



Introduction to **Freescale** **Automotive**

NXP Shanghai, China

Matt Johnson | VP & GM Auto Microcontrollers

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Overview

- Introduction to Freescale Automotive
- Leading Solutions
- Moving forward together



Introduction

- **R Matt Johnson** is the Vice President and General Manager for the Automotive Microcontroller Group at Freescale Semiconductor. He is responsible for the Auto MCU Product Groups and Software Development. In this role, He and his team focus on delivering innovative and leading MPU and MCU solutions across a wide range of automotive applications.
- Matt joined Freescale in 2014 coming from the Mobile industry where he held different leadership roles most recently as Senior Vice President and General Manager of the Mobile Business Unit and company IC Technology Development at Fairchild Semiconductor. Matt has more than 15 years of industry experience and a Bachelor of Electrical Engineering Technology from University of Maine as well as Executive Programs at Harvard Business School and Stanford.
- <https://www.linkedin.com/pub/matt-johnson/7/281/347>

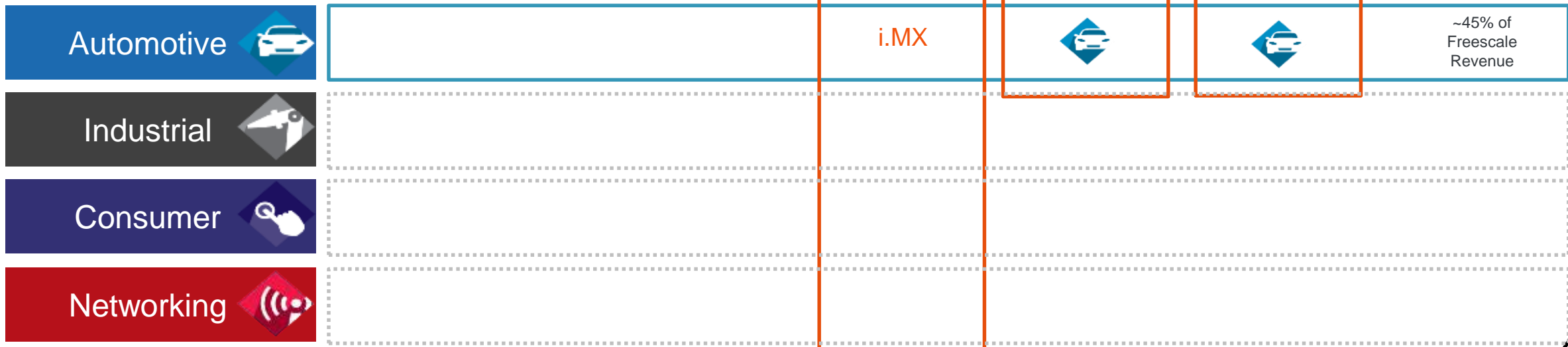


Freescale Automotive

Five Core Product Groups



Four Primary Markets



Automotive Mega Trends



Efficient Travel

>60% WW Oil
Consumption
from
transportation

Gov't efficiency
and consumption
mandates



Safer Travel

1.2M Automotive
Casualties per
year WW

50M Automotive
Injuries per year
WW



Connected Travel

80% of new
vehicles will be
'connected' in the
next decade

10-150 connected
MCU per vehicle

Did you know?

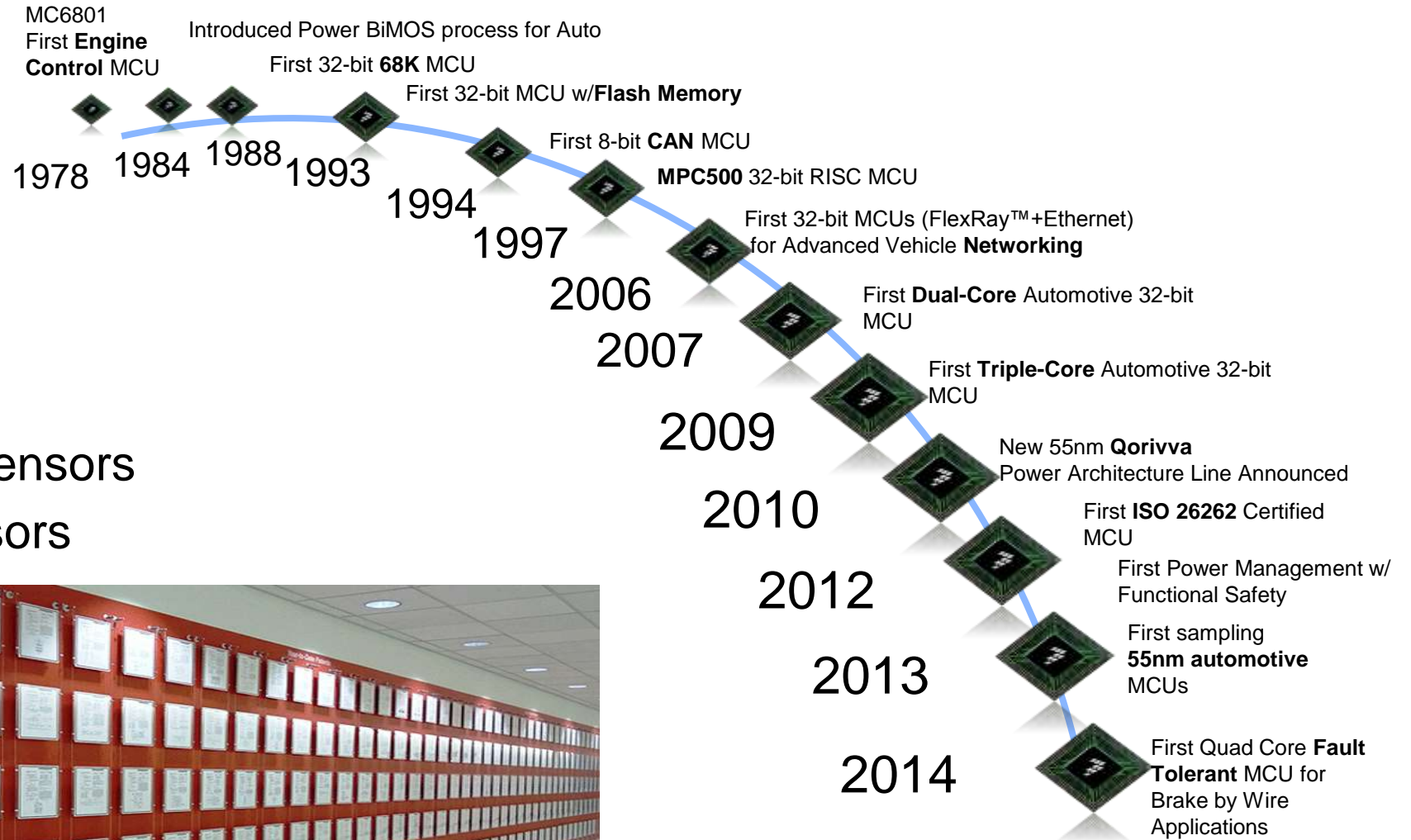
- 90% of Automotive innovations are enabled by electronic content...
- 30% of vehicle cost is electronics....Moving to >50%.
- There are more Software Lines of Code in a new high end car than any other product you can buy...
- 5 of the top 15 R&D companies in the world are Automotive OEMs...
- Vehicle sales are increasing... AND IC content is increasing.
- Together, we are going to be the largest Automotive IC Supplier in the world...
- We are in the right place at the right time...!

Freescalé Leading Automotive Solutions



Freescale Automotive Leadership

- #1 in Radar
- #1 in Gateway
- #1 in Integrated Solutions
- #1 in 16-bit
- #1 in Custom Braking
- #1 in China
- #1 in Safety Analog and Sensors
- # 1 in Merchant Auto Sensors



#1 Automotive Semiconductor Supplier in China

- Strong portfolio address market trends – safer, greener, mobility and secured connectivity.

Vendors	2014(\$M)
Freescale	330
STM	305
NXP	252
Renesas	245
Infineon	240
Toshiba	80
On Semi	70
Fairchild	67
ADI	60
Microchip	53
Fujitsu	45
TI	40
ATMEL	35

* Source Q1 2015, IHS.



- Deeply rooted in China market

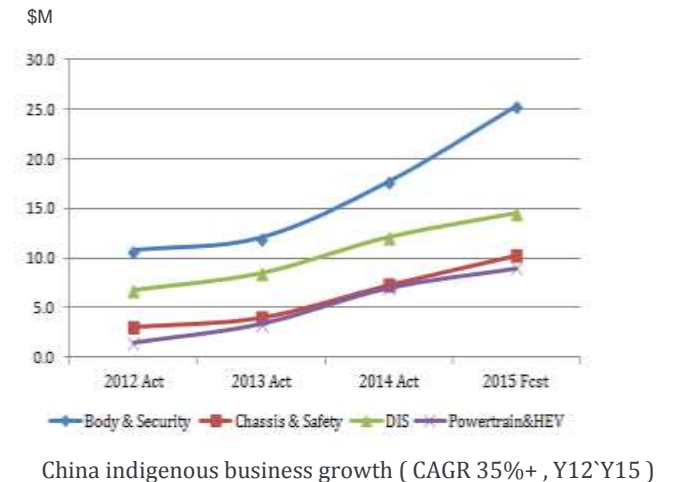
- 5 joint labs with Car OEMs (DF, CA, FAW, BAIC and Chery)
- Engagement with TOP tier1s, e.g. BYD (90% marketshare)

- Enablement and tools

- Market oriented low cost EVB and Compiler
- PMSM and BLDC motor control Ref kit and s/w library
- S/W stack for Ethernet camera, ADAS application algorithm
- BMS reference design

- Award

- “China BEST automotive field application support team” by Global Sources and EE Times, 2014



Analog for Automotive Safety

Tire Pressure Monitoring Module

- Small 7x7 mm system footprint
- Low power consumption
- Accurate measurement over wide range



#1 Analog and Sensors for Automotive Safety

ADAS 77 GHz Radar

- Scalable packaged 77 GHz radar ICs
- Radar processor with optimized API
- Next generation, high integration ICs



Braking ESC and ABS

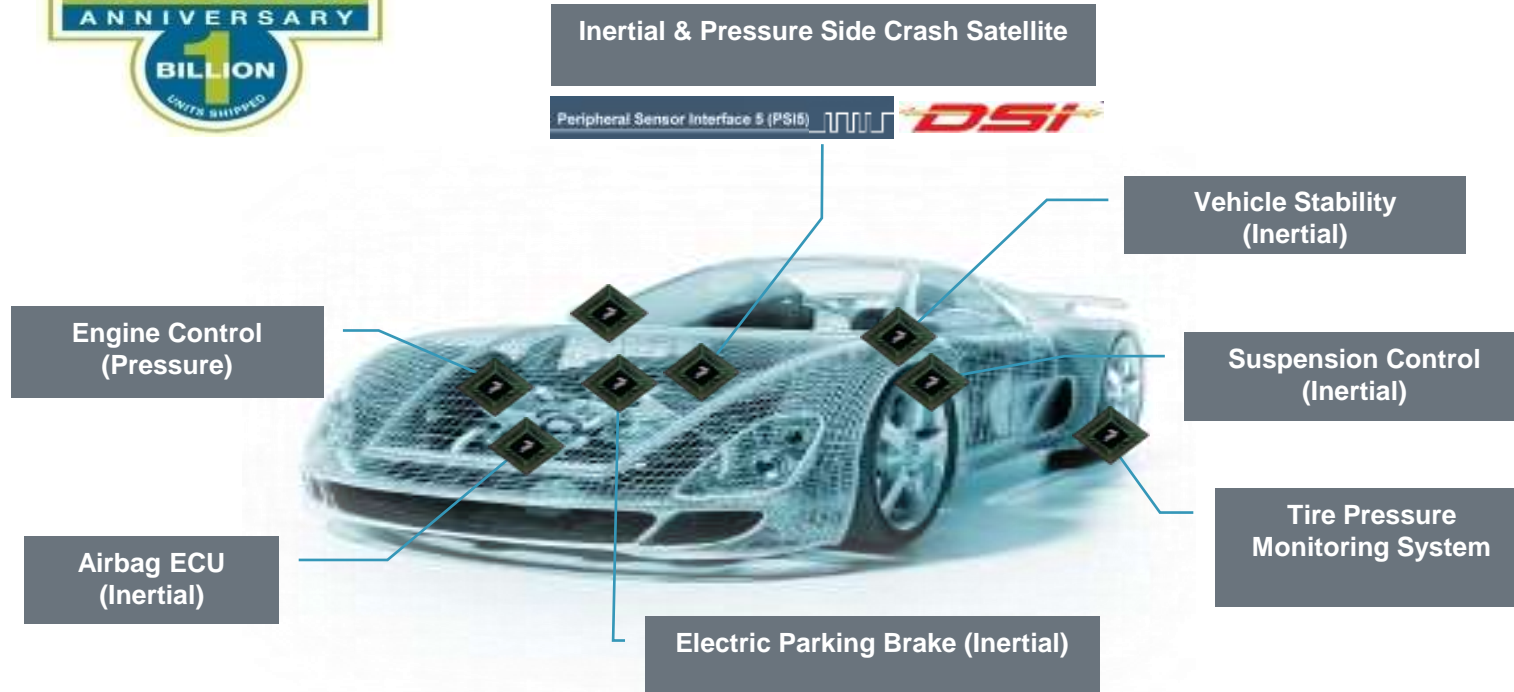
- Precision valve control
- Advanced motor drive



Airbag solutions

- High integration, including PMU and sensor interface
- Accelerometers, satellite crash sensors and pressure
- Leadership in both DSI and PSI standards

#1 Merchant MEMs for Auto MEMS Sensors for Automotive



Business Facts

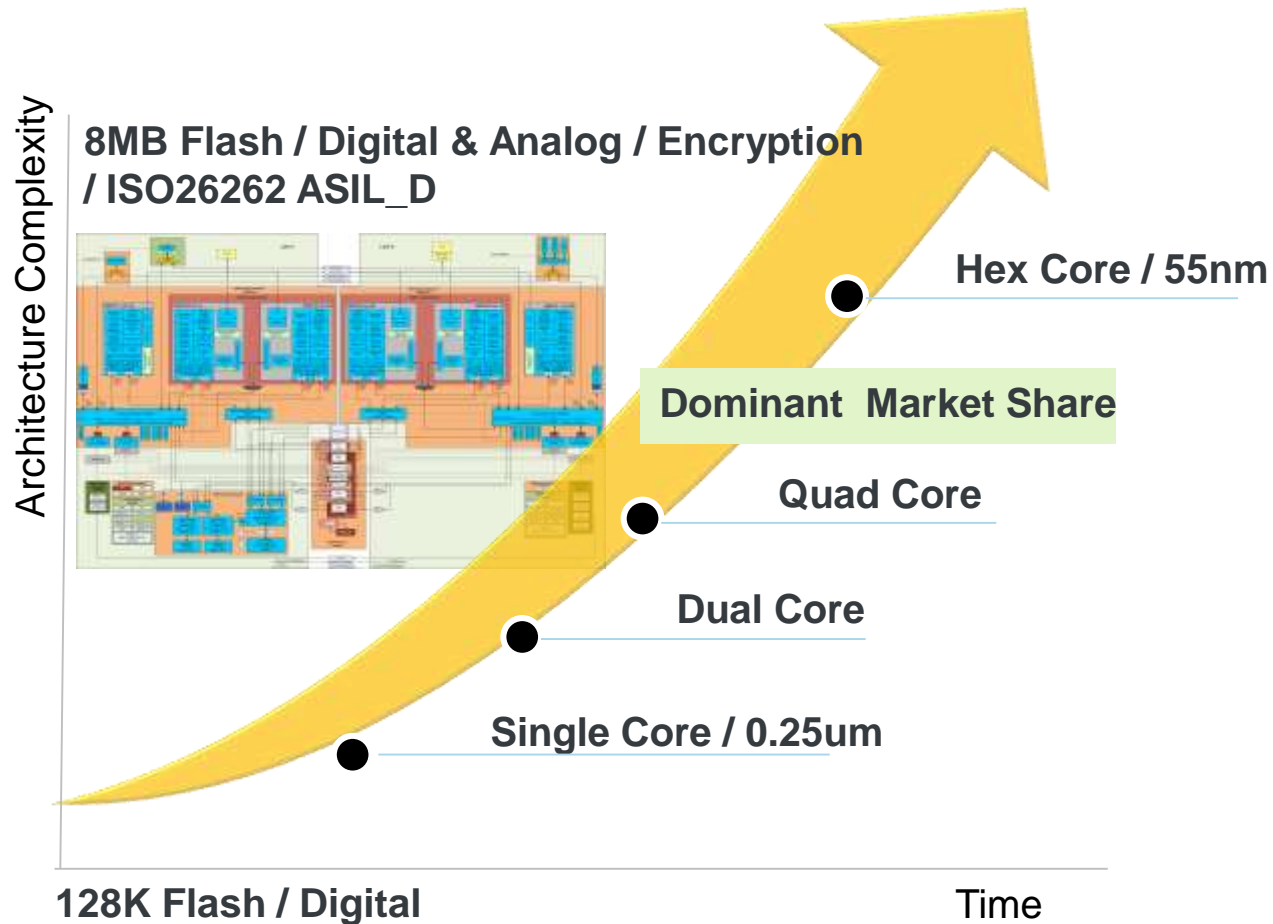
- Shipped more than 1 billion sensors
- Shipped **500 million acceleration sensors** in custom safety automotive applications
- Leading supplier of **barometric pressure sensors** for engine management

* Source: iSuppli

20 Jun 2013

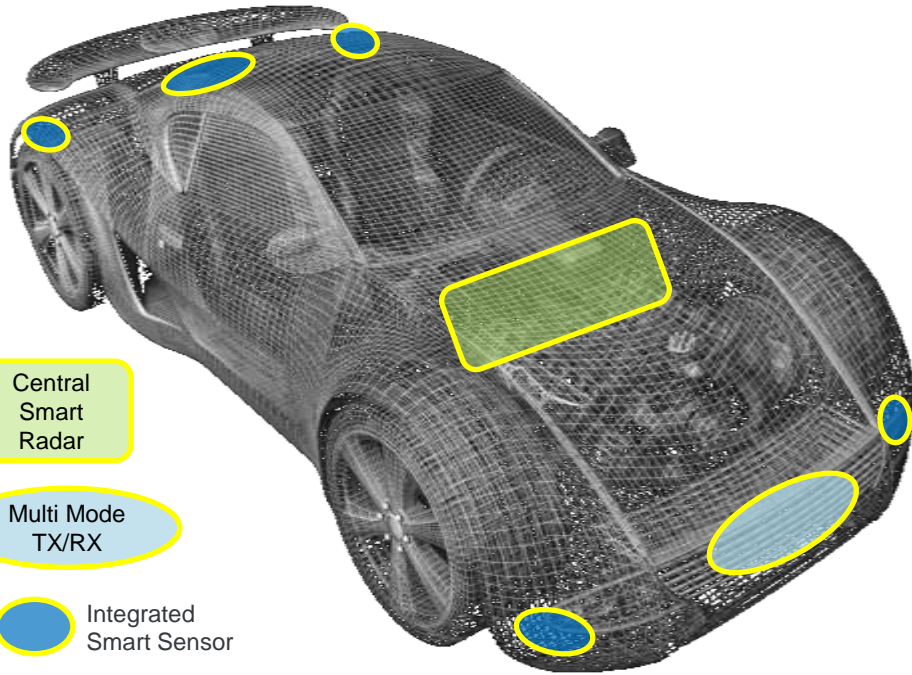


#1 in Custom Braking



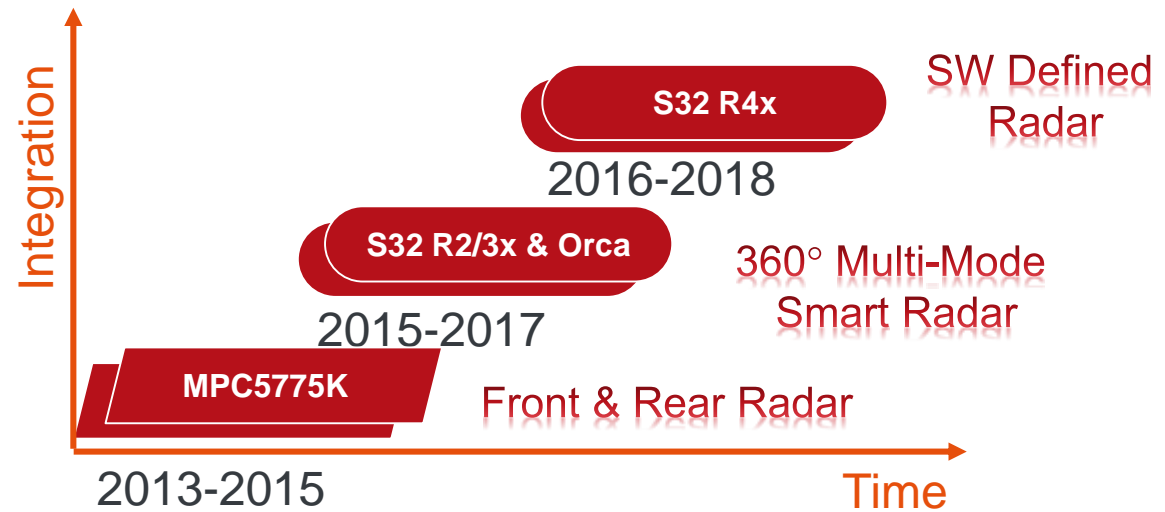
- >500M lifetime Custom Braking devices shipped
- 90% of braking ECU Functionality undertaken by FSL Si.
- Dual Core Lock Step Safety Architecture – 10 years ahead of Market
- Partnership with FSL delivers a Multi-Year TTM advantage
- “Fail operation” (recovery/availability) in production now

#1 Radar SoC Provider



- Central Smart Radar
- Multi Mode TX/RX
- Integrated Smart Sensor

- Four generations of **Digitalization** ⇒ Smart integration
 - **Simplified** Radar Processing ⇒ SW Defined Radar
 - Highest **Safety & Security** ⇒ ASIL-D and SHE assured
 - Small **Size and Scalable** ⇒ Rfcmos computing
- One SW Platform from Smart Sensors to Fusion Unit**



ADAS Vision and Fusion Processors

Assisted Driving



Co-pilot Driving



Automated Driving



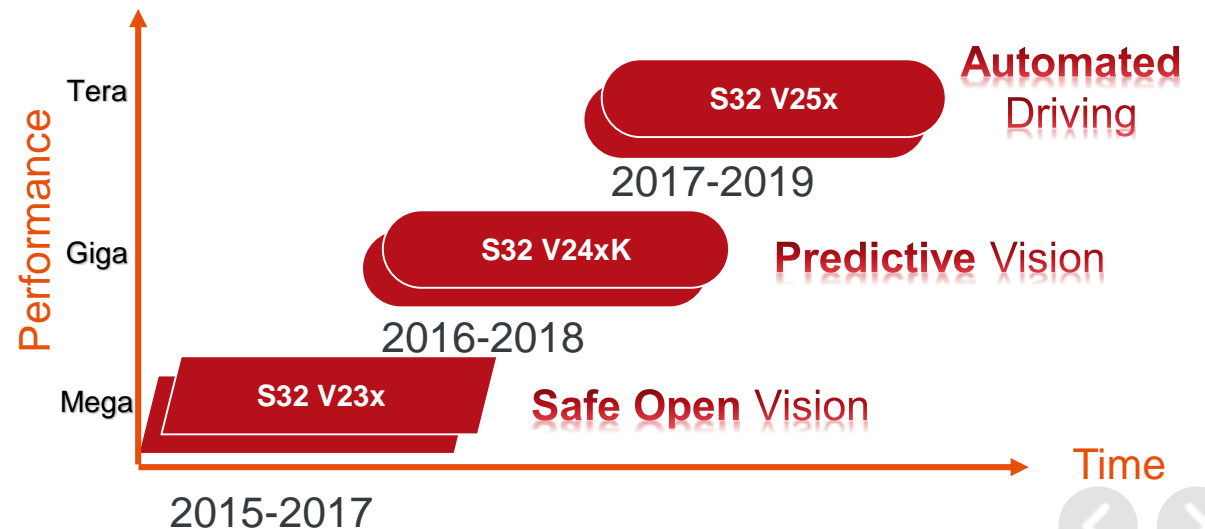
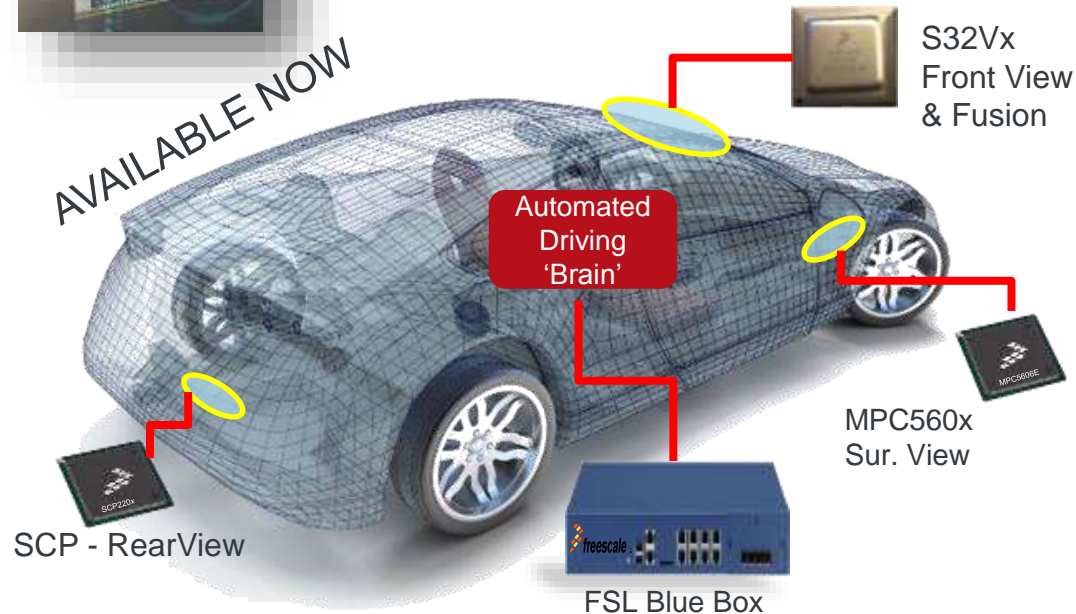
- μ C Families with **true automotive reliability**
- High **Performance/Power**, and True **Safety**
- **Guaranteed Security** and Connected Network
- **Ecosystem** of SW and Tools (mCAL-Linux-Safe OS)

Safe, Secure, and Reliable

1st Ethernet Camera mC & Embedded Integrated Ethernet PHY

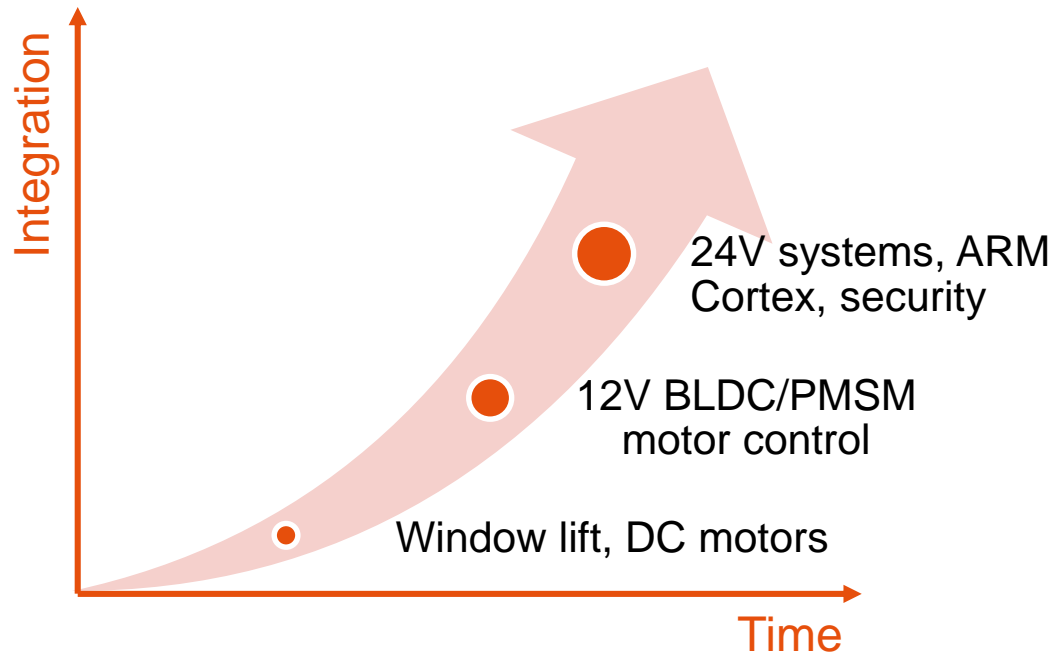
1st True Asil-B HW only «Vision» Platform

AVAILABLE NOW



#1 in Integrated Solutions - MagniV

- Saves 20% PCB/module size
- Improves manufacturing efficiency
- Simplifies system design



Single Chip Integration of MCU + HV Analog



Driving Vehicle Electrification

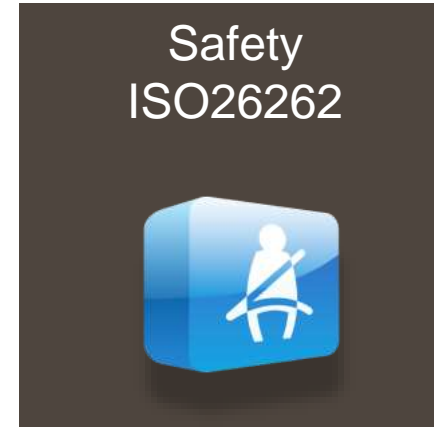
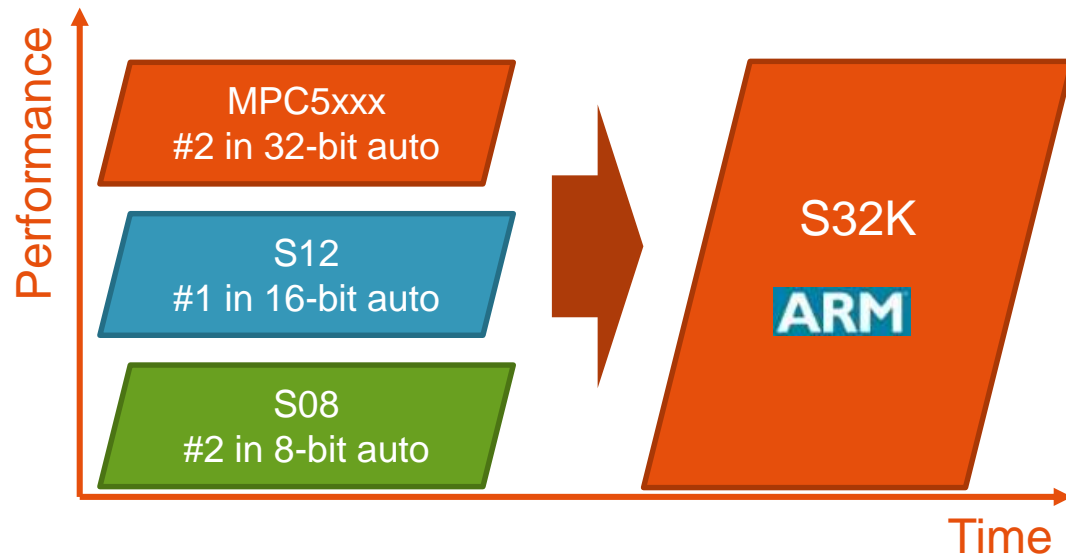


Enabling Miniaturization



Driving for #1 in General Purpose Automotive 32-bit

- First Auto MCU designed for SW engineers
- Reducing time-to-market by months and quarters
- Moving to ARM Cortex architecture
- Future-proofing through superior performance and advanced feature set

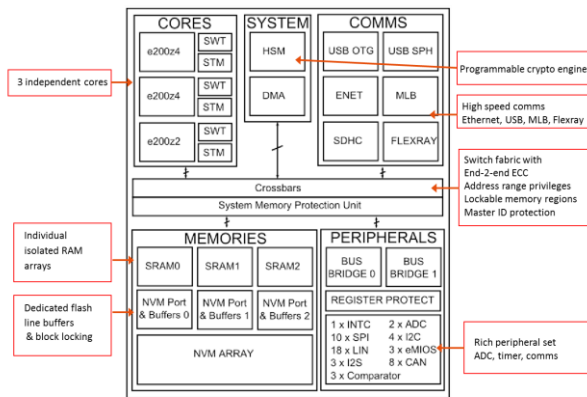


#1 in Secure Vehicle Gateways

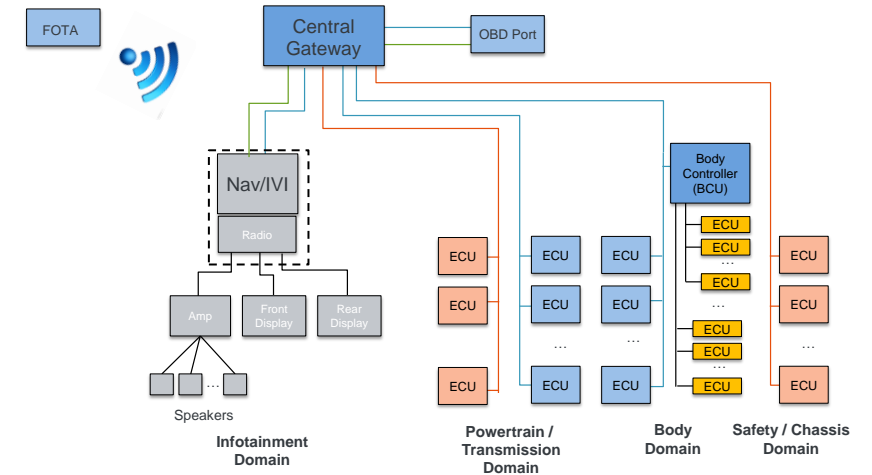
Freescal History

- Developed first **secured ENET based Gateway Processor** with BMW in mid 2000's
- Drove **HSM** and **SHE** automotive security standards with European OEM's
- **First to implement SHE security**, First to production launch HSM security
- **First to implement SHE on Flashless device** (S32V234 for ADAS)

MPC5748G Today's leading Secure Gateway Solution being developed with all the Premium European OEM's



S32G New **ARM Cortex** based solutions in development to cope with all the future market challenges



- **30-50 ECUs per average car**
- **Top end cars have**
 - 150 ECUs
 - 150 network connections
 - >5 km copper wire (>60 kg)
 - 100 motors
 - 500 LEDs
 - >5 cameras



Fiat Chrysler recalls 1.5M cars after hack revelations



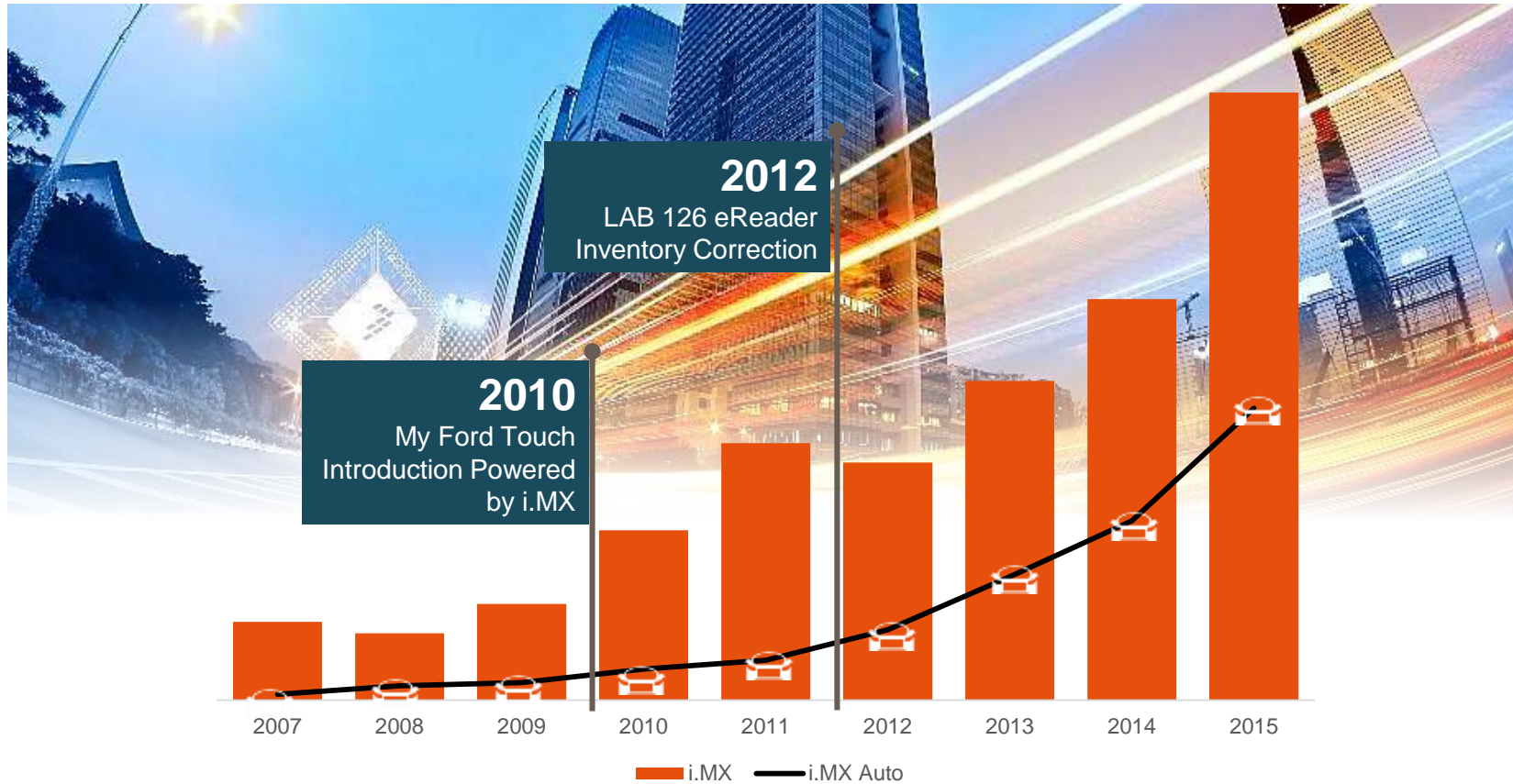
Car-hacking: A New Fear For Drivers of Tech-Loaded Vehicles



Automakers don't protect you enough from car hackers, senator says



i.MX Driving Growth in Automotive & Smart Devices



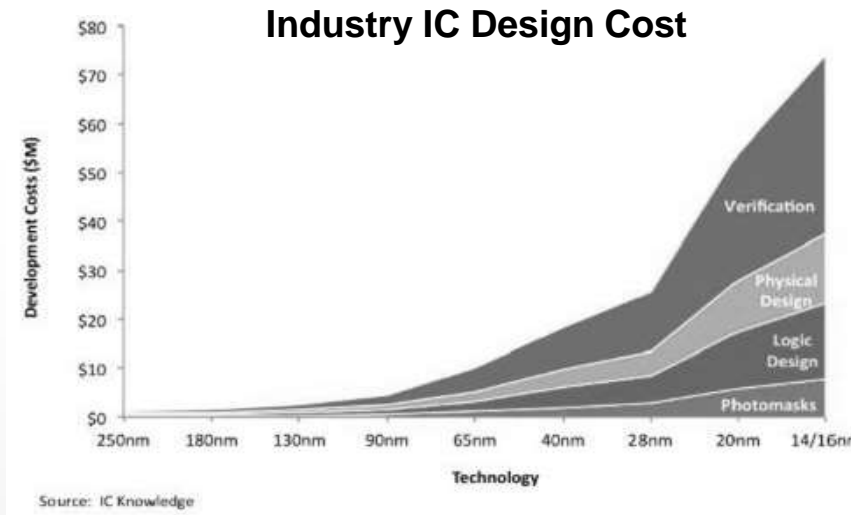
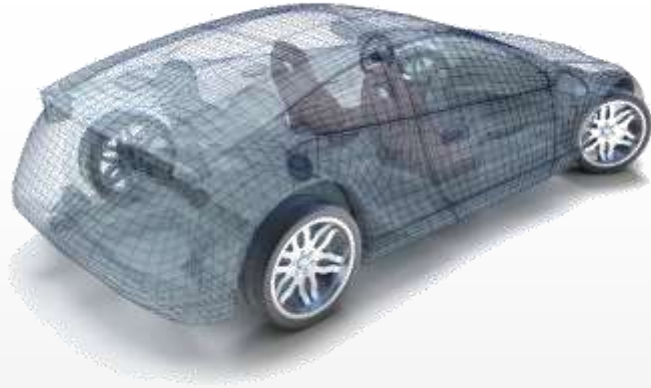
Over **200M i.MX** SOC's shipped to date
Over **35M vehicles** enabled with i.MX since 2007
#1 in eReaders, #1 in Auto Infotainment ASSP

- **Scalability**
 - CPU (single/dual/quad, asymmetric), GPU, IO
 - Software: Linux, Android, QNX, RTOS
 - Industry Leading Ecosystem and Partnerships
- **Integration**
 - Automotive/Industrial/Consumer peripheral sets
 - Qualifications: AEC-Q100, JEDEC Industrial and Consumer
- **Ease of Adoption**
 - Communities, Innovation, Support
 - Design Collateral, Distribution
 - System Solutions: SoC, Sensors, PMIC, IoT Comms, SBC

Moving Forward

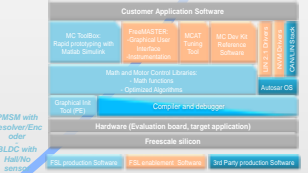


Making an Auto Micro

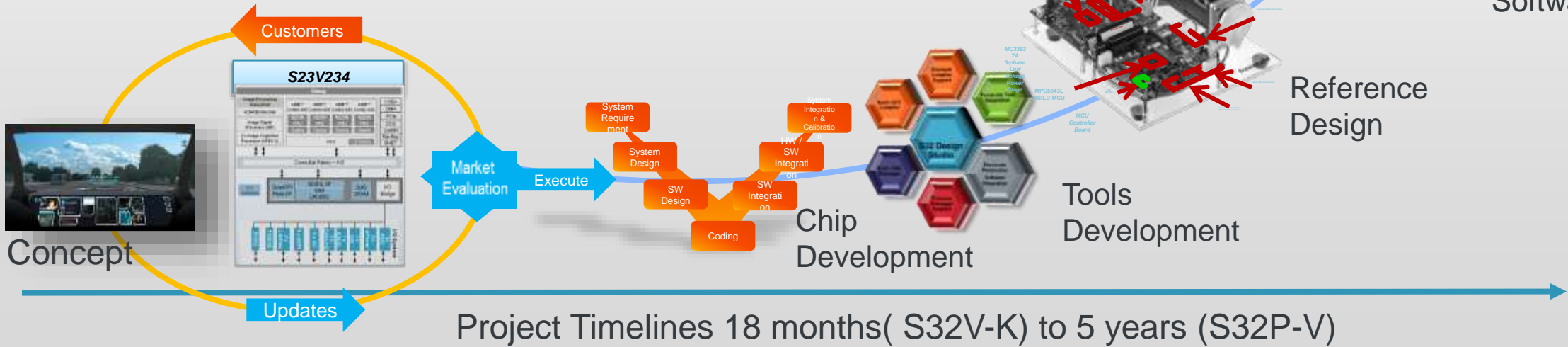


MPU-Apps Proc.
 Hi Performance **Emb. MCU**
 Integrated **MagniV** and **S32K**

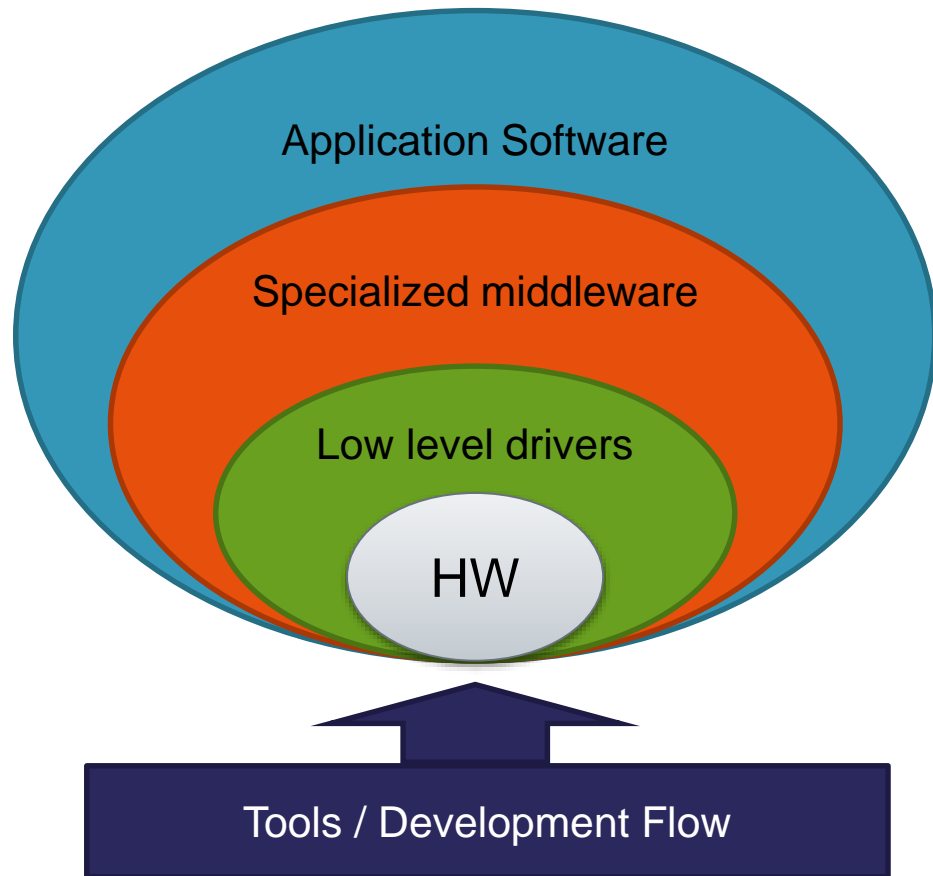
S32V **\$30-50M** (1+ Ghz, Quad Cores ASILB)
S32P-C **\$10-20M** (300 Mhz, Multi Core 8MByte, ASILD)
S32V-K **\$2M-\$5M** (120MHz, 512K, ASILB)



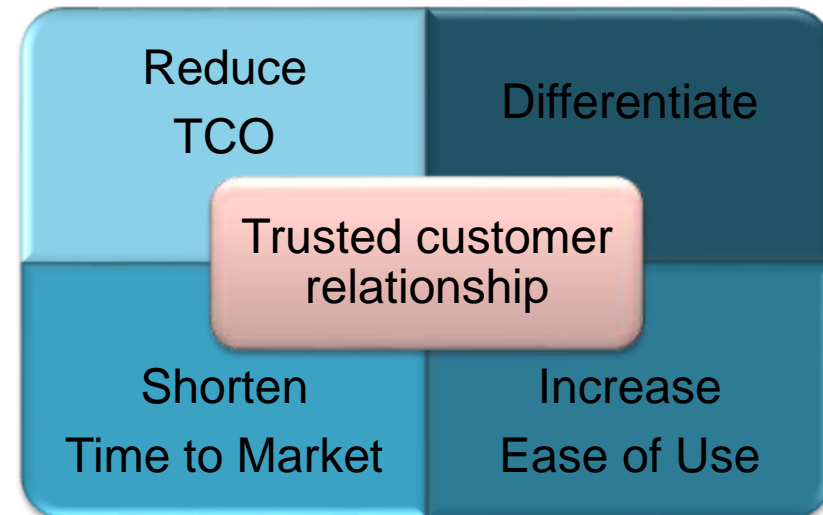
Applications Software



Automotive Tools and Software – Critical.



- Tools & SW are the #1 decision criteria for our customers
- Software is where our customers spend the most time in development.
- We are a solution provider (SW and Si)



Automotive Software – Products, Enablement, Tools & Services



ADAS

- Ethernet Camera Solution
- Vision Processing SW
- Vision Processing SDK
- Toolbox for MATLAB
- Graphics Software
- Linux BSP



Gateway

- Ethernet Audio/Video Solution
- Fast Path Router
- USB Stack
- SDHC Stack



GPIS

- S32 Design Studio
- S32 SDK w/ freeRTOS
- Math & Motor Control Library
- Motor Control Toolbox for MATLAB



VDS

- Braking SW
- eTPU Libraries



i.MX Infotainment

- Audio / Video Solution
- Multimedia Middleware
- Codecs
- Graphics Software
- Elektrobit Guide HMI Dev. Kit
- Linux BSP
- Android BSP

Cross Segments

- AutoSAR MCAL & Operating System
- Functional Safety Libraries & Software
- Core & Peripheral Self Test Software
- MultiCore Communication Software
- Linux BSP
- Android BSP



- CodeWarrior Development Studio
- Initialization Tools, RAppID
- Header files
- Compiler / Debugger support
- eNVM Drivers
- LIN Stack

Professional Services



Complementary Products

NXP CONNECTS THE CAR - SMART RECEPTION & SENSING



Freescale Solutions

Vehicle Dynamics Processing

4th Generation Radar System

Smart Camera, Vision, Fusion Processing

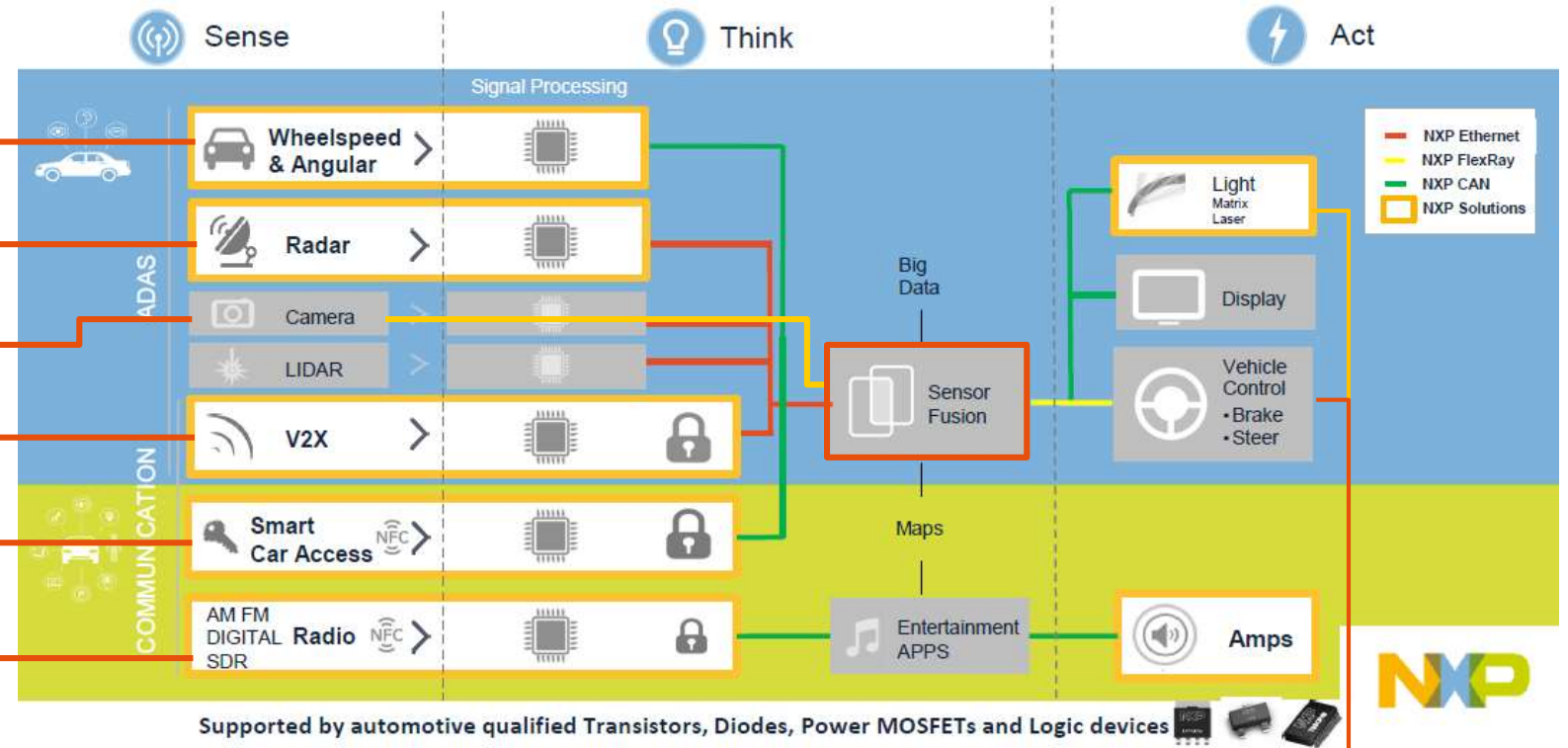
Gateway Central Controller

General Purpose Body, S32K

Applications Processors, SDR solutions

MagniV MCU + Actuator: Value-Add Integration >10 nodes per vehicle

App Specific Middleware: Automotive Grade Software





Events



Summary

- We have multiple strong leadership positions in Auto
- There is a major market evolution occurring in Auto driven by megatrends
- Electronics are the key enabler and together we are the WW leader!
- This is new and exciting territory... We are at the right place and right time to make history.
- We need to work together to truly make $1 + 1 = 3$ (or more)
- Extremely excited for Day 1 and beyond!





www.Freescale.com