HED®
Intelligent Vehicle Controls

Architecture Design

Next generation systems for connected vehicles

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Introduction

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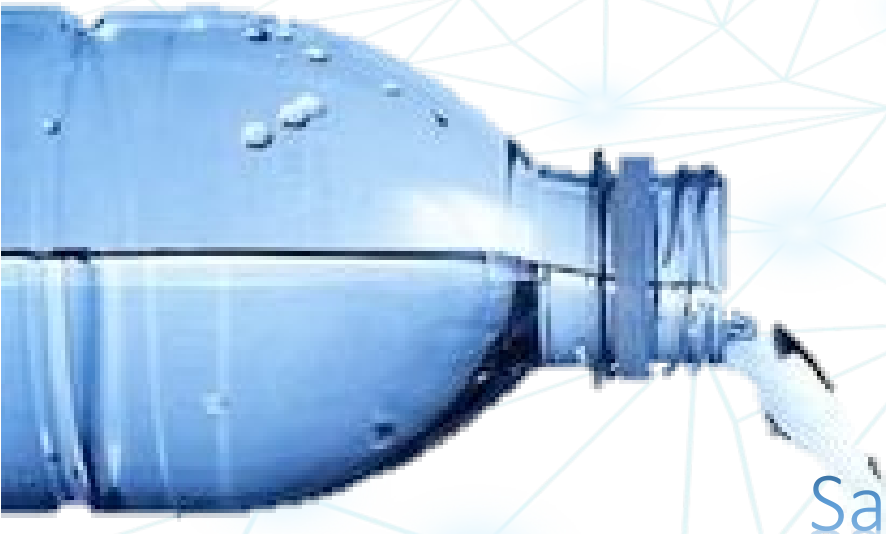
VP Sales and Marketing | **HED, Inc.**

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~~



$AVINGS

Safety

Productivity

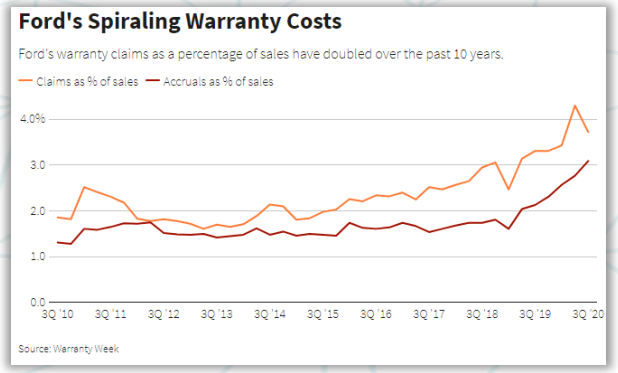
Improve uptime

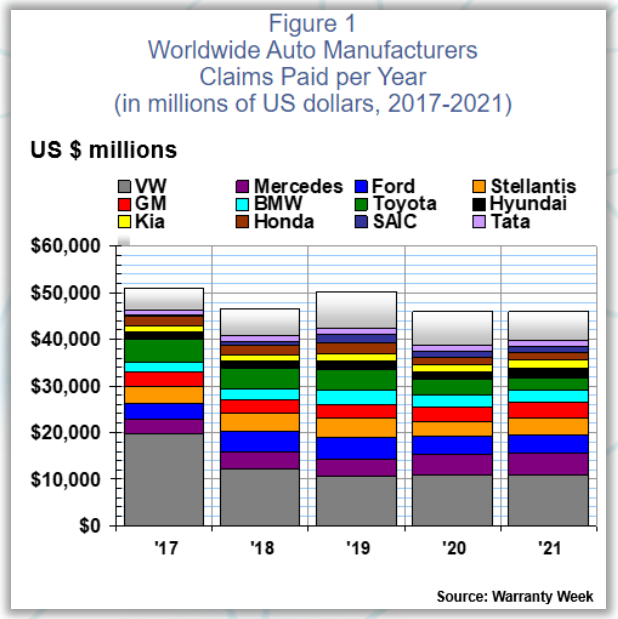
Predictive maintenance

Driver Performance User Experience

Over the Air Programming Efficiency Security

But there is more - OEM savings

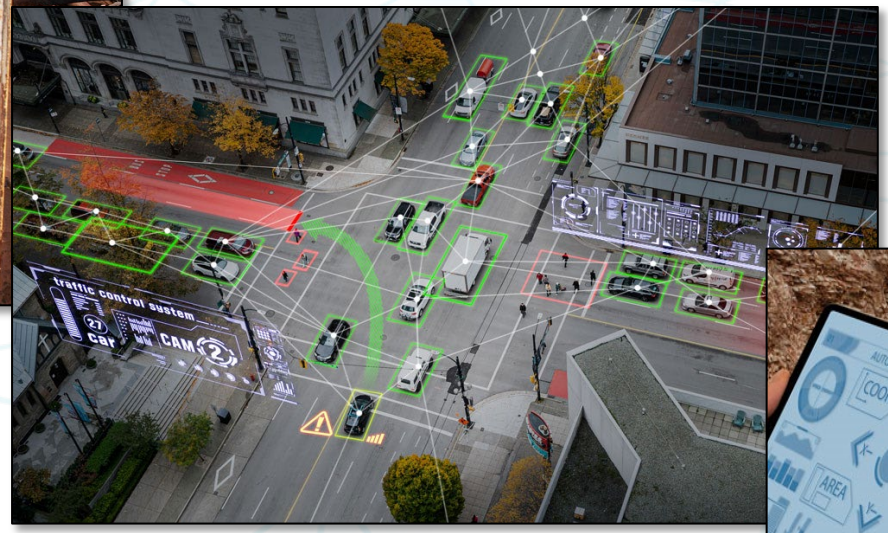




Technology creates more data

YESTERDAY

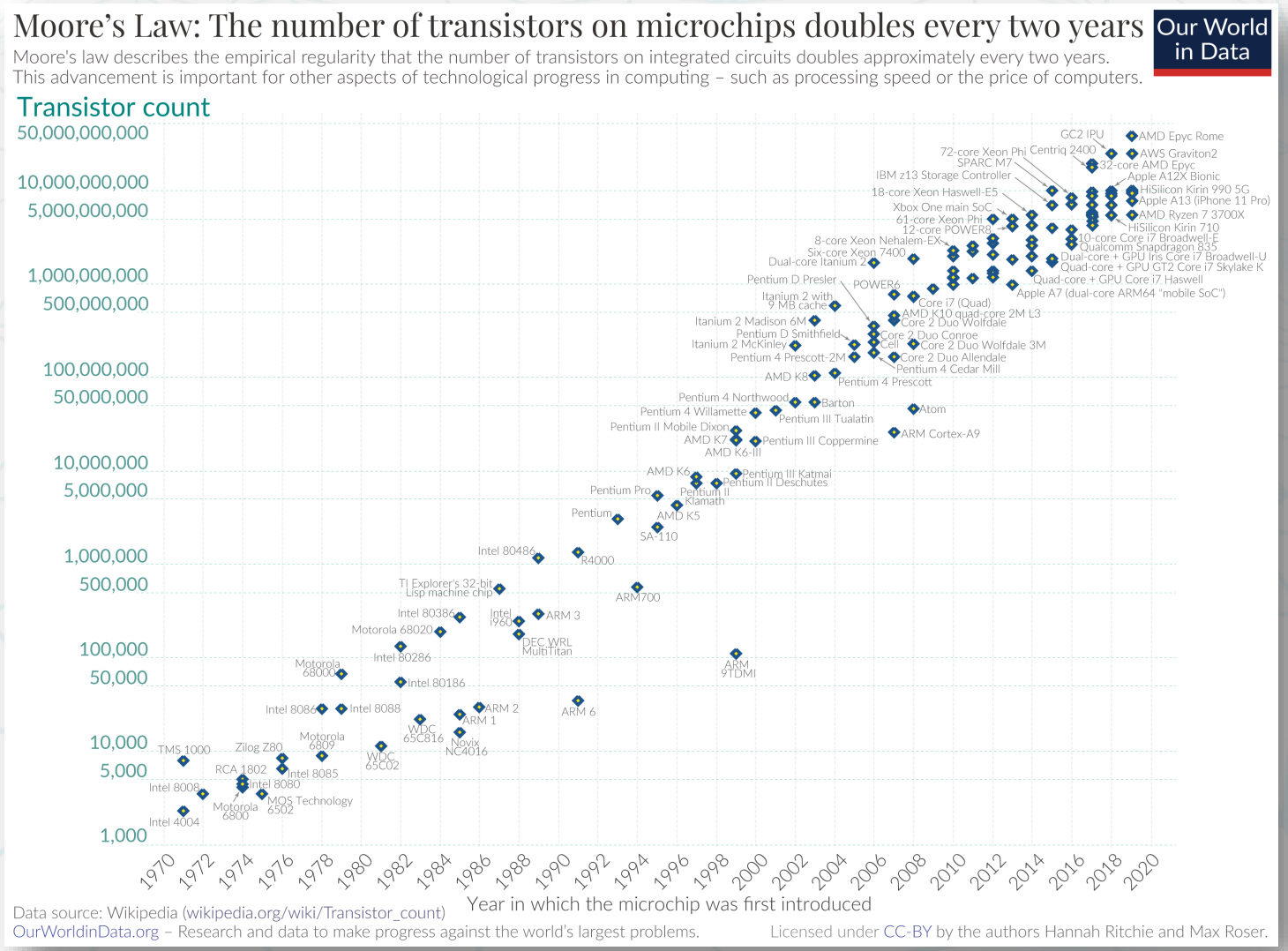
TODAY & TOMORROW



FUTURE

The growth in data processing

The future will require more than faster and larger processors



The vehicle of the future is software

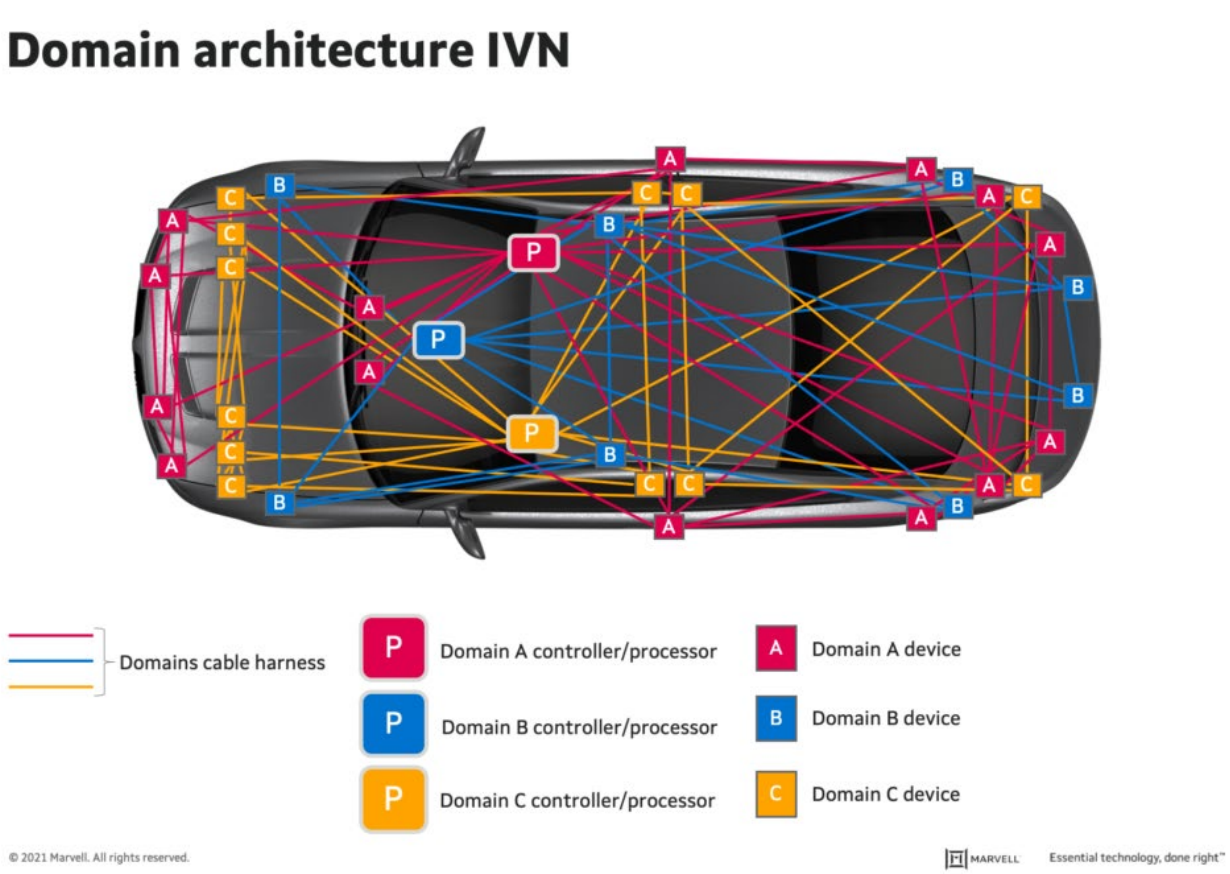
200X

the data of today by 2035

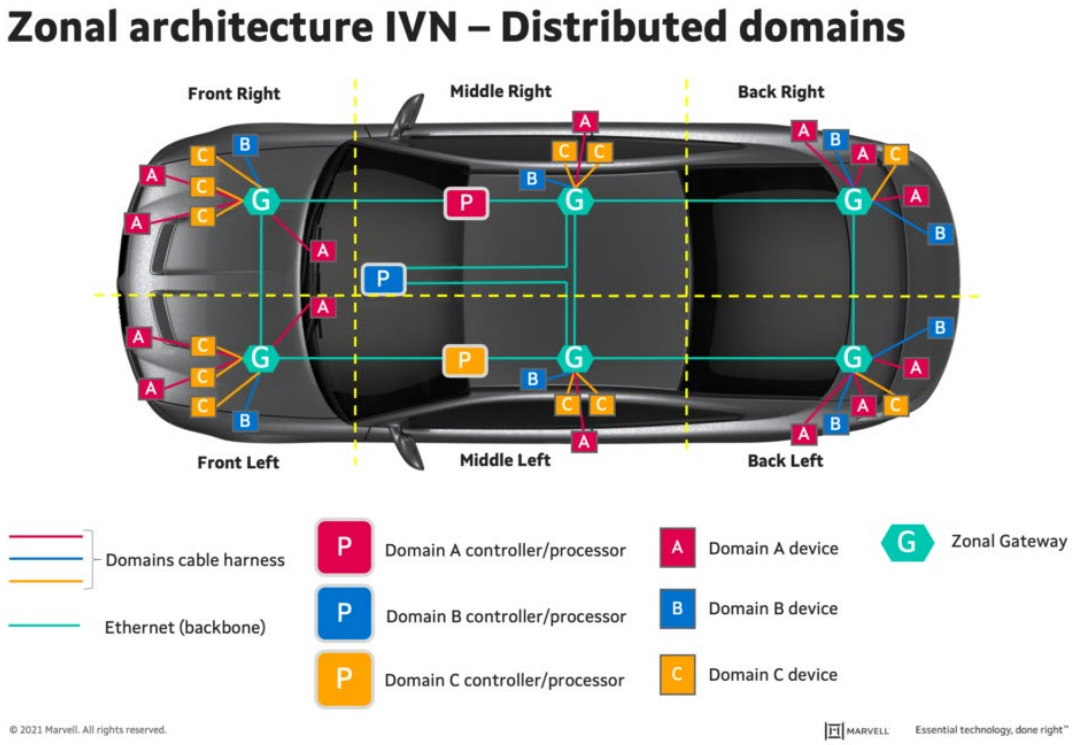
Today's architectures are not up to the challenge

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.



The future of vehicle architectures



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

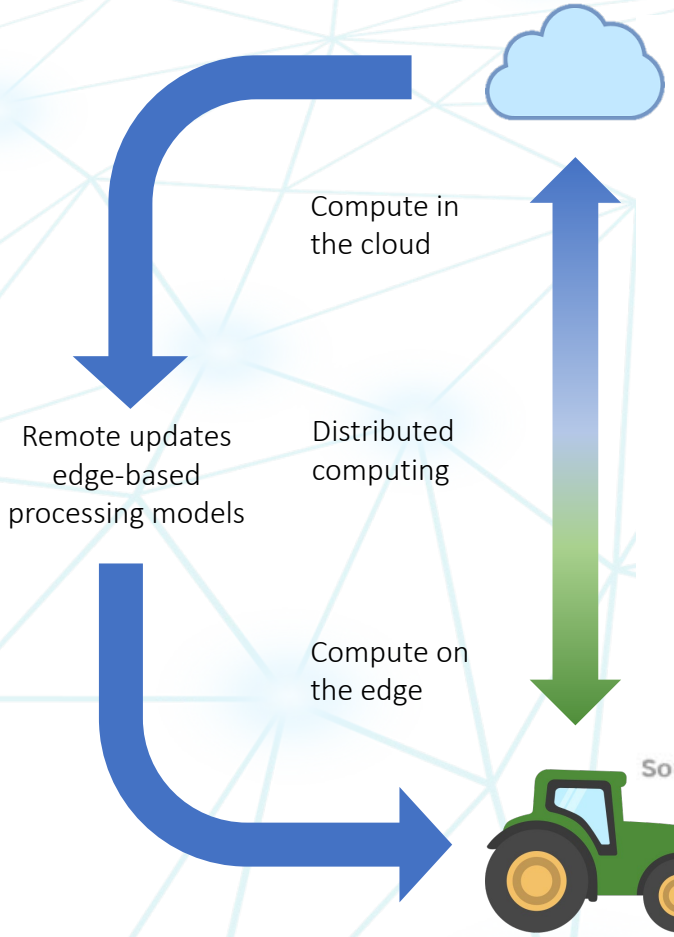
The architecture enable data speeds from 10 Mbps up to 1 Gbps, to allow autonomy and automation features.

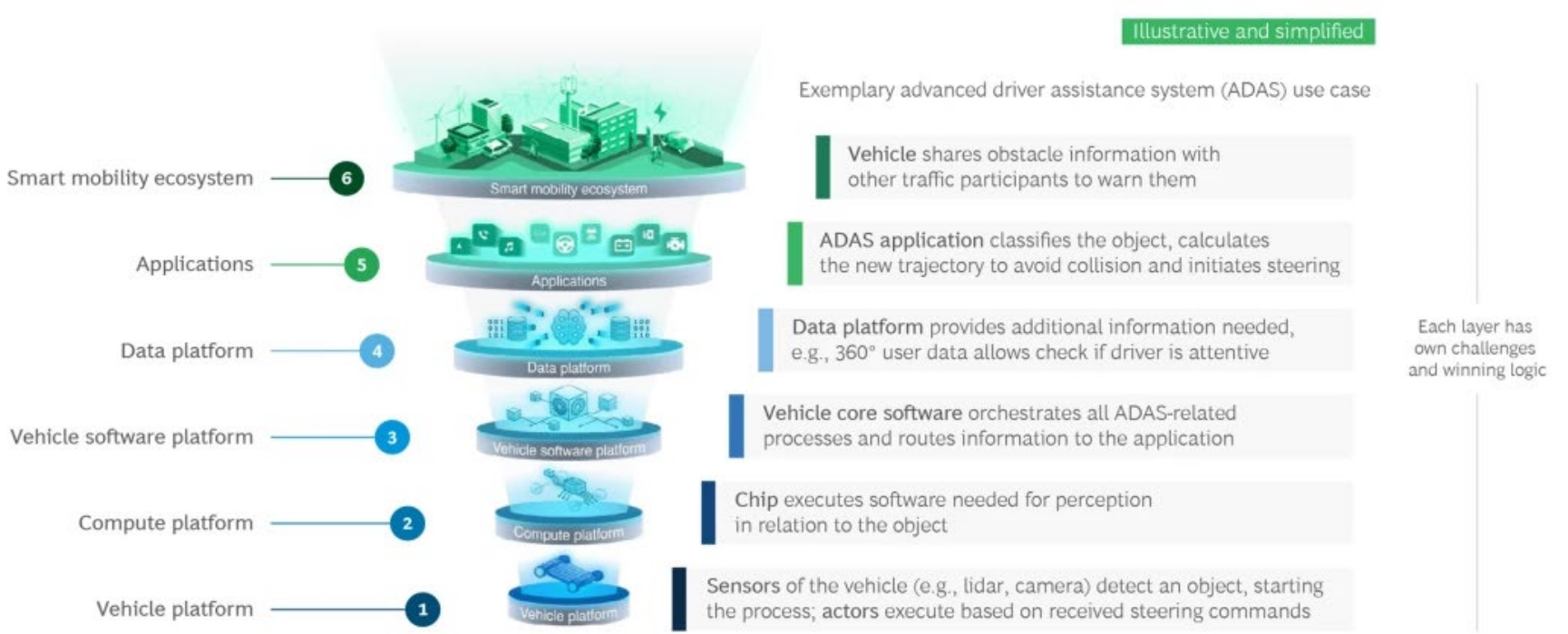
Telematics moves to a central role

4-keys to OEM telematics need:

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

Where to process what





Source: World Economic Forum, BCG analysis.

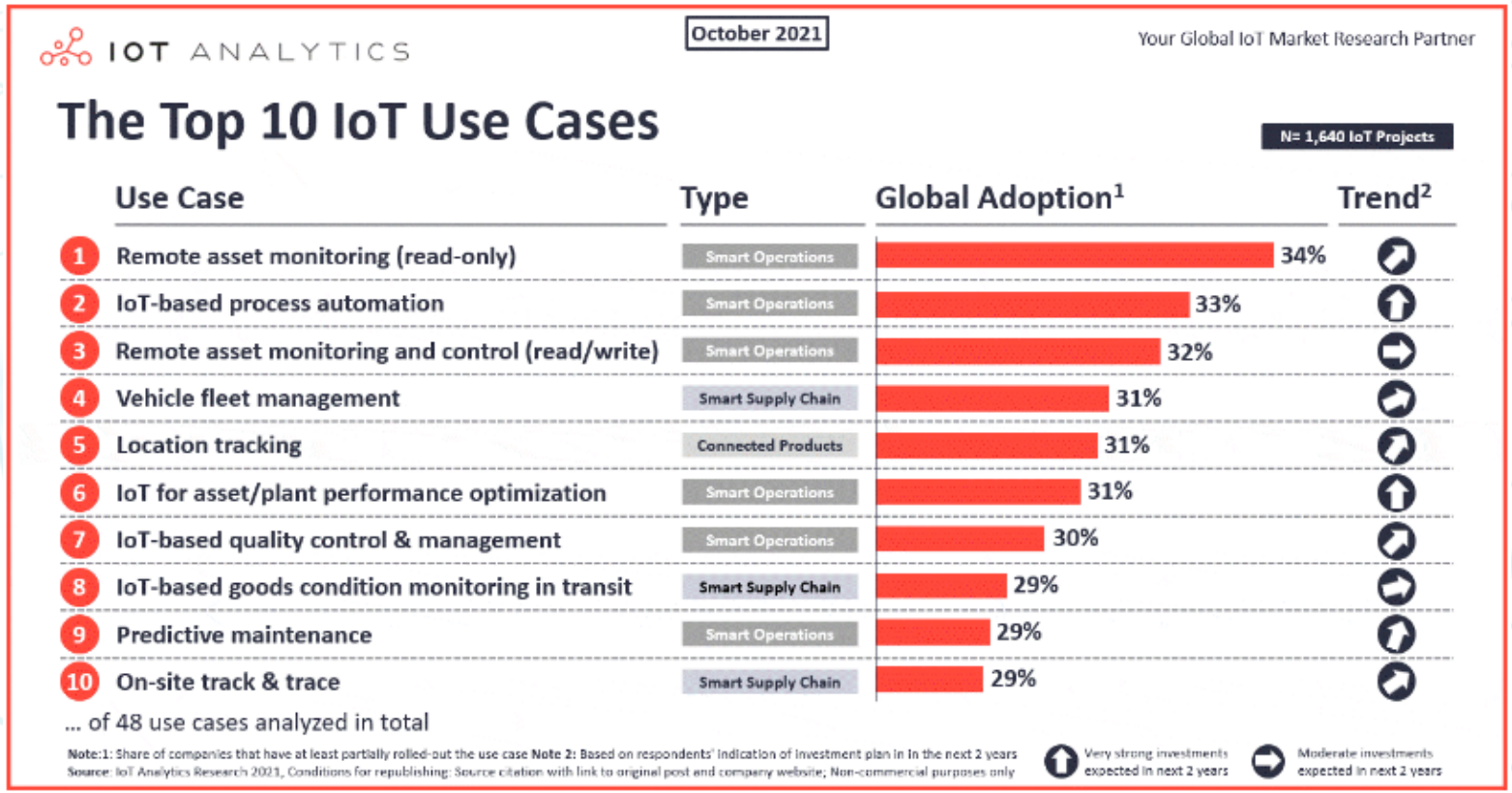
Opportunities of a software defined vehicle

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:

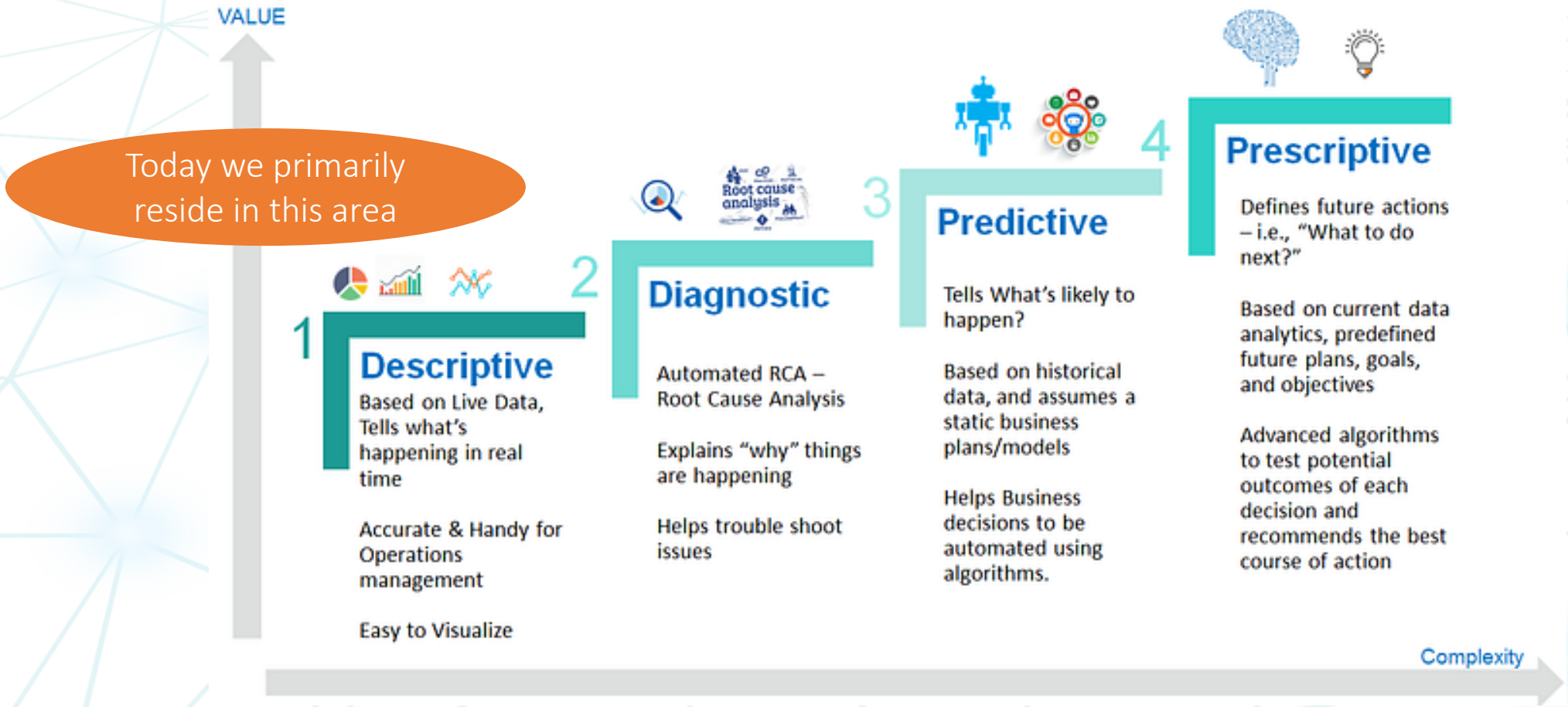
- Tesla highest ranked for customer satisfaction
- 91% customer retention through repeat buyers
- Industry warranty rate of 1.1% vs. a 2.5% automotive industry average

Determining what data matters



Creating an outcome focused framework

Better data may not be better outcomes



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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