



UNITED STATES
DEPARTMENT OF TRANSPORTATION

Using Freight Advanced Traveler Information Systems to Promote Urban Freight Mobility

Randy Butler

FHWA Freight Operations and Technology

FRATIS Program Manager



UNITED STATES
DEPARTMENT OF TRANSPORTATION

Agenda

- Overview of FRATIS – *Concept of Project to Prototype*
- FRATIS Optimization Algorithm
- Freight Terminal Manager Perspective
- Preliminary Results
- South Florida FRATIS Emergency Management
- Questions



UNITED STATES DEPARTMENT OF TRANSPORTATION

- FRATIS Project Origination – USDOT Intermodal Freight Technology Working Group (IFTWG)
 - The Intermodal Freight Technology Working Group (IFTWG) is a public-private partnership focused on the identification and evaluation of technology-based options for improving the efficiency of intermodal freight movement.
 - IFTWG meets in Regional Locations to Identify local freight bottlenecks that are potential locations where Freight.
- IFTWG Five Step Process for Project Recommendations
 - Step 1 – Develop a Problem Statement:
 - Provide a concise description of the problem
 - Provide information on the inefficiencies and proposed improvements
 - Step 2 – Identify a Proposed Concept
 - Define the “Scope” of the research effort.
 - **Use stakeholders to identify User Needs and Required Features of the planned Technology.**



UNITED STATES DEPARTMENT OF TRANSPORTATION

- Step 3 – Identify Anticipated Benefits:
 - Summarize the anticipated benefits
 - **Benefits communicated in terms of Performance Measures recommended by Freight Professionals**
- Step 4 – Viability Analysis:
 - Provide an objective review of the **Challenges** faced in implementing the project to attain measurable benefits.
 - Include Statements of Support from Significant Stakeholder Representatives that explain why the project would be a worthwhile.
 - Present reasons why the **Project is Potentially Viable, Sustainable, and is it a Long-Term Solution.**
- Step 5 -- IFTWG Final Report on Recommendations:
 - Recommendation on Developing Prototypes
 - Recommendation on Adoption of the Technology

FRATIS Concept

Freight Advanced Traveler Information (FRATIS) Problem Statement:

The lack of Freight Advanced Traveler Information has negative effect on:

- **Efficient Movement of Freight Transportation**
- **Planning of freight daily work activities**
- **Logistics Management Systems**
- **Environment of Neighboring Communities**
- **Energy Consumption**
- **Safety of the Traveling Public**



Freight Advanced Traveler Information System (FRATIS): Scope and Anticipated Benefits



- **FRATIS Application: Freight-Specific Dynamic Travel Planning and Performance**
 - Enhances traveler information systems to address specific freight needs
 - Integrates data on wait times at intermodal facilities (e.g. ports), incident alerts, road closures, work zones, routing restrictions (hazmat, oversize/overweight)

- **FRATIS Application: Drayage Optimization**
 - Optimize truck/load movements between freight facilities, balancing early and late arrivals
 - Individual trucks are assigned time windows for pick-up or drop-off

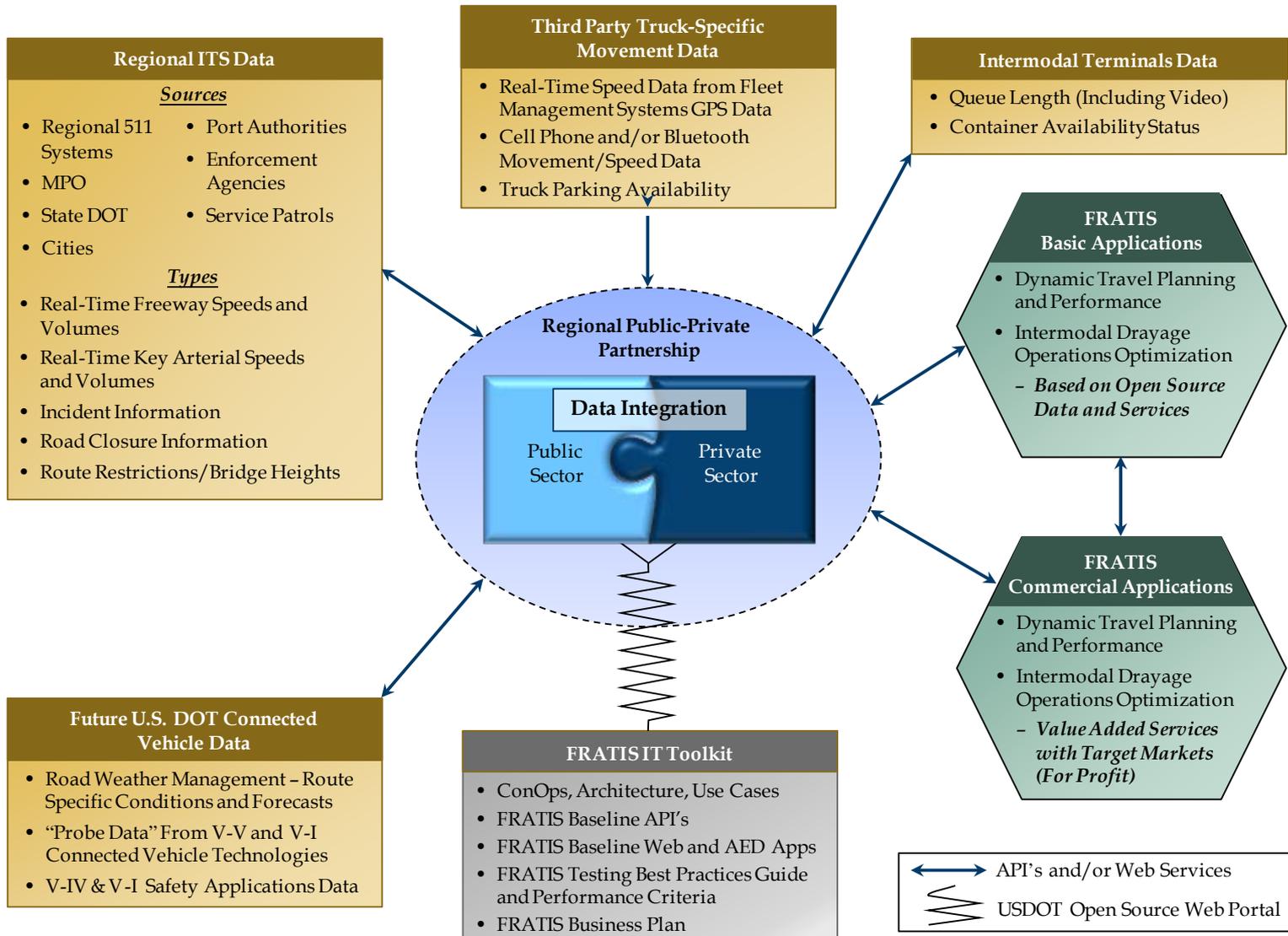
- **10-year transformative impact targets**
 - Reduce truck travel times, 17%
 - Reduce bobtail (empty) trips, 15%
 - Reduce terminal wait times, 35%
 - Reduce freight-involved incidents, 35%
 - Reduce fuel consumption/emissions, 10%



FRATIS USDOT Lead: Randy Butler
(FHWA Office of Operations)



FRATIS High-Level System Concept Focuses on Challenge – Data Integration and Dissemination



Benefits to Trucking Companies and Drivers

- Improve productivity and efficiency of the fleet
- Empower dispatchers with real-time information for faster and better decisions
- Generate near optimal trucks itinerary taking into consideration travel times with traffic, waiting times at the terminal, weather conditions, driver availability, etc.
- Dispatcher will have access to real time Terminal Waiting Times and Turn-Times
- Drivers will be able to navigate to their destinations and be rerouted in case of heavy traffic, incidents and congestion in their current route



Benefits to Intermodal Facilities

- Receive pre-notifications containing details for trucks coming to perform transactions in their facilities
- Receive real time notifications of trucks heading towards their facilities with estimated time of arrival
- Reduce waiting time and turn around time at the facility
- Reduce unproductive pickups/drop-offs by enabling better container turns and reuse.
- Communicate directly with dispatcher to notify about terminal closures, incidents, or any other operational status in order to mitigate congestion in their facilities.



Public Benefits

- Promote better transportation planning and policy
- Improve air quality by reducing CO2 emissions
- Provides a platform to support economic development in the region
- Improve quality of life of the region
- Better utilization of existing infrastructure and capacity
- Provides capabilities for safer routes for trucking operations.



Recommendation to Move Forward with Prototypes



Memphis Drayage Optimization Algorithm

Pre-deployment vs. Post-deployment pairwise comparison of average performance measures using clustered data sets:

| Performance Measure | Pre vs. Post using clustered data sets |
|---|---|
| Bobtail Miles Reduction | 13% |
| Total Miles Reduction | 9% |
| Average Miles per Truck Increase | 14% |
| Required Fleet Size Reduction | 21% |



Three Initial FRATIS Prototypes Under Development

- **Los Angeles-Gateway Region:**

- Develop FRATIS applications to address dynamic travel planning around the marine terminals and queues to move cargo out of the ports more efficiently

- **Dallas-Fort Worth, Texas:**

- Incorporate integrated corridor management capability along with size and weight permitting
- Test Connected Vehicle Basic Safety Message (SAE Standards J2735-2009)
- Optimize drayage opportunities in coordination with rail and local truck drayage companies

- **South Florida:**

- Similar focus as the other two sites, but includes emergency response capability to FRATIS that would integrate FRATIS functionality into Emergency Operations Center activity during an emergency such as a hurricane



FRATIS Project Status

- FRATIS Prototype
 - Architecture Complete
 - Baseline data for before and after complete
 - Development of the Application Complete
 - External Traffic Information
 - Devices Installed in 50 trucks
 - Optimization Algorithm designed for Marine Terminal Operations
 - Waiting times will be collected to measure queues at the gates
- Los Angeles FRATIS went live on March 1, 2014
- Dallas Live on July 1, 2014
- South Florida planned to begin six month test on August 1, 2014



Questions?

For More Information ...

Randy Butler

FHWA Freight Operations and Technology

randy.butler@dot.gov

(202) 366-9215

