Towards a Canadian Network of Centres for Innovation, Education and Training in Cooperative Transportation Systems (CTS)

UBC / AUTO21 Connected Vehicle Workshop
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Intelligent Transportation Systems
Transportation Infrastructure Programs
PURPOSE

• Introduce **Cooperative Transportation Systems (CTS)**
  – Integration of wireless communications (i.e., *connectivity*) with next-generation intelligent transportation systems (ITS)

• Provide a policy context for fostering a network of **Centres for Innovation, Education & Training (CIET)**
  – **Focus:** operational evaluation and commercialization of emerging CTS-based devices, applications, products, services

• Highlight the business planning process we followed
  – Consider the costs/benefits of establishing a CIET in each of Canada's three Gateways: **Asia-Pacific; Quebec-Ontario; Atlantic**

• Promote CIET concepts and consider next steps
WIRELESS HAS COME TO TRANSPORT

- Increasingly powerful and more affordable smartphones are revolutionizing the way we interact at home, at work, at play

- Next-generation intelligent transportation systems (ITS) will use wireless connectivity to:
  - Allow vehicles, infrastructures and devices to talk to each other
  - Move toward a crashless society by eliminating driver error in crashes
  - Enable transformational gains in transportation safety, security, efficiency, mobility, accessibility and sustainability
  - Provide drivers, travellers and operators with real-time, value-added information on freight, roads, traffic, weather, transit and rail
  - Collect system-wide data for logistics, planning and research

- We call the global movement to connectivity for transport: **Cooperative Transportation Systems or CTS**
CTS = MULTIMODAL – INTELLIGENT – CONNECTED – INTEGRATED – INFORMATION/DATA EXCHANGE

Drivers & Operators

Marine Ports

Vehicles & Fleets

Information

Wireless Devices

Infrastructure

Rail & Intermodal
IMAGINE! CTS VEHICLES AS PROBES

- Speed & Heading
- Location & Elevation
- Adaptive Cruise Control (ACC)
- Hours of Operation
- Sun/Rain Sensor
- Windshield Wiper Setting
- Head Lights Status
- Ambient Air Temperature
- Barometric Pressure
- Traction Control
- Stability Control
- Brake Status
- Antilock Braking System (ABS)

May 31, 2012
AUTO21 Annual Meeting: Tech Session #3
IMAGINE! CTS GENERATED DATA

Probe Data From Multiple Technologies
- GPS Data (lat / long), Acceleration, Speed
- Heading, Direction, Altitude

Probe Data From Vehicles
- Heading, Steering Angle, Braking status
- Elevation, Turn Signal, Airbag
- Odometer, Rain/Sun Sensor, Wipers
- Traction Control, Headlights, Fog Lamps
- Hazard Signal, Temperature

Data From Infrastructure
- Signal State, Pedestrian Signal State, Signal Priority
- Ramp Meter State, Weather conditions, Geo-warnings
IMAGINE! CTS FOR FREIGHT & INTERMODAL

Today

Customs

Fingerprint Reader
Chassis Tag
TC 204 Standard
10891 Container Tag
18185 E-Seal
17363 Manifest Tag
17364 Tags
17365 Tags
Tractor Tag TC 204 Standard

On Board Unit (OBU)

Transportation Worker ID Card (TWIC) with Fingerprint Biometric
ISO/IEC 14443

Proposed

Tomorrow

Customs

Part of CALM Network
Road Side Unit (RSU)

On Board Unit (OBU)

Chassis Tag TC 204 Standard

Source: American National Standard Institute
IMAGINE! ALL THAT CTS DATA!

- Local, regional and network-wide
- Live, real-time, near real-time, historical, archival
- Applications:
  - Operational control
  - Network management
  - Security, enforcement, safety, mobility, environmental
  - Policy development
  - Transportation & urban planning
  - Economic analysis
  - Research, simulation, modeling
  - Info-tainment, electronic payment
WE’RE GOING TO BUILD A **NATION-WIDE WIRELESS NETWORK** FOR SURFACE TRANSPORTATION!

**GOOD NEWS! WE WON THE BID TO BUILD A NATIONWIDE WIRELESS NETWORK!**

**BAD NEWS! WE DON’T KNOW HOW TO BUILD A NATIONWIDE WIRELESS NETWORK!**

**IT’S WIRELESS. HOW HARD COULD IT BE TO NOT INSTALL WIRES?**

**HOW HARD COULD IT BE ???**
SOME POLICY AND TECHNOLOGY CHALLENGES

- What’s *business case* and value proposition for the private and public sectors?
- Are new *governance and safety regimes* needed that can span Federal, P/T, Municipal jurisdictions?
- What about *human factors* (e.g., driver distraction)?
- What are the *infrastructure and security* needs?
- How do we handle *data ownership, privacy, access*?
- How do we ensure North American *interoperability*?
- How do we deal with largely *diverse environments*, conditions and stakeholder requirements?
- What are the engineering, design, deployment *costs*?
- Who pays for *operations and maintenance*?
- Who *certifies* OEM and aftermarket *equipment*?
- What about *liability* due to equipment failure?
CANADA NEEDS TO BE INVOLVED

• Geography and proximity to the United States

• Implications for our economy, competitiveness, trade

• Implications for our vehicles:
  – Cars, trucks, buses, public/private fleets, bicycles, pedestrians

• Implications for our transportation infrastructures
  – Roads, signals, bridges, land border crossings, rail grade crossings, marine terminals, airports, intermodal yards

• Implications for new and/or updated safety regulations
SOME CANADIAN CTS RESEARCH OBJECTIVES

• Raise awareness among transportation sector stakeholders

• Find and develop our unique Canadian niches:
  – Recognize and complement global CTS research
  – Examples: freight, weather, rail, urban, non-urban

• Foster *Centres for Innovation, Education & Training* at Canadian universities with CTS focus
  – Industry-led partnerships with governments and academia
  – Tailored to the key geographic, regional and trade opportunities
  – Operational evaluation and commercialization of emerging CTS-based devices, applications, products, services

• Promote collaborative national and international partnerships, fellowships and exchanges of highly qualified personnel (HQP)
### Centres of Innovation, Education & Training

<table>
<thead>
<tr>
<th>Centre Name</th>
<th>Gateway</th>
<th>Partners</th>
<th>GBCF Study</th>
<th>GBCF Business Plan</th>
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</thead>
<tbody>
<tr>
<td><strong>WiFSE:</strong> Centre for Advanced Wireless Freight Security and Efficiency</td>
<td>Asia Pacific Gateway</td>
<td>• University of British Columbia • BC MOTI • Translink • PMV • IBI Group</td>
<td>Completed Jul 2008</td>
<td>Completed May 2010</td>
</tr>
<tr>
<td><strong>m-RWIS:</strong> Centre for Advanced Mobile Road Weather Information Systems</td>
<td>Ontario-Québec Continental Gateway</td>
<td>• Université de Sherbrooke • MTQ • Ville de Sherbrooke</td>
<td>Completed Jun 2009</td>
<td>Completed Oct 2010</td>
</tr>
<tr>
<td><strong>WITSSR:</strong> Centre for Advanced Wireless ITS for Small Cities and Rural Areas</td>
<td>Atlantic Gateway</td>
<td>• University of New Brunswick • NBDoT • Opus International Consultants</td>
<td>Completed Mar 2009</td>
<td>Completed Mar 2010</td>
</tr>
</tbody>
</table>
BUSINESS PLAN: THEMES CONSIDERED

• Vehicles:
  – Cars, trucks, buses, fleets, transit, rail (light, commuter, heavy)

• Infrastructure:
  – Gateways, borders, ports, intermodal yards, rail grade crossings

• Themes:
  – Freight, weather, urban, non-urban, supply chain security

• Locations:
  – Strategic gateways
  – High volume trade routes / corridors
  – Land border crossings

• Collaboration with the United States and others
BUSINESS PLAN: COMMERCIALIZATION GAP

Applied Research & Development
(e.g., AUTO21, DIVA)

Demonstration, Operational Evaluation & Commercialization
CIET & Wireless ITS Testbed

Deployment
(e.g., ITS Smart Corridors / Border Wait Time)
BUSINESS PLAN: OPPORTUNITIES

Faster acceptance, commercialization, utility, and benefits realized from new technologies and applications.

**TECHNOLOGIES**

- **FUTURE TECHNOLOGY**
- **EMERGING TECHNOLOGY**
- **PROVEN TECHNOLOGY**

**SYSTEMS AND APPLICATIONS**

- **EXISTING SYSTEMS**
- **NEW APPLICATION**
- **NEW CONCEPT**

**Opportunities**

- **Near-term Opportunities**
- **Long-term Opportunities**
- **Present-day Opportunities**
BUSINESS PLAN: OUTLINE

• Program requirements
  – Vision, Values, Mission, Outcomes, Resources & Performance Measures

• Collaborative approach
  – Multi-partnered
  – Multi-disciplinary
  – Multi-institutional

• Governance model
  – Managing Director ensures program, researchers & funding kept on track

• Cost / Benefits analysis
  – Financial, societal, economic & environmental

• Sustainability plan
  – What’s your plan after the federal $$$ run out?
BUSINESS PLAN: VISION

• Foster and promote public/private partnerships capable of seeding a network of industry-led, world-class Canadian Centres for Innovation, Education & Training in Cooperative Transportation Systems, one in the heart of each of Canada’s Gateways.

• Facilitate a collaborative environment for government, industry, NGOs, academia and international partners to advance the commercialization, uptake and deployment of digital and wireless technologies that improve and enhance the safety, security, efficiency and sustainability of Canada's transportation system.
BUSINESS PLAN: VALUES FOR EACH CIET

- A virtual organization, housed at a Canadian university, but accessible by other gateway stakeholders

- Envisioned with three distinct but complementary parts:
  - Learning Centre with a Commercialization Laboratory
  - On-campus Development Testbed
  - Live On-Street Demonstration Testbed within an ITS Smart Corridor

- Create a business advantage for Canada’s Information & Communications Technologies (ICT) providers and receptors

- Provide industry partners with real-world facilities to showcase their CTS solutions (i.e., devices, apps, products, services)
B U S I N E S S  P L A N :  M I S S I O N

• Bridge “Commercialization Gap” and shorten time lag between innovative ideas and widespread deployment

• Provide the facilities needed to educate/train next-generation of experts, innovators and HQP

• To provide decision makers with a unique “try-before-you-buy” capability to operationally evaluate and assess CTS solutions before making major deployment investment commitments
BUSINESS PLAN: SECTOR BENEFICIARIES

Public Sector
- Transport Agencies
- Transport Providers
- Emergency Responders
- Border Agencies

Private Sector
- Supply Chain Users & Operators
- Technology & Solution Providers (e.g., ICT, Logistics, Telecoms)

Academic Sector
- Universities & Colleges
- National & International Research Institutes

- Lowering Institutional Barriers
- Exploring innovative & cost-effective solutions

- Trying new technologies prior to making investment decisions
- Accelerating deployment with significantly less risk

- Producing new skills & training in the labour force
- Expanding the knowledge of integrated solutions deployment
POSSIBLE NEXT STEPS

• Develop marketing plans and partnership strategies

• Develop and release Requests for Expressions of Interest

• Hold workshops to promote CIET business plans and to solicit feedback from sector stakeholders

• Continue to brief public sector, industry and university senior executives

• Identify CIET “champions”

• Engage potential partners

• Help foster specific public/private partnerships
“In a knowledge economy, talent and innovation are creators of competitive advantage and drivers of success.”

– Kevin Lynch, Vice-Chair, Bank of Montreal