

8th University Transportation Center Spotlight Conference

The Role of Freight Transportation in Economic Competitiveness

Innovative Freight Data Collection Methods and Performance Measure at U.S.-Mexico Border

Juan Carlos Villa



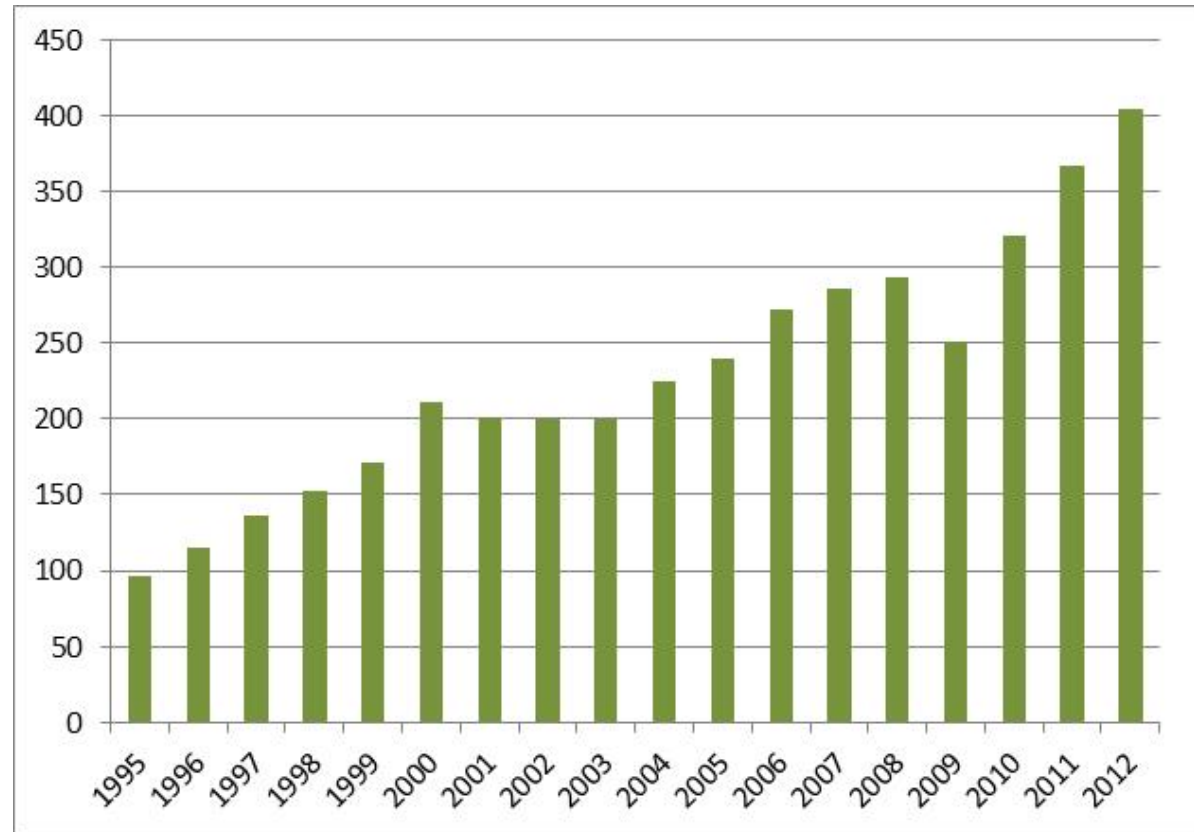
Agenda

- **Land border crossing operations**
- **Technology assessment**
- **Border crossing information system**
- **Performance measures**

Land Border Crossing Operations

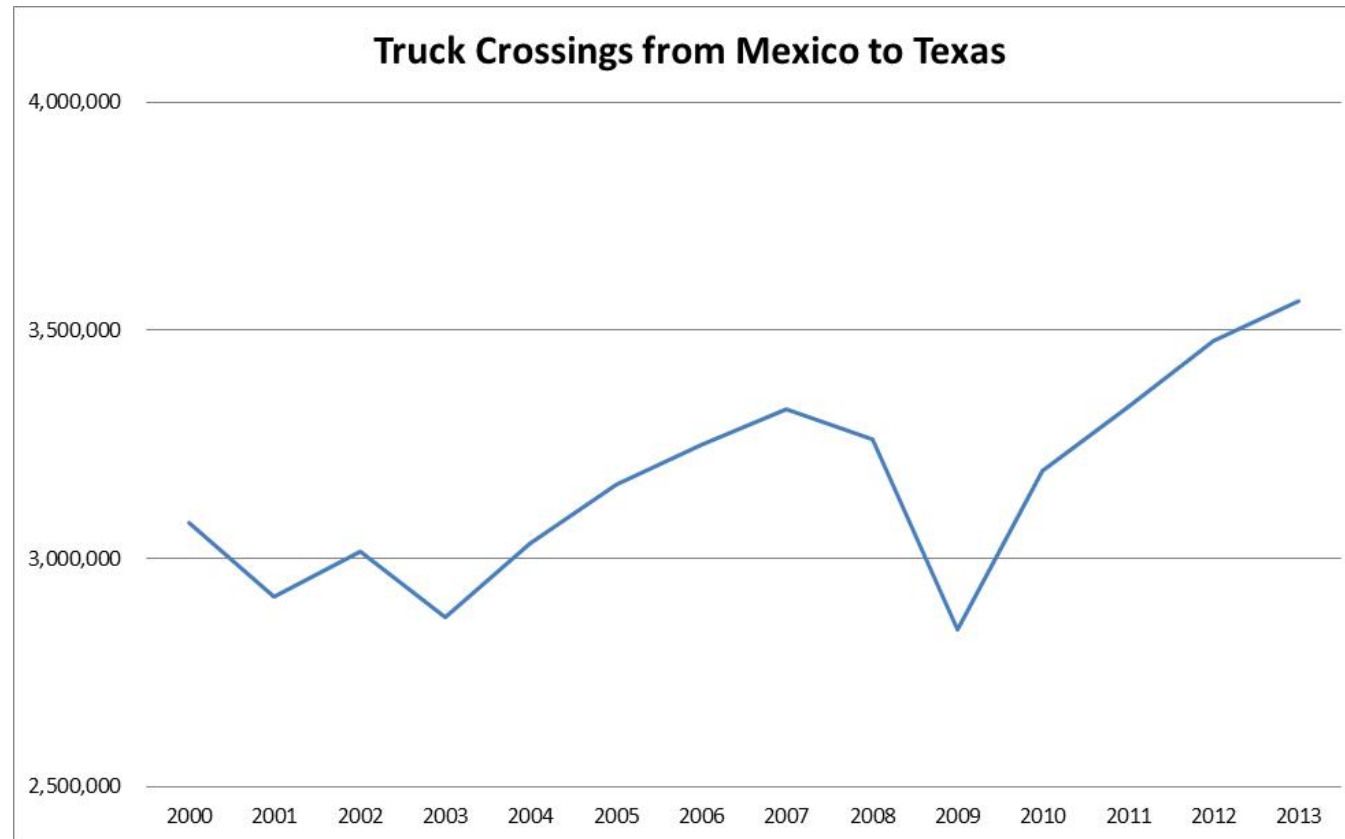
- Surface trade grew from \$97 billion to more than \$400 billion since NAFTA started.
- More than \$30 billion dollars of trade traffic cross the border on a monthly basis

Surface Trade between U.S. and Mexico



Land Border Crossing Operations

- Crossings grew from 3 to more than 3.5 million between 2000 and 2013.
- Average annual growth higher than GDP growth



Land Border Crossing Operations

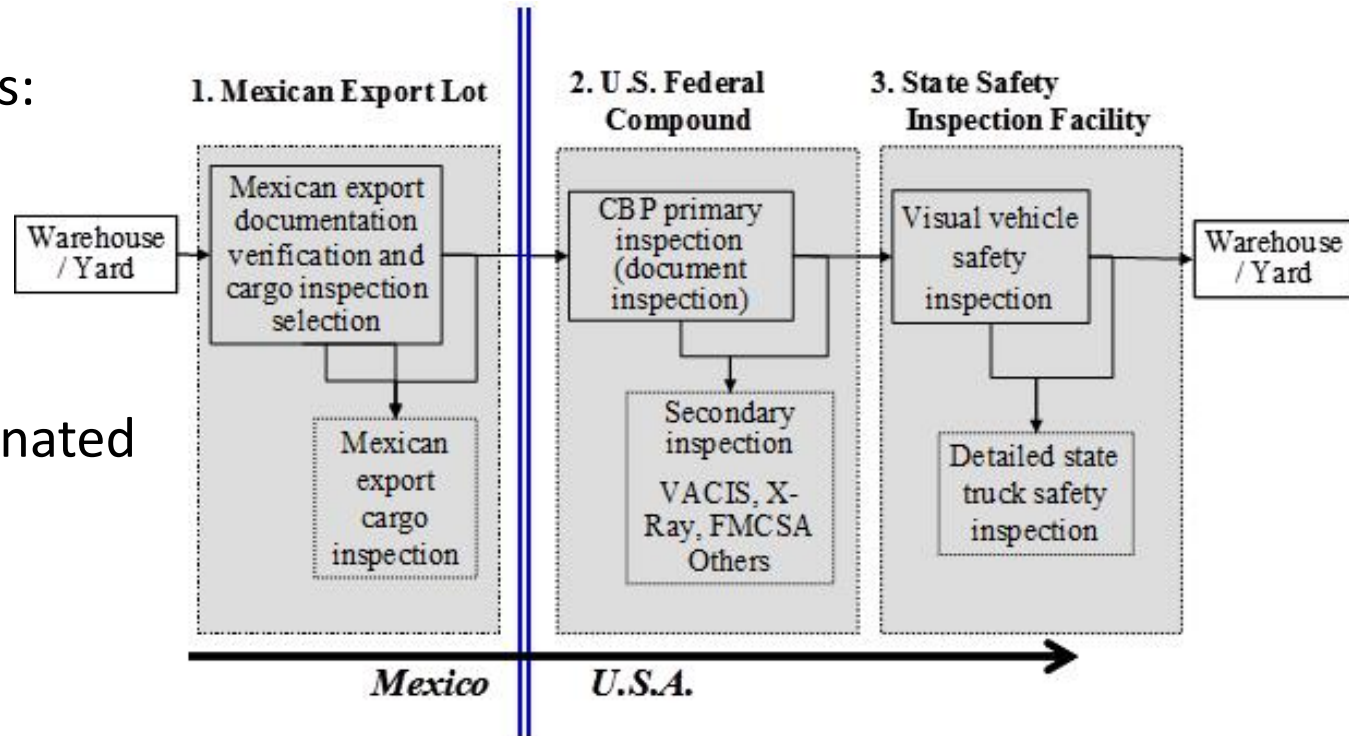
- Three potential inspection points

- Multiple stakeholders:

- 2 countries
- Public and Private
- Federal, state, local

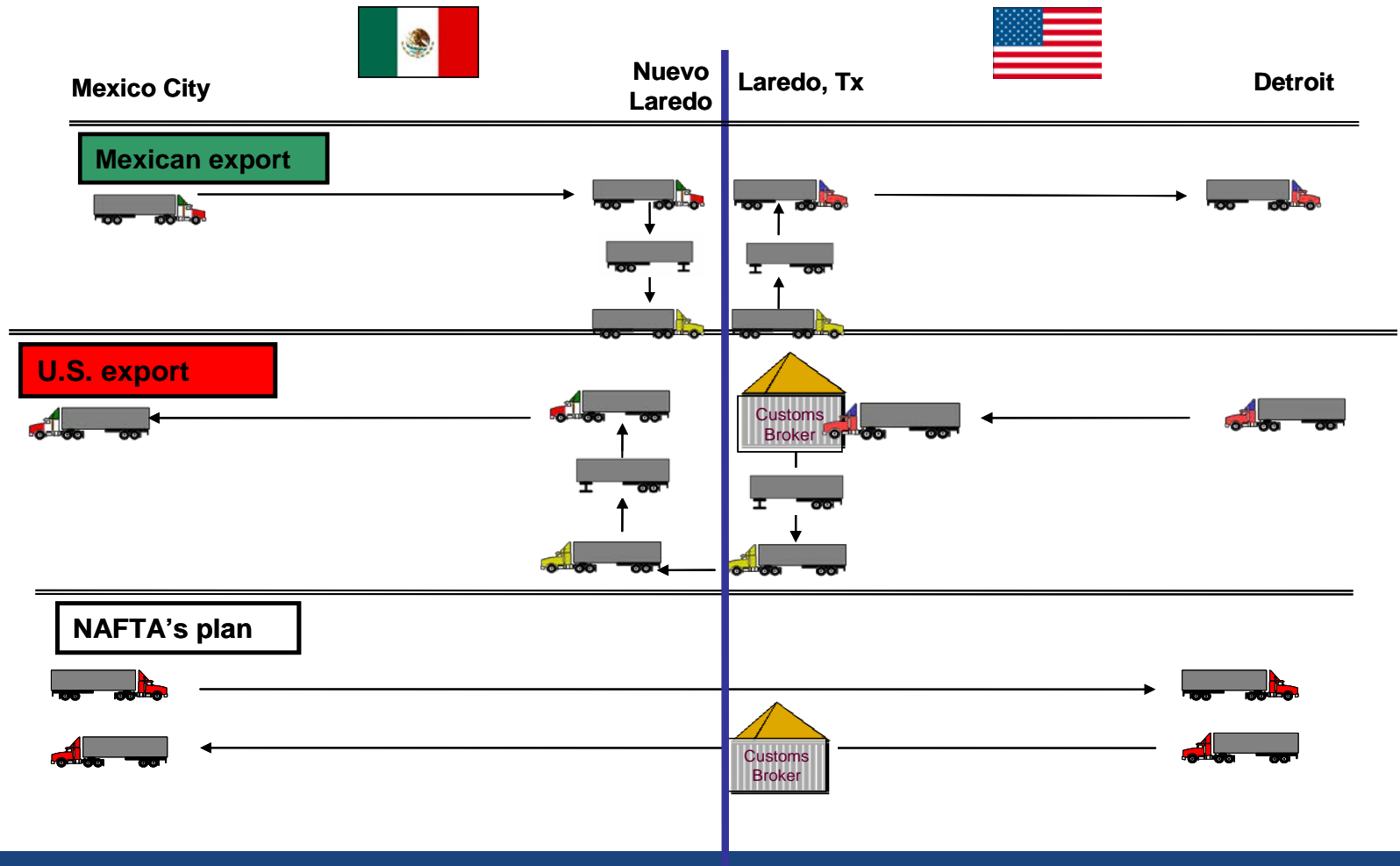
- All need to be coordinated

US Bound Commercial Vehicle Crossing

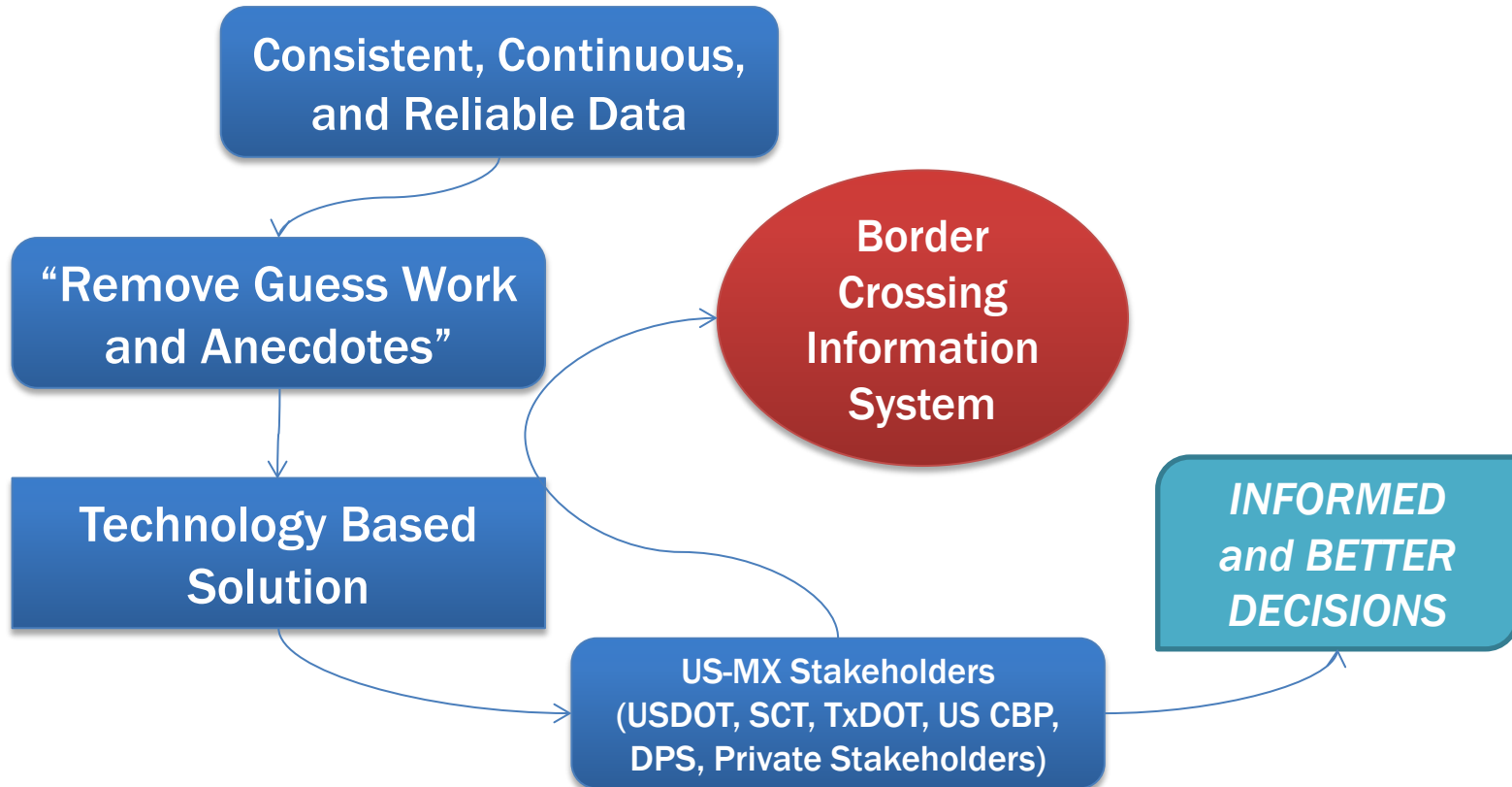


Land Border Crossing Operations

US-Mexico Commercial Vehicle Crossing



Rationale for Deploying Measurement Systems



Technology Assessment

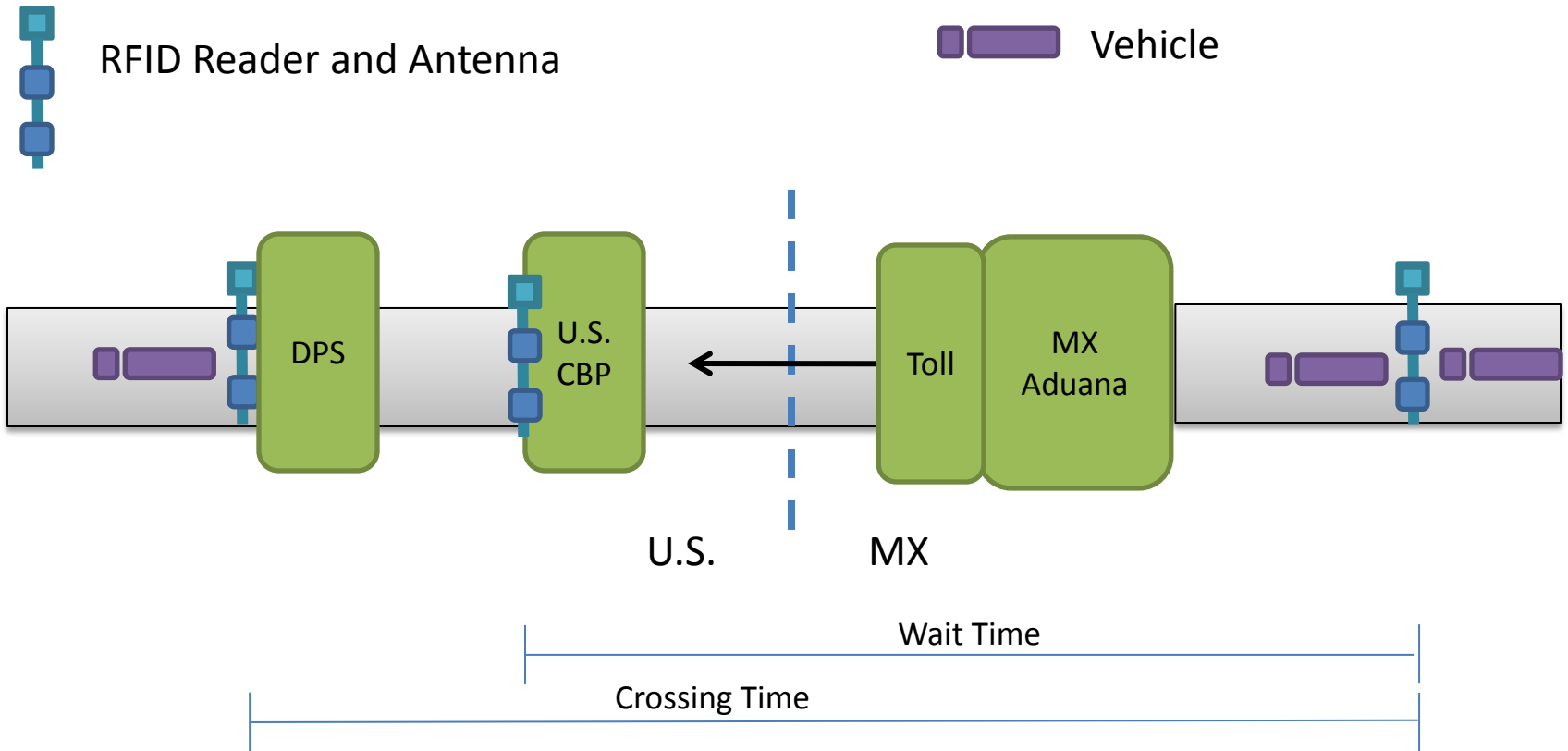
- Six Technologies were Originally Analyzed
 - Automatic Vehicle Identification (AVI)
 - AVI using Laser Frequency
 - AVI using Radio Frequency (RFID)
 - AVI using Infrared Frequency
 - Automatic License Plate Recognition (ALPR)
 - Vehicle Matching
 - Automatic Vehicle Location (AVL)
 - GPS
 - Mobile Phone Location
 - Inductive Loop Detectors
- Two Technologies Emerged as Best Candidates
 - GPS
 - RFID

Technology Assessment (con't)

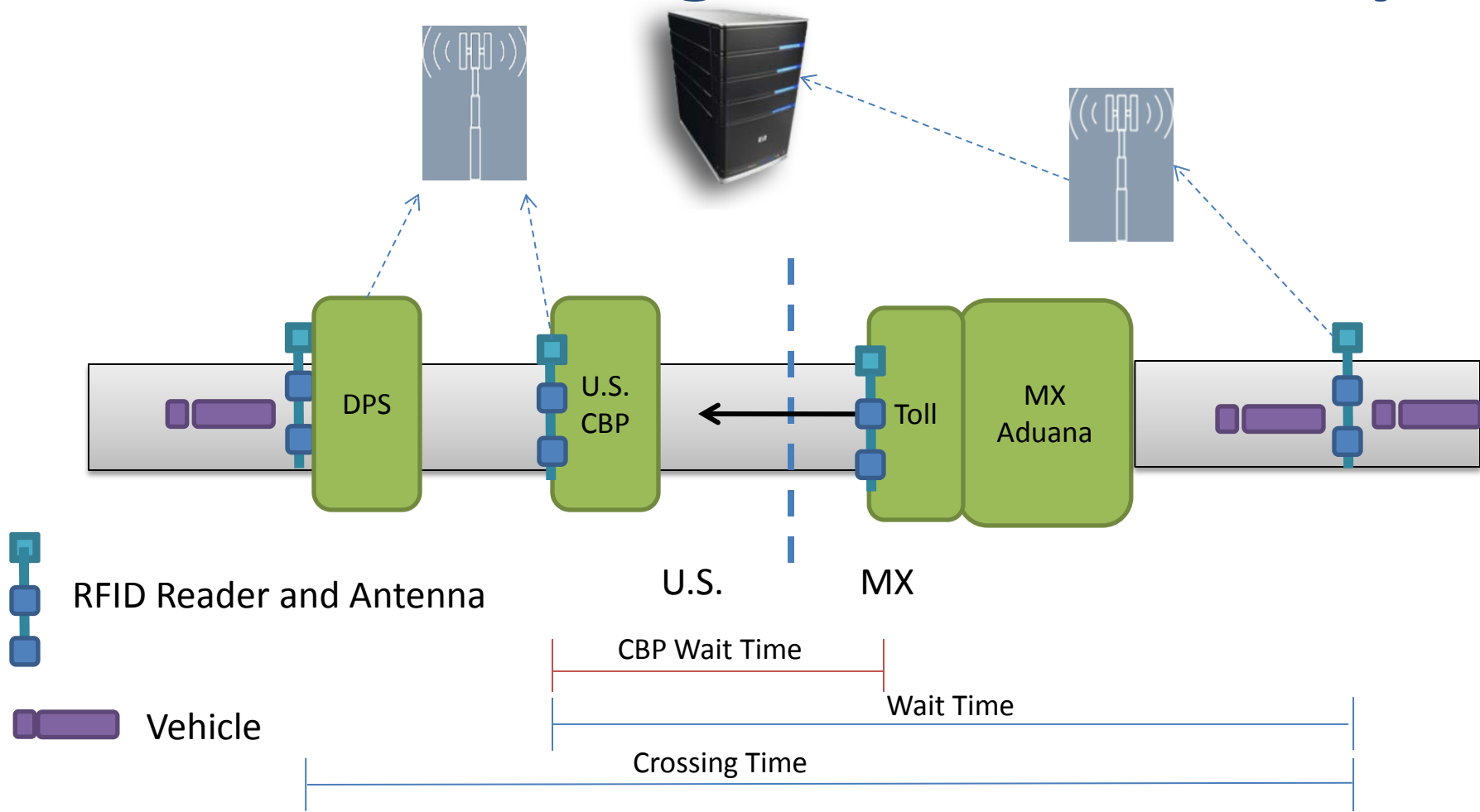
RFID

- Benefits
 - RFID technology already in use by CBP for FAST program, and is being implemented by DPS at State Inspection Facilities
 - No in-truck equipment installation required
 - Continuing costs of operation is relatively low
- Concerns
 - Data collected is not as precise as GPS
 - Agreements must be made with US / Mexican agencies to install RFID readers Information system more complicated than GPS

How RFID Technology Works



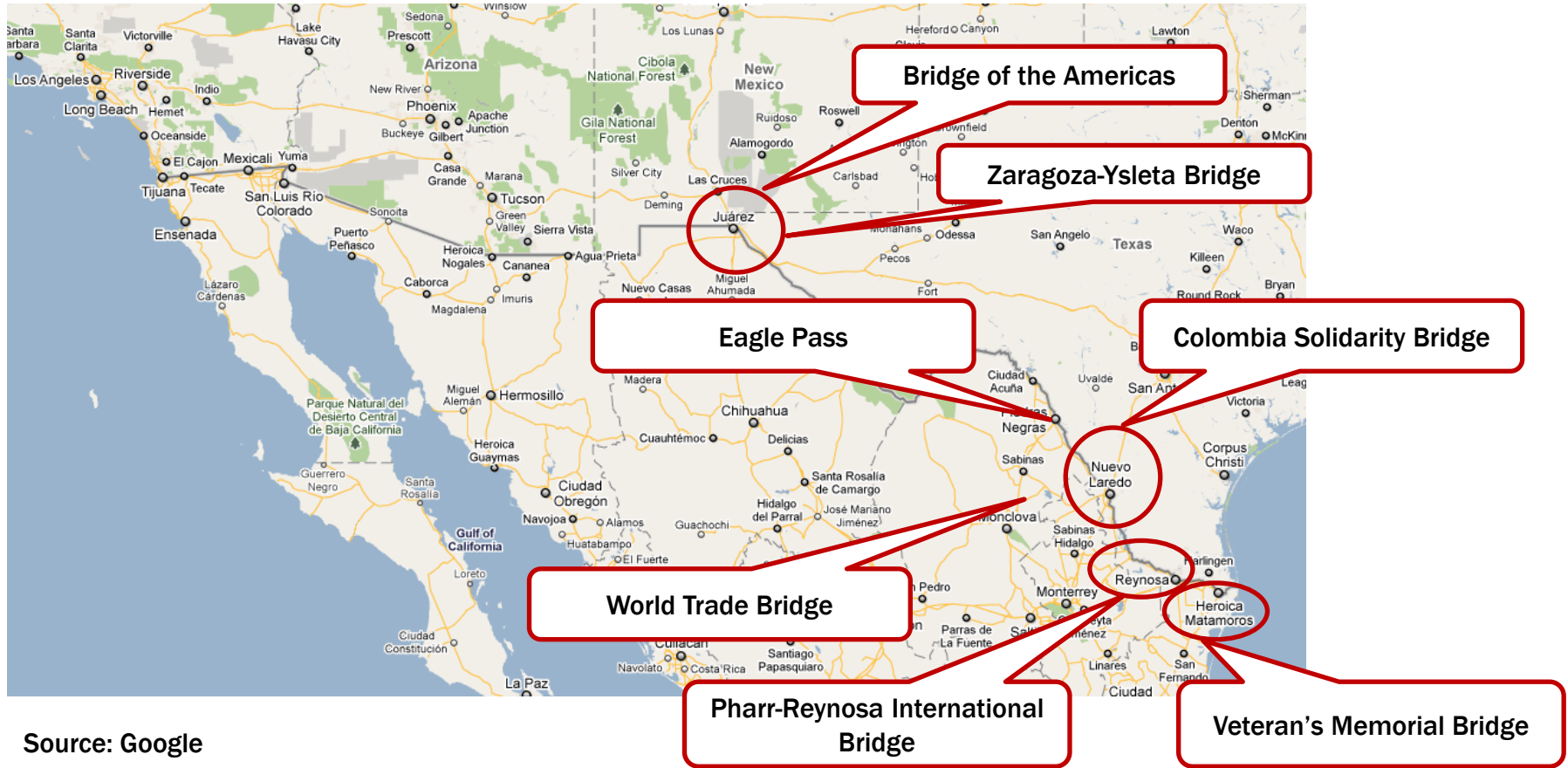
Additional Segmentation of Trips



Positioning of RFID Readers

- End of Queue
- Exit of CBP Primary Inspection Facility (to compute wait time)
- Exit of DPS Inspection Facility (to compute crossing time)
- Intermediate readers as required
- One antenna for each lane
- Additional antennas are being installed at toll booths in Mexico with CBP funding to estimate wait times from that point to CBP Primary

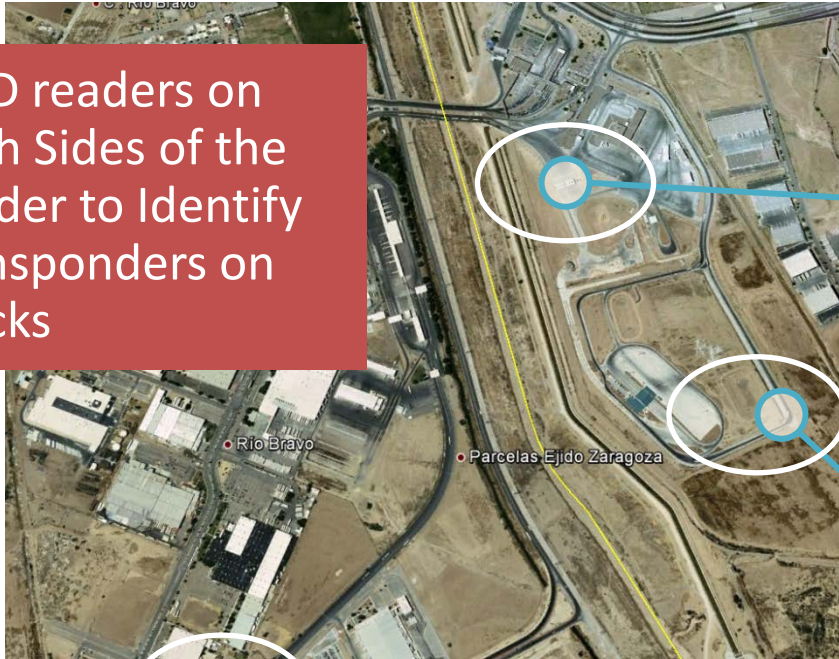
Commercial Vehicle Wait Times



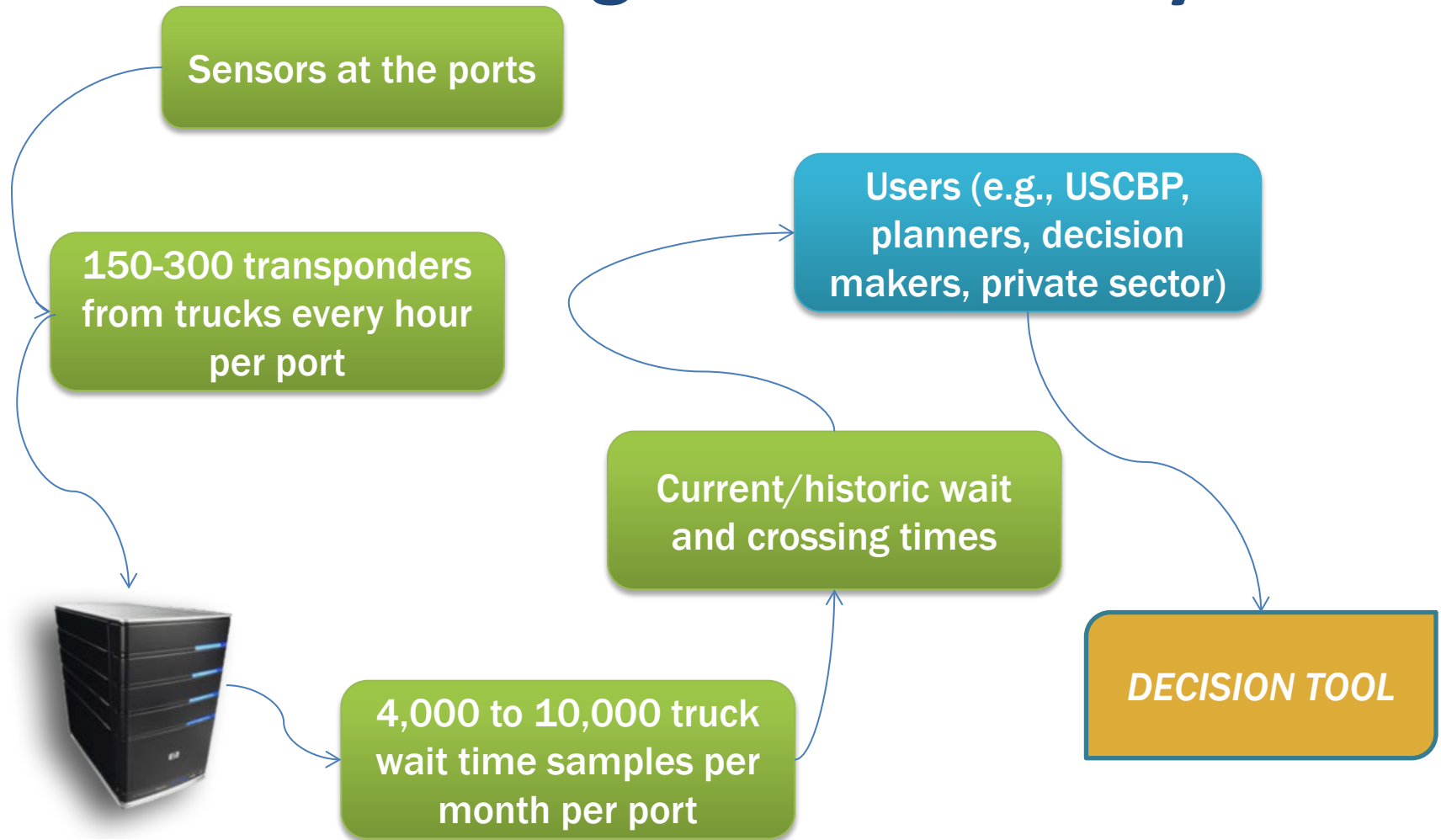
Source: Google

RFID Based Wait Time Measurement System

RFID readers on both Sides of the border to Identify transponders on trucks



Border Crossing Information System



Land Border Performance Measures

Northbound commercial vehicle travel time measurements

- Wait times
- Crossing times
 - Real time
 - Archived data



Delays – Annual hours of delay per crossing

Planning Time Index (reliability) – ratio of 95th percentile travel time to the uncongested travel time

Land Border Performance Measures

En Español

<http://bcis.tamu.edu>

Border Crossing Information System

REAL-TIME INFORMATION

- Real-time Information
- Query Archived Data
- View Dashboard
- Subscribe Data

- View Project Reports
- About Team and Sponsors
- Help and Glossary
- Contact Us

- Capability to provide travel times to users in real time

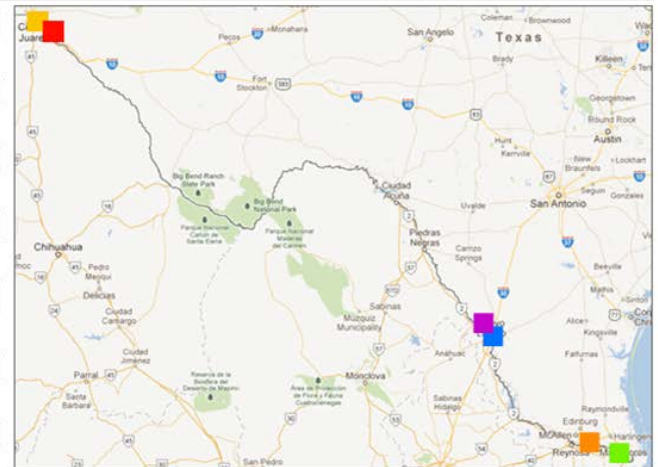
■ Bridge of the Americas, El Paso, TX

Wait time for Bridge of the Americas, El Paso, TX is estimated based on the travel time between the RFID station at Intersection of MX45 and Cuatro Siglos and the RFID station at U.S. CBP Primary.

Crossing time for Bridge of the Americas, El Paso, TX is estimated based on the travel time between the RFID station at Intersection of MX45 and Cuatro Siglos and the RFID station at Exit of DPS.



WAIT TIME	CROSSING TIME	LAST UPDATE
■ Bridge of the Americas, El Paso, TX		
Unavailable	Unavailable	Aug 17 2013 8:40AM MDT
■ Ysleta Bridge, El Paso, TX		
20 Minutes	29 Minutes	Aug 17 2013 8:40AM MDT
■ Pharr-Reynosa International Bridge, Pharr, TX		
36 Minutes	39 Minutes	Aug 17 2013 9:40AM CDT
■ World Trade Bridge, Laredo, TX		
21 Minutes	29 Minutes	Aug 17 2013 9:40AM CDT
■ Colombia Bridge, Laredo, TX		
Unavailable	Unavailable	Aug 17 2013 9:40AM CDT
■ Veteran's Memorial Bridge, Brownsville, TX		
Unavailable	Unavailable	Aug 17 2013 9:40AM CDT



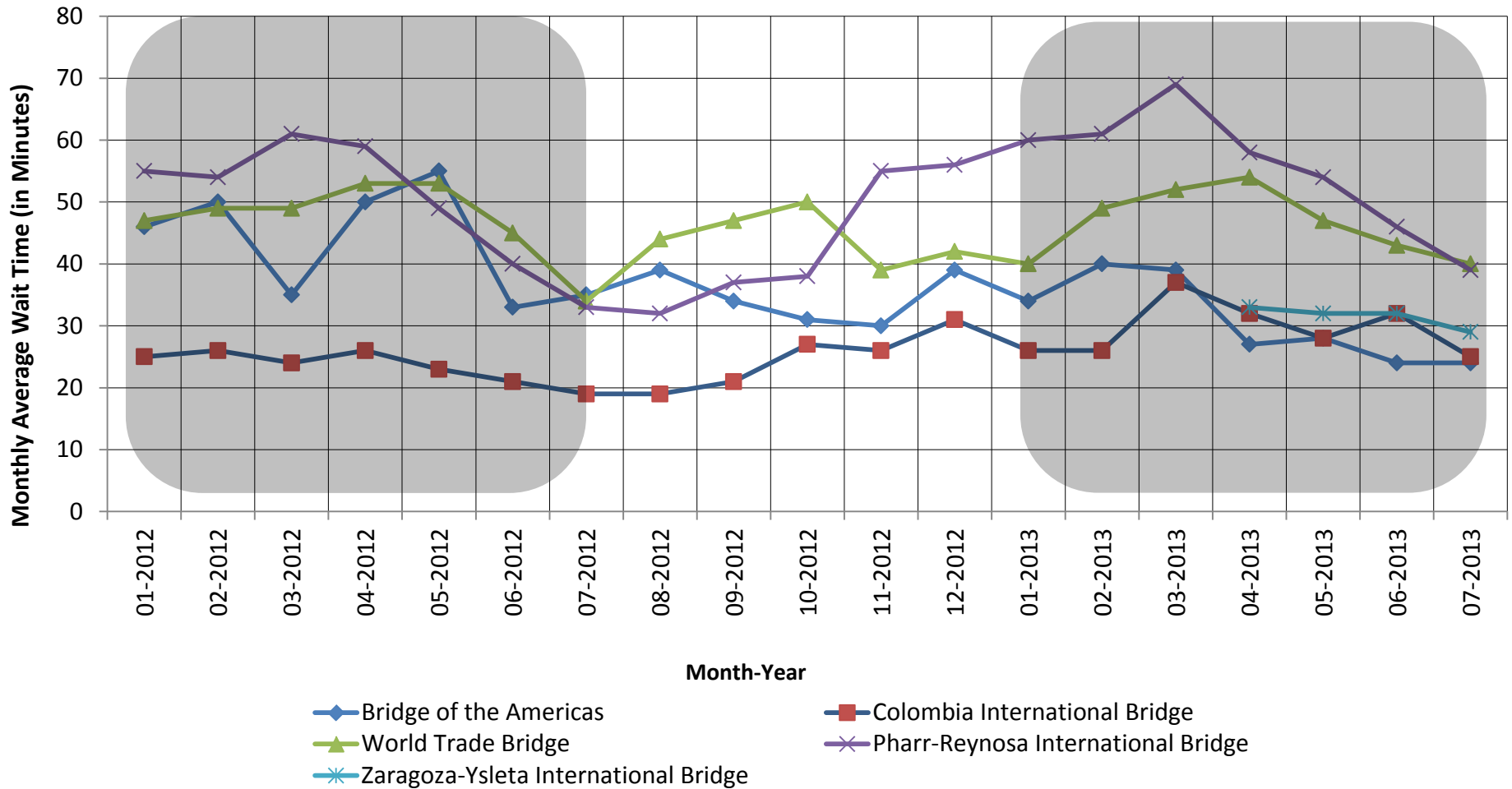
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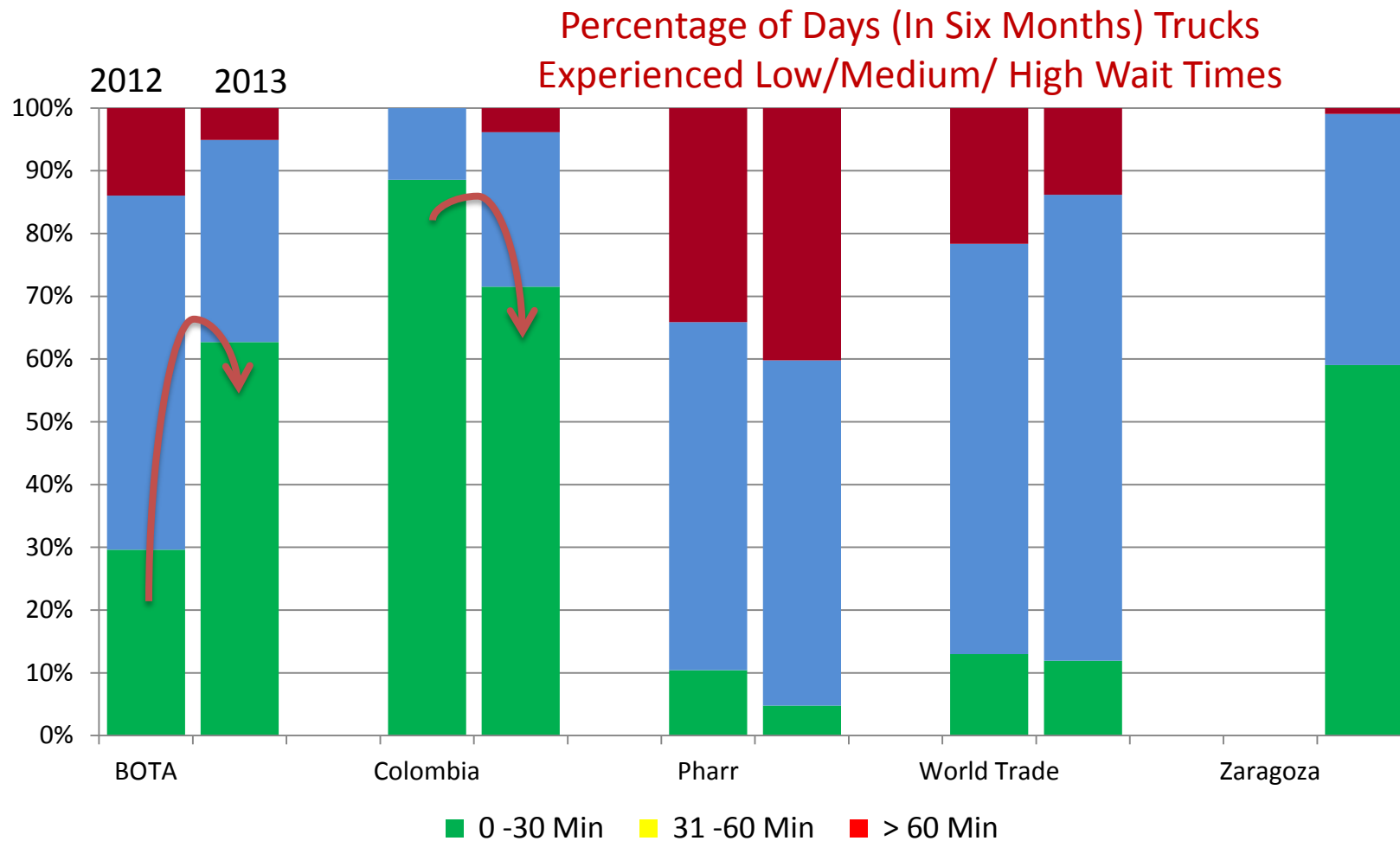
Land Border Performance Measures

US Bound Truck Wait Time Trends



Land Border Performance Measures

US Bound Truck Wait Time Trends



Land Border Performance Measures

Freight Fluidity

- Transport Canada's "fluidity indicator"
- Evaluate the performance of trade corridors and multi-modal supply chains.
- Measures total transit time and travel time reliability of goods along defined supply chains.

Land Border Performance Measures

Border Freight Fluidity

How “fluid” the supply chains at international border crossings are operating in terms of mobility and reliability.

Two performance components:

- 1. Mobility and reliability measures:**
 - Delay
 - Extent/duration/intensity of congestion
 - Cost of wasted fuel
 - Cost of time
 - Economic impacts

Land Border Performance Measures

Border Freight Fluidity

2. How much freight is moved?

- Truck volumes by time of day
 - ✓ Empty
 - ✓ Loaded
 - ✓ FAST
 - ✓ Non-FAST
- Weight
- Value (by commodity type)

Challenges

- Capture additional information to supplement current measures:
 - Volumes by empty, loaded, FAST, Non-FAST
 - Commodity (inside the box)
 - Annual Congestion Cost – value of truck operating costs plus wasted fuel
- **Complement measures to include the whole supply chain**

Opportunities

- Take advantage of emerging technologies
 - GPS, Bluetooth, Wifi
- Develop additional applications with input from private and public sector stakeholders
 - Annual Congestion Cost – value of truck operating costs plus wasted fuel
 - Emissions
- Provide information for border crossing operations to carriers, shippers, federal and state agencies

Thanks

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