Active Safety Roadmap

- **Driver Info & Alerts (No Control)**
- **Emergency Intervention (Limited Control)**
- **Limited On-Demand Automation (Monitored Control)**
- **Complex On-Demand Automation (Transferred Control)**
- **Autonomous Driving (Chauffeured Driving)**

Increasing Capability → Increasing Automation → Increasing Crash Avoidance

2008 → 2012 → Future

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Early GM Automated Vehicles
November 3, 2007:
“BOSS” Wins DARPA Urban Challenge
Electronic Stability Control
Crash Avoidance Technologies Available Today

- **LDW w/Traffic Sign Recognition**
  - "Opel Eye"
  - Many Models

- **Speed/Curve Advisor**
  - Cadillac STS
  - Cadillac DTS
  - Cadillac SRX

- **Rear Vision Camera**
  - GMC
  - Many Models

- **Side Blind-Zone Alert**
  - GMC
  - Many Models

- **Rear Cross Traffic**
  - GMC
  - Many Models

- **Side Blind-Zone Spotter Mirror**
  - Chevrolet Traverse

- **Dual Feature Front Camera**
  - Lane Departure Warning and Forward Collision Alert
  - GMC
  - Many Models

- **Adaptive Cruise Control and Auto Collision-Mitigation Braking**
  - Opel Zafira
  - Opel Astra
  - Chevrolet Impala
  - Chevrolet Tahoe
  - Many Models
2012 GMC TERRAIN USES INDUSTRY-FIRST SINGLE CAMERA-BASED CRASH AVOIDANCE SYSTEM

- Left icon tells driver when vehicle detected ahead.
- Center icon lights up when following too closely and flashes with audible chimes when there is danger of collision.
- Right icon turns to amber from green when unsignaled lane change begins.

LANE DEPARTURE WARNING

FORWARD COLLISION ALERT

Windshield-mounted camera looks for vehicles and lane markings.
New for 2013 Model Year

- Cadillac ATS
- Cadillac XTS
- Cadillac SRX

- Full Speed-Range Adaptive Cruise Control (Stop-&-Go Notifier)
- Auto Collision Preparation (includes Collision Imminent Braking)
- Low-Speed Emergency Braking
- Side Blind-Zone Alert + Rear Cross-Traffic Alert
- Haptic Safety Alert Seat Feedback
Future Systems; More Capability....
Driving Automated......in non-Automated Vehicles....
Vehicle Safety – V2X Communication

**V2X:**
- Vehicle to Vehicle (V2V)
- Vehicle to Infrastructure (V2I)
- Vehicle to Pedestrian (V2P)

**V2X+GPS** is a new object detection sensor
- Reduced cost and complexity
- Extended range up to 300 meters
- Immune to extreme weather conditions
- Digital communication simplifies object identification
V2V Implementation & Deployment Considerations

- Tech Readiness
- OEM / Feature Approach
- Penetration Rate
- Business Considerations
- Aftermarket / Retrofit
- Regulation / Gov’t Incentive
- ...

[GM Logo]
V2V Implementation & Deployment Considerations

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Graph showing penetration rate over time with two models: one successful and one failed.
Active Safety Roadmap

Increasing Capability

Increasing Automation

Autonomous Driving
(Chauffeured Driving)

Complex On-Demand Automation
(Transferred Control)

Limited On-Demand Automation
(Monitored Control)

Emergency Intervention
(Limited Control)

Driver Info & Alerts
(No Control)

2013 Cadillac Driver Assist Package

Cadillac “SuperCruise” Concept

Technology Enablers:
Improved Detection & Algorithms from Integrated Sensing, Maps, V2X, and Driver State Knowledge

2008  2012  Future

JCapp – Oct 2012
Thank You