January 2020

# APTIV CES 2020

## SVA™ Overview

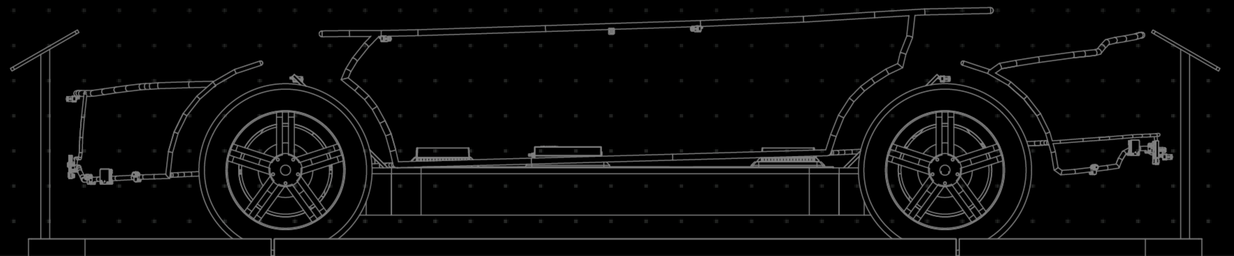
## PORTFOLIO

CAPABILITIES WITH BOTH THE BRAIN AND NERVOUS SYSTEM OF THE VEHICLE

## COMMERCIALIZATION

CONCEIVING, SPECIFYING AND DELIVERING THE ADVANCED ARCHITECTURES OF THE FUTURE

SVA™ LOWERS TOTAL COST OF OWNERSHIP AND ENABLES THE SOFTWARE-DEFINED VEHICLE



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**VEHICLE FATALITIES COMING DOWN GLOBALLY, BUT PASSIVE SAFETY AT ITS LIMIT; ADVANCED SAFETY SOLUTIONS CRITICAL IN REDUCING VEHICLE FATALITIES**

**94%** of all accidents are caused by human error

NHTSA

**1.35M** road traffic deaths annually

World Health Organization

**EMISSIONS REGULATIONS BECOMING INCREASINGLY STRINGENT GLOBALLY TO HELP IMPROVE AIR QUALITY AND REDUCE TRANSPORTATIONS ENVIRONMENTAL IMPACT**

**#1** air pollution is the number one environmental cause of death in the European Union

European Environment Agency

**4.6** metric tons of $CO_2$ per year emitted from a typical passenger vehicle

EPA

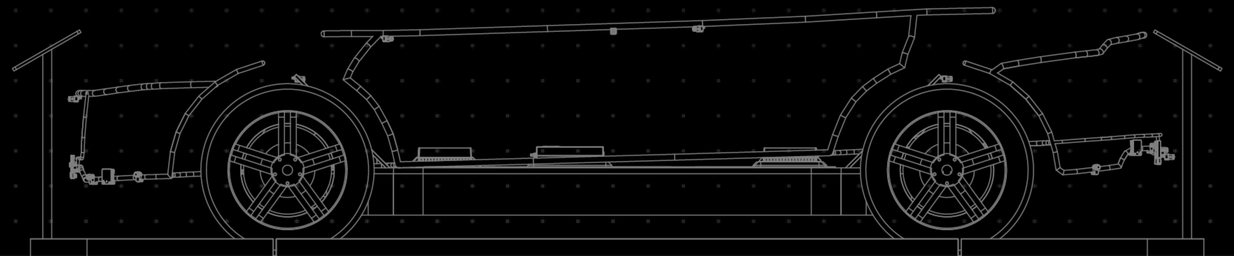
**URBANIZATION AND CONSUMER EXPECTATIONS DRIVING DEMAND FOR MORE INTELLIGENT, INTEGRATED AND PRODUCTIVE SOLUTIONS**

**6B** smartphones globally by 2025, replacing the PC as consumers key connected device

IHS Markit

**25B** IoT connected devices globally

McKinsey & Company



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## SAFE

APTIV MISSION

**A SOCIETY THAT SEES ZERO FATALITIES, ZERO INJURIES AND ZERO ACCIDENTS**

APTIV TECHNOLOGIES

- Perception systems and sensor fusion
- Active Safety software and multidomain controllers
- High fidelity / reliability interconnects and signal distribution
- Gesture and voice recognition for hands free control

## GREEN

APTIV MISSION

**ZERO EMISSIONS: MINIMIZE THE VEHICLE'S TOTAL LIFECYCLE ENVIRONMENTAL IMPACT**

APTIV TECHNOLOGIES

- High Voltage wiring and electrical centers
- High Voltage connectors, plug-in chargers and cord sets
- Aluminum wire harnesses for light-weighting
- Architecture optimization for mass and weight reduction

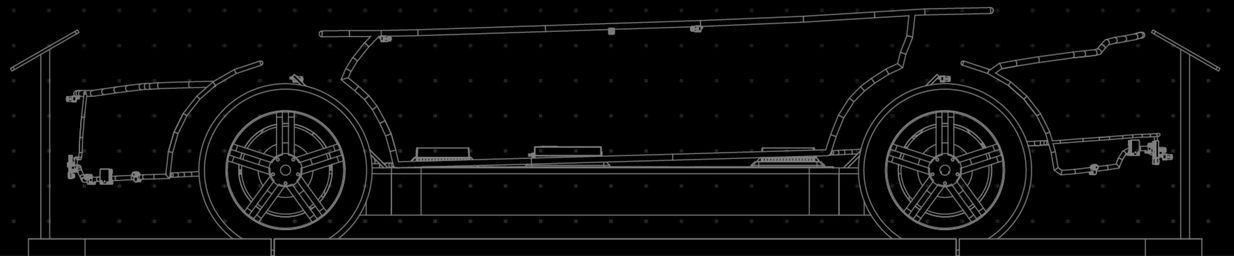
## CONNECTED

APTIV MISSION

**SEAMLESS INTEGRATION BETWEEN THE CAR, ITS PASSENGERS, AND THE WORLD AROUND IT**

APTIV TECHNOLOGIES

- Secure connected gateways (Cellular, Satellite, DSRC, GPS)
- Wireless (Wifi, BT), Media Modules and Consumer Ports
- Over-The-Air (OTA) for Software and Firmware
- Edge Processing, cloud analytics and cybersecurity



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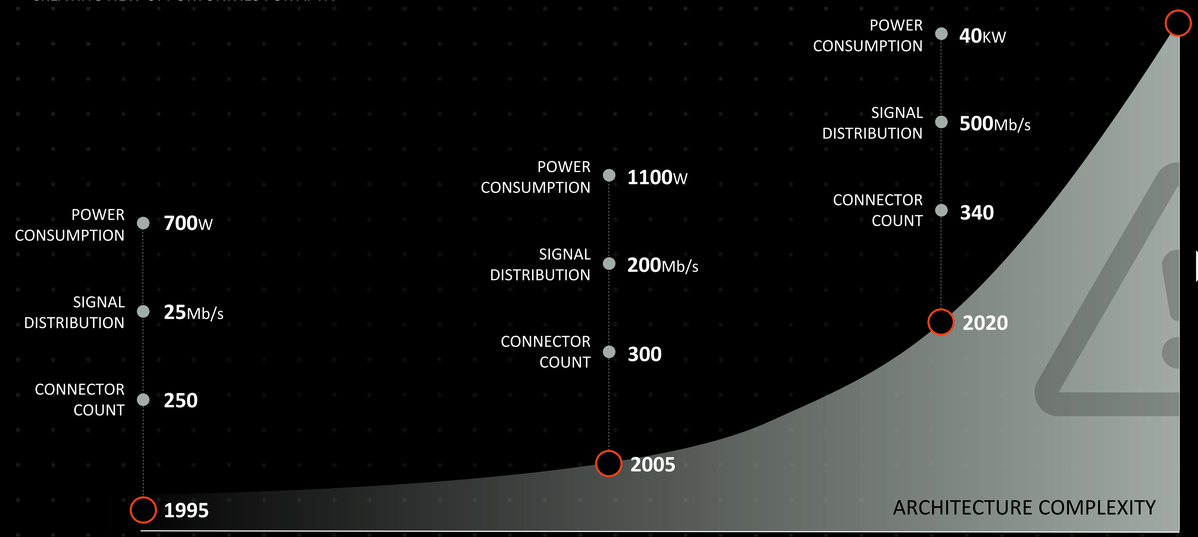
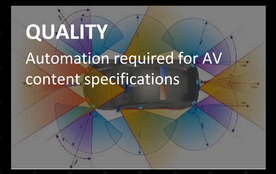
# Architecture Requirements Expanding...

CREATING NEW OPPORTUNITIES FOR APTIV



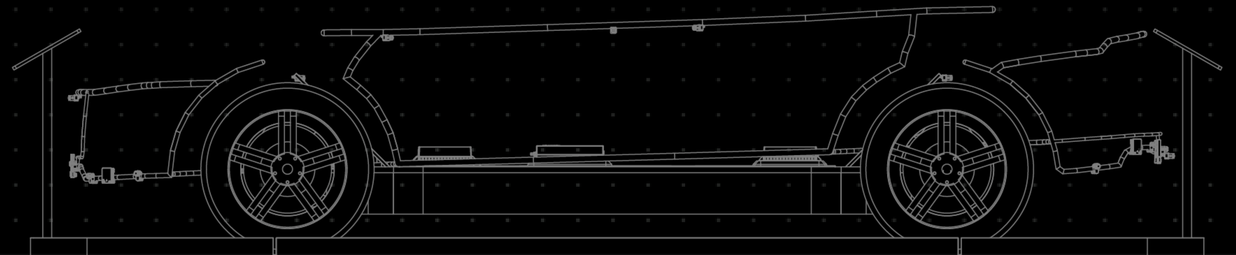

KEY CHALLENGES









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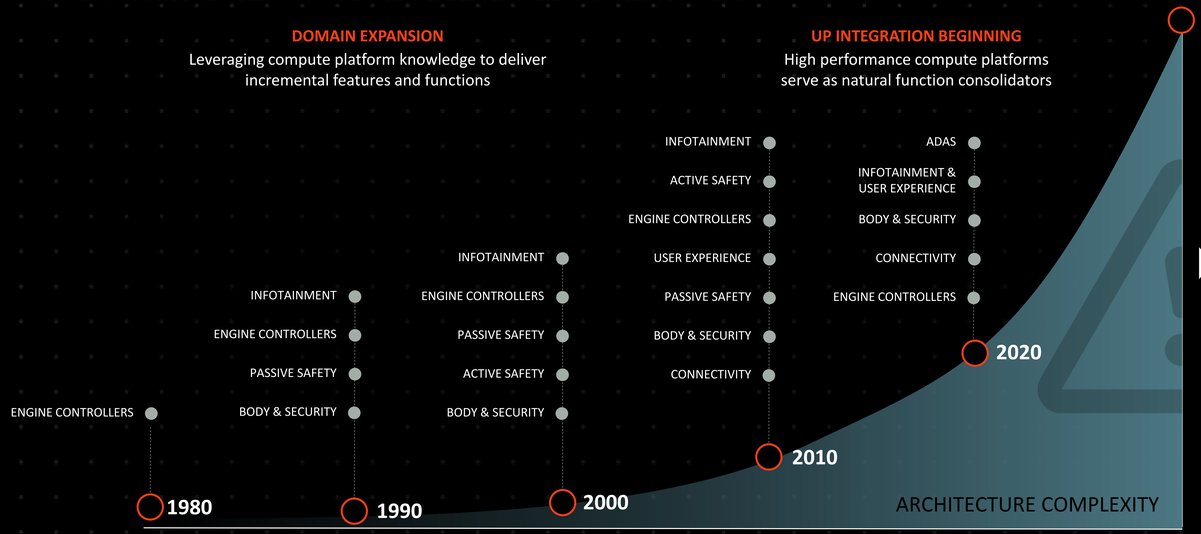
## … Demanding New Compute Solutions

PLATFORM STRATEGY ENABLES APTIV TO EFFICIENTLY DELIVER THESE ADVANCED SOLUTIONS

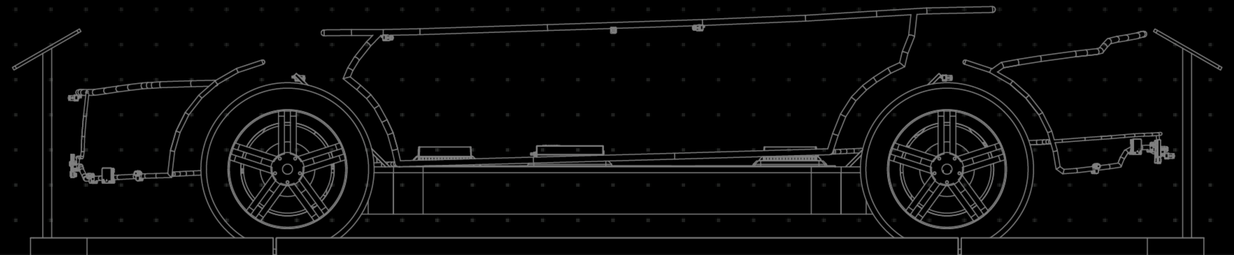



KEY CHALLENGES

**DEVELOPMENT**
Increasing complexity and interdependencies extending timelines

**MANUFACTURING**
Vehicle physically out of space, and difficult to assemble

**POST-PRODUCTION**
Heavy burden on sustaining engineering, with no ability to enhance functionality



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# Perfectly Positioned to Win

BRAIN AND NERVOUS SYSTEM CAPABILITIES ENABLING FULL SYSTEM SOLUTIONS

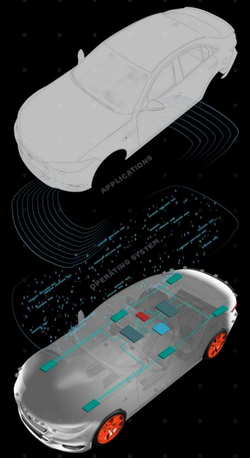
## CURRENT PLATFORMS

**ADVANCED SOFTWARE**

**ADVANCED ARCHITECTURES**

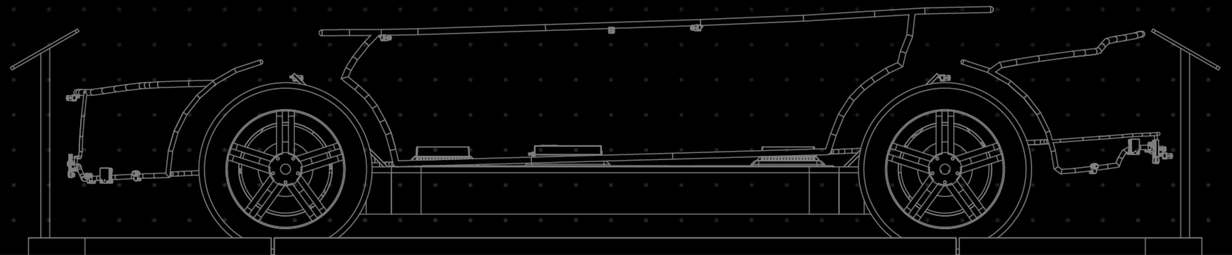
- CLOUD
- APPLICATION LAYER
- MIDDLEWARE
- OPERATING SYSTEM
- HARDWARE ABSTRACTION
- COMPUTE
- DATA & POWER DISTRIBUTION
- SENSORS, PERIPHERALS & ACTUATORS

## SVA™




## FUTURE PLATFORMS



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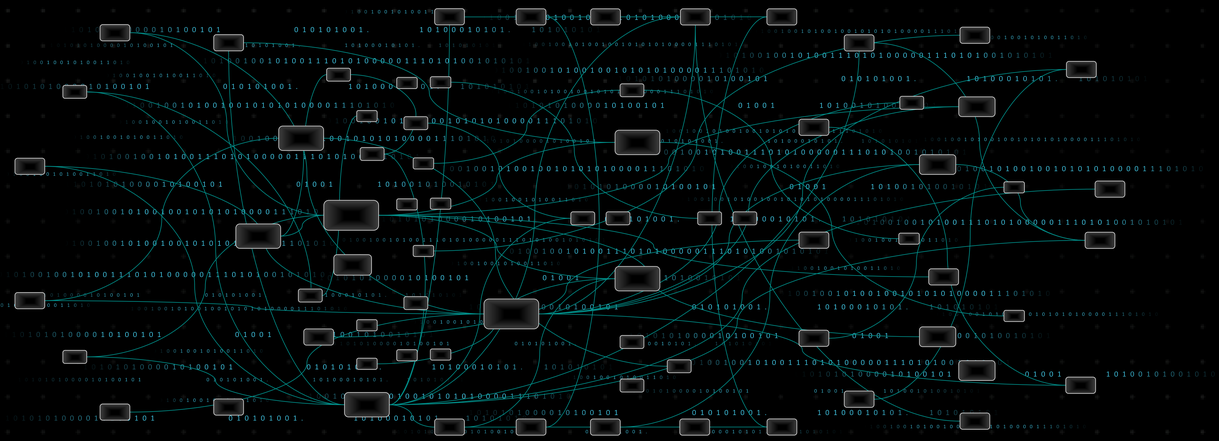
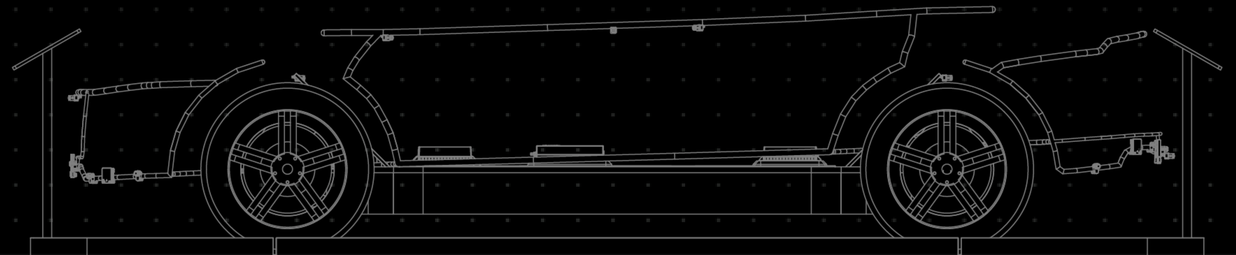
**100+**
Controllers

**200**
Million lines of code

**1000+**
Functions dependent upon multiple controllers



**“The complexity is paralyzing us”**
– OEM customer



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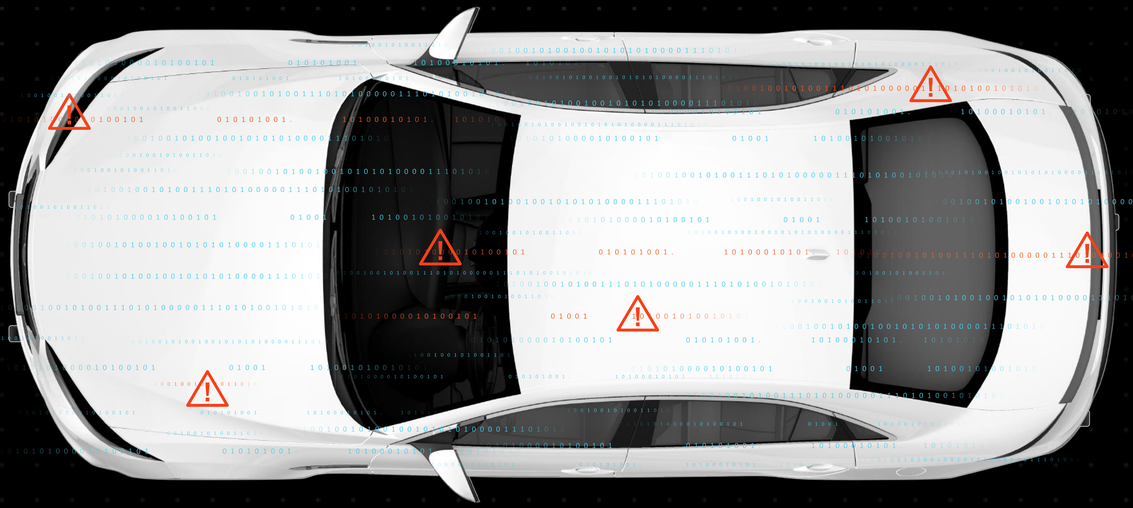
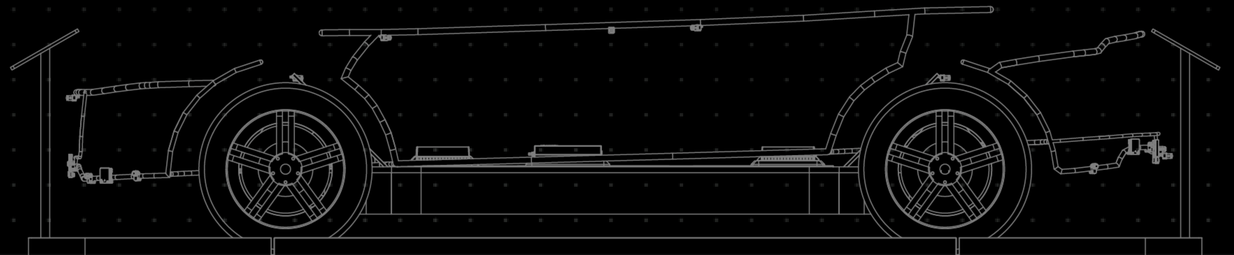
TODAY

## CHALLENGES IN ALL THREE PHASES OF VEHICLE LIFECYCLE





Development

Manufacturing

Post-Production

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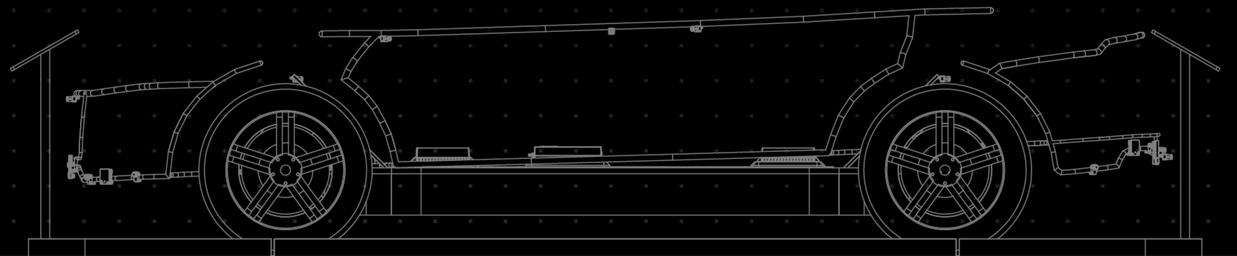
## SVA™ A FLEXIBLE AND SCALABLE PLATFORM DESIGNED TO

SIMPLIFY
Vehicle System and Function Complexity and Interdependence

UNITE
Diverse Applications Across the Full Vehicle Lifecycle

EMPOWER
OEMs to Fully Control the User Experience of Their Vehicles



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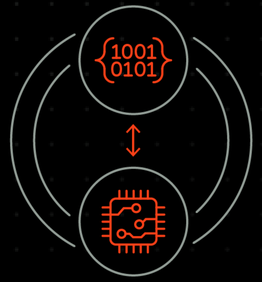
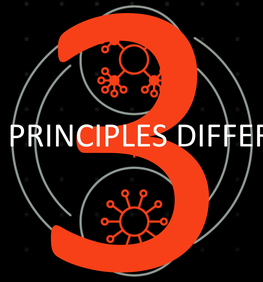
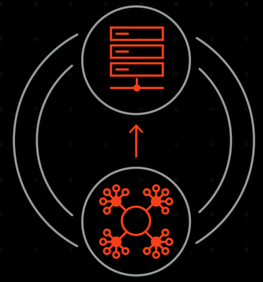



ABSTRACT
Software From Hardware

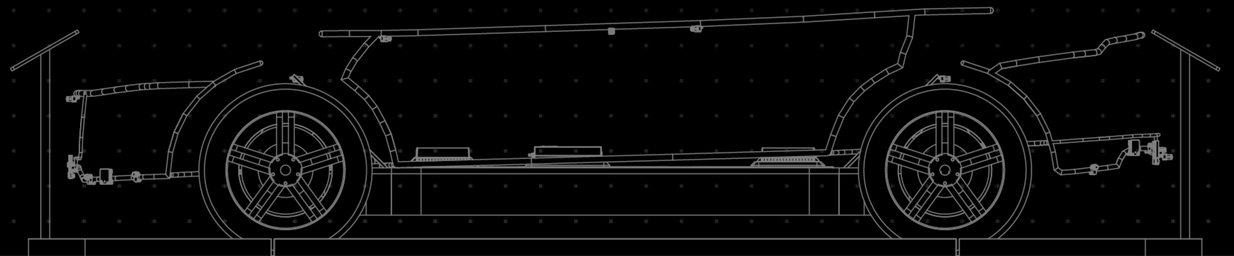
# 3 FUNDAMENTAL PRINCIPLES DIFFERENTIATE SVA™



SEPARATE
Input / Output From Compute



ENABLE
“Serverization” of Compute



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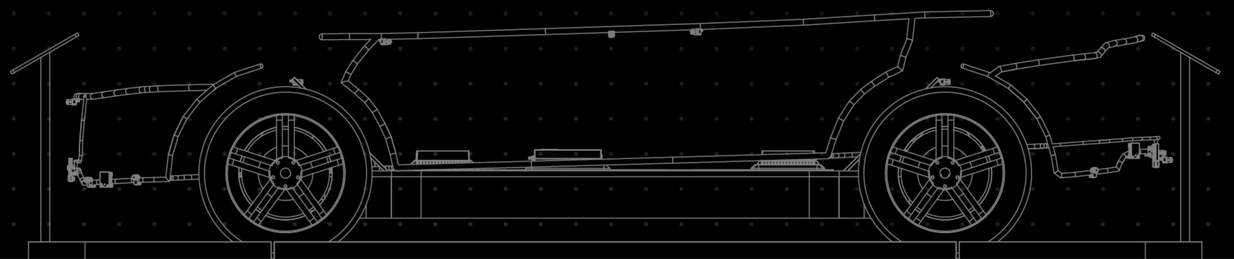
THIS SLIDE HAS BEEN REDACTED



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## LOWER TOTAL COST OF OWNERSHIP

**75%** Lower System Integration and Testing Cost

**25%** Reduction in Weight and Packaging Space for Compute

**50%** Labor Savings to Install Electrical Distribution

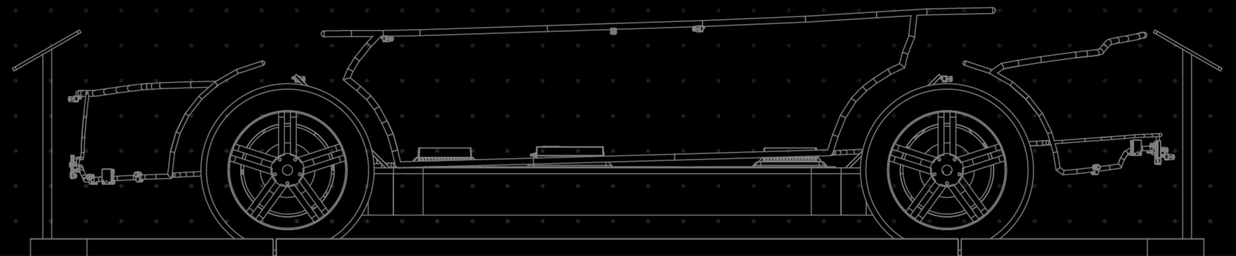
**75%** Software Warranty Cost Reduction

**20%** SKU Reduction

**20%** Reduction in Wire Harness Weight

**20%** Factory Floor Space Reduction for Electrical Architecture Installation

**100%** Elimination of Model Year Updates



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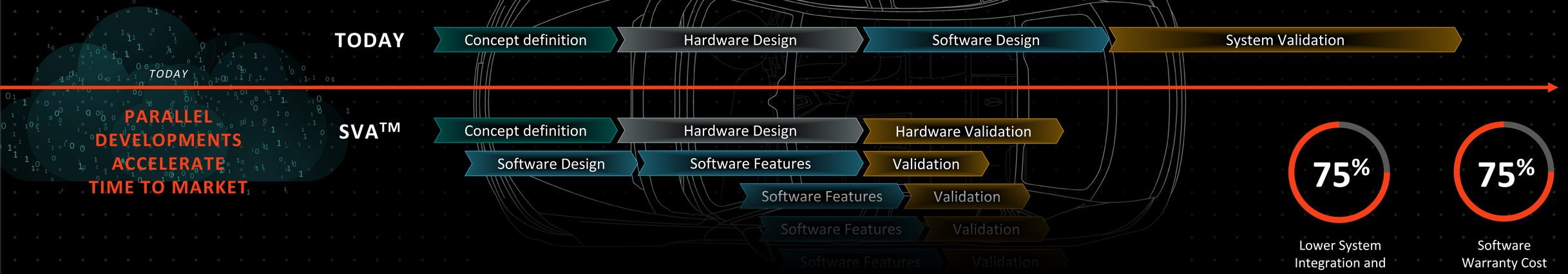
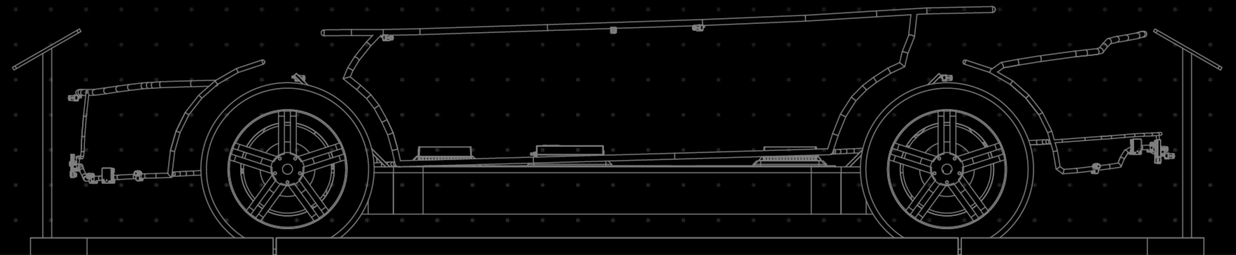



**75%**

Lower System Integration and Testing Cost

**75%**

Software Warranty Cost Reduction



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SIMPLIFY
AND AUTOMATE
ASSEMBLY
25%
Reduction In Weight and Packaging Space for Compute
50%
Labor Savings to Install Electrical Distribution
20%
Reduction in Wire Harness Weight
20%
Factory Floor Space Reduction for Electrical Architecture Installation
20%
SKU Reduction
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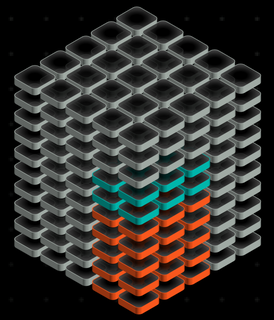
## STREAMLINE LIFECYCLE MANAGEMENT

VEHICLE MANUFACTURER SOFTWARE LIBRARY

VEHICLE SPECIFIC SOFTWARE BUILD



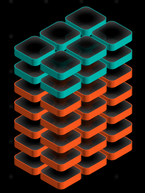
Updates

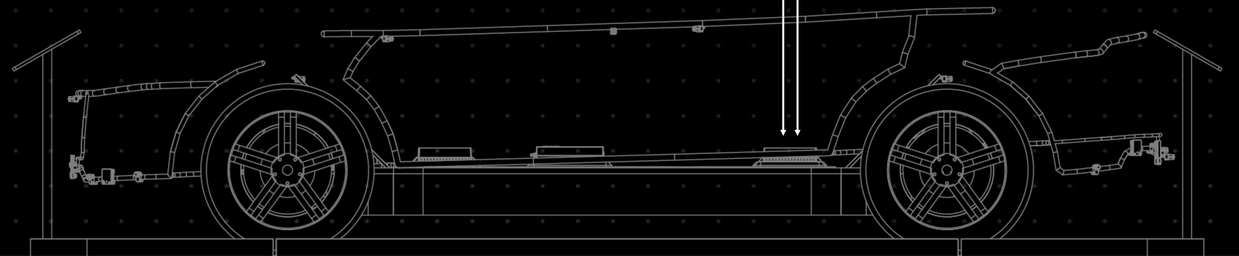
New Certified Software Functionality

Certified Software Functionality

Updates

Certified Hardware





**100%**

Elimination of Model Year Updates

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# DOMAIN AND ZONE CONTROL REPRESENT BUILDING BLOCKS TOWARDS SVA™

*Initial Introductions Into Production*

## FUNCTION
**Historically**

50 – 100 Distributed ECUs per Vehicle

## DOMAIN
**Today**

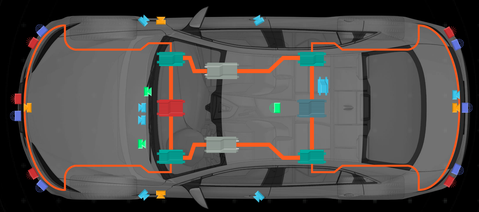
Supporting incremental functionality through domain centralization

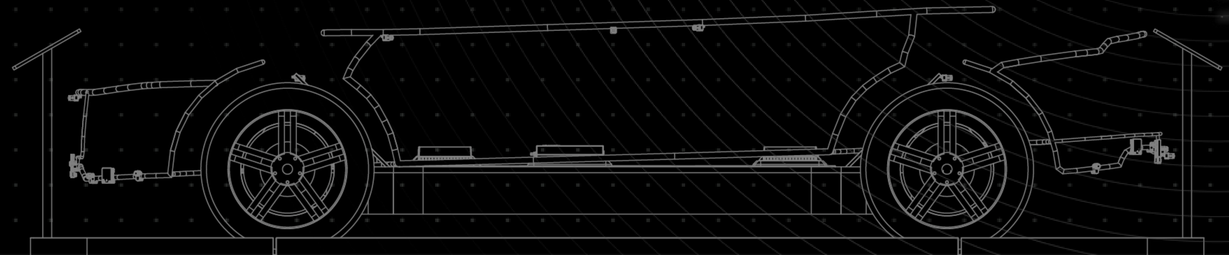
## ZONE

Reducing complexity through intelligent zone control and management

## SOFTWARE DEFINED
**2025 and beyond**

Enabling software to define new features independent of underlying hardware





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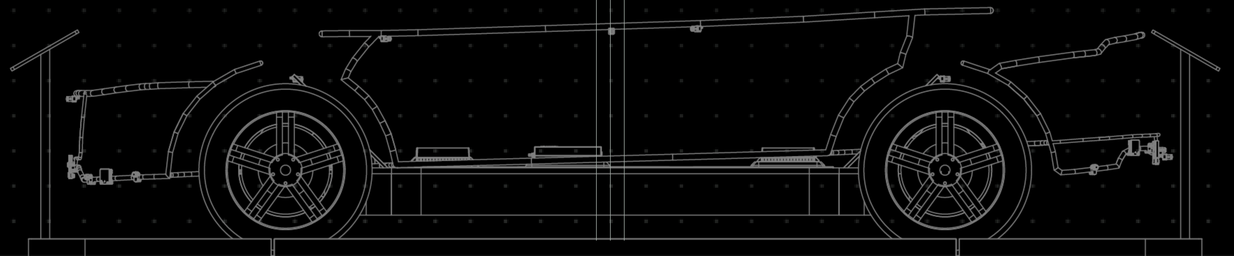
**UNLOCK NEW INNOVATION AND EMPOWER OEMS TO DEFINE THE USER EXPERIENCE**

| | VEHICLE MANUFACTURERS | APTIV | 3RD PARTIES |
|---|---|---|---|
| Examples | EV Range Performance Update | Point / Gesture To Search | Digital Assistants |
| | Occupant Authentication | Audio Enhancements | Home Automation |
| Middleware | SOFTWARE SERVICES LAYER & FRAMEWORK | | |
| | MIXED CRITICALITY MIDDLEWARE | | |
| O/S | INTEGRATED OPERATING SYSTEM | | |
| HAL | VEHICLE INTEGRATION AND VALIDATION | | |
| | PLATFORM INTEGRATION AND TOOLING | | |



## APPLICATIONS

- Software as a Services (SaaS)
- Software as a Platform (SaaP)

## SVA™ PLATFORM & SYSTEMS INTEGRATION

- Platform as a Service (PaaS)
- Software Development Kit (SDK)
- Technology Licensing
- Cloud Based Lifecycle Management
  - Digital Twin
  - OTA (SOTA / FOTA)

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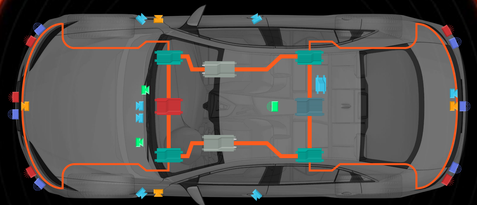

SVA™ A SUSTAINABLE ARCHITECTURE

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