



# The Intelligent **Automated Vehicle**: the Last IoT Node

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# Agenda

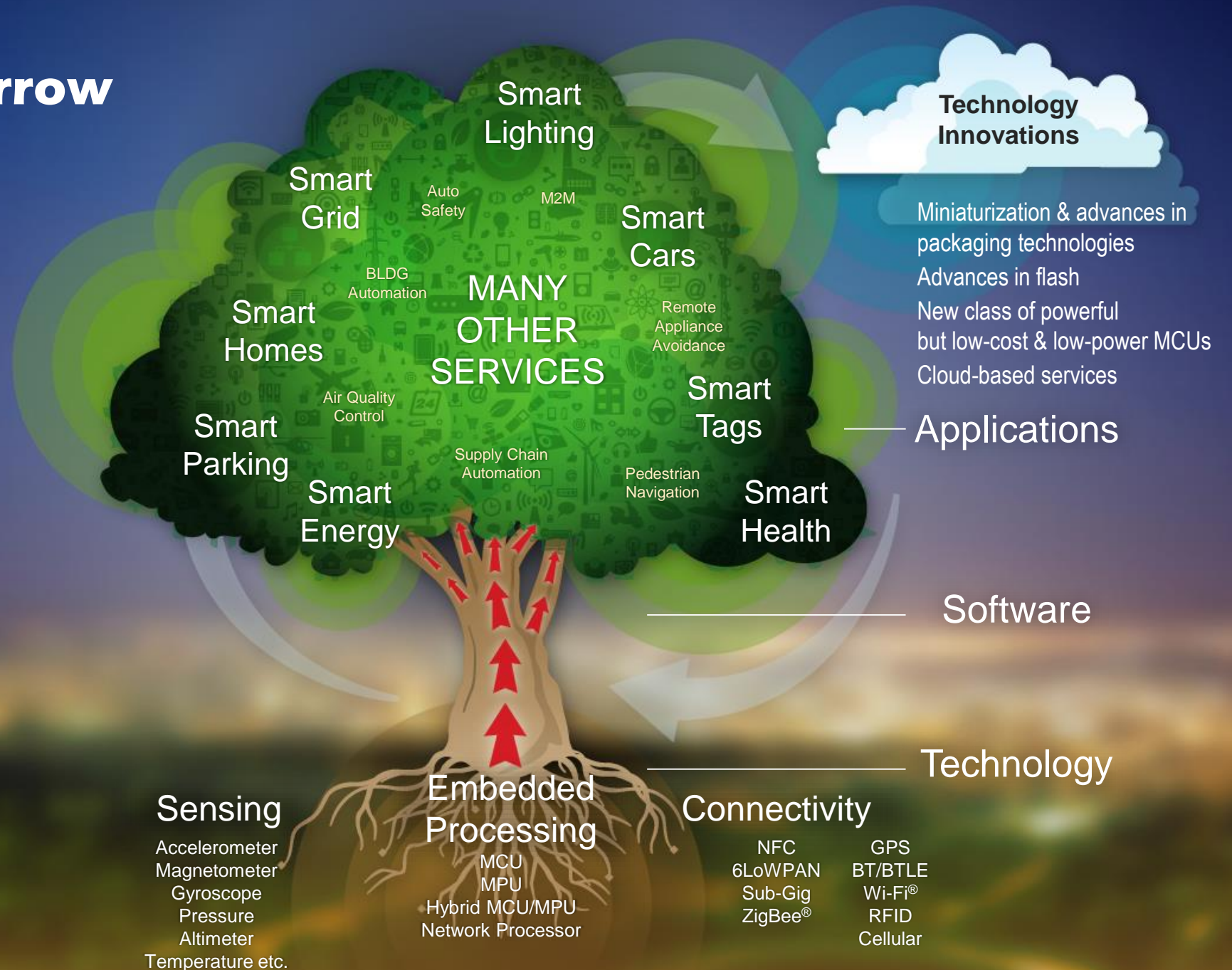


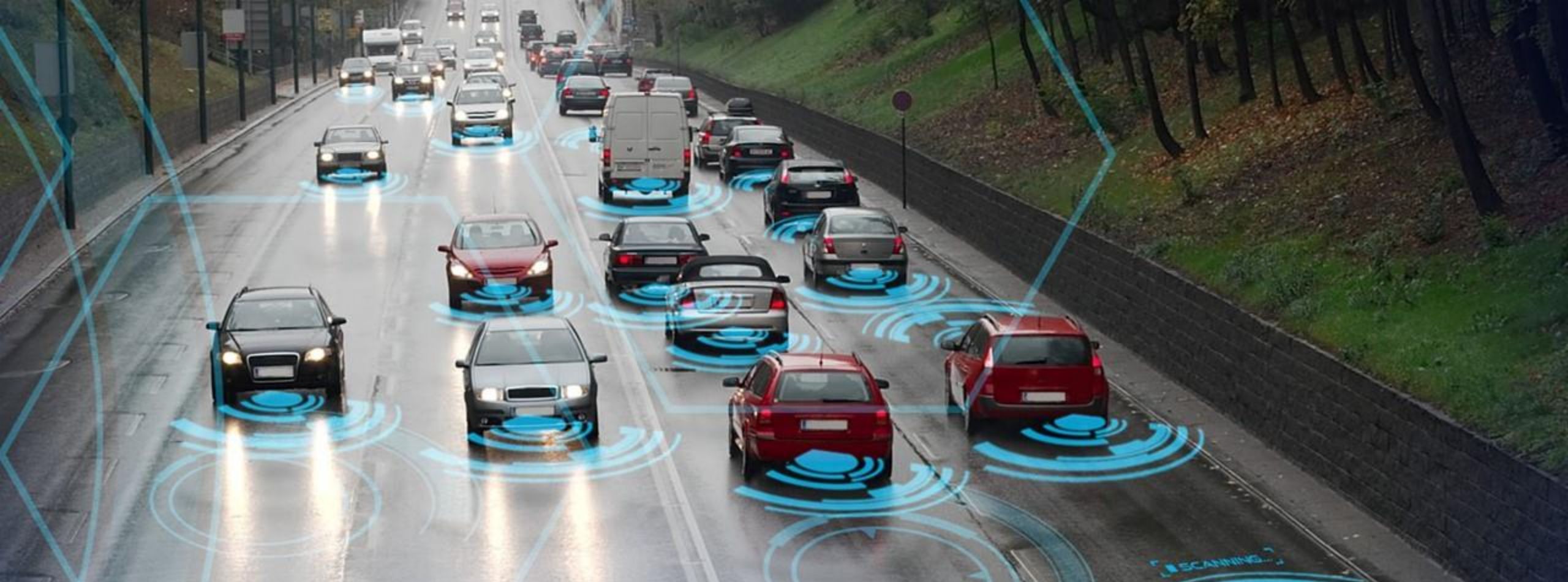
- Autonomous vehicle introduction
- Freescale's contribution to intelligent vehicles

# Internet of Tomorrow

Different Services,  
Different Technologies  
Different Meanings for Everyone

And the Word  
“SMART”  
Is Everywhere!

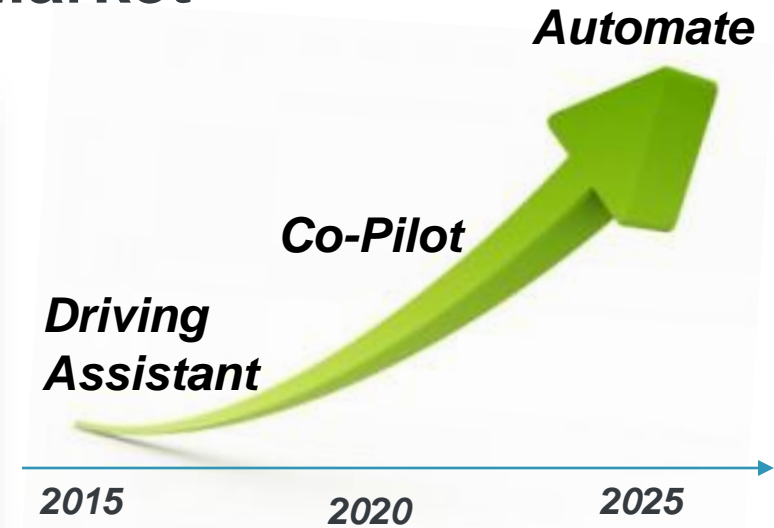
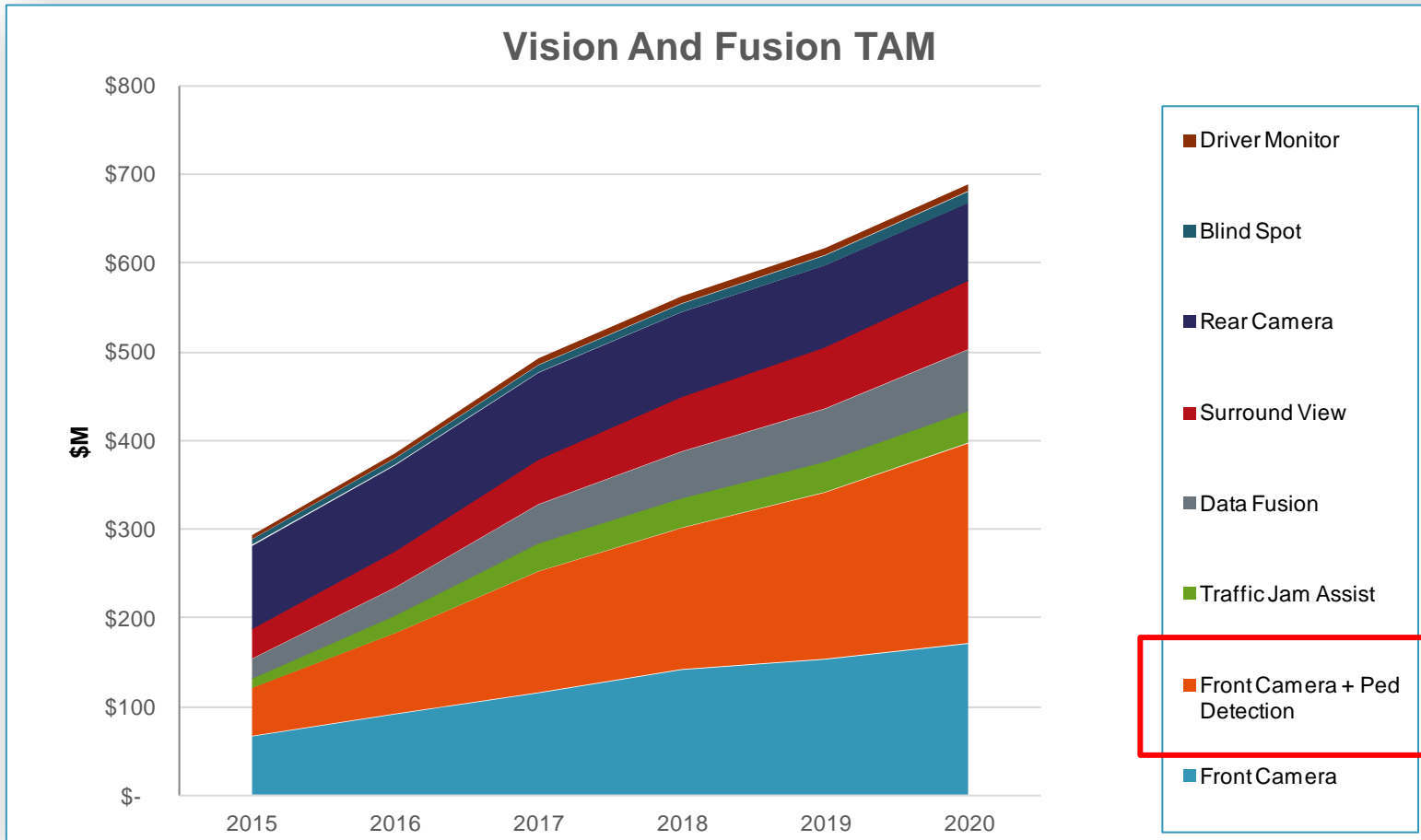




# Advanced Driver Assistance System Applications



# Advanced Driver Assistance Systems – Vision Market



**8.2 million  
autonomous cars  
by 2030**



Market: **20% CAGR**, driven by safety deployment *IHS 2014*

# The “Language” of Autonomous Vehicle

- Sensor
- Driver Active
- Fail Safe

## Assist

- Automatic Cruise Control
- Lane Departure
- Blind Spot Det.
- Road Sign Recognition

- Sensor Fusion & Maps
- Co-Pilot
- Dependable & Reliable

## Automated

- Park Assist
- EBA
- Highway Platoons
- ACC with Steer

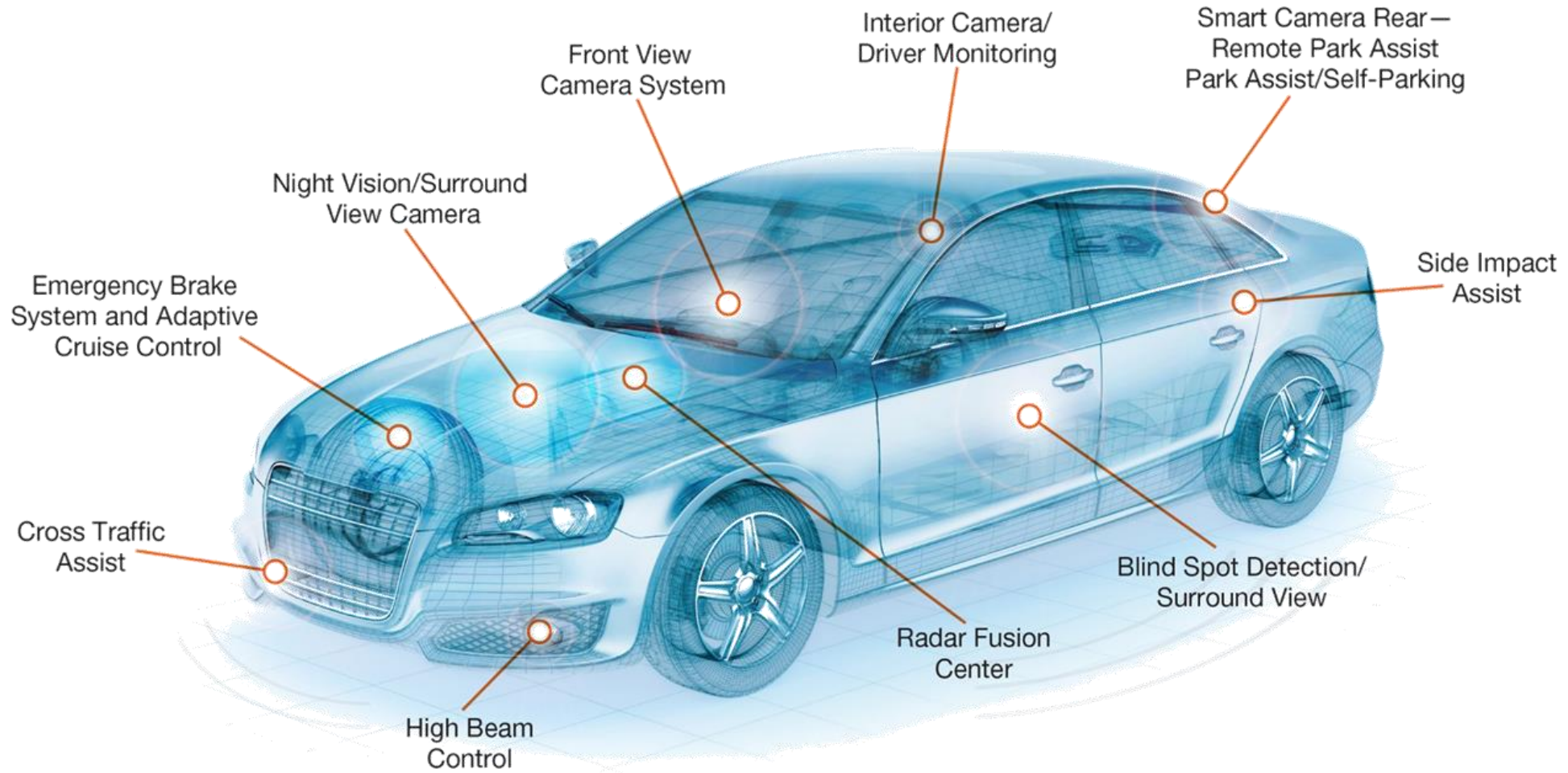
- Sensors & Maps & V2X
- Driverless
- Fail Operational

## Fully Automated

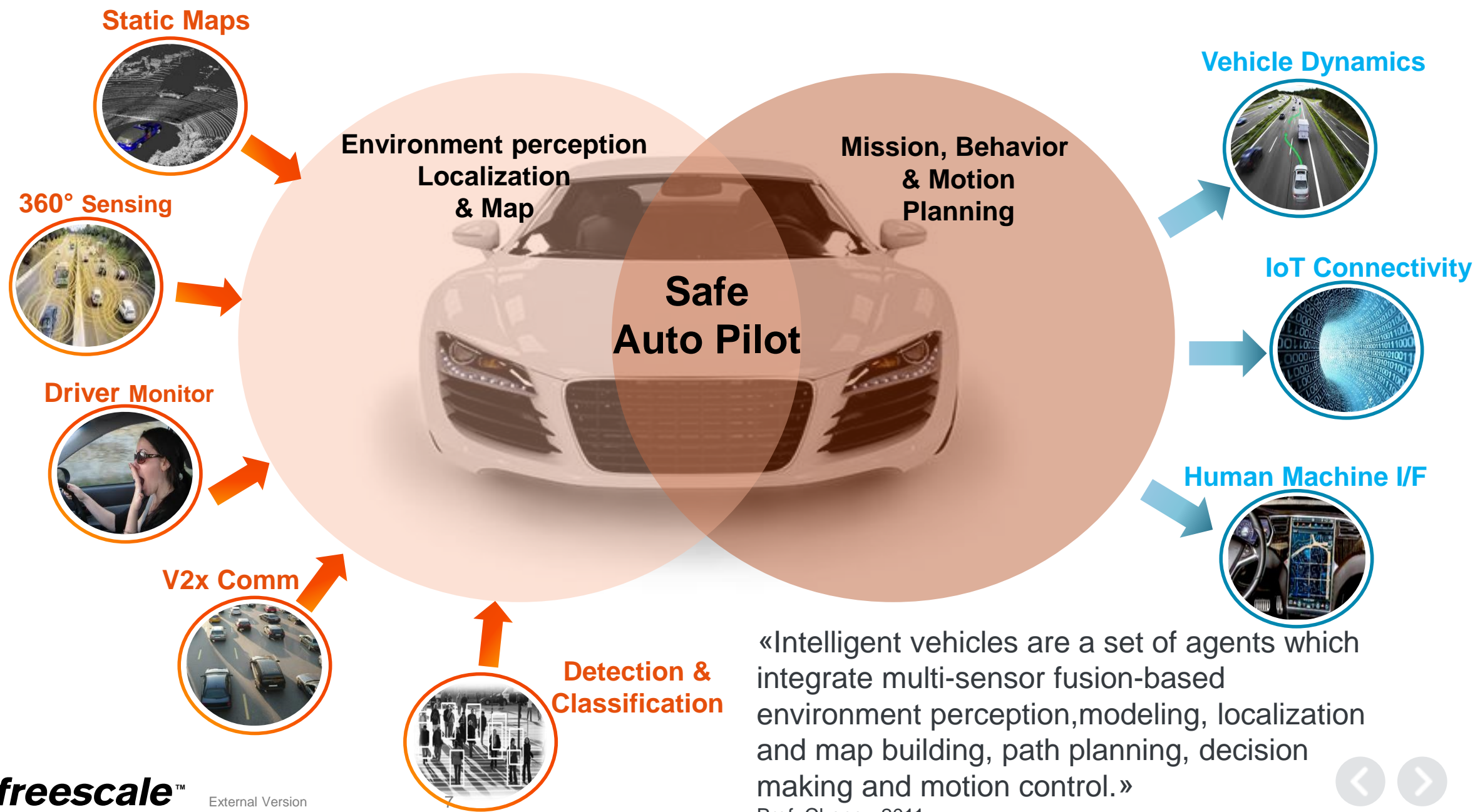
- Commercial Autonomous Vehicles
- (Drones–Big Vehicle)
- Driverless Public Transport
- ACC with Steer

Freescale has a **long history in delivering functional safety and security** for the automotive industry and is designed into **virtually every safe application present in automobiles today**. This puts us in an optimal position to enable deployment of safety and security functions for future car technologies.

# Advanced Driver Assistance System Applications



# Simplified Autonomous Vehicle Model



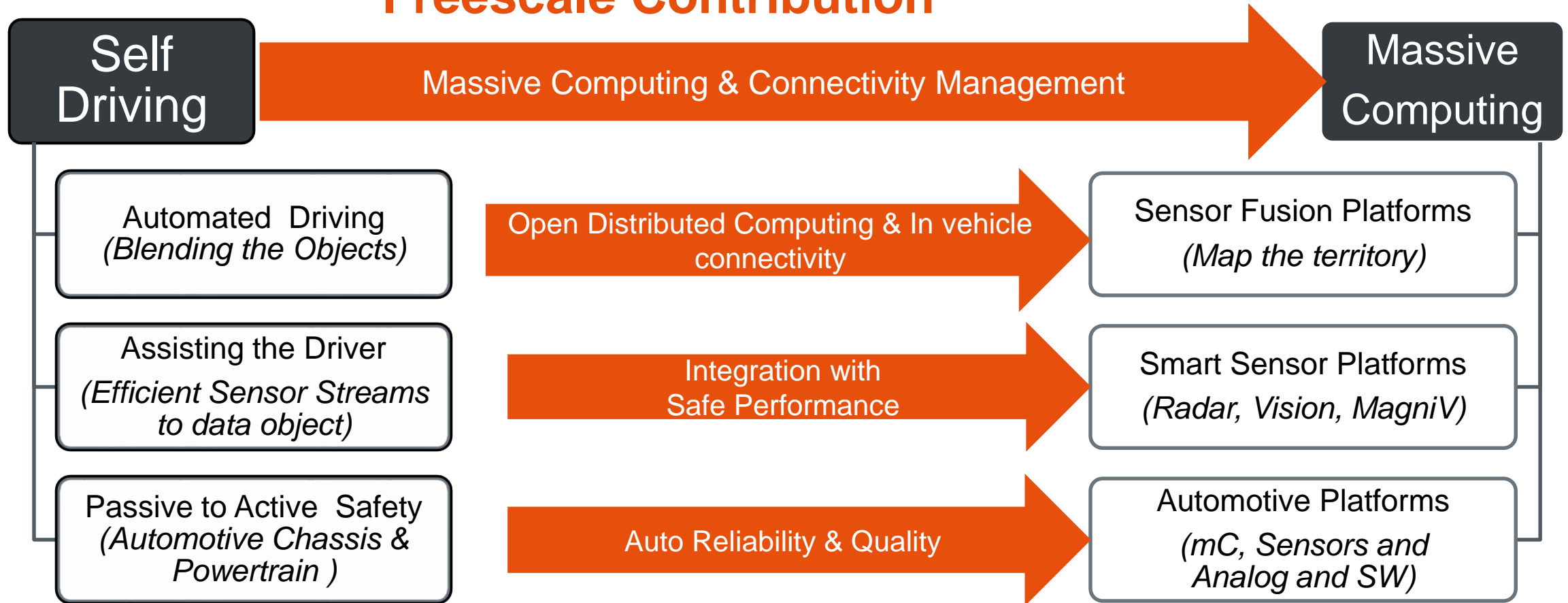
«Intelligent vehicles are a set of agents which integrate multi-sensor fusion-based environment perception, modeling, localization and map building, path planning, decision making and motion control.»

Prof. Cheng - 2011



# Progress Toward Autonomous Vehicle

## Freescale Contribution



**Automotive competence combined with reliable, safe and secure, SW enabled, massive performance**

# Automated Driving – Computing Challenges

*Probabilistic*

*Deterministic*

Automated Drive

Co-Pilot

Collision Avoidance

Self Parking

Lane Keeping

Collision Warning

Sign View

Mission Planning

Behavior Generation

Motion Planning



Sensor processing

Dynamic Actuation

Real time data management

Processing resources need to be dynamically managed to execute **probabilistic** AND **deterministic** functions  
... Within the same vehicle context

# Computing Challenges – FSL Solution

## Super Computing

## Safe Computing

Automated Drive

Co-Pilot

Collision Avoidance

Self Parking



Lane Keeping

Collision Warning

Sign View

**Number Cruncher**

Layerscape

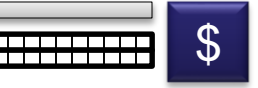



72,000 DMIPS



**Safety Processor**

S32 V200



10,000 DMIPS

- Probabilistic**
1. Analyze Scenario
  2. Make Contextual Decision

- Deterministic**
1. Initiate Safe Measure
  2. Fail Safe / Operational



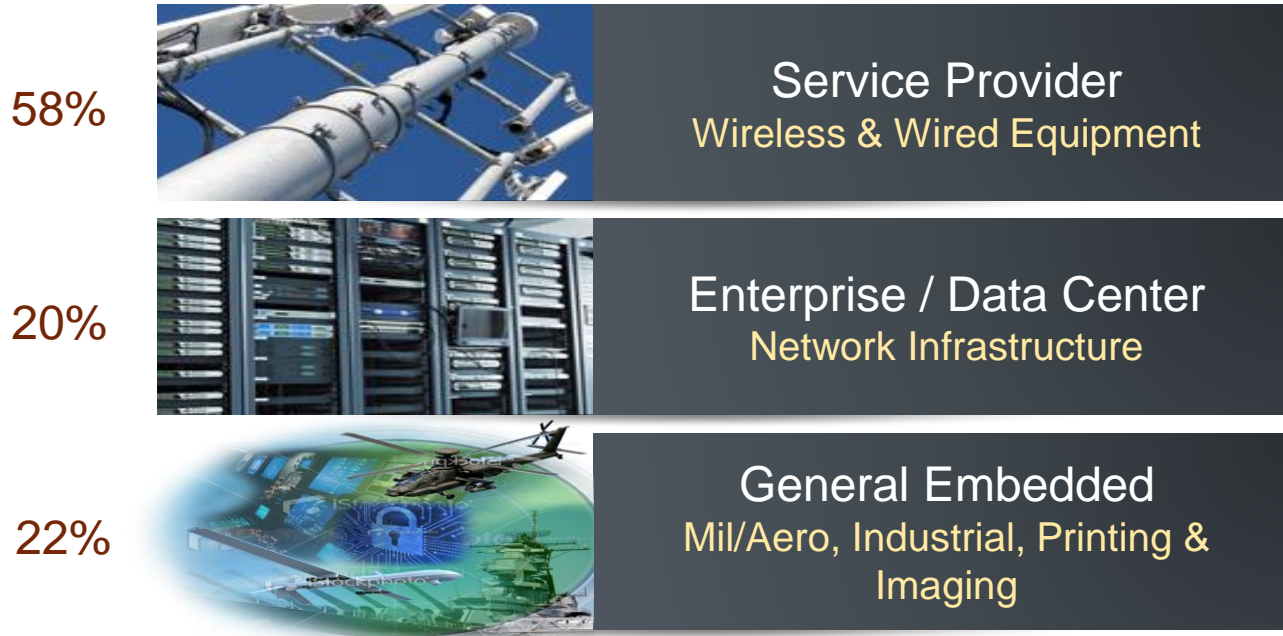
# Freescale High Performance Processors

# Freescale High Performance Processors

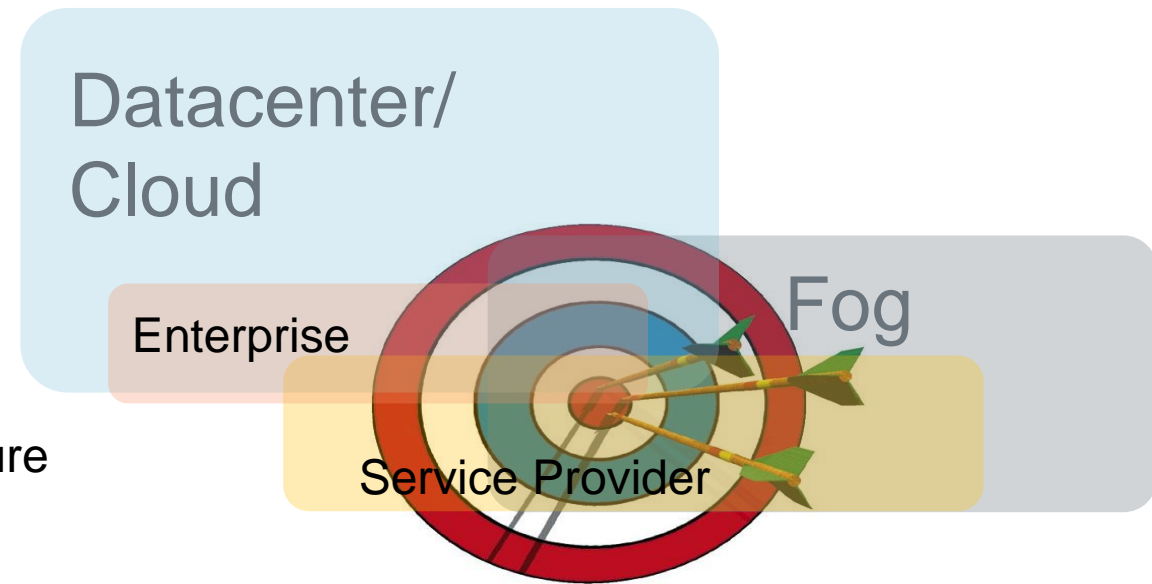
Leadership in Wired/Wireless Communications & Embedded Control

**2013 Revenue \$915M**

2<sup>nd</sup> Largest Business in total Freescale



Freescale Networking processors offer **server class performance** for data centers, and high touch data services in wireless & wireline infrastructure.

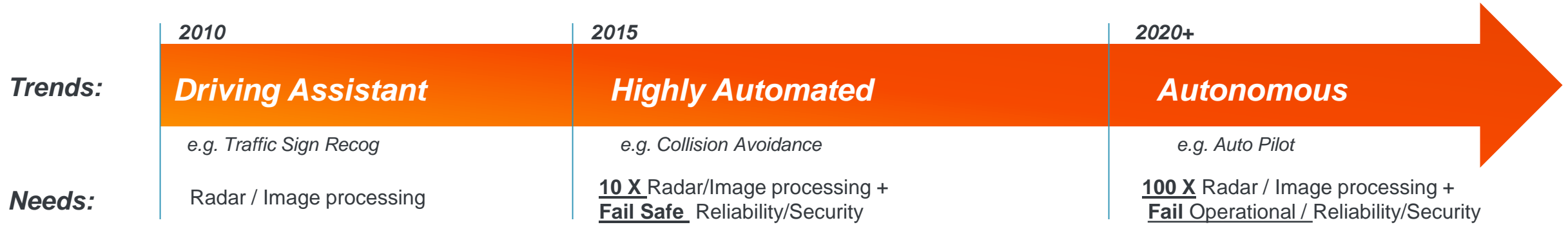


**Fog Computing**; latency sensitive intelligent infrastructure including smart highways.



# Safety Processing for Autonomous Vehicles

# S32V234 – Robust, Efficient, Flexible



## Robust



- Fully targeted at ISO26262
- Reliable, dependable automotive design and integration
- Embedded security

## Efficient



- Intelligent partitioning to reduce cost
- Dedicated Acceleration to improve performance
- Best in class power

## Flexible



- ***Simplify the experience!***
- Flexible, Open programming models
- Supported by off-the-shelf RTOS & tools
- Enabled by 360° EcoSystem

**Freescale Future Ready: Robust, Efficient, Flexible solutions**

# Conclusion



**Cleaner:** ADAS/AV enables **greener**, lighter Autos and best utilization of transportation infrastructure



**Safer:** ADAS/AV **saves** lives! Reduce accident's impact and cost of emergency actions while ensuring communication security. Moving toward zero fatalities



**IoT:** ADAS contributes to enable the vehicle as the most advanced IoT node in everyday life (V2X, V2V)



**Legacy:** Freescale has a legacy of automotive leadership that spans more than four decades: HSM and SHE automotive security standards and first to implement into Silicon

Designed into all critical security systems in cars today  
Leveraging networking (QorIQ) expertise for Connected car emergence







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