATL) and financial backers (such as Guotai Junan and Hubei Science and Technology Investment Group). The battery asset management company is primarily responsible for the operation and management of battery swapping stations, as well as the recycling of used batteries. The responsibility for operating the swapping stations is shifted from the automotive company to the battery asset management company.

However, customers who chose the BaaS option are concerned of the vehicle residual value as rarely there will be some buyers to buy the vehicles under the policy.

## **Achievements**

- To reduce the threshold of purchasing a car
- Flexible battery upgrade options
- Increase the resale value

#### **Obstacles** ריין

 Complex collaboration with the financing company and other stakeholders



	Partners	
Silicon providers	Tier-1	SW integration providers

Organization			
Product planning	UX	Engineering	
Marketing	Cyber	IT	







Analysis

## **Chapter Introduction**

This chapter introduces the concept of existing Key Automotive Paradigms which can be unlocked by OEMs and partners as part of their journey to Software Defined Vehicles.

Each of today's paradigms is defined and considered in terms of indicative verbatims one might hear in such a culture or arrangement. Each paradigm gives a spectrum of options with benefits and challenges in tension. Case studies from the previous chapter along with additional examples help to demonstrate the state of the art of today's organization and strategies.

OEMs and partners delivering Software Defined Vehicles will continue to have today's options into the future, with the addition of breaking up opportunities in the middle of the spectrum which were previously not possible.

The chapter then attempts to consider the benefits that can be achieved in this 'center space' and to identify the enablers that should be put into place.

### What benefits do the enablers of this chapter deliver?

- Pace & Agility
- New Experiences
- Owning own IP
- Simplifying Complexity
- Revenue Flexibility

	Today's Paradigm	
Option A	, 3	Option B
What to deliver?		
Delivering Commodities & Features		Delivering Services
Commercially Defined Competitive Products		Innovative Features through Technologies
Point of Sale		Aftersales
Who will deliver?		

Product Delivery	Service Operations
Vehicle Line Leadership	Functional Leadership
Third Party Sales & Service	Dealerless Sales & Maintenance

#### How to deliver?

Waterfall	Agile
Insource Build	Outsource Buy
On-Vehicle Verification	In-Loop Verification

## 

ins, maintenance, and repairs.

Transformed

Third Parties

A car dealership is a business that specializes in selling new or used vehicles to customers.

vehicles. Car dealerships often offer additional services such as vehicle financing, trade-

established in the market

It serves as a retail location where customers can browse, test drive, and purchase

Sales & service are conducted through

## Huge transformation amongst emerging OEMs

The dealer is the trusted connection to the end customer **Challenges Advantages Risk-sharing** Costs added Long-term customer Real Estate needed relationship Sales and service bundle Large inventories parked Visual presence Aging cars on the dealer lot Need to educate dealers Inventory outsourced about features OEM has no quality control Personal interaction of the services provided

Centre Space Difficult to achieve with today's State of the Art Sales & service are conducted Without Dealers

being required in the market

Car sales direct to consumers, also known as direct-to-consumer car sales, involve selling vehicles directly to customers without the traditional involvement of a dealership. In this model, automakers or online platforms act as the sellers, allowing customers to purchase vehicles directly from them.

## Dealers are a relic of a past before the internet

<u>Advantages</u>	Challenges	
Lower sales cost	Loosing older target groups	
Capture, own, & use data to build customer relationships	US law prohibiting direct-to- consumer in some states	
Connection with a younger target group	No personal consultations	
Direct customer data from configurators	Hard to upsale	
Transparent pricing	No test drives as sales argument	
Not bound to opening hours	Financing and trade-in challenges	

Transformed

Sales & Service

## Customer experience of Sales & Service moving to the OEM





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## Do you have any questions?

If you have any questions or feedback about this research report or SBD Automotive's consulting services, you can email us at info@sbdautomotive.com or discuss with your local account manager below.



info@sbdautomotive.com

	<b>₽</b>	99		<b>PPPPPPPPPPPPP</b>	
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