THEA CV PILOT

Overview, Status, Challenges, and Lessons Learned

DRIVEN TO MAKE A DIFFERENCE
WHAT IS THEA?

- A local, user-financed public agency
  - Financed through revenue bonds
  - Supported by user tolls
  - No tax funding
  - Tolls stay local

- Seven Member Board
  - 4 Appointed by Governor
  - Mayor (or Council Chair)
  - Hillsborough County Commissioner
  - FDOT District 7 Secretary

INDEPENDENT
Agency of the State
THEA OWNS, OPERATES & MAINTAINS

Lee Roy Selmon Expressway

Selmon Greenway

Brandon Parkway

Meridian Avenue
COMING SOON…

Selmon West Extension
First Reversible All Electric Toll Road in the World

First All Electric Toll Road in Florida

First Florida Expressway to Convert entire system to All Electronic Tolling

USDOT $21 Million Contract for Connected Vehicles Pilot Project (1 of 3 Nationally)

Economic Impact – Enabled $1.4 billion in business sales and the creation of over 10,000 jobs in a variety of industries.

Smart Funding – THEA revenue and bonds fund roadway construction and improvements, without adding to state, or local government debt.

Taxpayer Savings – THEA operations are funded by our toll revenue
THEA STRATEGIC OVERVIEW

**Mission**
Our mission is to provide safe, reliable, and financially-sustainable transportation services to the Tampa Bay region while reinvesting customer-based revenues back into the community.

**Vision**
Our vision is to lead, partner, and implement safe, economically-sound, and innovative multi-modal transportation solutions for our Tampa Bay community.

- Provide THEA customers with the safest, most efficient drive possible.
- Advance Mobility Technology
- Promote Tampa Bay
FOCUSED DEPLOYMENT AREA

Traffic Flow Optimization/Bus Priority
Pedestrian Safety
Traffic Flow Optimization
Rush Hour Collision Avoidance
Wrong-Way Entry Prevention
Traffic Management
Traffic Flow Optimization
Pedestrian Safety
Streetcar Safety
PARTICIPANTS AND INFRASTRUCTURE

1,600 Privately Owned Vehicles
9 TECO Line Streetcar Trolleys
10 Hillsborough Area Regional Transit (HART) buses
44 Roadside Units
MORNING BACKUP

Forward Collision Warning (FCW)
Emergency Electronic Brake Light (EEBL)
End of Ramp Deceleration Warning (ERDW)
Intelligent Signal Systems (I-SIG)

PHOTO: TAMPA HILLSBOROUGH EXPRESSWAY AUTHORITY (THEA)
WRONG WAY DRIVERS

Wrong-way Entry
Intersection Movement Assist (IMA)
MAP
Signal Phasing and Timing (SPaT)
PEDESTRIAN SAFETY

Pedestrian in a Signalized Crosswalk Warning (Ped-X)

Pedestrian Collision Warning (PCW)
TRANSIT SIGNAL PRIORITY

I-SIG
Transit Signal Priority (TSP)
IMA
STREETCAR CONFLICTS

Vehicle Turning Right in Front of Transit Vehicle (VTRFTV)

PHOTO: TAMPA HILLSBOROUGH EXPRESSWAY AUTHORITY (THEA)
TRAFFIC PROGRESSION

Probe Data Enabled Traffic Monitoring (PDETM)

I-SIG
IMA
### Status

#### Level 6
- Needs & Feasibility
- Project Stakeholders

#### Level 5
- Concept of Operations
- System Validation
- System Verification

#### Level 4
- Requirements
- System Verification

#### Level 3
- High Level Design
- Sub Systems

#### Level 2
- Detailed Design
- Units / Devices

#### Level 1
- Existing Software & Hardware (Available From)

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**Phase 3**
- September 1, 2018

**Phase 2 Project Workflow**
- PI Deliverable
  - Measures the Effect
- Install & Test
  - 40 Locations
- Install & Test
  - In 100 Vehicles
- Integrate & Test
  - 6 User Cases
- Integrate & Test
  - Apps into Phone
- Integrate & Test
  - Apps into CRUI
- Integrates & Test
  - Android Phones Security & Test
  - Pre-Drive Security & Test
  - Vehicle Pre-Drive Security & Test

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**Source:** HNTB
Perform data fusion and transmit performance measures to USDOT independent evaluators, research community, and the public at large.

**Mobility**
- Travel time
- Travel time reliability
- Delay
- Throughput

**Safety**
- Crash rates
- Type of conflicts
- Severity of conflicts

**Environment**
- Emission analysis
• CV deployment impact on travel will be reported on a Performance Evaluation Dashboard
  • Linked to Tampa CV Pilot website
  • Customizable reporting frequency (daily, weekday, monthly)
  • Downloadable custom queries
  • Performance measures algorithms, analysis tools available to select stakeholders

• Pre-post implementation participant surveys:
  • Overall effectiveness of the CV Pilot
  • Feedback on applications
DATA GENERATION

- Data collection Feb – Sep 23, 2018
  - 657 participants
  - 64,430 files
  - 146.8 GB of highly compressed data (uncompressed is 20+ times larger)
- Compiling comprehensive SQL database to process
  - BSM
  - SPAT
  - TIM
  - SSM
  - SRM
  - MMITTS
- OBU Logs (in process)
PARTICIPANTS

- 800 participant currently enrolled (ongoing)
- Stratified sample with 2 to 1 treatment to control assignment
- Reflect THEA user base
• Average of 1.7 million BSM/day
• About 0.9 million BSM/RSU
• Weekday travel patterns with a.m. and p.m. peak periods
• Up to 270 participants per hour on average at a.m. peak hour
BSM AND RSU: STUDY AREA

- Some RSU receive more BSM than others
- Coverage of entire study area ensured
RSU collected BSM allow generating mobility performance measures by Use Case
Cluster analysis of events to spot areas prone to accidents
Automated process to batch upload data to SDC for Independent Evaluator use

- Currently uploading BSM and SPAT
- Geofenced
- Sanitized
IF WE COULD DO IT OVER AGAIN, WE WOULD:

- Solidify Standards Earlier
- Obtain a Better Understanding of “Available” Applications’ Maturity
- Obtain a Better Understanding of “Available” RSU and OBU Hardware
- Obtain a Better Understanding of Vendors’ Depth and Resources
- Like More Transparency in the Device Certification Process From Vendors
- Complete Integration Testing Before Private Vehicle Installs Begin
- Have Shifted the Focus Much Sooner to a Commercial Security Credential Management System
- Identify the Need to Use Traditional ITS Devices as Part of Solution Earlier
LESSONS LEARNED – IN-VEHICLE

- OBUS - DON’T DO IT!!! Hire auto professionals to manage!
- Multiple Technical Scans using RFPs (with on the road testing)
- Early Sourcing of Suppliers to Create a Collaborative Environment
- Early real-life testing with infrastructure in place to verify end-to-end system/application performance
- Distributed Team Across the Country and in Europe, be careful can they support you from overseas
- New development efforts - OTA and security - need to be piloted, i.e. tested early in the program
- Adequate incentives with community/media support engage the driver/consumer community
- Recognizing the need for a complete and experienced project team - systems, infrastructure, vehicle systems, performance measurement, etc.
Innovative ways to incentivize the public to participate helped

Contracting – Fixed Fee and “Experimental Sole Source” way to go

Cross functional coordination is absolutely critical

Importance of face to face progress meetings

Deployment in an area undergoing significant redevelopment complicated Pilot to deal with confounding factors

Establish Communication usage on your channels early, CV is not only allowed user

Certification process - Certification process was outside of Pilot control, mitigated by Conformance statement to self-certify
STAY CONNECTED

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