Roy Hulli, P.Eng

and

Fernando Chua

Intelligent Transportation Systems
Ministry of Transportation Ontario
Context of Change

Automated Vehicles
- Monitoring by sensors
- Control by algorithms
- Navigation by maps

Connected Vehicles
- Connectivity to improve: safety, mobility and the environment

Vision Zero

Today

Smart Cities
- Data Connectivity

Disruption

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ITS in the Context of Change

**Automated Vehicles**
- Monitoring by sensors
- Control by algorithms
- Navigation by maps

**Connected Vehicles**
- Connectivity to improve: safety, mobility and the environment

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**INTELLIGENT TRANSPORTATION SYSTEMS**
## ITS Service Bundles

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*Intelligent Transportation Systems Program*
ITS Service Bundles - Examples

1. Travel Times
   - Travel times (or delays) utilize travel time data collection to estimate the time it takes for vehicles to travel between points of interest, and then displays that travel time information to travelers.

2. Electronic Road Metering
   - Electronic Road Metering applies transportation demand management principles by communicating information and incentives to road users (through an app), moderating or redirecting their flow onto the road network.

3. Advanced Traveler Info
   - Provides tailored information in response to a traveler’s specific context. This can take the shape of either real-time interactive request/responses or publishing of tailored streams of information to travelers based on submitted profiles. Travelers can obtain current information regarding traffic conditions, roadway maintenance and construction, transit services, ride share/ride match, parking management, detours and pricing information.

11. Emissions Monitoring and Management
   - Emissions Monitoring and Management monitors either area wide air quality or point emissions. Summary emissions information or warnings can be displayed to motorists, and the gathered information can be used to implement environmental programs, policies, and regulations.

13. Roadwork Monitoring
   - Roadwork Monitoring facilitates knowledge of current and planned roadwork to enable oversight of road work activities. The service enhances agencies’ transportation management capabilities in and around work zones by monitoring construction zone ITS technologies and enabling work zone management strategies.
ITS Customer Driven Projects

1. Queue end warning
2. Median mounted sign (TC 64)
3. Temporary construction zone ITS smart zone (camera, travel times, etc.)
4. Google Glass applications (safety study, asset management)
5. HOT Lanes
6. LTE communications, devices, system, predictive algorithms
7. Non intrusive sensors for pavement detection
8. Video analytics – incident detection
9. Commercial Vehicle Eco Drive – Ottawa & Transport Canada
10. Weather advisory system – 401 Northumberland
11. Environmental Office – Hwy 26 (deer, turtles, etc.)
12. University research projects (York, Guelph, Western, Waterloo)
13. Ontario Centers of Excellence – Connected Vehicle
14. Multi Ministry Connected Vehicle Working Group
15. Partnerships development - municipal, New York, Michigan, MoH, etc.
16. Transport Canada Smart Corridors
Ontario Centres of Excellence - Research Fund

- Ontario Centres of Excellence Connected/Automated Vehicle Program (To-Date Total $2.95M)
  - To advance and commercialize Ontario technologies in the CVAV space
  - Encourages businesses to collaborate with each other and academic institutions to develop and commercialize innovations in connected and autonomous vehicle technologies.

- Phase 1 ($0.95M funded by MTO) launched in early 2014
  - Leveraged $2.9M in investment and funded 15 projects in areas such as 3D camera sensors, fleet sharing software solution, adaptive cruise control, audio alerts, V2V communications and context aware traveler information.

- Phase 2 ($2.00M funded 50/50 by MTO and MEDG) launched in 2015
  - Has generated 16 proposals seeking contributions up to $50k and 14 submissions seeking contributions up to $250k
  - Nearly a 3:1 in matching funds and in-kind contributions from applicants
News Release

Automated Vehicles Coming to Ontario Roads
University of Waterloo, Erwin Hymer Group, BlackBerry QNX First to Test New Technology

November 28, 2016 9:30 A.M. | Ministry of Transportation

Ontario is supporting innovation in the transportation sector by launching the first automated vehicle (AV) pilot program in Canada, led by The University of Waterloo, the Erwin Hymer Group and BlackBerry QNX.

Automated vehicles are driverless or self-driving vehicles capable of detecting and navigating the surrounding environment, and have the potential to help improve road safety and fuel efficiency, as well as reduce traffic congestion and greenhouse gas emissions. The pilot brings together a range of expertise from the research, manufacturing and technology sectors to advance innovation and capability in Ontario's AV sector. The participants include:

- **The WATCar Project at the University of Waterloo's Centre for Automotive Research**, which will monitor a Lincoln MKZ for performance and test it on-road at different levels of automation

- **The Erwin Hymer Group**, an international auto manufacturer active in the Kitchener-Waterloo tech and innovation corridor, which will test and monitor a Mercedes-Benz Sprinter Van at different levels of automation

- **BlackBerry QNX**, a Canadian global software development leader, which will test a 2017 Lincoln with automated features.
Automated Vehicle Pilot Permits (Reg. 306/15)

GENERAL

- 10-year pilot program
- Restricted to testing purposes only
- Applicants must complete & submit AV application to MTO and keep an approved copy in the vehicle as this constitutes acceptance into the pilot program
- Driver must remain seated in the driver's seat at all times monitoring the safe operation of the AV and be capable of taking over immediate manual control
- Current HTA rules of the road and penalties apply
- Penalties in HTA s. 228(8) also apply to violations of the pilot regulation (fine of $250 – $2,500)

ELIGIBILITY/DRIVER QUALIFICATION

- Only vehicles manufactured and equipped by recognized parties permitted:
  - Original Equipment Manufacturers
  - Technology Companies
  - Academic/Research Institutions
  - Component and Systems Manufacturers
- Driver must hold a valid licence for the class of vehicle (A, B, C, D, E, F or G), a valid licence from another jurisdiction, or a valid international driver's permit
- Participant must have insurance of at least $5,000,000

VEHICLE TECHNOLOGY/EQUIPMENT

- Permitted: passenger, street cars and commercial vehicles
- Not Permitted: motorcycles and motorized bicycles
- Prohibited from being used for a road test for licensing purposes
- Must be in good working order | registered and plated | equipped with an alert to notify the driver when AV system disengages
- Vehicles must comply with SAE Standard J3016 and any requirements of the Canadian Motor Vehicle Safety Act that apply to AV driving systems for the vehicle's year of manufacture

DATA REQUIREMENTS

- Must report accident involving an AV no later than 10 days afterward to the Registrar
Highway 26: MTO ITS Pilot to Production Project
Overview of Highway 26 Project
Mitigation Measures: Exit Ramps
Mitigation Measures: Deer Fence
Methodical Approach
Pilot to Production Approaches

Methodical Approach

- **New tools** i.e. radar
- **New services** i.e. wildlife monitoring
- **New needs** i.e. bluetooth integration

**Summer Testing**
- Apr-May
- Jun-Jul
- Aug-Sep

**Winter Testing**
- Oct-Nov
- Dec-Jan
- Feb-Mar

- **New services** i.e. weather advisory
- **New tools** i.e. wind turbines
Steps to Full Implementation

- Concept Stage
  - Initial Pilot: refine and repeat as needed
  - Scaled Pilot: refine and repeat as needed
  - Local Deployment: refine and repeat as needed
  - Full Deployment: refine and repeat as needed

Ontario
Adaptive Approach
Pilot to Production Approaches

Adaptive Approach

- Summer Testing
- Winter Testing

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New tool i.e. Stronger Battery
Fast-Tracked Approach
QUESTIONS?