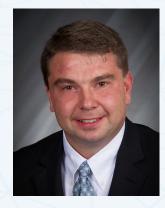


# Architecture Design Next generation systems for connected vehicles

#### **Matt Via**

VP Sales and Marketing | HED, Inc.



#### Introduction

20+ years in the mobile commercial vehicle space applying and developing hydraulic, electronic controls, operator controls, sensors and sensing system, power management, and telematics systems with multiple fortune 100 organizations in the Ag, Construction, Material Handling, Commercial truck and Auto industries.

#### HED Inc.

HED is an industry leader specializing in the design, manufacture, and application of innovative controls, displays and telematics systems for on- and off-highway OEMs. Our application development teams, and engineering services enable OEMs the flexibility and configurability to create unique vehicle control systems.



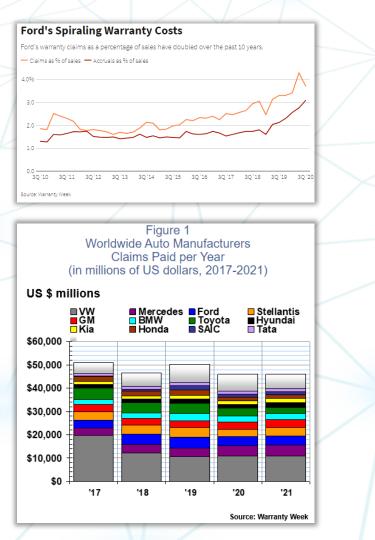
## **Driving the thirst for data**



Safety Productivity Improve uptime Predictive maintenance Driver Performance User Experience Over the Air Programming Efficiency Security



## **But there is more - OEM savings**



## **THE NEWS**

"Ford plans to use data gathered from vehicles to catch problems faster - in minutes rather than months in some cases - and fix them with over-the-air software updates" Jim Farley CEO Ford



## **Technology creates more data**

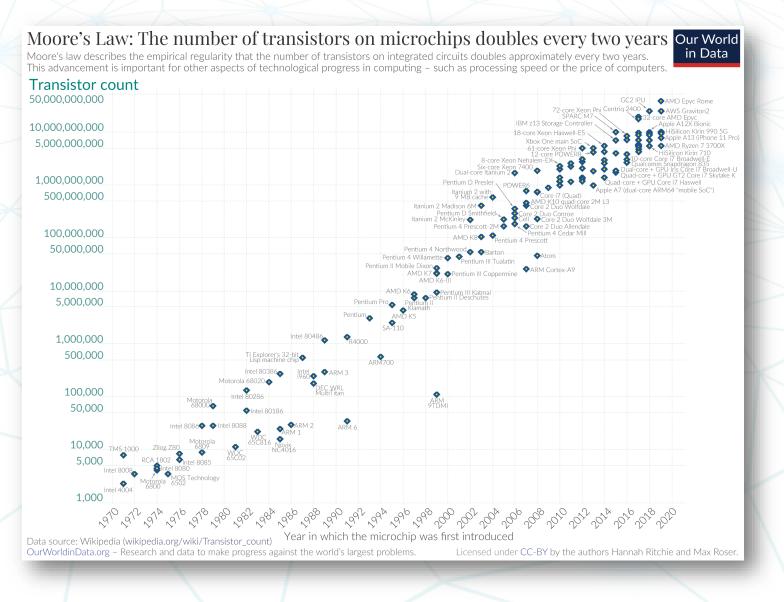
#### YESTERDAY



Intelligent Vehicle Controls

# The growth in data processing

#### The future will require more than faster and larger processors





## The vehicle of the future is software



200X the data of today by 2035

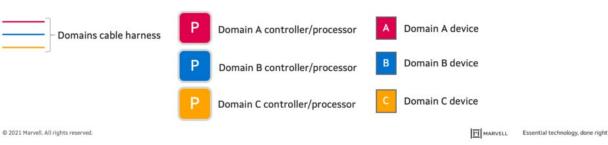
#### Today's architectures are not up to the challenge

Domain architectures segment the vehicle electronic control units into domains based on the function regardless of the location.

Data rates are limited to predominately CAN at 10 Mbps.

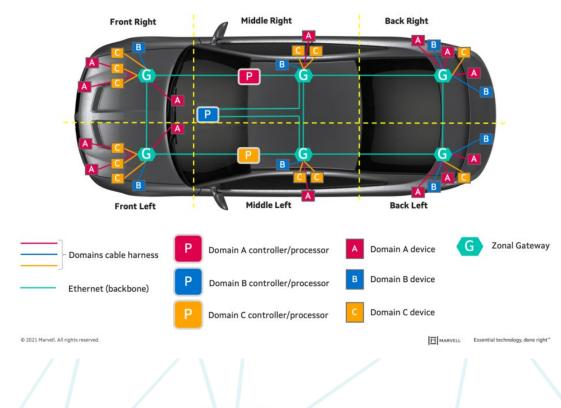
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**Domain architecture IVN** 





## The future of vehicle architectures



#### **Zonal architecture IVN – Distributed domains**

The Zonal architecture organizes communication, power distribution and load control based on location.

The architecture enable data speeds from 10 Mbps up to 1 Gbps, to allow autonomy and automation features.



## **Telematics moves to a central role**

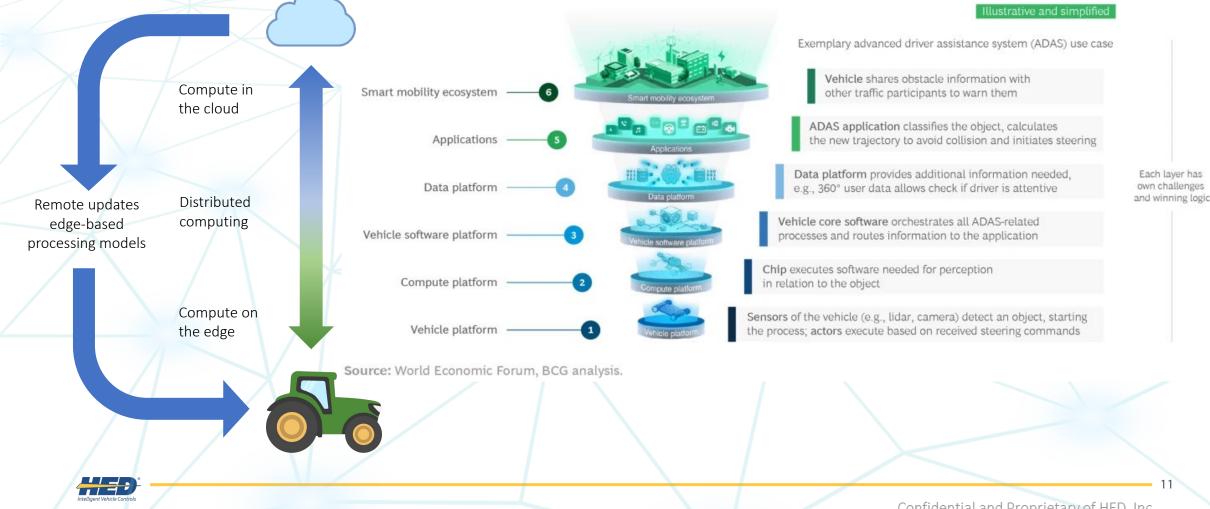


#### 4-keys to OEM telematics need:

- Software Security
- Over-the-Air programming
- Software defined machine
- Advanced Machine Automation / Autonomy



## Where to process what



## **Opportunities of a software defined vehicle**

The Tesla affect shows the value that can be added through the continued ability to improve and add value to your customer.

#### The customer payback:

- Tesla highest ranked for customer satisfaction
- 91% customer retention through repeat buyers
- Industry warranty rate of 1.1% vs. a 2.5% automotive industry average







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## **Determining what data matters**

#### Not analytics

October 2021

Your Global IoT Market Research Partner

N= 1,640 IoT Projects

#### The Top 10 IoT Use Cases

Use Case	Туре	Global Adoption <sup>1</sup>	Trend <sup>2</sup>
Remote asset monitoring (read-only)	Smart Operations	34%	0
IoT-based process automation	Smart Operations	33%	0
Remote asset monitoring and control (read/write)	Smart Operations	32%	0
Vehicle fleet management	Smart Supply Chain	31%	
Location tracking	Connected Products	31%	
IoT for asset/plant performance optimization	Smart Operations	31%	
IoT-based quality control & management	Smart Operations	30%	
IoT-based goods condition monitoring in transit	Smart Supply Chain	29%	
Predictive maintenance	Smart Operations	29%	
On-site track & trace	Smart Supply Chain	29%	

... of 48 use cases analyzed in total

Note:1: Share of companies that have at least partially rolled-out the use case Note 2: Based on respondents' indication of investment plan in in the next 2 years Source: IoT Analytics Research 2021, Conditions for republishing: Source citation with link to original post and company website; Non-commercial purposes only

ents Moderate investments ears expected in next 2 years



## **Creating an outcome focused framework**

Start here OUTCOMES	ACTIONS	INSIGHTS
Which specific people do we want to be better off in which specific ways because we acted?	WHO could do WHAT differently if they had better information?	What would we need to see on a screen to enable those actions?
What are our desired outcomes?	What's the intervention?	What's the data product?
		<b>→</b>
1	LOTI Outcomes-based Data Methodology	
ENABLERS	ETHICS	DATA
Beyond the data product, what else is needed to achieve our desired outcome?	Can we access and use the data legally and ethically?	What data is required to create those insights?
What other enablers need to be present?	Is this project worthy of citizens' trust? Just because we can, should we do it? What are the potential limitations and unintended negative impacts of acting on this data?	Can we use our existing data? Can we get data from other public or private sector organisations? Do we need new (e.g. smart city) tech to generate the data?



#### **Better data may not be better outcomes**



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## **Key Takeaways**

#### 1. Software is the future in vehicles

It will drive changes to architectures and expand how connectivity is used in the vehicle.

#### 2. More data creates more opportunities

Software driven vehicles create new opportunities for OEMs to build customer value in existing vehicles, increase satisfaction and lower warranty rates.

#### **3. Better outcomes drive analytics needs**

The push to predictive and prescriptive outcomes need to drive larger ROI to provide more value and adoption.

#### 4. Data does not equal value

Users of data want to get to an outcome the produces a better result otherwise its noise and an expense.

#### 5. Outcome driven framework

Start with the outcome not the data and determine what is needed to deliver the outcome.

## Questions?



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