Application of Freight Flow Measurements

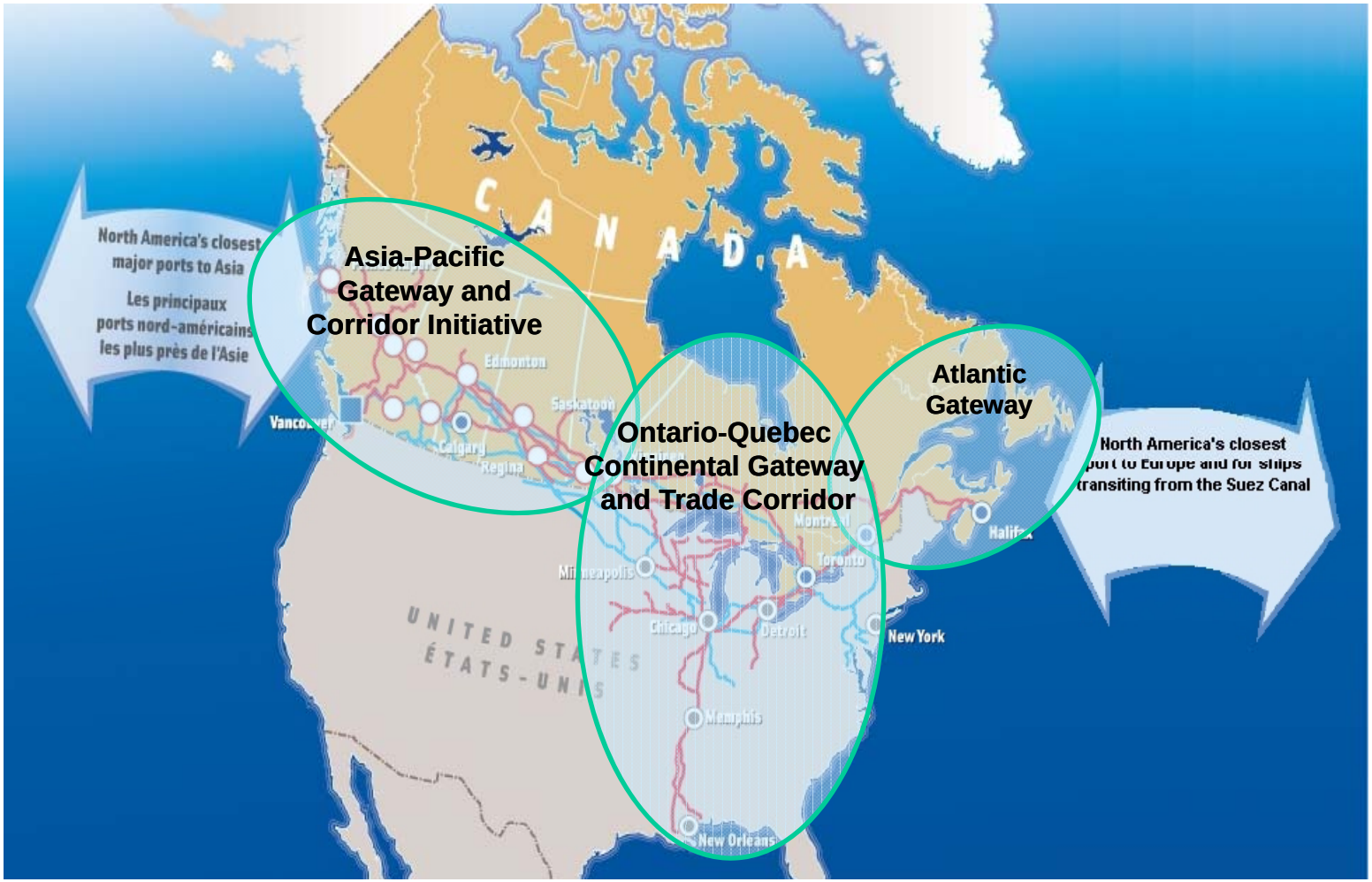
Presentation at TRB/OECD Workshop,
Vancouver, British Columbia
October 15-16, 2009

Welcome / Bienvenue

Transport Canada Policy Context: Gateways and Trade Corridors

- Transport Canada ‘s Reliability concepts based on the following:
  - Transparency of Country’s Performance
  - Build credibility of supply chains
  - Based on “Time-to-Market” Concept
    - Time-consistency of the supply chain taking into account seasonality and landmark events
    - Variability of Transport
    - Predictability for the users
  - Competitiveness

Canada's Gateways and Trade Corridors: System-wide Approach



October 2006+

Efficient, reliable and secure gateways to North America

Aligning trade & transportation

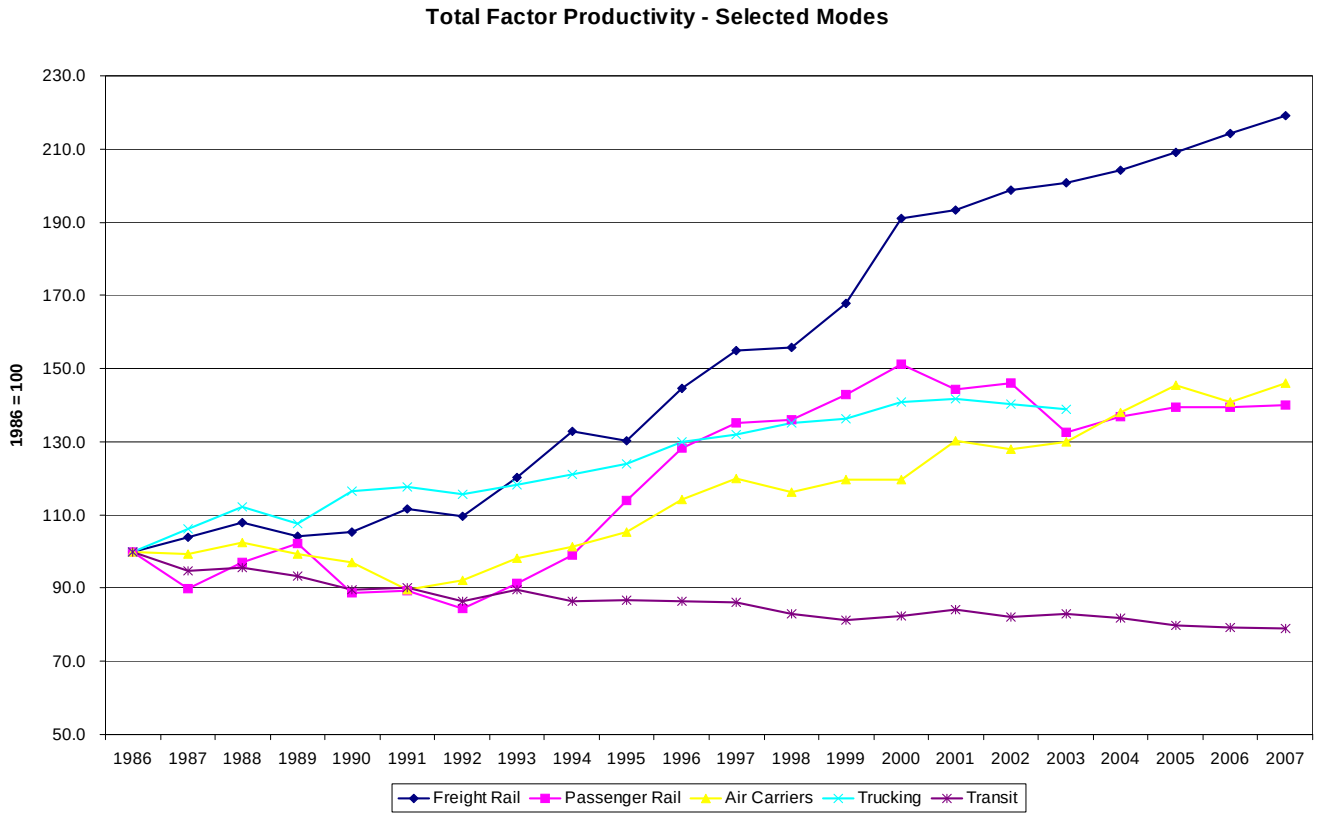
Integrated package of investments and policy aimed at enhancing Canada' s competitiveness

System-wide approach

Role of Transport Canada's Economic Analysis Directorate

- Transportation price and productivity performance measurement
- Impact of transportation productivity
- Recognize the need for new performance indicators – more horizontal than vertical
- System wide performance indicators recognizing horizontal integration compared to traditional vertical measurement

Example of Modal Productivity Measures



System-Wide Approach to Gateways & Corridors

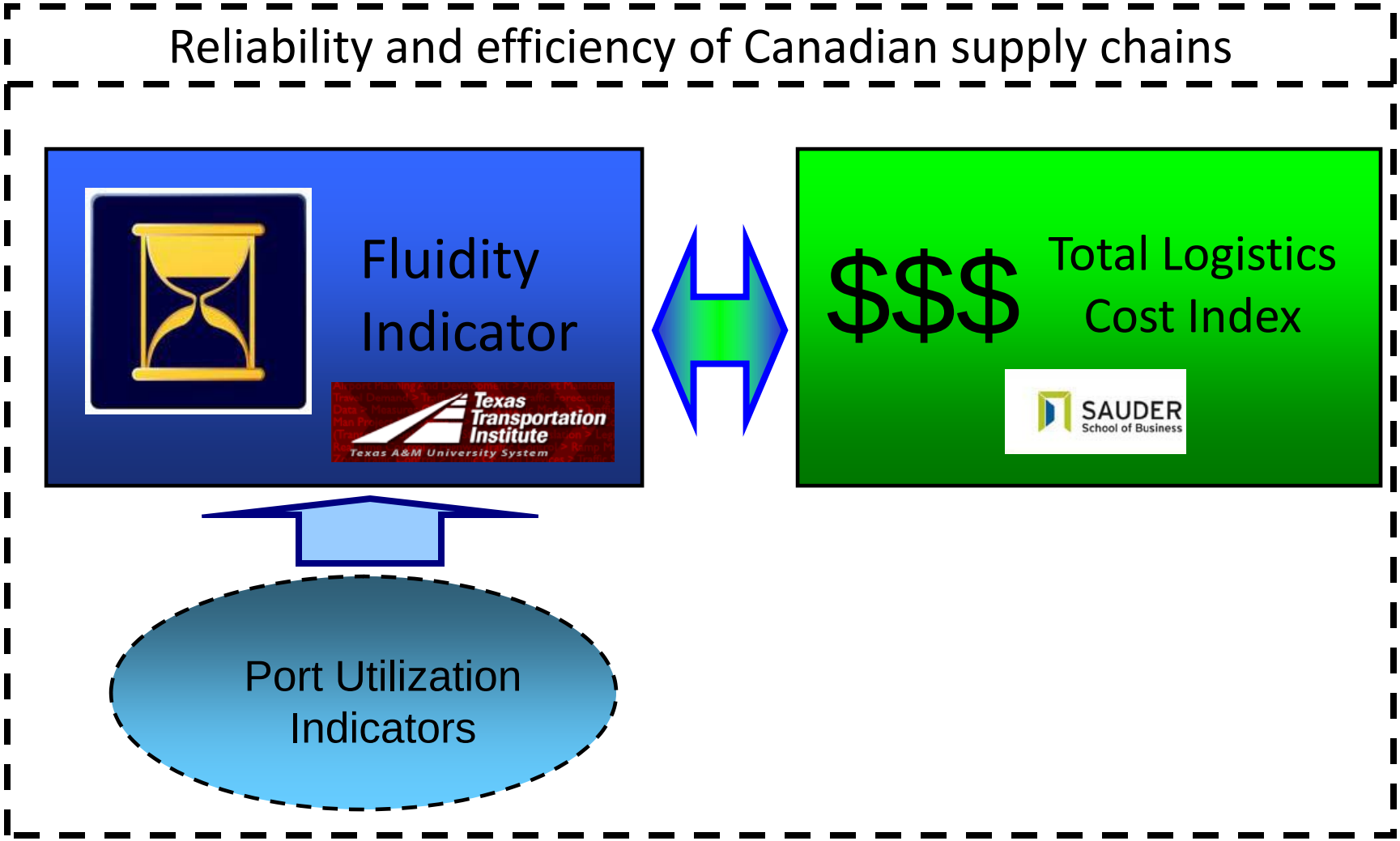
- Looking at performance of Canadian system through a Total Logistics and Global Value Chain lens.

- Objective: develop system-wide performance indicators that would allow for the periodic evaluation of Canada's gateways and corridors' performance and possibly the competitiveness of our Gateways.

- Support the Department in the following ways:
  - Increase our ability to monitor major system choke points;
  - Support marketing initiatives of gateways & corridors, policy-making, environmental measures, air cargo competitiveness, Security and border crossings delays etc…, and
  - Build a foundation/rationale to guide possible intervention/investment;

- 3 key projects:
  - Total Logistics Costs Index;
  - Fluidity Indicator; and
  - Port Utilization Indicators.

Integrated Research Approach

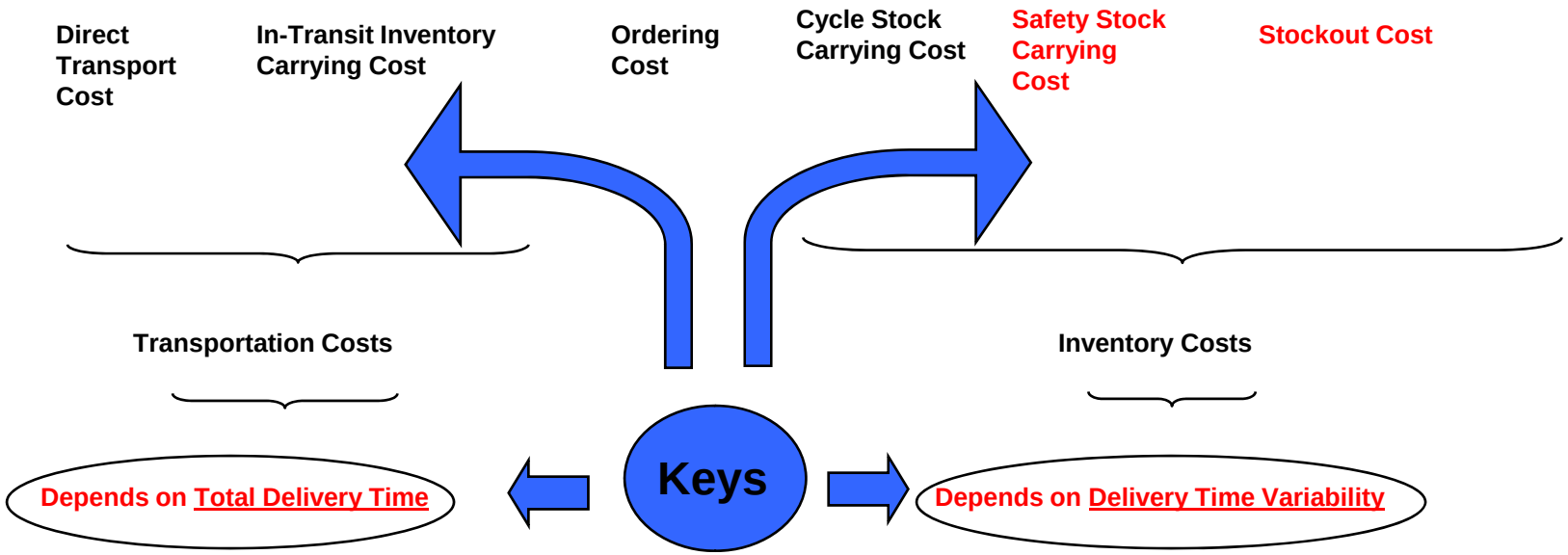


Total Logistics Costs

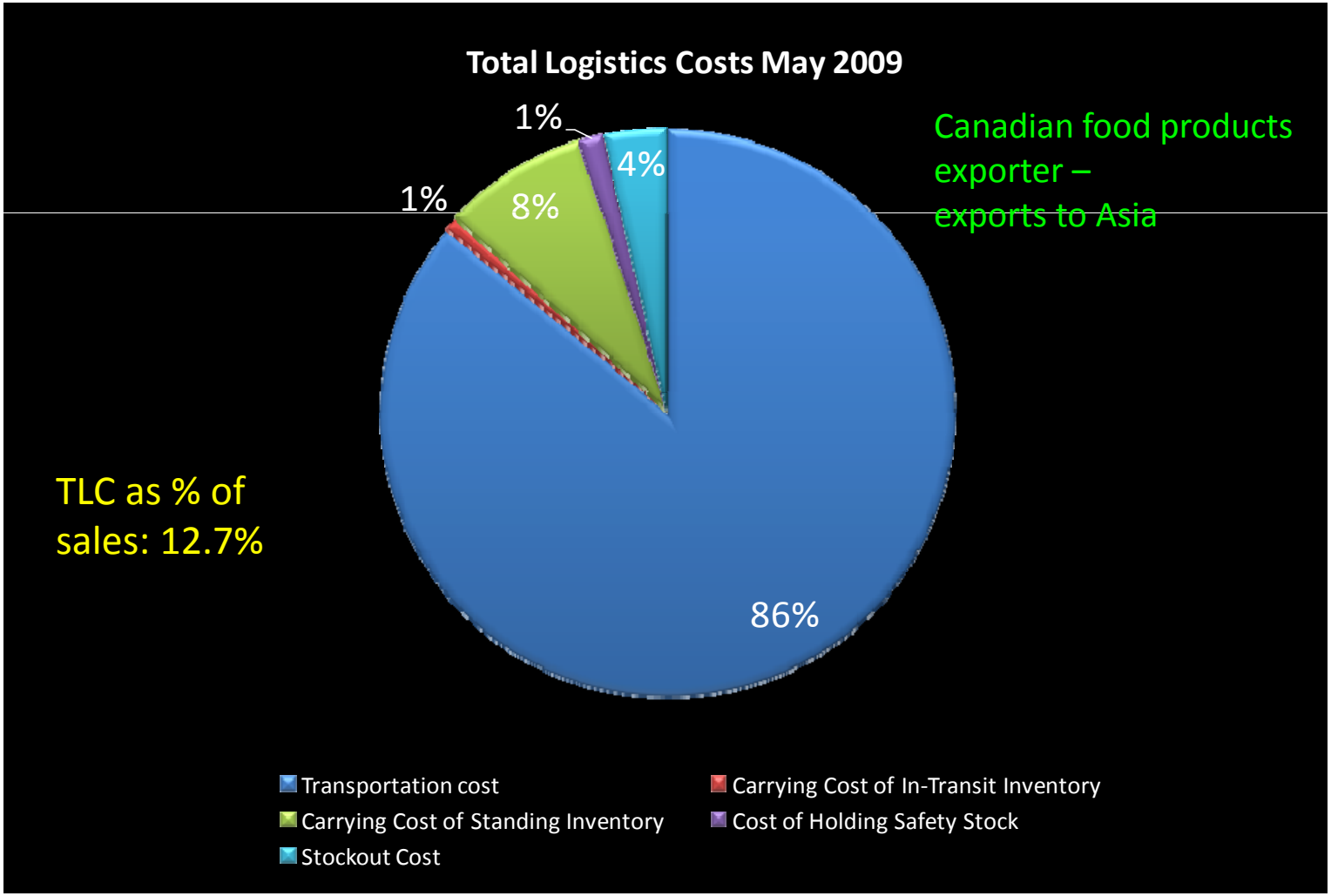
- Using a model developed in North America in the 1960s and improved since
- Model tested in 2008 and 2009 with various industrial sectors
- Proof-of-concept completed and results show that for most industrial sectors the model can be applied and repeated.
- Tool to use as a Proxy to indicate monetary impact of variability in "time-to-Market"
- Tests show that data gathering exercise can be minimized provided the participants have in place data management systems (six sigma, continuous improvement process, etc.)
- The sectors we are exploring:
  - Retail sector for imports (container movements)
  - Grain and specialty crops for exports (bulk and containers)
  - Processed food and beverages sector for both imports and exports (container movements)

Total Logistics Cost Model

$$TLC = RD + (UCTD/365) + SD/Q + QCI/2 + rIC + K(D/Q)N(Z)S`$$



Total Logistics Costs:
Preliminary Results



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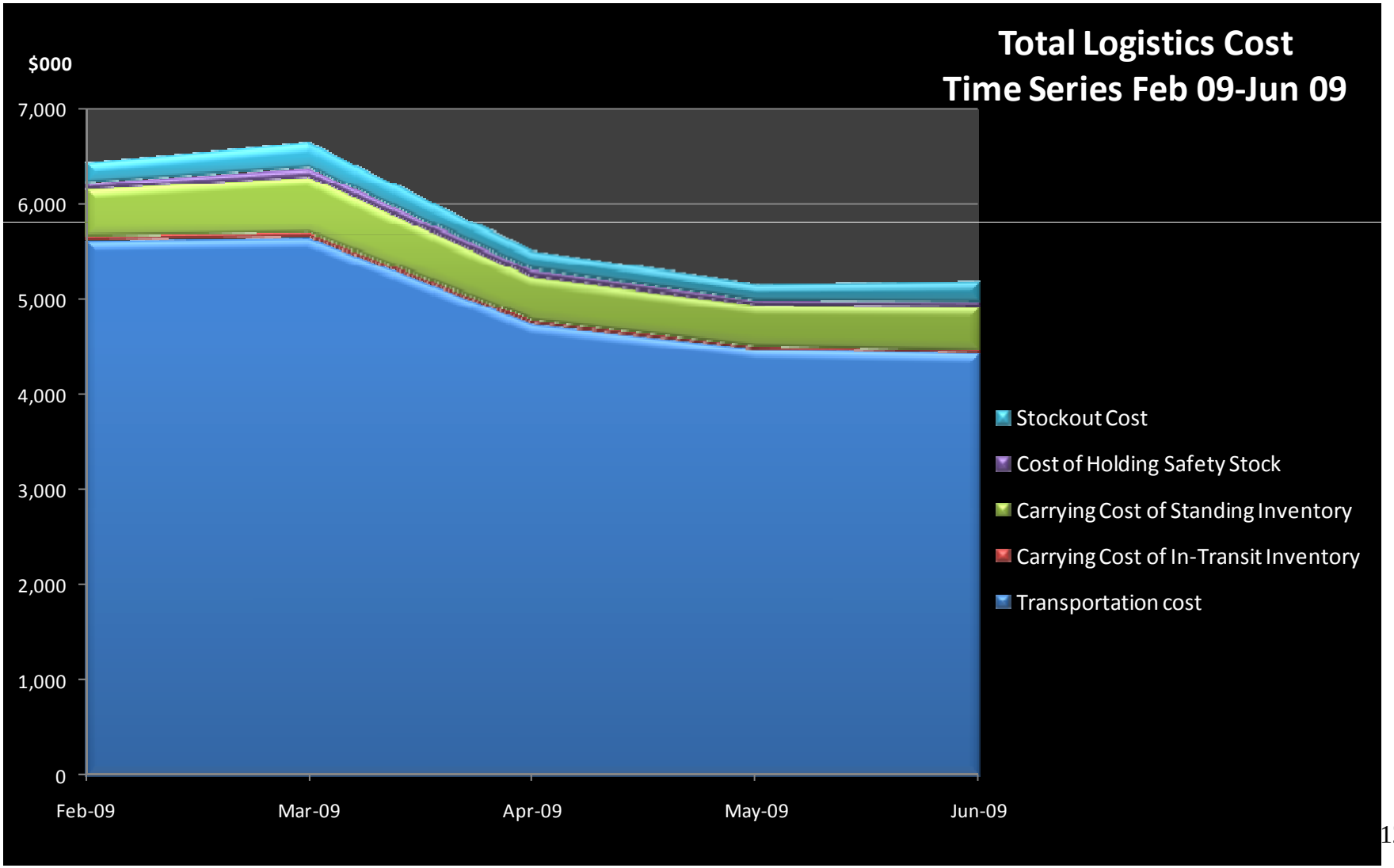
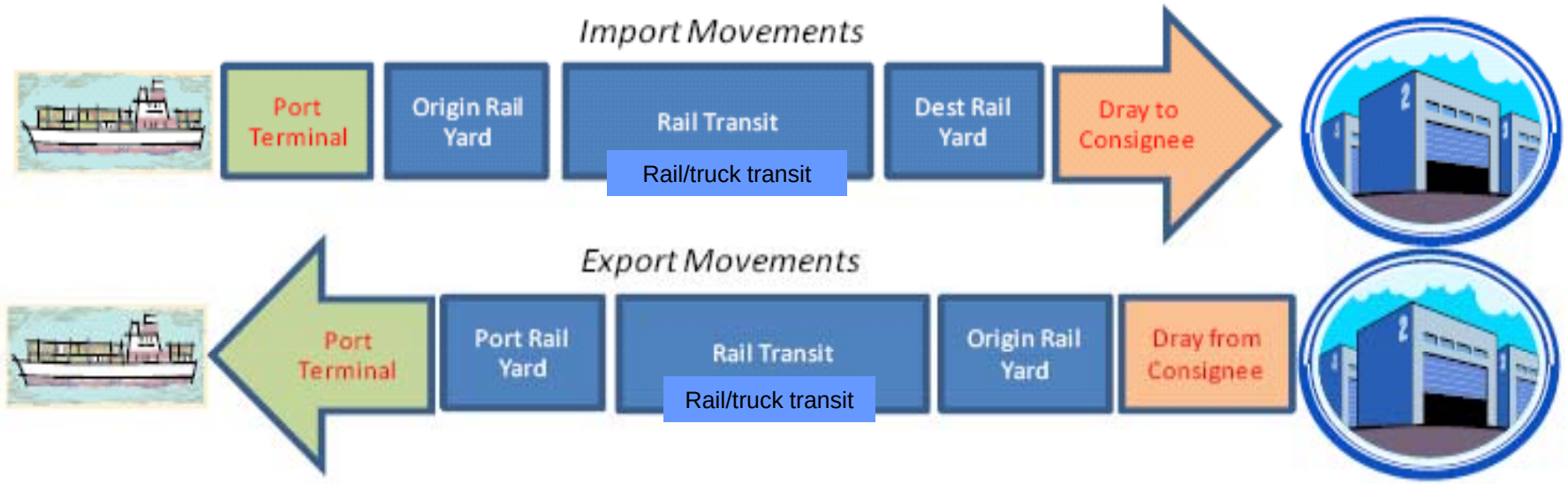


Fluidity project



Fluidity

- Some parts of the model exist at the mode level
- Difficulty is to integrate all modes into one model
- Proof-of-concept should be completed in January 2010
- Up to now we have concentrated on the data acquisition components and issues such as data quality and validation
- Data acquisition from all four modes is on a voluntary and partnership basis
- Data acquisition exercise is near completion and validation tests are on-going
- Transport Canada's team – 8 people with various specializations
- Working in cooperation with Texas Transportation Institute to develop system-wide model with a mandate from October 2009 till April 2010

Port Utilization Indicators

- Data is provided by Port Authorities on a monthly basis or collected directly by Transport Canada
- Indicators being currently implemented at Canada's Container ports:
    1. Gate Fluidity Indicator [Min.]
    2. Average Truck Turnaround Time [Min.]
    3. Berth Utilization [TEU /m]
    4. Vessel Turnaround Time [Sec/TEU]
    5. Vessel Dwell Time in Port Waters [Hr/Vessel]
    6. Average Container Dwell Time [Days]
    7. Port Productivity [TEU/Ha]
    8. Crane Productivity [TEU/ Crane]

- Indicators being currently developed at Canada's ports for Bulk Commodities:
    1. Berth Occupation Rate [%]
    2. berth Productivity [Tonnes/berth/Hr]
    3. Average Vessel Turnaround Time [Hrs]

Container Ports: Vancouver, Prince Rupert, Montréal, Halifax and St. John's

PUI for British Columbia Container Ports

		Measure	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09
TC	1	Gate Fluidity - **Minutes**	n/a	n/a	12.8	13.8	13.5	12.4	12.2	17.0
	2	Avg. Truck Turnaround Time - **Minutes**	n/a	21.9	22.1	22.3	20.4	21.0	20.1	19.4
TC	3	Berth Utilization - **TEU/Meter**	60.0	56.6	63.9	67.4	70.5	70.5	71.2	73.0
	4	Vessel Turnaround Time - **Seconds/TEU**[1]	51	46	45	42	40	41	36	34
TC	5	Vessel Dwell in Port Waters - **Hours/Vessel Call**[1]	n/a	31.7	33.2	30.0	30.9	33.4	31.6	31.5
	6	Avg. Container Dwell - **Days**[2]	3.2	2.7	2.3	3.0	1.8	2.5	2.8[3]	2.0[3]
TC	7	Port Productivity - **TEU/ha**	1,286	1,119	1,386	1,375	1,470	1,396	1,465	1,487
TC	8	Crane Productivity - **TEU/STS crane**	8,046	7,018	8,676	8,642	9,250	8,796	9,298	9,510
		Container Throughput - **TEU**	179,742	158,305	194,455	195,935	210,095	200,331	213,455	218,717

Notes:

Figures are aggregated results of the five container terminals at Port Metro Vancouver and Port of Prince Rupert. All figures are weighed averages.

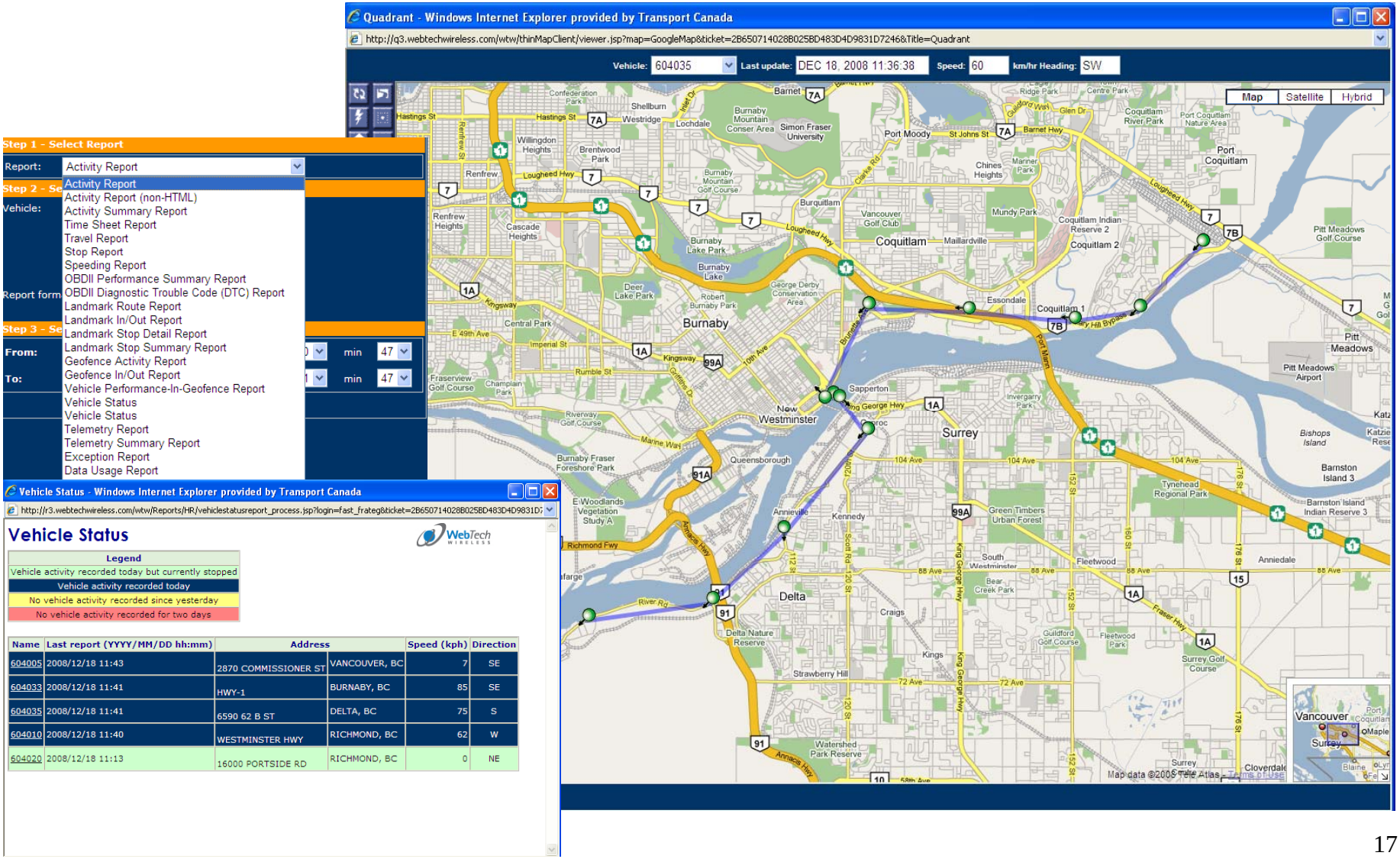
1: For fully cellular container ships only. Excludes ro-ro and mixed cargo ships

2: Dwell time calculation between the 2 ports differ. Figures represent dwell times for import containers to rail only (exports and empties excluded)

3: As of July13, 2009, CN discontinued service at inner-harbour terminals at Port Metro Vancouver

TC means that the data is collected directly by Transport Canada

GPS-based Methodology for Truck Movements



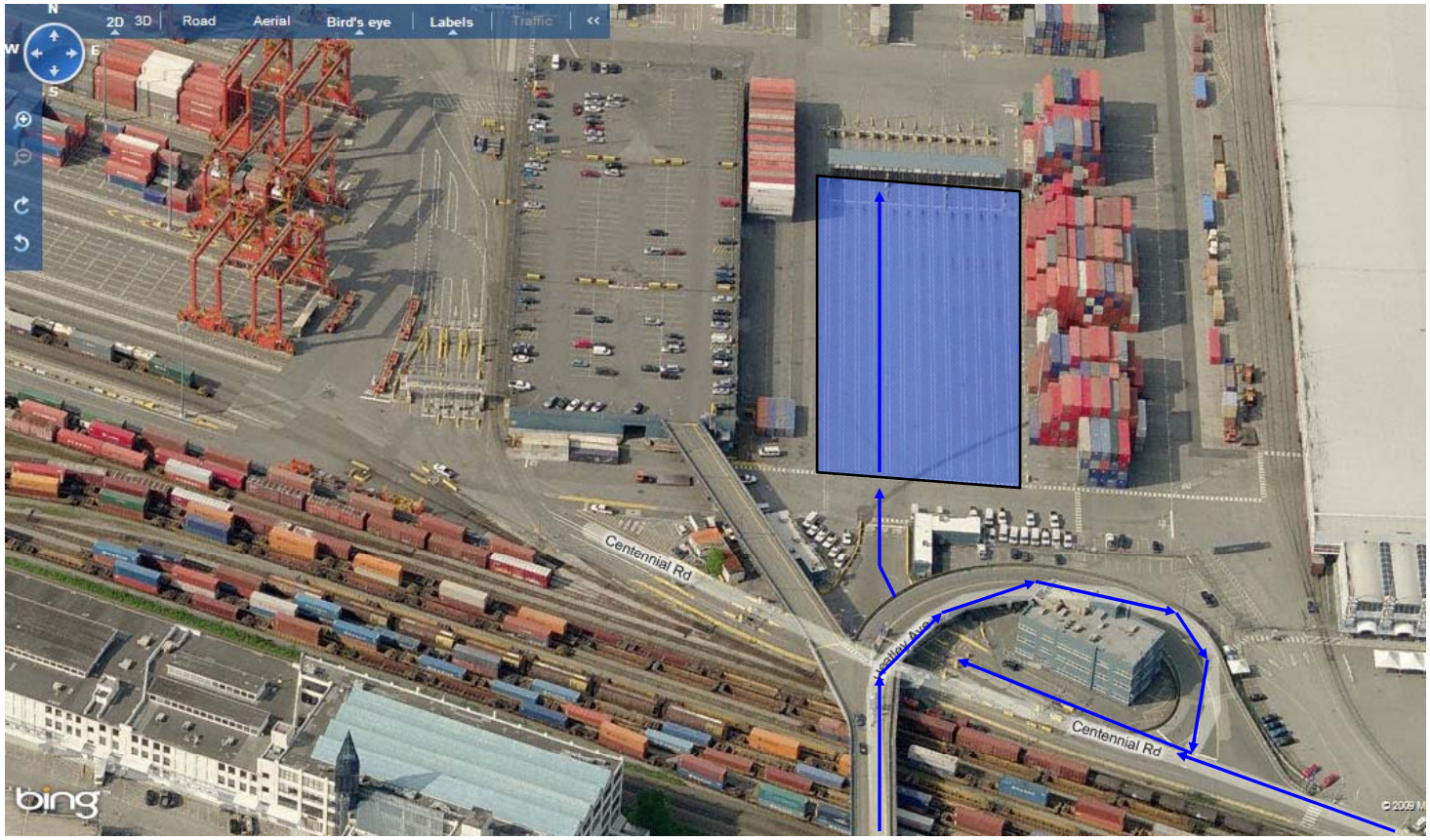
Gate Fluidity Indicator

Example: Centerm, Vancouver, B.C.

Calculating average wait times of trucks at terminal gates

GPS technology

'Geofencing'

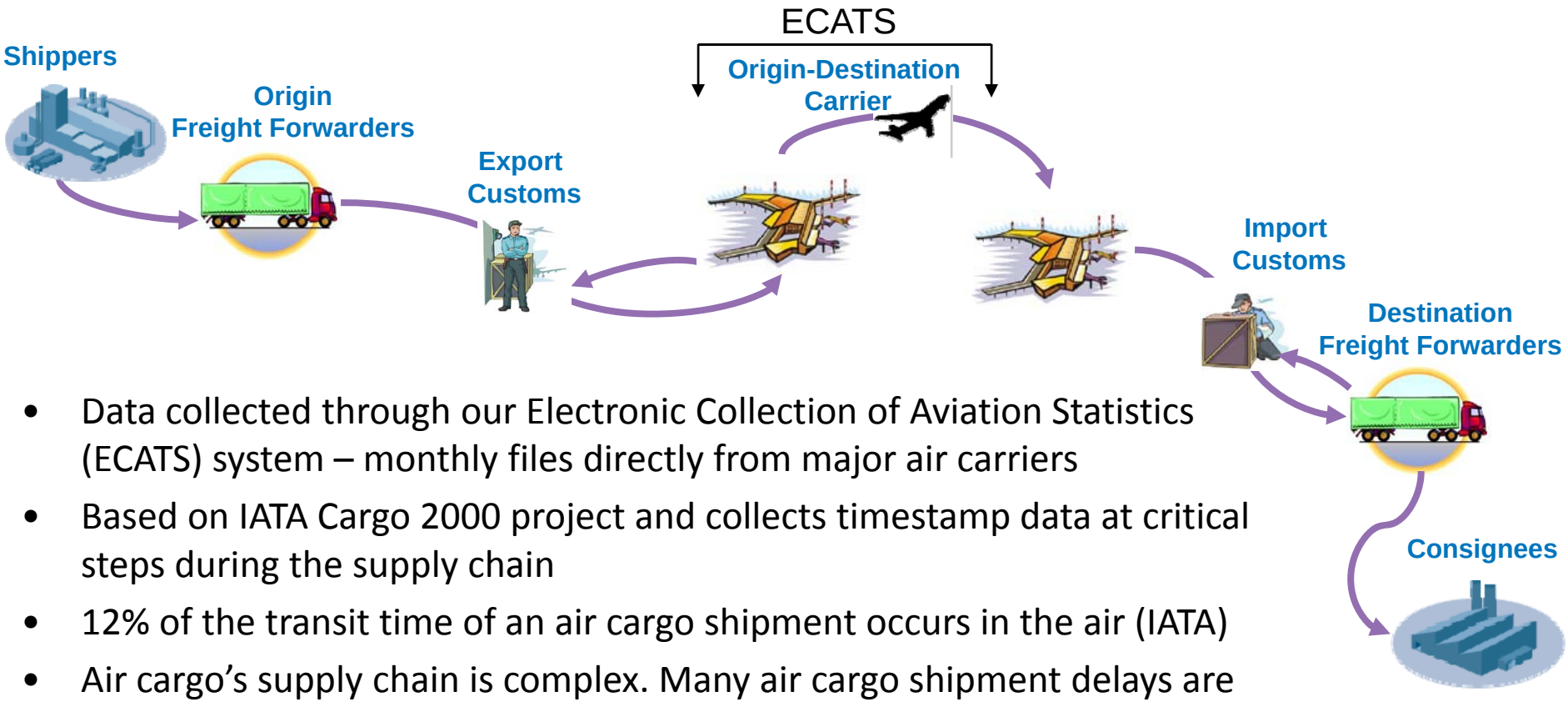


Terminal entry movement

Rail Transport

- Data to be obtained from Class 1 railroads
  - Data provided by Class 1 rail carriers
  - Specific corridors related to our Gateways
  - Intermodal and some bulk commodities
  - Origin (if loaded)
  - Destination (if loaded)
  - Event type (i.e. passed an EDI station, placed empty, arrived at destination terminal, etc.)
  - Event time (day, hour, minute)
  - Location: Station Number
  - Time of transit last month
  - Time of transit last quarter
  - Time of transit last year with seasonality variability

Air Cargo Fluidity Study

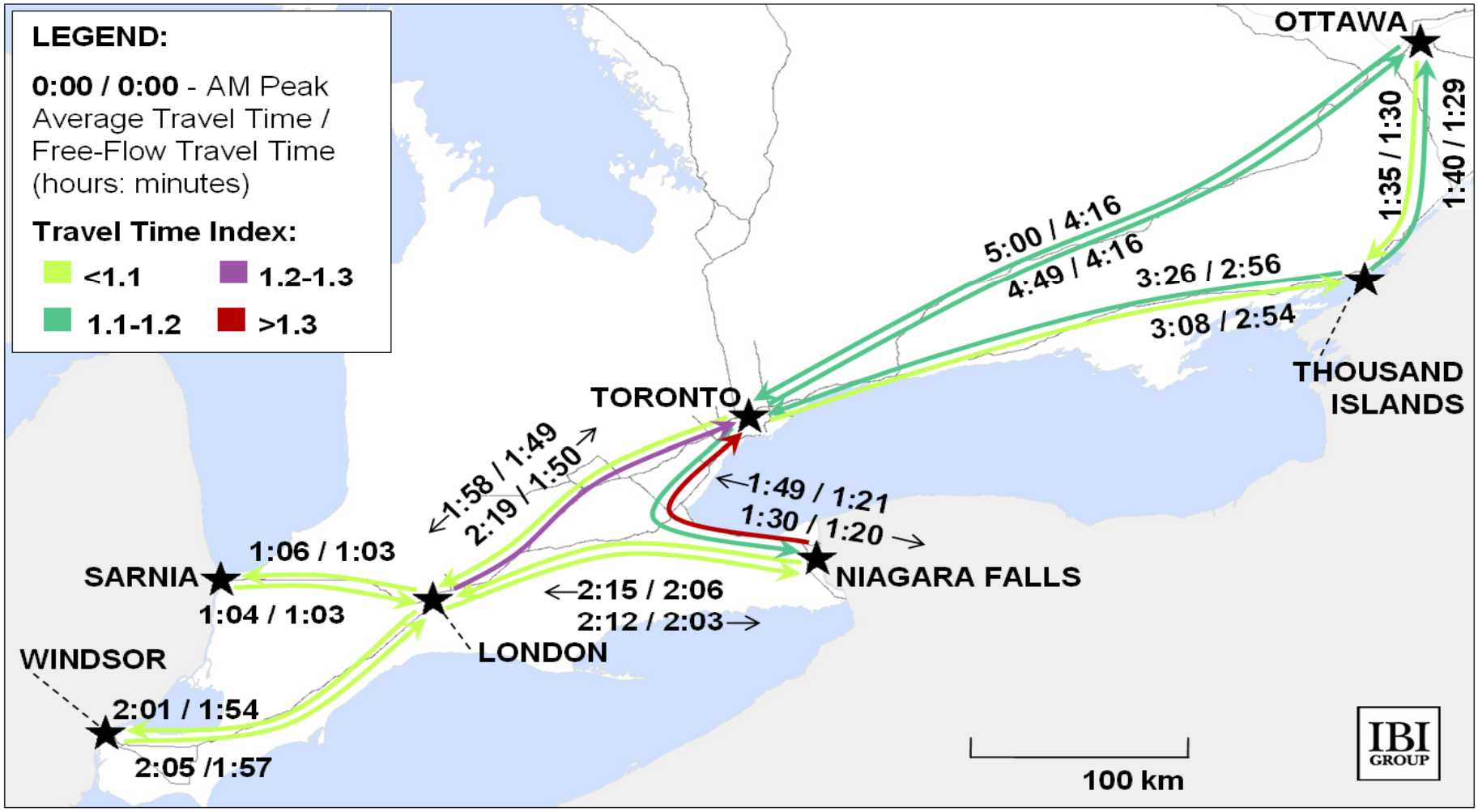


- Data collected through our Electronic Collection of Aviation Statistics (ECATS) system – monthly files directly from major air carriers
- Based on IATA Cargo 2000 project and collects timestamp data at critical steps during the supply chain
- 12% of the transit time of an air cargo shipment occurs in the air (IATA)
- Air cargo's supply chain is complex. Many air cargo shipment delays are caused by the need for paper documentation and reconciliation

Road Transport

- Started data collection in 2008
- In 2009 - data collected from transport fleets on a daily basis (near-real-time)
  - Daily records from 30,000 units
    - Satellite data
    - Dispatch files
  - Points of Origin and Destination (latitude and/or longitude)
  - Total distance traveled and waiting time (border crossings, intermodal yards,etc.)
  - Date and time of departure and arrival
  - Vehicle type
  - Loaded/Empty
  - Fuel consumption (including idling time)

O/D Trip Times (Fluidity)



Data acquisition

Two Types	Pro's	Con's
Data Acquisition Through Third Parties (I.e. Drewry, Turnpike, OAG, MIDT)	- Simple process - Already cleaned - Cost efficient - Copyright protection	- May not have all information you need (I.e dispatch details) -Do not know the validation & cleansing procedures - Limit analysis capabilities - Frequency of availability
Direct Access (Electronic Collection of Air Transportation Statistics (ECATS), GPS truck and dispatch records, rail carriers through AAR and Port data)	- Granularity - Timeliness - Industry feedback - Get exactly what you want - 24 x 7 x 365 - Protected when legislated - Easier for small universe - Easy adaptation to any new technology - Platform independent	- Resource demanding - Cleansing & validating is very challenging -Long process to involve all partners when there is a large universe (I.e. trucking sector) -More costly than data acquisition - Requires confidentiality agreements when not legislated

Questions / Comments

Thank you / Merci

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