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

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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

Rail & Intermodal

Wireless Devices

Infrastructure

IMAGINE! CTS VEHICLES AS PROBES

IMAGINE! CTS GENERATED DATA

Probe Data From Multiple Technologies

- GPS Data (lat / long)
- Heading
- Acceleration
- Direction
- Speed
- Altitude

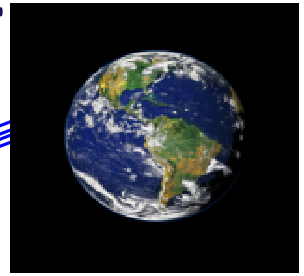
Probe Data From Vehicles

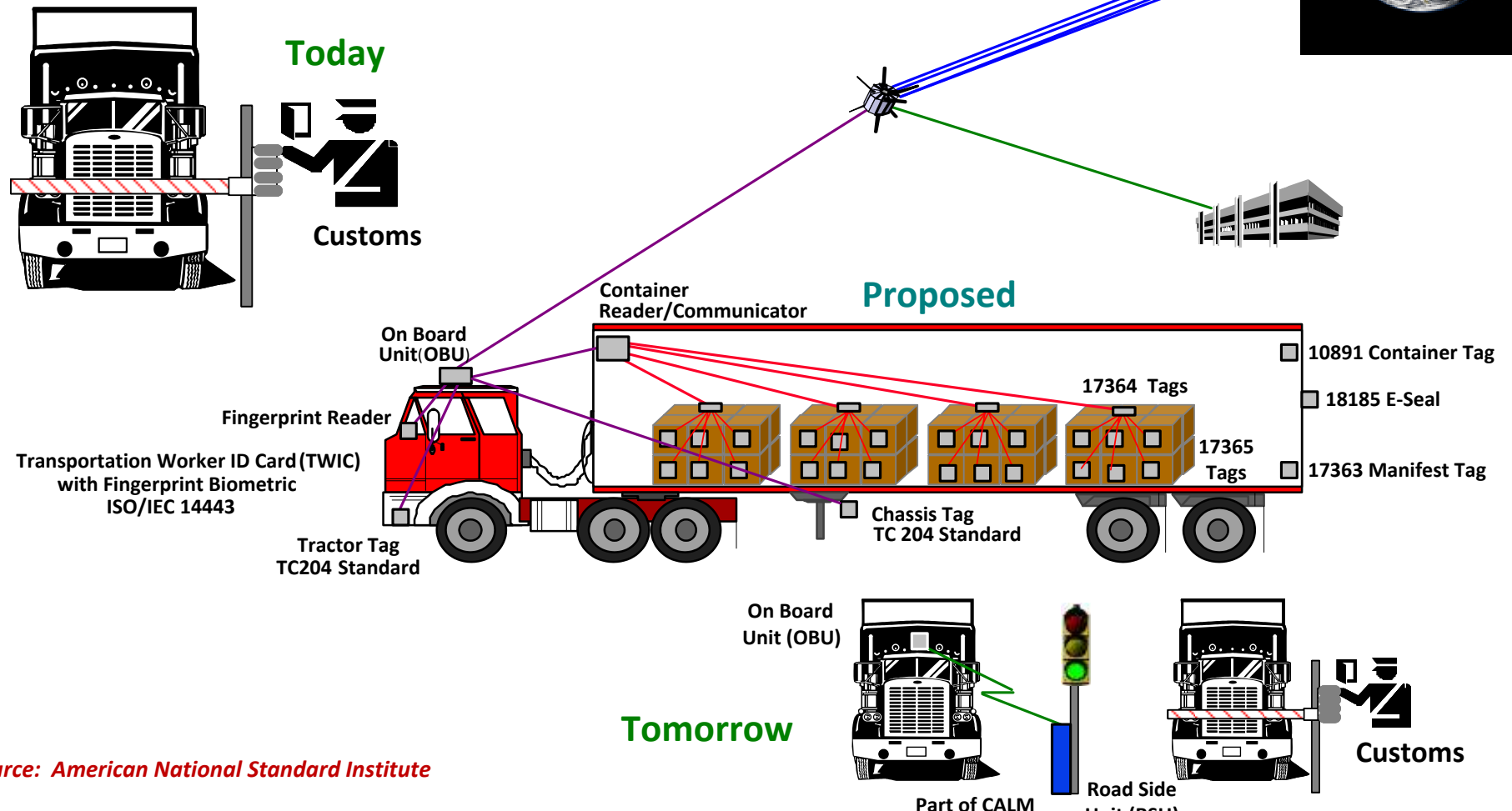
- Heading
- Elevation
- Odometer
- Traction Control
- Hazard Signal
- Steering Angle
- Turn Signal
- Rain/Sun Sensor
- Headlights
- Temperature
- Braking status
- Airbag
- Wipers
- Fog Lamps

Data From Infrastructure

- Signal State
- Ramp Meter State
- Pedestrian Signal State
- Weather conditions
- Signal Priority
- Geo-warnings

IMAGINE! CTS FOR FREIGHT & INTERMODAL

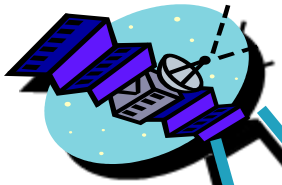




Source: American National Standard Institute

IMAGINE! CTS FOR WINTER MAINTENANCE

GPS



Operations & Dispatch

Communications & World Wide Web

VEHICLES:
Sensors & Data

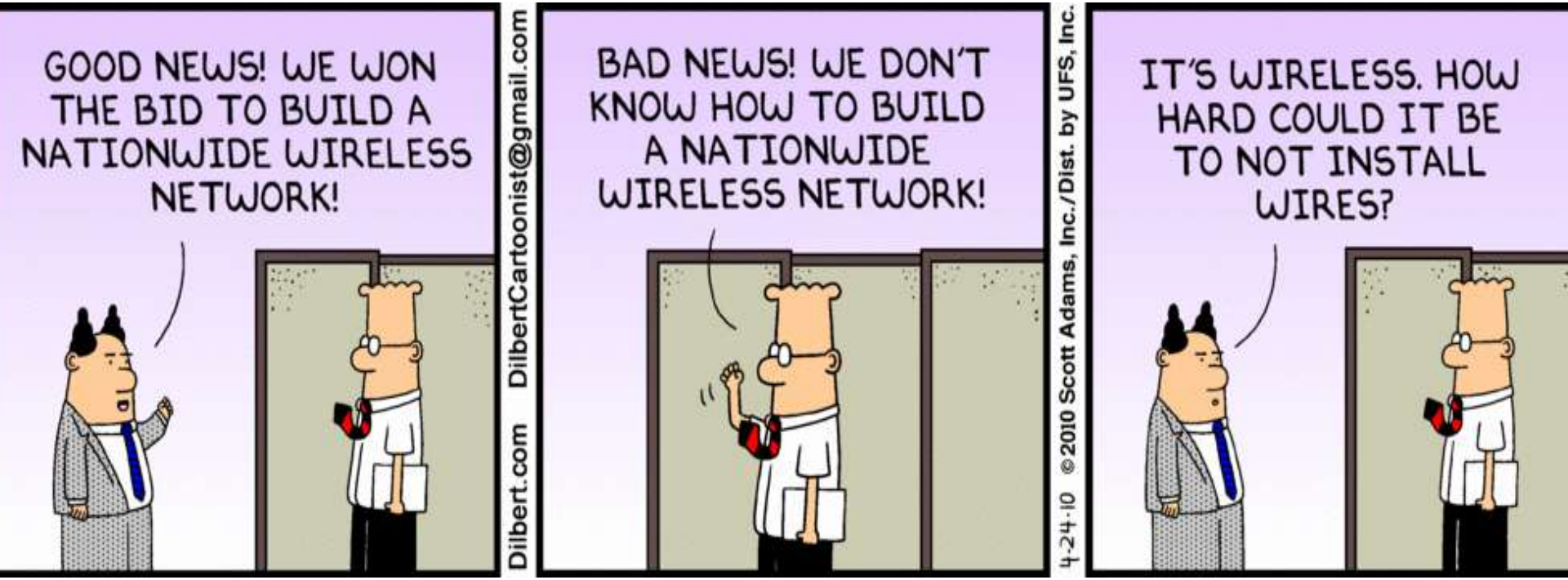
INFRASTRUCTURE:
Weather Stations,
Cameras & Sensors

Public Maintenance
Fleets & Contractors

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

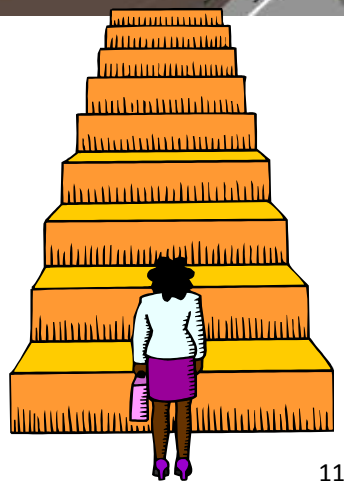
WE'RE GOING TO BUILD A *NATION-WIDE WIRELESS NETWORK* FOR SURFACE TRANSPORTATION!



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

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)

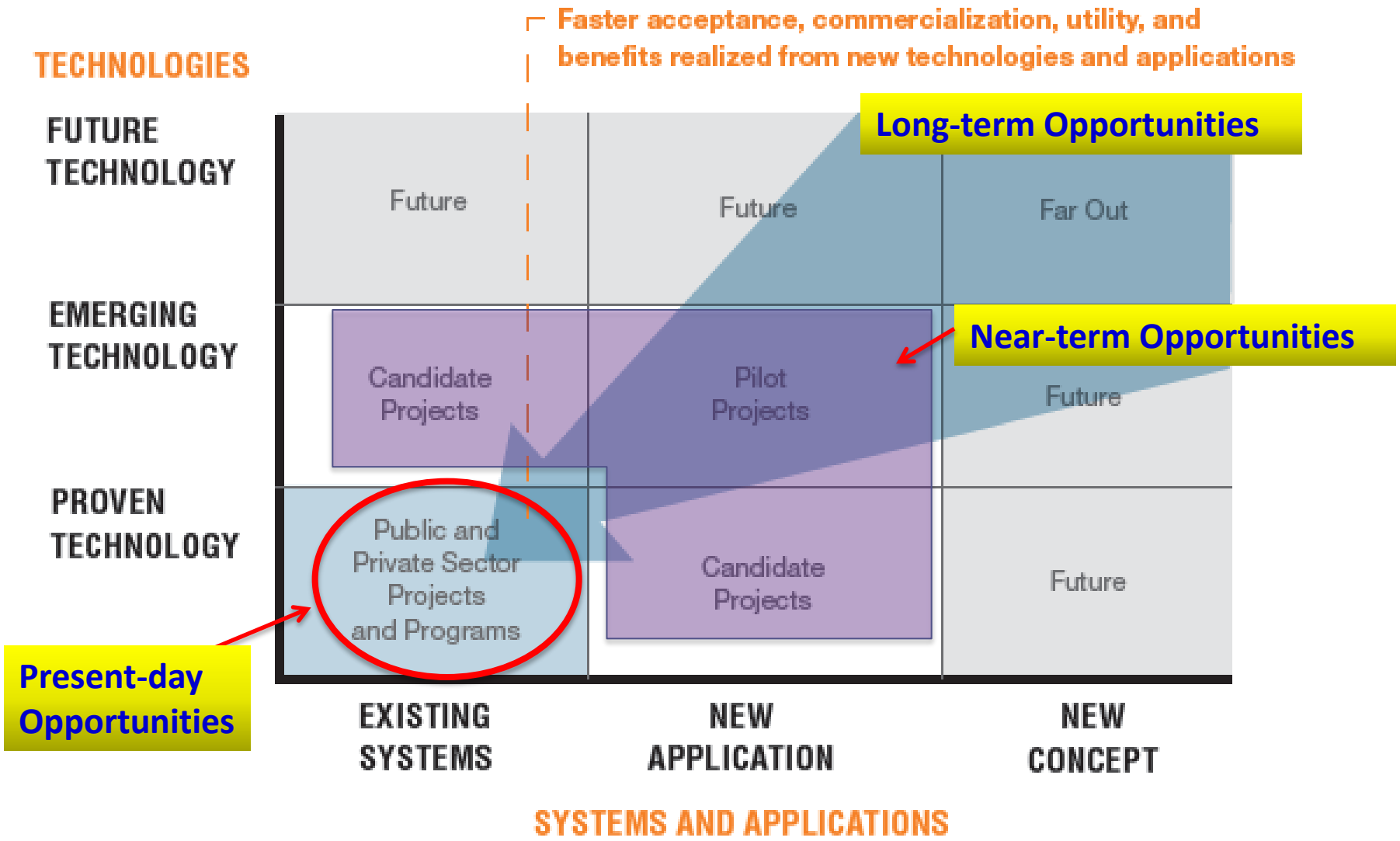
Demonstration, Operational Evaluation & Commercialization

CIET & Wireless ITS Testbed

Deployment

(e.g., ITS Smart Corridors / Border Wait Time)

BUSINESS PLAN: OPPORTUNITIES



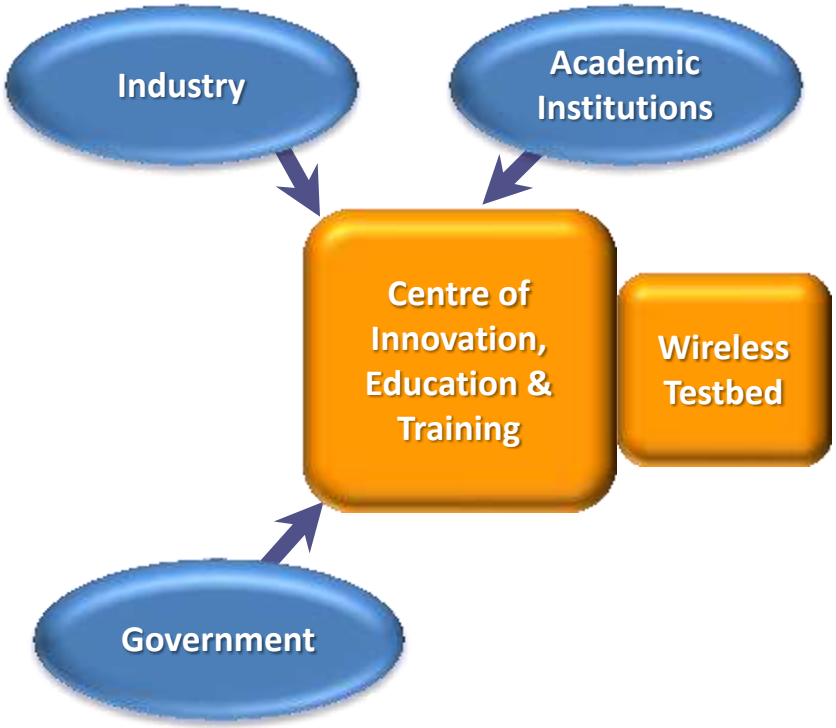
BUSINESS PLAN: OUTLINE

- 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

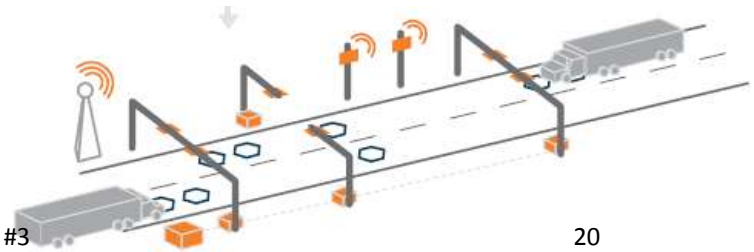
- Foster and promote public/private partnerships capable of seeding a *network of industry-led, world-class Canadian Centres for Innovation, Education & Training in Cooperative Transportation Systems*, one in the heart of each of Canada's Gateways.

- 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



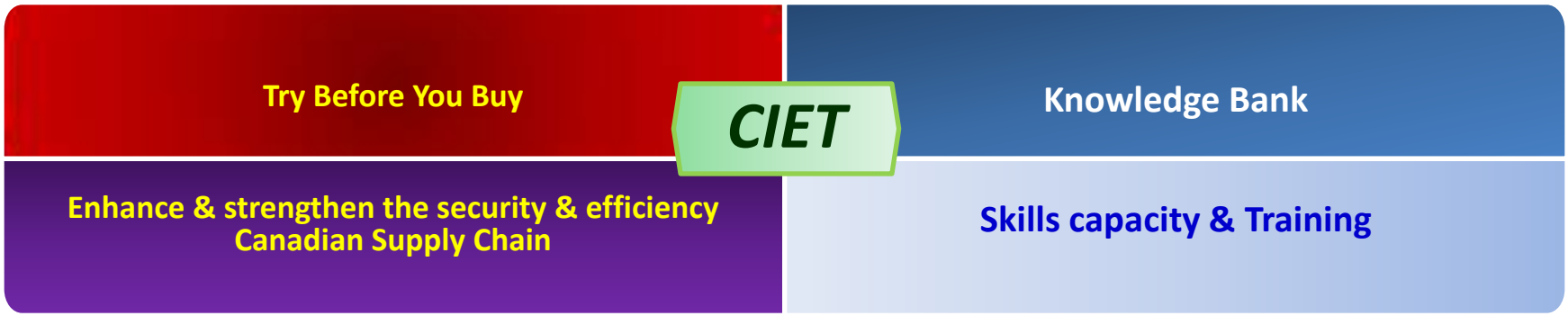
BUSINESS PLAN: VALUES FOR EACH CIET

- 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)



BUSINESS PLAN: MISSION

- 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

CIET

- 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