Intelligent Transportation Systems (ITS)
- Background
- Framework for Deployment
- New Directions
Intelligent Transportation Systems (ITS) Background

1. Initiated in the early 90’s
2. Responds to:
   - Congestion
   - Energy
   - Environment
   - Safety
3. Cost/challenges 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?

- **INTEG**
  
  “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”
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
- Maximize 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)
What is an ITS Architecture?

“a common framework for planning, defining, and integrating intelligent transportation systems.”
• 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.”
Regional ITS Architecture Guidance for Canada

Developing, using and maintaining an ITS architecture for your region

Remote traveler support • Personal information access • Wide area wireless communications • Vehicle • Transit vehicle • Commercial vehicle • Emergency vehicle • Vehicle-to-vehicle communications

STEP #1: GET STARTED
- Identify Need
- Define Scope
- Identify Stakeholders
- Identify Champions

STEP #2: GATHER DATA
- Define Inventory
- Determine Needs and Services
- Develop Operational Concept
- Define Functional Requirements

STEP #3: DEFINE INTERFACES
- Identify Interconnects
- Define Information Flows

STEP #4: IMPLEMENTATION
- Define Project Sequencing
- Develop List of Agency Agreements
- Identify ITS Standards

STEP #5: USE THE REGIONAL ARCHITECTURE

STEP #6: MAINTAIN THE REGIONAL 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
Traffic Data

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

IBI Group

CTRF 46th Annual Conference

Traffic Management Subsystem

Information Service Provider

Communications

Roadway Subsystem

Vehicle Subsystem

ITS - The Practice and The Promise
Traffic Data

• 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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## Conventional Delivery (Public Sector)

<table>
<thead>
<tr>
<th>Data (Inputs)</th>
<th>Delivery (Outputs)</th>
</tr>
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<tbody>
<tr>
<td><strong>Traffic</strong></td>
<td></td>
</tr>
<tr>
<td>• events</td>
<td>• dynamic signs</td>
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<tr>
<td>• road conditions</td>
<td>• telephone (IVR)</td>
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<tr>
<td>• congestion</td>
<td>• website</td>
</tr>
<tr>
<td>• travel time</td>
<td></td>
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<tr>
<td><strong>Transit</strong></td>
<td></td>
</tr>
<tr>
<td>• schedules</td>
<td>• telephone (call centre)</td>
</tr>
<tr>
<td>• fares</td>
<td>• websites</td>
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<tr>
<td>• routes</td>
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</tbody>
</table>
• 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
New Direction Examples

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