

Driving Automotive Safety

Opportunities and Challenges



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Vice President,
R&D and Strategic Planning,
General Motors Corporation

Tremendous Growth Potential

Universal Aspiration

Personal Freedom

Autonomy

Accessibility



By 2020:



1.1 billion vehicles

15% ownership rate

The Global Picture

- 1.2 million killed
- 50 million injured
- Road fatalities projected to double by 2020, from 1998 level

Source: World Health Organization and World Bank, "The World Report on Road Traffic Injury Prevention" – World Health Day 2004

Motor Vehicle Safety: The "Haddon Matrix" of Influencing Factors

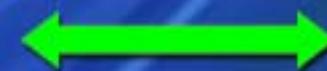
Crash Contributors

	Driver	Environment	Vehicle
Pre-Crash	✓	✓	✓
Crash Event	✓	✓	✓
Post-Crash	✓	✓	✓

Event Timing

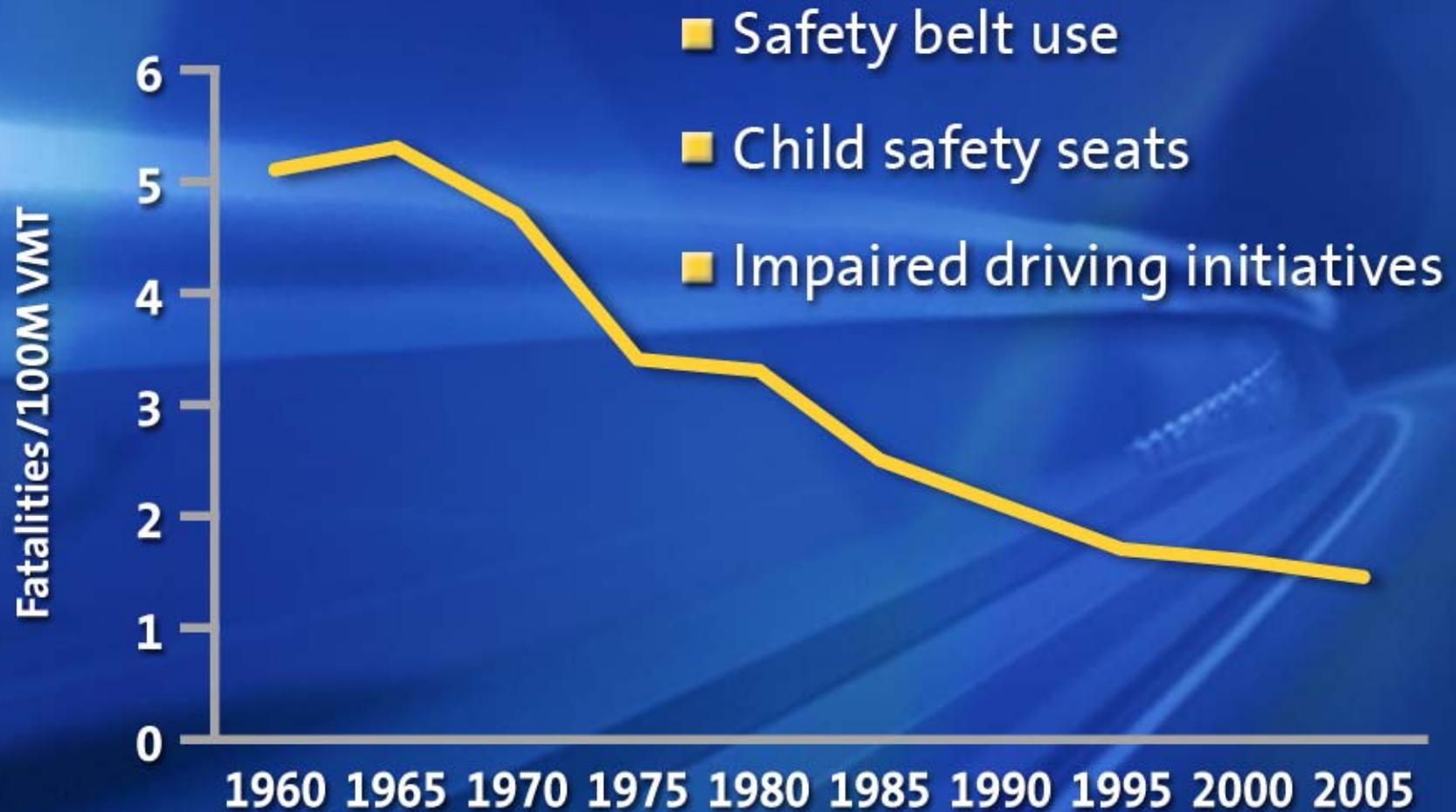


Policy
Related



Product
Related

U.S. Fatality Rate per 100M VMT



Source: U.S. DOT, National Transportation Statistics 2005

GM Continuous Safety

BEFORE



Daytime Running Lamps

STABILITRAK



Electronic Stability Control System

DURING

Vehicle Structure



Systems to Help Absorb Energy of "2nd Collision"

AFTER



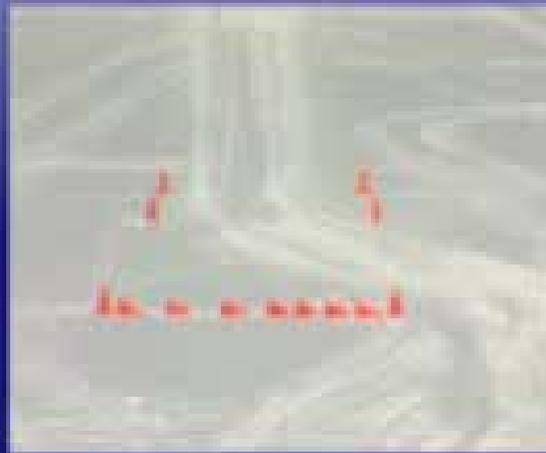
Post-Crash Occupant Protection

GM's Lane Departure Warning System and Side Blind Zone Alert System



Electronic Stability Control

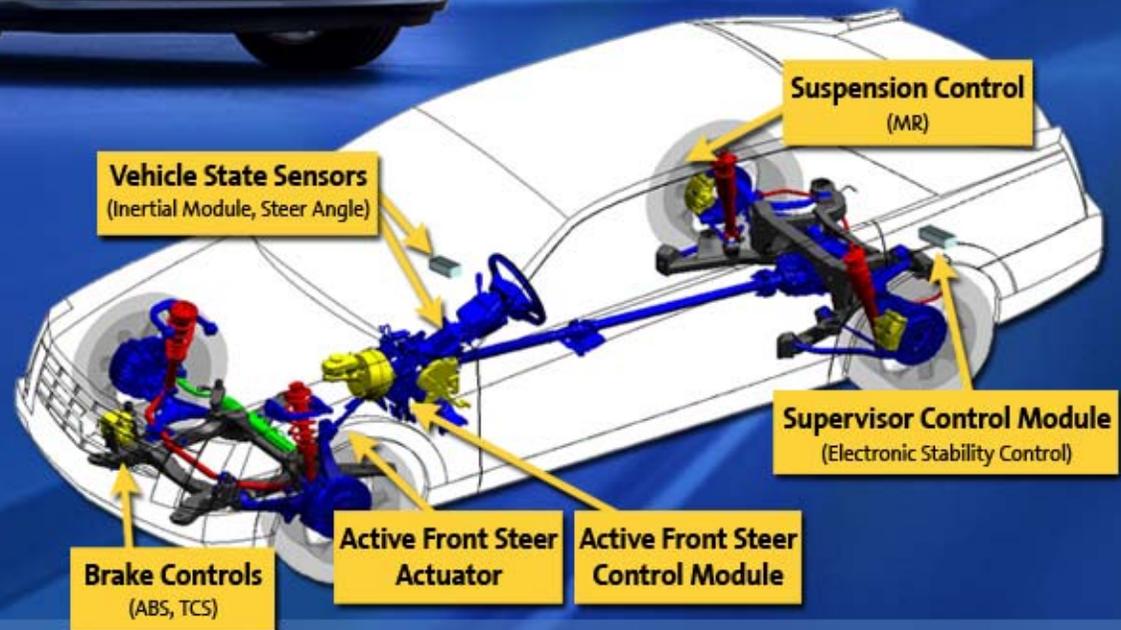
StabiliTrak
ON



StabiliTrak
OFF

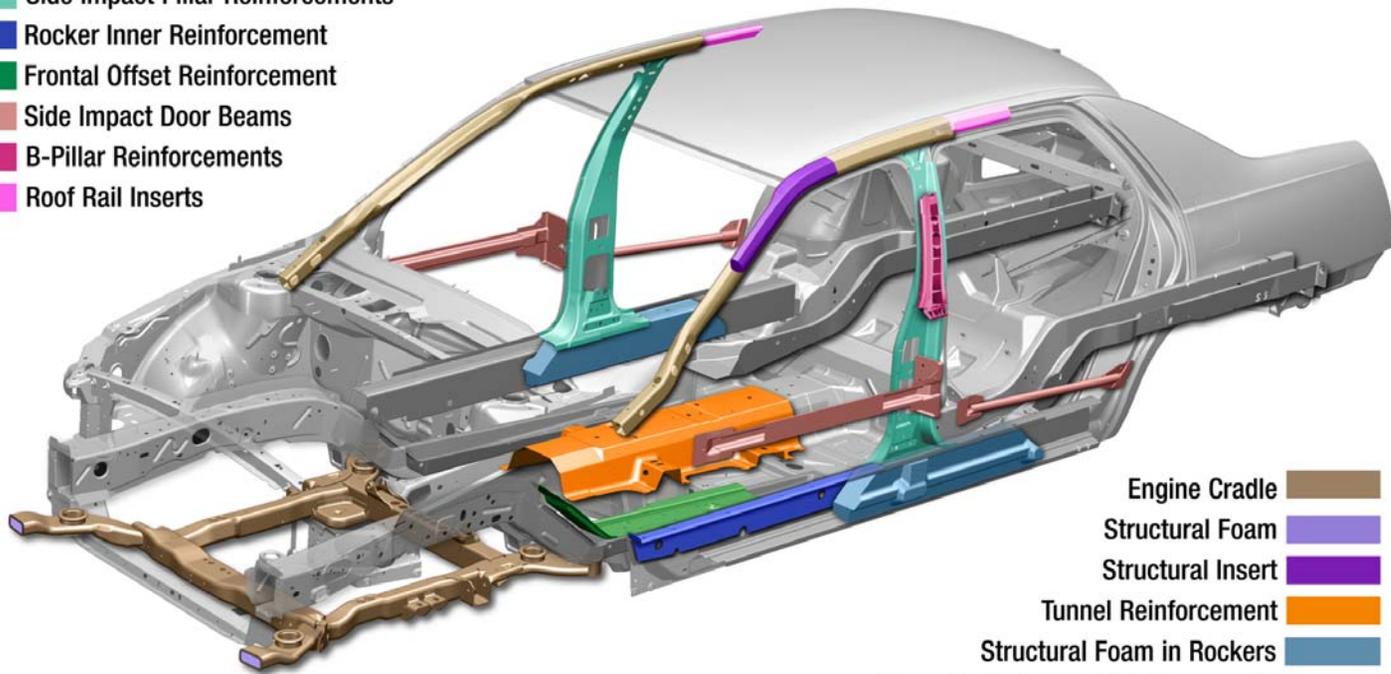


StabiliTrak 3.0



STRUCTURAL SAFETY ENHANCEMENTS

- Side Impact Pillar Reinforcements
- Rocker Inner Reinforcement
- Frontal Offset Reinforcement
- Side Impact Door Beams
- B-Pillar Reinforcements
- Roof Rail Inserts

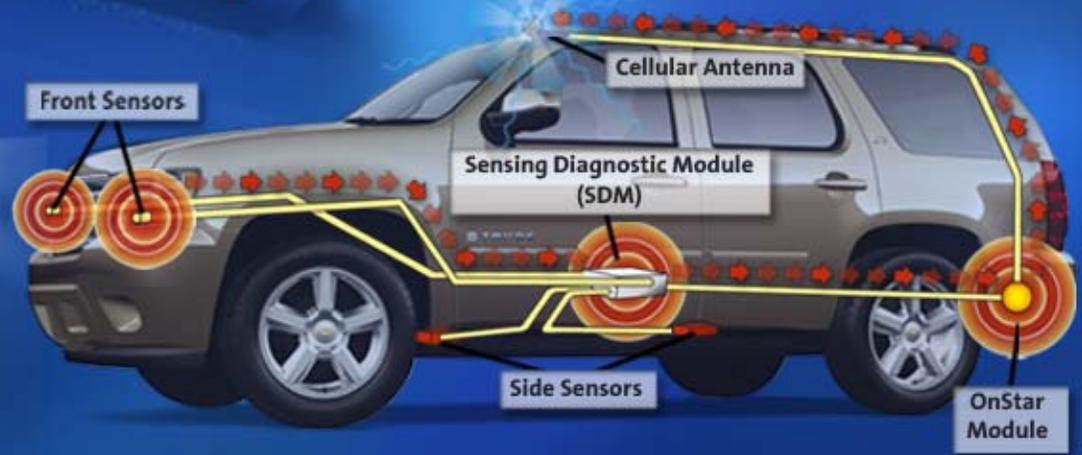


- Engine Cradle
- Structural Foam
- Structural Insert
- Tunnel Reinforcement
- Structural Foam in Rockers
- Windshield (A-Pillar) Reinforcements

OnStar

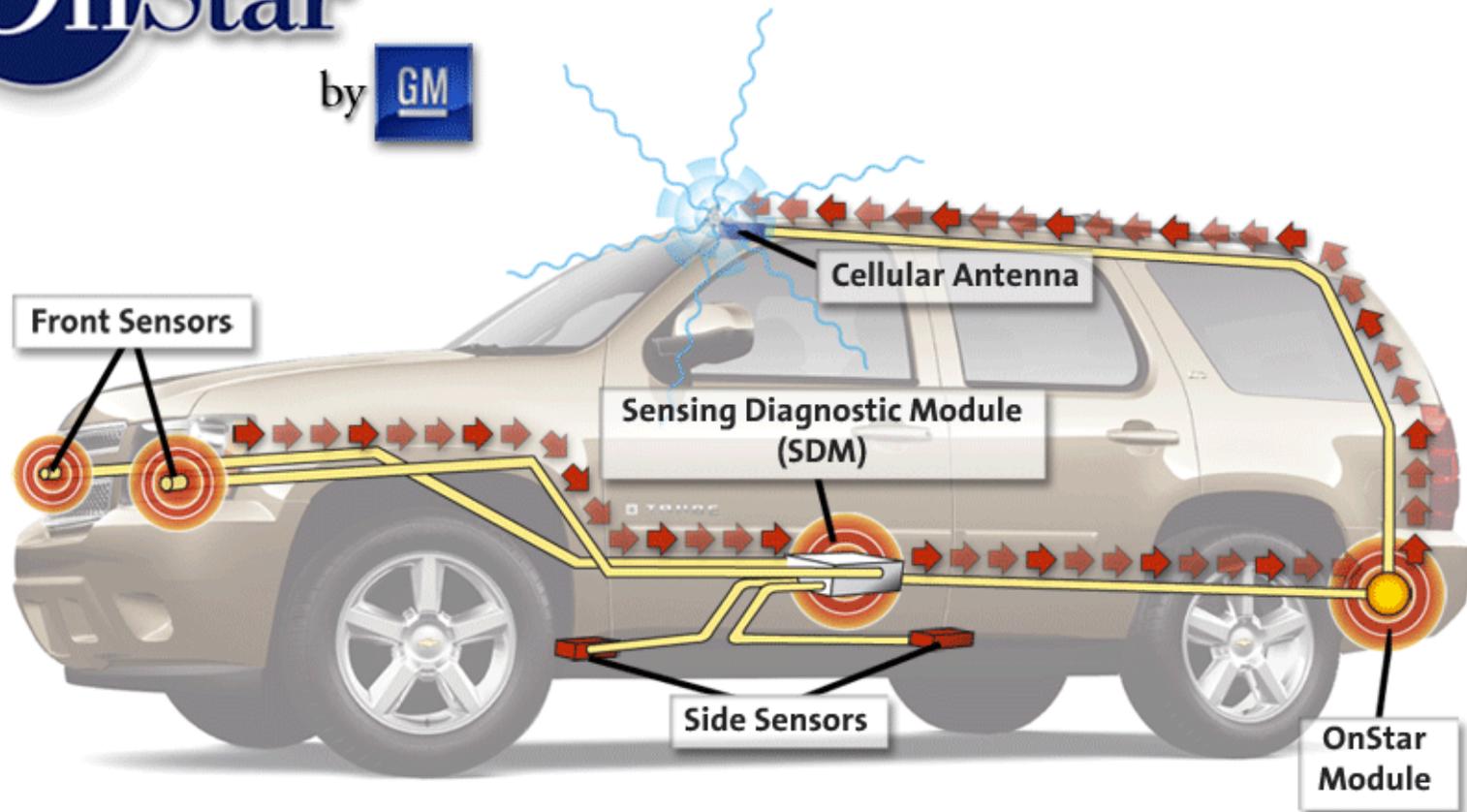
by

GM



OnStar

by GM



OnStar Advanced Automatic Crash Notification (AACN)

OnStar Turn-by-Turn Navigation

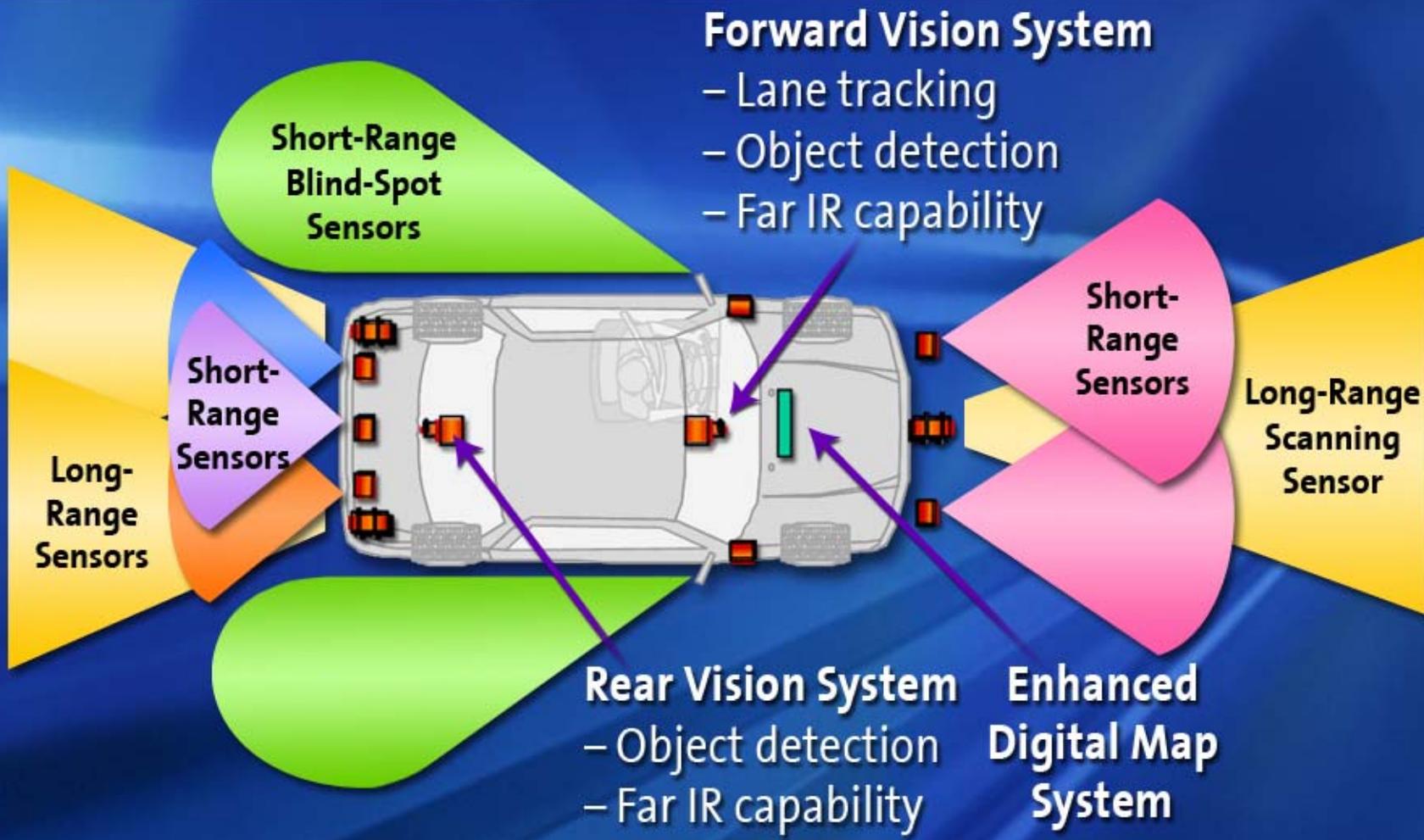


■ Gen 2: OnStar Turn-by-Turn Navigation

- Driver makes Blue Button call for directions
- OnStar Advisor downloads directions to vehicle
- As driver proceeds along route, OnStar uses continuous GPS to provide driver with real-time directions



360° Safety with Integrated Sensor Strategy



Forward Vision System

- Lane tracking
- Object detection
- Far IR capability

Short-Range Blind-Spot Sensors

Short-Range Sensors

Long-Range Sensors

Short-Range Sensors

Long-Range Scanning Sensor

Rear Vision System

- Object detection
- Far IR capability

Enhanced Digital Map System

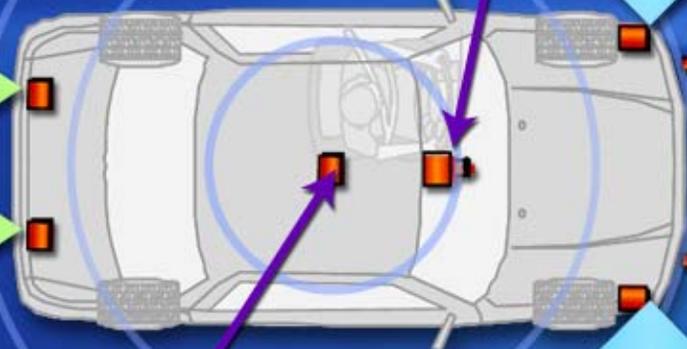
V2V Communications



360° Sensing Capability – Future Capability

Side Blind-Zone Alert
Long-Range Side/Rear
Lane-Change Assist

Forward Vision System



Digital Short-Range
Communication (V2V)

Vehicles That Drive Themselves

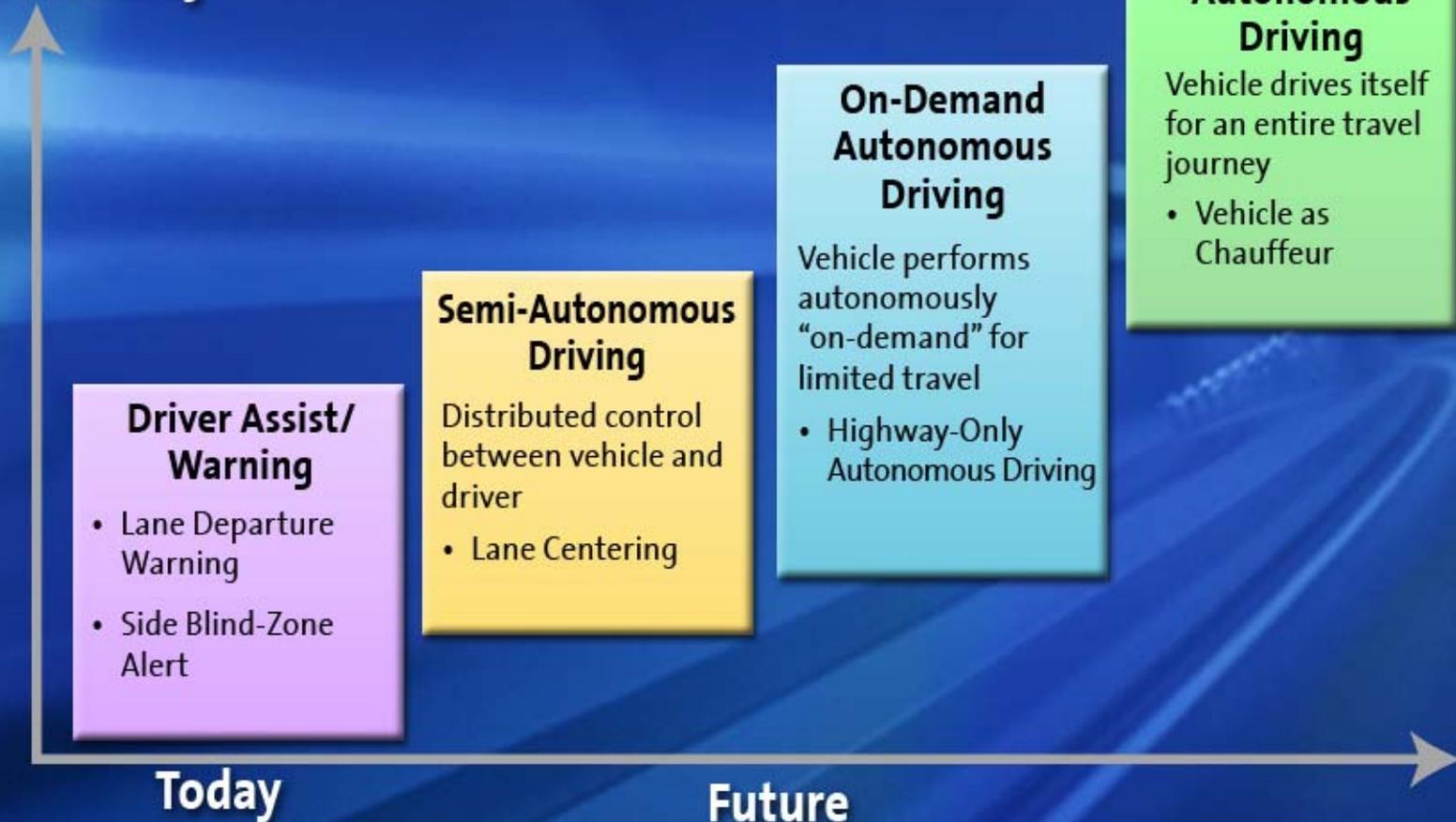
Where am I – GPS + digital maps

What's around me – 360° sensing
(sensors + “V2V”)

Take me where I want to go –
Software algorithms + electronic
controls and actuators

Roadmap to Autonomous Driving

Functionality



“Boss”



The Vision

GPS +
Digital Maps
+
360° Sensing
(Sensors + “V2V”)
+
Software Algorithms
+
Electronic
Controls and
Actuators



The Vision

GPS +
Digital Maps
+
360° Sensing
(Sensors + “V2V”)
+
Software Algorithms
+
Electronic
Controls and
Actuators



Enhanced Roadway
Safety
+
Real-Time Traffic
Management
+
Improved Throughput
+
Enhanced Energy
Efficiency and
Reduced Emissions

Minimize Roadway Infrastructure





***Minimize
Fuel Consumption***



New Automotive DNA

The New DNA

Internal Combustion
Engine



Electric Propulsion
(Electric Motors, Fuel Cells,
and Batteries)



The New DNA

Petroleum



Electricity and
Hydrogen



The New DNA

Mechanical
Systems



Electrical and
Electronic Systems



The New DNA

Stand-alone
Systems



Connected Vehicle
Technologies





REINVENT

the Automobile

SEQUEL





Extend the Significant Benefits of Automobile
Ownership to Many More People Around the Globe



