Smart Cities –
Tampa’s Perspective

Vik Bhide
Chief Traffic Management Engineer
• Smart City Context
• Key Technologies
• Developing Smart City Framework
• Tampa’s Smart City Projects
AGENDA

• Smart City Context
• Key Technologies
• Developing Smart City Framework
• Tampa’s Smart City Projects
- Urbanization
- Demographics
- Climate Change
- Safety
- Technology
• Smart City Context
• Key Technologies
• Developing Smart City Framework
• Tampa’s Smart City Concepts
Key Enabling Technologies

- IoT
- 5G and Small Cell Sites
- Faster Processors
- CV/AV
- AI & Machine Learning
- Crowd-Sourced Data
AGENDA

• Smart City Context
• Key Technologies
• Developing Smart City Framework
• Tampa’s Smart City Projects
Developing A Framework

- Regional Leadership
- Clear Benefits Narrative
- Leverage Generalists
- Collaboration - Public, Private, Academia
- Community Engagement
- PPP Commitment
Developing A Framework

- Consider O&M
- Streamline Procurement
- City as a Lab Approach
  - Engage Academia
  - Deploy Pilot Projects, Take Risks
- Vulnerable Communities
- Tackle Few, Big Needs
- Be Bold, Think Transformation
• Smart City Context
• Key Technologies
• Developing Smart City Framework
• Tampa’s Smart City Projects
Goals

• Competitive Advantage
• Pedestrian & Bicycle Safety
• User-Focused Mobility
• Congestion Mitigation
• Vulnerable Communities
• Climate Change Sustainability
• Port & Airport Security
Stakeholders

**PUBLIC**
City
FDOT
County
HART
USF/CUTR
THEA
MPO
TBARTA
Port Tampa
TIA

**PRIVATE**
TDP, Westshore
TECO, Verizon
AARP, TLB
TGH, SPP,
Google/WAZE
Coast Bikes,
TTS, Vride,
ZipCar
.... and many more

Figure 1: Smart Tampa Partners
Tampa Smart Paint Project

- PPA Effort
- Enhances Pedestrian Safety
- Paint w/ Embedded Messaging
- Downtown, USF Campus, South Tampa
- Future Applications
  - Place Call on Traffic Signal
  - CV Notifications
  - Indoor Ped Navigation
  - AV Guidance
  - Work Zone Safety

1st Major Smart Paint Project!
Crowd-Sourced Data

Key Component of City’s ATM Program

100+ cities in Waze Connected Communities Program...Tampa was 1st City in Florida
Crowd-Sourced Data – Next Steps

• Monitor - Aggregate TMC Data Sources
  – *WAZE* + Historical volume/crash data + ITS Sensors

• Plan – Insights with Deep Learning
  – Example: Corridor Insights in 4-hour Increments
  – Deploy Preventive Measures (Signal Timings, Stage Road Rangers..)

• Incident Prediction
  – Identify and Mitigate Incidents Before They Occur
  – Leverage Contextual Driver Behavior Data
  – In-Vehicle Data (SDK on Local Apps)
Connected Vehicles Demo - TTS

Communications Flow

- Traffic Technology Services receives signal data
- Provides MAP message (detailed map of intersection)
- Provides SPaT Message (current signal status, predicted signal switch time, confidence of prediction)
- OEM backend system and vehicle receives authentication token
- Once validated, OEM system sends MAP and SPaT messages to vehicle
- Information displayed only if high confidence in timeliness and accuracy of prediction
CV Pilot Overview

- 40 Roadside Units
- 1600 Vehicles
- 10 Streetcars
- 10 Buses
- 500 Personal Devices
- 12 V2V, V2I and V2P apps
- Detection Equipment
  - Unequipped Pedestrian & Vehicle study data
- Management Platform
- Agency Data

Source: HNTB
CV Pilot Overview

Source: Siemens Industry Inc.
STREET LIGHTS WITH INTEGRATED SENSORS
- Energy-efficient LED
- Video and spatial sensing
- Traffic Counts
- Smart parking
- Neighborhood Security

SMART WATER METERS

FLOOD SENSORS

CV INFRASTRUCTURE

CONNECTED PIDs

WHY DOES TAMPA NEED IT?
- Climate Change Sustainability
- High Pedestrian Crash Rate
- Lack of Real Time Parking Guidance

WHAT ARE THE BENEFITS?
- Improved Ped Safety
- Reduce Flood-related Damage & Costs
- Optimize Existing Infrastructure
- Increase CV Footprint
EXPAND OBA TO MULTIPLE TRAVEL MODES

TRIP PLANNING TOOL

KIOSKS AND MOBILITY HUBS

WHY DOES TAMPA NEED IT?

Diversify Mode Options

Reduce Single-Occupant Vehicle Trips

Manage Traffic Congestion

WHAT ARE THE BENEFITS?

Lower Software Costs

Benefits Vulnerable Populations

Enhanced Mobility Services & Trip Planning

We're interested in having OneBusAway be as useful for as many people as possible ... we are looking at how we make it more user-friendly for blind and low-vision riders.

ALAN BORNING, COMPUTER SCIENCE AND ENGINEERING PROFESSOR INVOLVED IN CREATING ORIGINAL ONEBUSAWAY APP

[OneBusAway] has had a real-world impact and will definitely make people's lives easier in terms of accessing transit.

SEAN BARBEAU, UNIVERSITY OF SOUTH FLORIDA CENTER FOR URBAN TRANSPORTATION RESEARCH
### Smart Parking

#### Why Does Tampa Need It?

- **30% Of City Traffic = Drivers Looking For Parking**

- Record Number of Special Events

  > As the downtown continues to be more vibrant and active, the demand for parking has gone up.

  - **Karen Kress**, Director, Transportation and Planning for Tampa Downtown Partnership

#### What Are The Benefits?

- Better User Experience
- Enhanced Parking Operations
- Reduced Trip Times and VMT
- Reduced Fuel Consumption
- Increased Parking $ & PPP Potential

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**PARKING OCCUPANCY DETECTION**

**PARKING INFORMATION SHARING WITH CVs**

**REAL TIME APP-BASED ROUTE GUIDANCE TO PARKING**

**INTEGRATION WITH REGIONAL MOBILITY APP**

**REAL TIME PARKING MAPS**
Integrated Corridor Management (ICM)

CV INFRASTRUCTURE

EMERGENCY VEHICLE PRE-EMPTION & TRANSIT SIGNAL PRIORITY

INCIDENT MANAGEMENT

CONGESTION REDUCTION & ROUTE GUIDANCE

TRAVELER INFORMATION

PREDICTIVE ANALYTICS

**WHY DOES TAMPA NEED IT?**

- 12th Worst Congestion in US
- High Crash Rates
- Fosters Economic Development & Enhances Mobility

**WHAT ARE THE BENEFITS?**

- Anticipated B:C = 9.7:1
- Reduce Emissions
- Real Time Demand and Network Optimization
INDOOR BEACON POSITIONING SYSTEM (BPS) FOR IMPAIRED AND ELDERLY

TRAFFIC SIGNAL AND CROSSWALK PEDESTRIAN MOBILITY SYSTEM USING CV TECHNOLOGY

WHY DOES TAMPA NEED IT?

High Ped Crashes + Demographics

12% OF TAMPA’S POPULATION IS 65+

Beneficial at TIA, MOSI, Tampa Convention Center, Museums, Stadium, Amalie Arena, etc.

WHAT ARE THE BENEFITS?

Enhance Quality of Life

Enhanced Safety for Most Vulnerable

PPP Potential for Sustainable O&M
Smart City Needs Full Communications

“Century-old” Energy Grid

Vulnerable Grid, Limited Monitoring

Leverage On-Going TECO Effort

WHAT ARE THE BENEFITS?

National Security, Reliable Network

Fosters Fleet Electrification

Strengthens Existing PPP

Reduce Energy Consumption

Accelerates CV/AV Deployment

Reduce Risk of Outages, Reduce City O&M Costs

2.8-6.0 TO 1

Anticipated benefit-to-cost ratio of updating the U.S. grid to “smart” status. Source: Electric Power Research Institute, 2011
## Key Achievements

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<th>Project</th>
<th>Achievement</th>
<th>Partners</th>
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<td>CV Pilot</td>
<td>1st Suburban Pilot in the US</td>
<td>THEA, City, USF, HART, FDOT, FHWA</td>
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<td>AV Shuttle</td>
<td>1st long-term AV Transit Service in the US</td>
<td>HART, City, FDOT</td>
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<tr>
<td>Smart Paint</td>
<td>1st Deployment in the US</td>
<td>City, HART, Lighthouse, USF, OSU, WMU</td>
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<tr>
<td>Waze</td>
<td>1st City in Florida on CCP</td>
<td>City</td>
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*Tampa Informs the State-of-the-Practice*
Thank You 😊

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