Intelligent Transportation Systems
The Practice and The Promise

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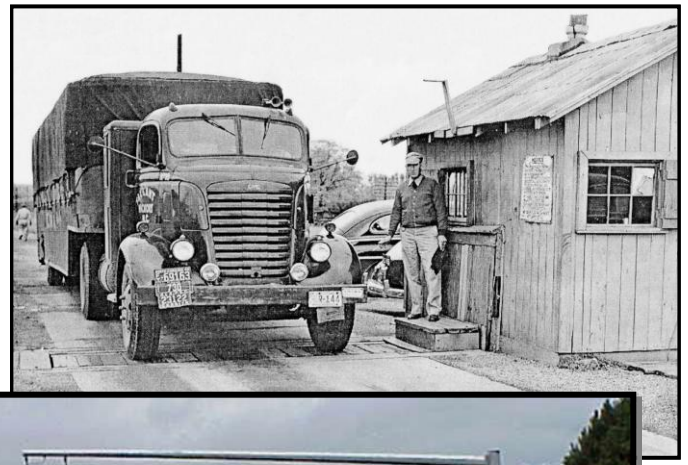
Intelligent Transportation Systems (ITS)

- Background
- Framework for Deployment
- New Directions

The Economist

Intelligent Transportation Systems (ITS) Background

1. Initiated in the early 90's
2. Responds to:
   - Congestion
   - Energy
   - Environment
   - Safety
3. Cost/challenges of of deploying technology
   - (e.g. Traffic control systems)
4. Led by government (U.S., Japan, Europe)
   - Research
   - Planning
   - Pilots/Demonstration Projects
5. Economic Development
6. World wide network of ITS Associations



What is ITS?

- **INTEGRATED** Intelligent Transportation Systems

"the application of advanced sensor, computer, electronics, and communication technologies and management strategies – in an ***integrated*** manner – to improve the safety and efficiency of the surface transportation system"

Objectives of ITS

1. Efficiency
   - Increase vehicular **throughput** without added lanes
   - Strategic traffic management
     - Networks
     - Corridors
   - Route, time and mode choices
     - **Traveller information**
   - Management of traffic incident and other events
2. Safety
   - Collision avoidance
   - **Roadway condition** warning (traffic, weather, animals, etc.)
   - Mixed use warning (pedestrians, cyclists, etc.)
3. Environmental
   - **Emissions** and consumption

Objectives of an ITS Plan

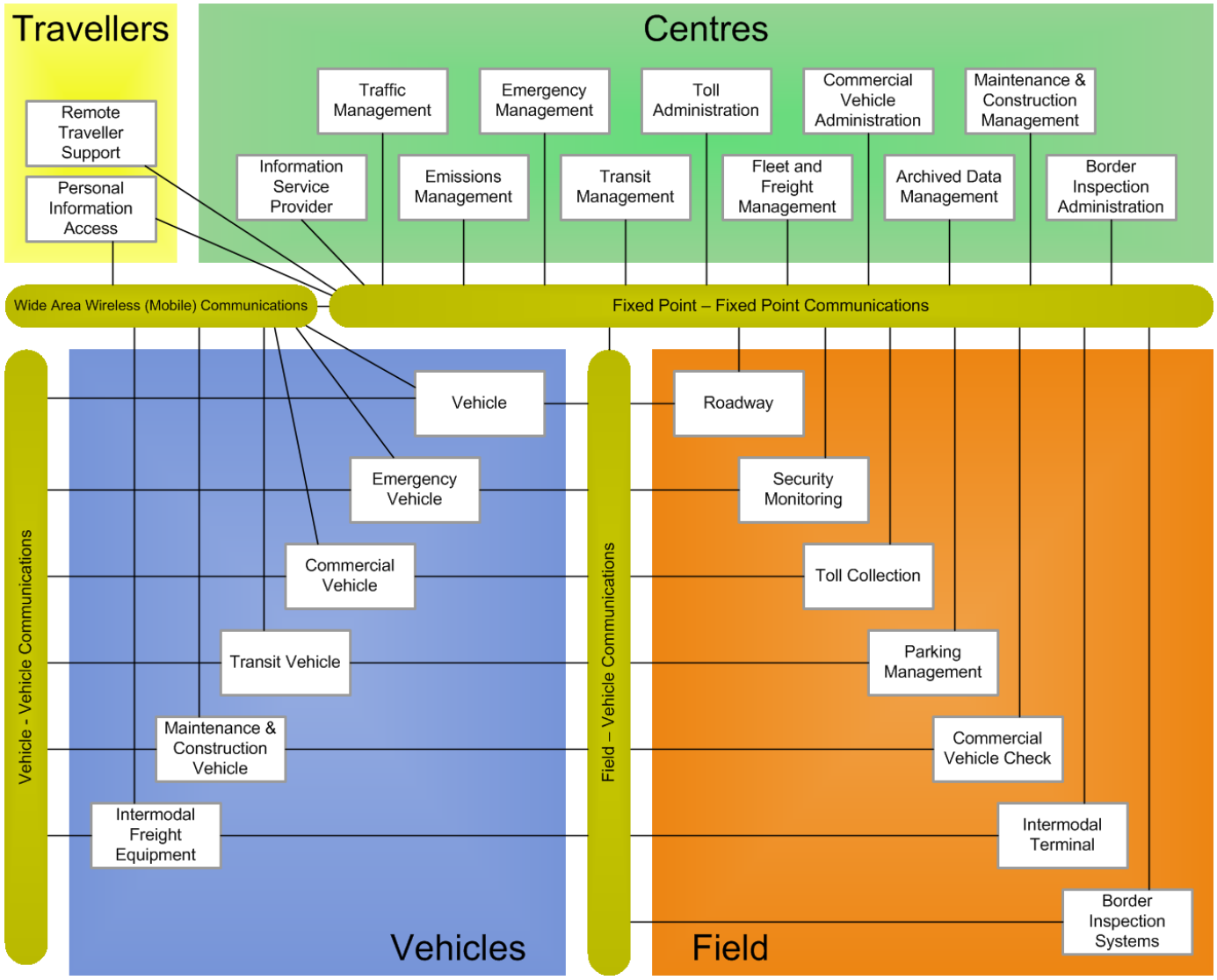
- Reduce cost and time to deploy technology
- Maximise value from the investments:
  - Standards
  - Common data structures
  - Interchangeable devices
  - Interoperable subsystems
- **Framework for interagency cooperation**

Scope of ITS

- Traffic Management (ATMS)
- Traveller Information (ATIS)
- Public Transportation Management (APTS)
- Commercial Vehicle Operations (CVO)
- Emergency Management (EM)
- Maintenance and Construction Management (MC)
- Advanced Vehicle Safety Systems (AVSS)
- Archived Data Management (AD)

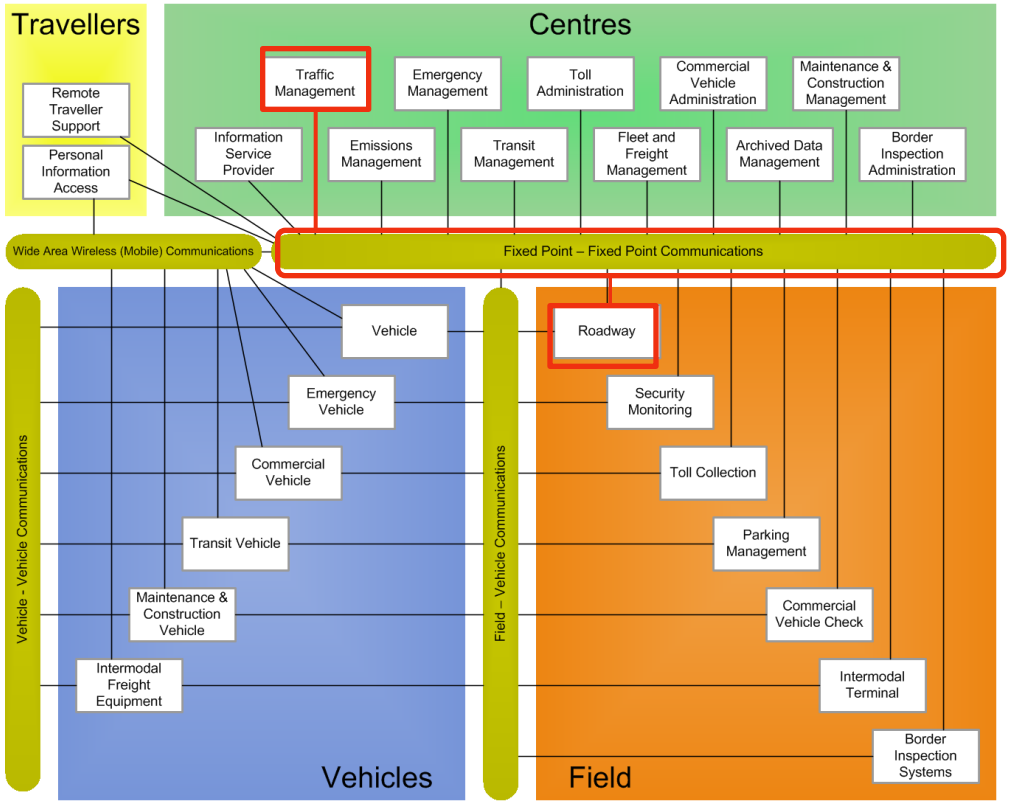
ITS FRAMEWORK (ARCHITECTURE)

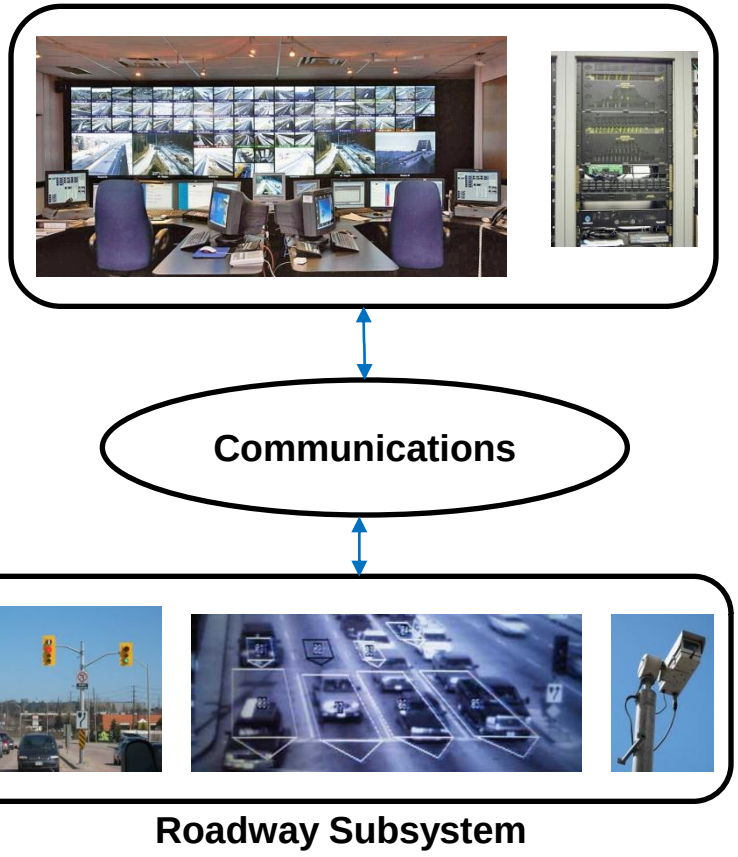
ITS Framework



What is an ITS Architecture?

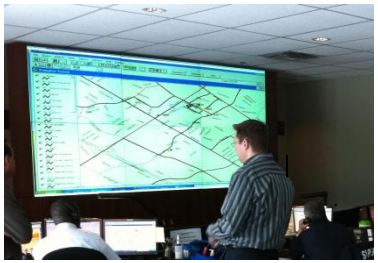
"a common framework for planning, defining, and *integrating* intelligent transportation systems."



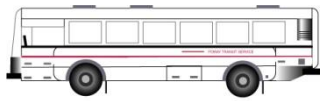


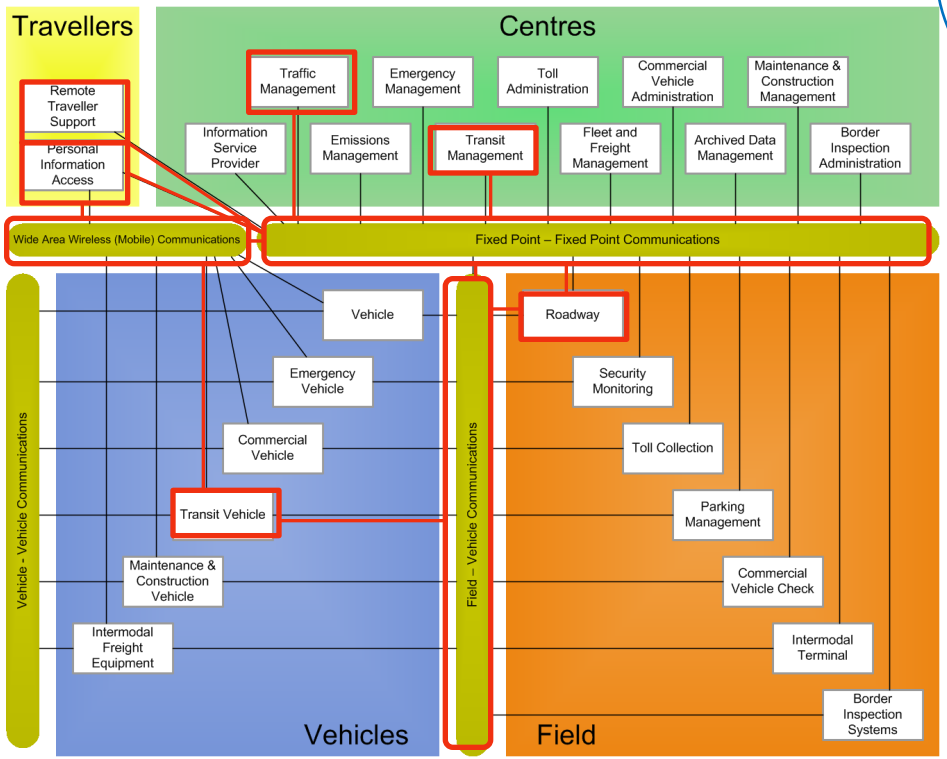
Transit Fleet Management + Signal Priority + Traveller Information

Transit Management



Transit Vehicle

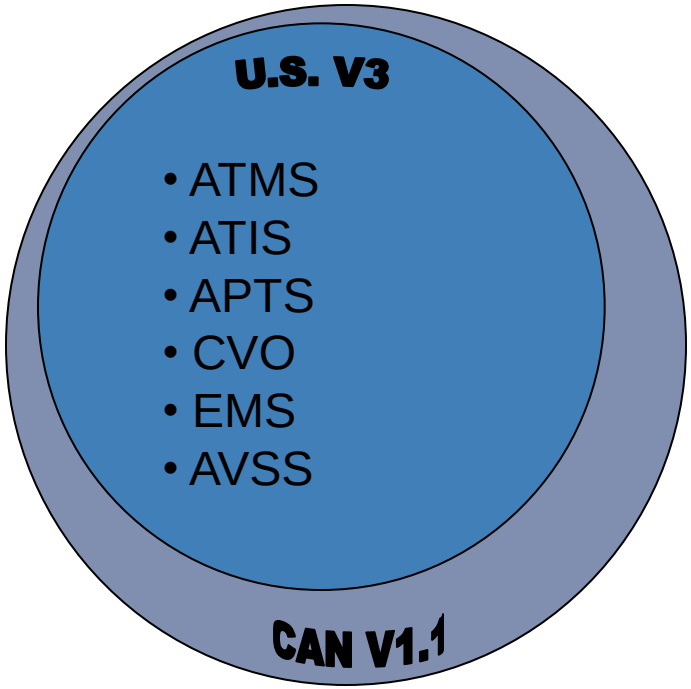




Communications

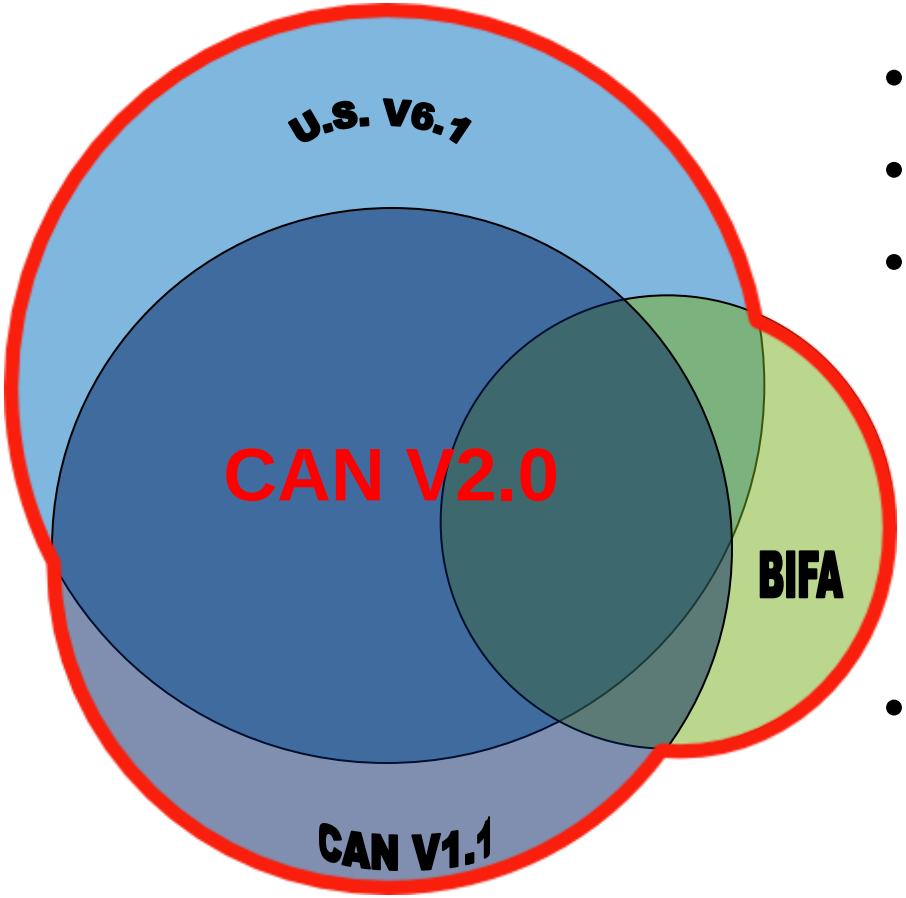
Roadway Subsystem

History of the ITS Architecture for Canada



- Expanded in areas:
  - Non-Vehicular Safety
  - Automated Enforcement
  - Operations and Maintenance
  - Environmental Monitoring
  - Disaster Management
  - Multi-modal
  - Intermodal Freight

ITS Architecture for Canada



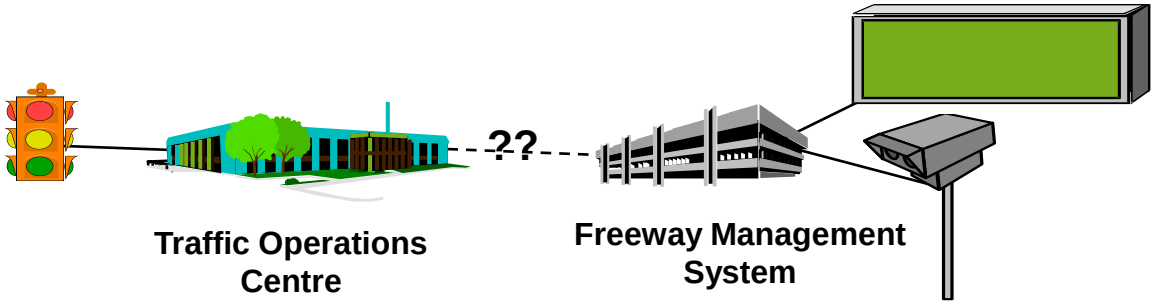
- Retain all of Version 1.1
- Align with U.S. Version 6.1
- Fully incorporate Border Information Flow Architecture

- Also:
  - Turbo Architecture for Canada
  - Regional Architecture Development Guide

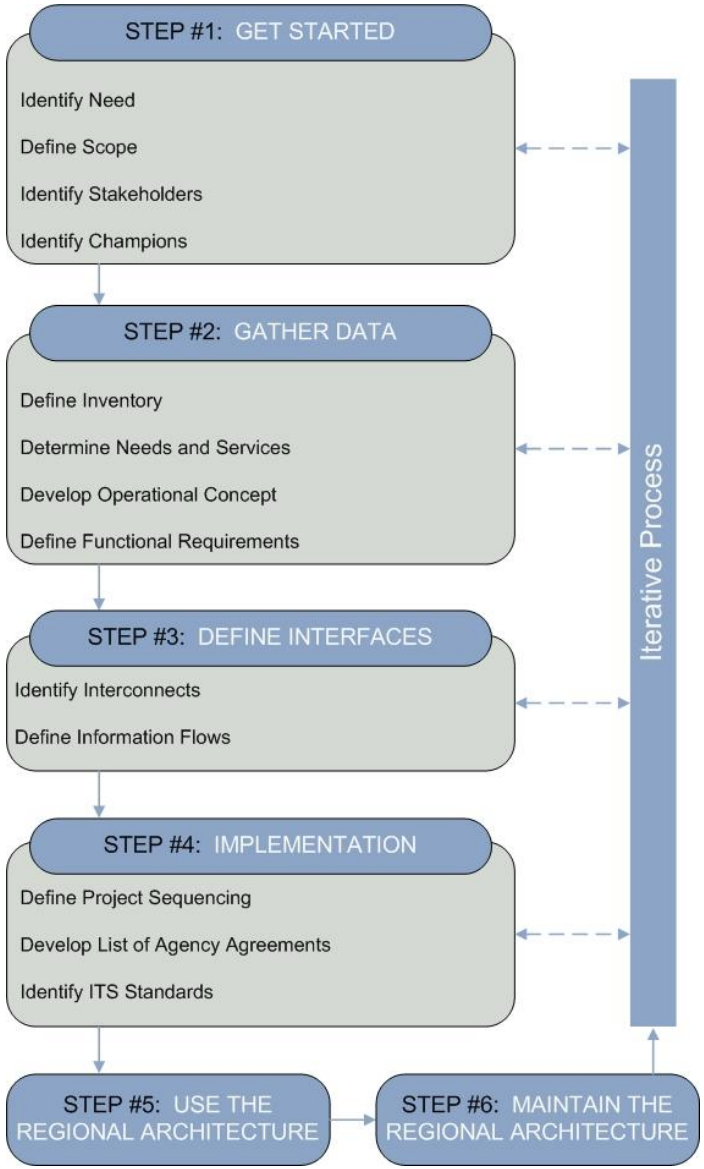
http://wwwapps.tc.gc.ca/innovation/its/eng/architecture/menu.htm

FRAMEWORK TO PLANS
(REGIONAL ARCHITECTURE)

"A regional ***framework*** for ensuring ***institutional agreement*** and ***technical integration*** for the implementation of ITS projects in a particular region."



Process for Developing a Regional ITS Architecture



Regional ITS Architectures in Canada

- Translink - Vancouver
- City of Calgary
- Region of York
- Transports Québec
- Ministry of Transportation of Ontario (Traveller Information)
- Ville de Montréal
- New Brunswick-Maine (Border)*
- Ontario-Québec Smart Corridor*
- Region of Peel*

* currently under development

NEW DIRECTIONS

External Influences and Opportunities

- Technology Evolution
  - Smart Phones
    - Services
    - Apps
  - ‘Google’; social media
  - INFOstructure (e.g. 3G,4G)
  - Smart Cars
- Public Expectations
- Alternate Fuels
- Environment
- Government Funding

New Direction: Examples

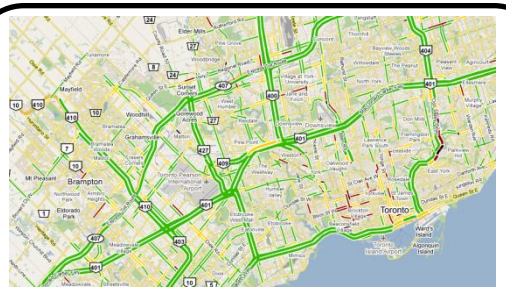
- **Traffic Data Collection**
- **Traveller Information**
- **Connected Vehicle**
- Managed Motorways
- Electronic Vehicle Registration
- HOT Lanes
- Congestion Charging
- Electric Vehicles
- VMT vs. Gas Tax

- Conventional Traffic Data Collection
  - Public sector
  - Capital (and maintenance) intensive
  - Spot data
  - Limited coverage
  - Processing
    - Automatic Incident Detection
    - Travel Times
    - Congestion

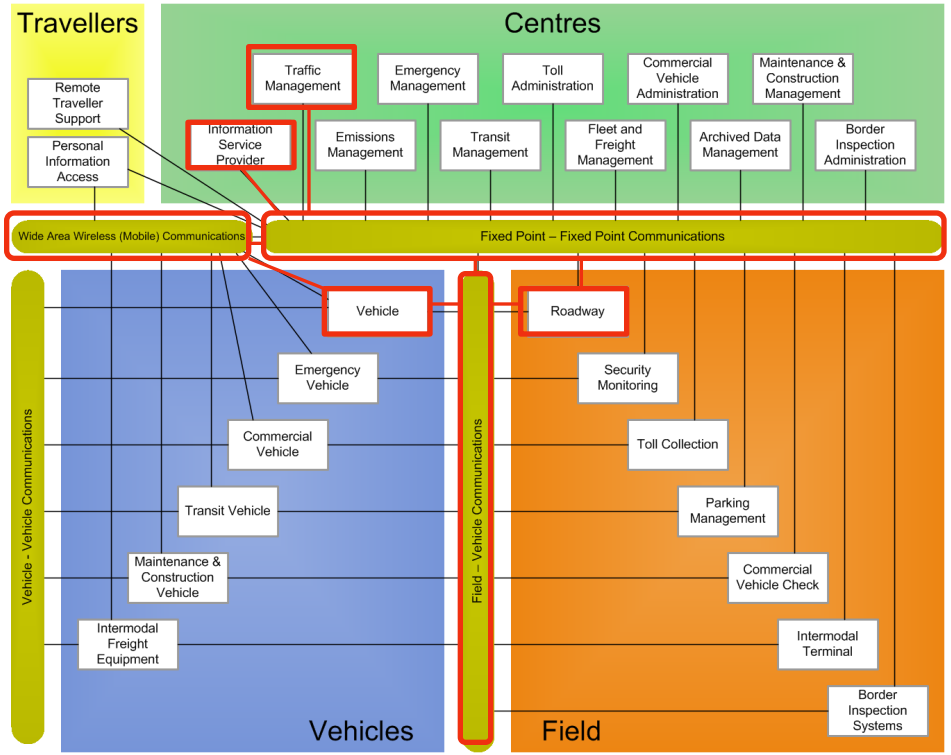
Probe Traffic Data

Traffic Management Subsystem

Information Service Provider



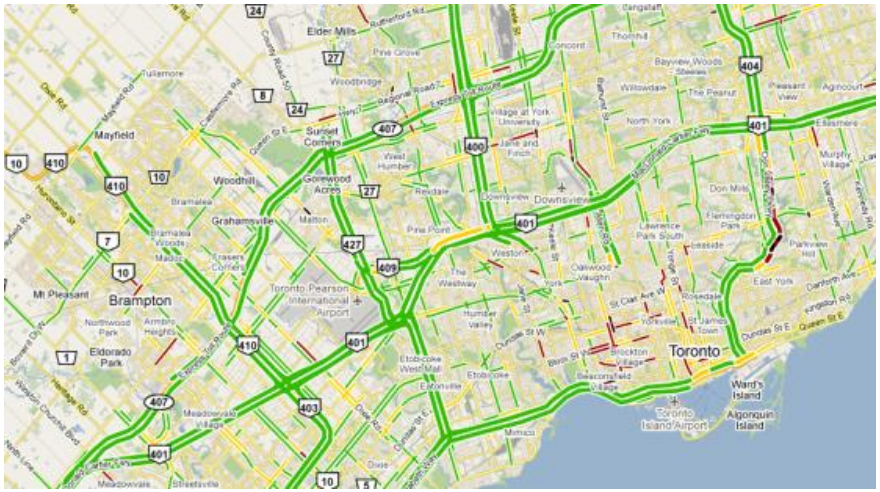
Communications



Roadway Subsystem

Vehicle Subsystem

- Opportunities
  - Private sector providers
  - Multiple technologies and data fusion
    - Cellphone tracking
    - GPS
    - GPS Fleet tracking
  - Network coverage
  - Travel times
    - Routes



The challenge: ***payment; service versus a capital expenditure***

New Direction Examples

- Traffic Data Collection
- Traveller Information
- Connected Vehicle
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- VMT vs. Gas Tax

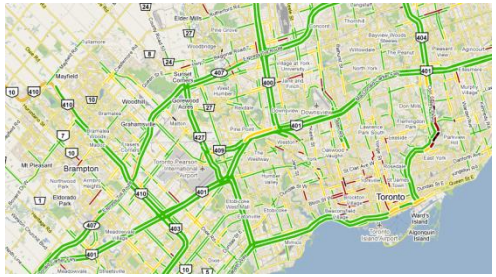
Conventional Delivery (Public Sector)

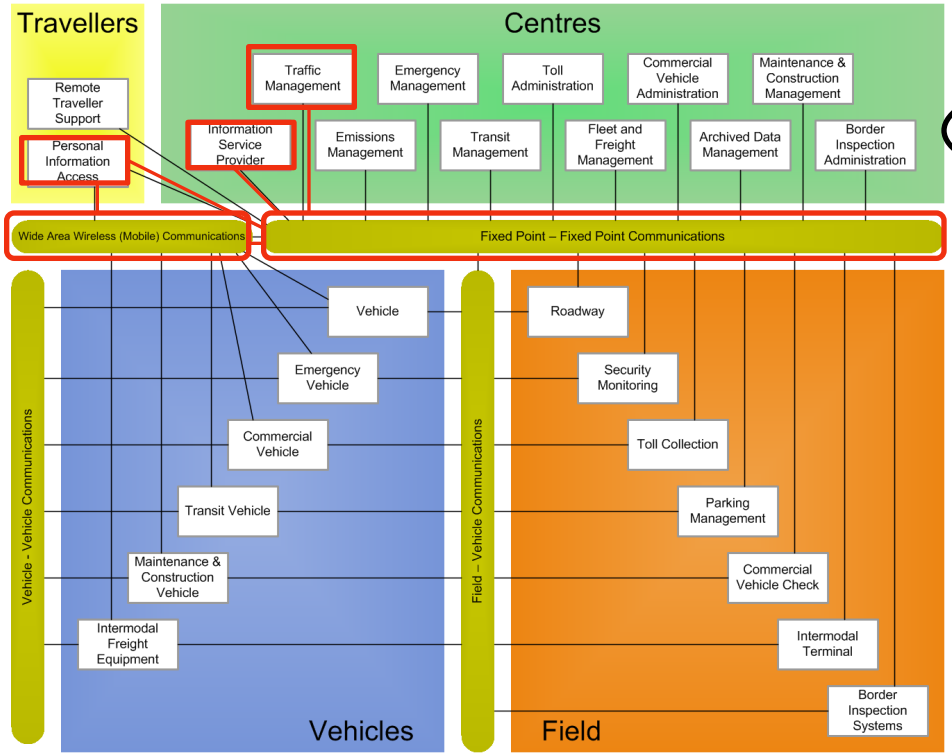
	Data (Inputs)	Delivery (Outputs)
Traffic	• events • road conditions • congestion • travel time	• dynamic signs • telephone (IVR) • website
Transit	• schedules • fares • routes	• telephone (call centre) • websites

Traveller Information

Traffic Management Subsystem

Information Service Provider





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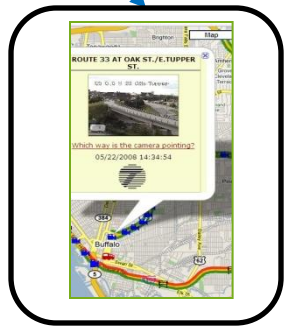

Other ISP

Personal Information Access

- Opportunities
  - Government has a mandate – public safety, network management, etc
  - Public Information an important service
  - Private sector can:
    - Move quickly
    - Help reduce costs

The challenge: **defining a partnership between government and private sector**

- Traffic Data Collection
- Traveller Information
- Connected Vehicle
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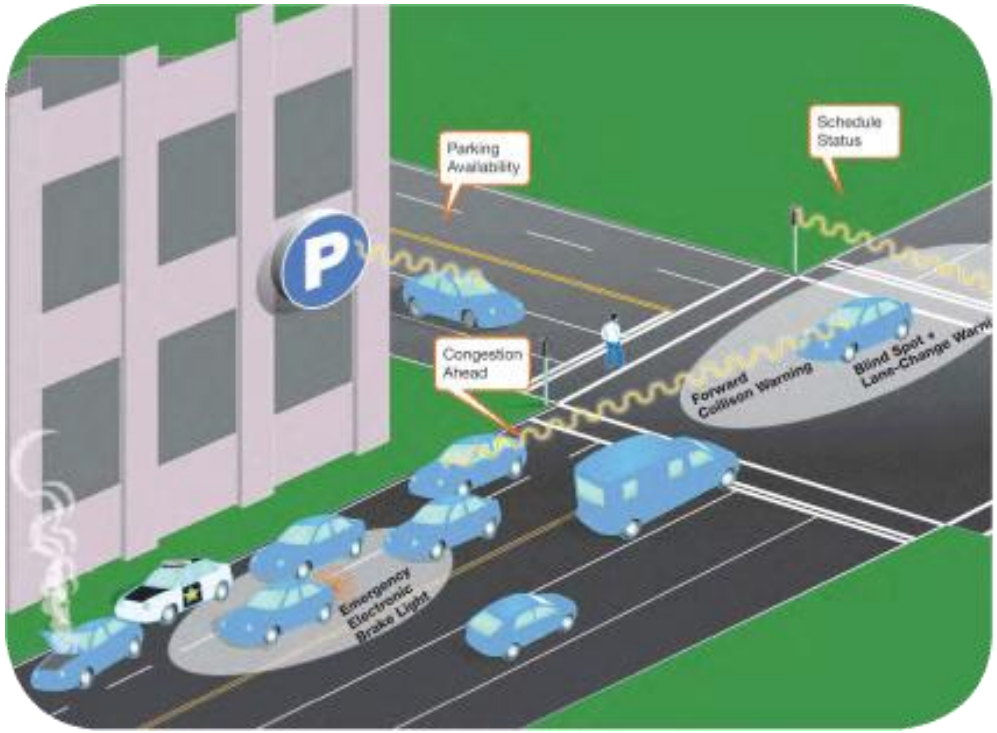
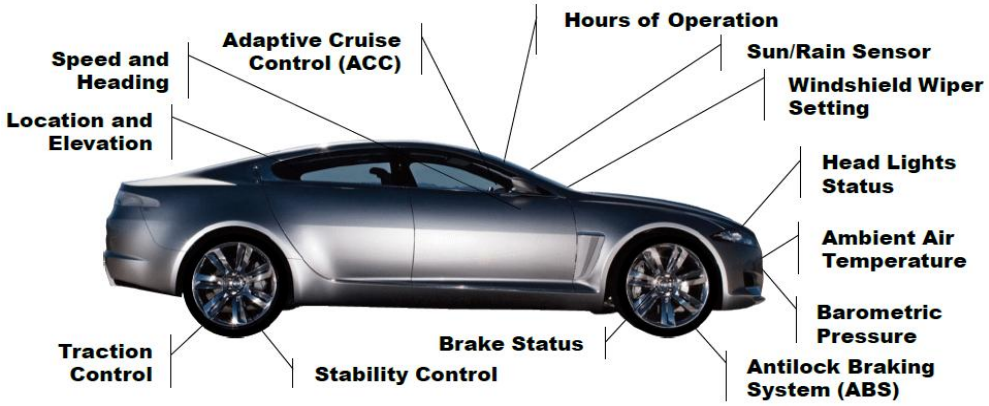
- VMT vs. Gas Tax



US DOT RITA

Opportunity

- Vehicles are heavily instrumented:
  - Vehicle sensing
  - GPS
  - Navigation



- Benefits from INFOstructure

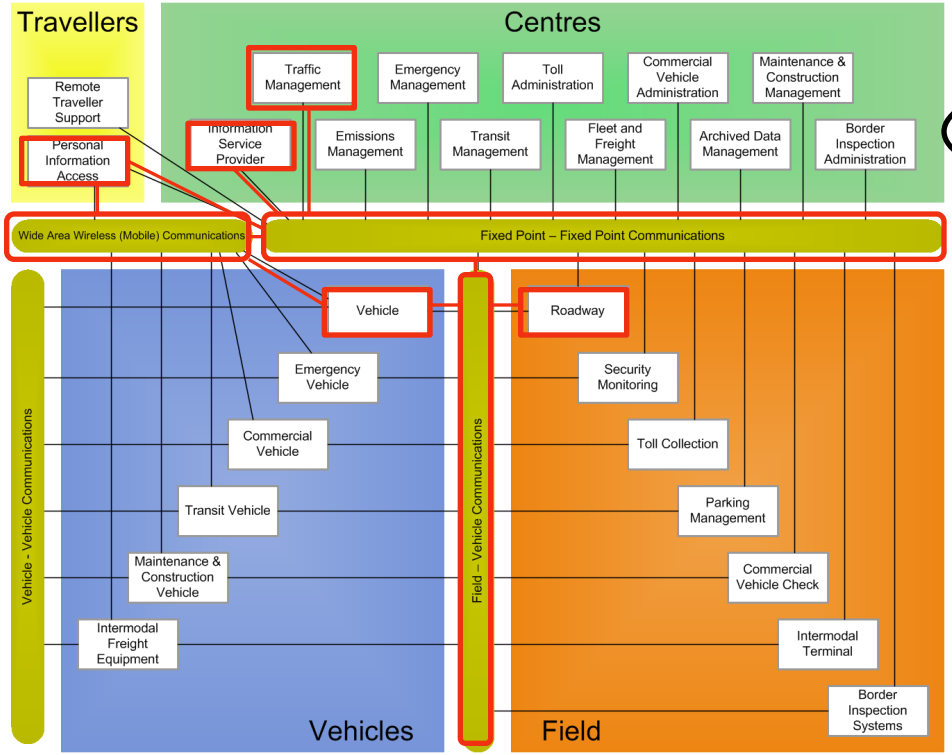
- .Opportunities for :
  - Improved safety
  - Better traveller information
  - Vehicle to roadside communications
  - Vehicle to vehicle communications

- Economic Development

Connected Vehicle

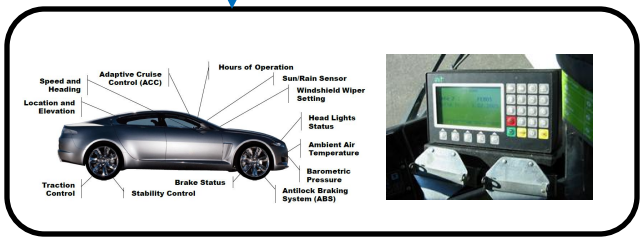
Traffic Management Subsystem

Roadway Subsystem



Communications

Personal Information Access



Vehicle Subsystem

The Challenge:

- Coordination between government, business (auto sector) and infostructure
- Impact on local infrastructure

Considerations

- **ITS will become increasingly important** :
  - Technology evolution (INFOstructure)
  - Population expectations
  - Limitations on infrastructure

- Next generation of **ITS technology has significant promise**:
  - will require more **innovative delivery options** mechanism
    - e.g. PPP
  - Payment for a service versus ownership of equipment

- To realize the full value of ITS requires a **Master Plan (Architecture)**:
  - Guides:
    - purchase of equipment
    - **arrangements with agencies and private sector**
    - construction of infrastructure

Questions?

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