The Office (U.S.)
Season 1 Ep. 2 - Diversity Day
2005 TV-14 21m
After receiving complaints about an employee's unsolicited repeat performance of a risqué comedy routine, Michael leads a diversity training session.
OVERVIEW

RECENT ACTIVITIES

TECHNOLOGY UTILIZATION PLAN

TODAY’S AGENDA
## TxDOT Innovative Initiatives

<table>
<thead>
<tr>
<th>Task Force</th>
<th>Primary Audience</th>
<th>Planning Horizon</th>
<th>Unique Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TEXAS TECHNOLOGY TASK FORCE</strong></td>
<td>TxDOT</td>
<td>Long-Term</td>
<td>Discovery &amp; Strategy</td>
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<tr>
<td><strong>STATE TRANSPORTATION INNOVATION COUNCIL</strong></td>
<td>TxDOT RTI</td>
<td>Short-Term</td>
<td>Implementation &amp; Scaling</td>
</tr>
<tr>
<td><strong>TEXAS INNOVATION ALLIANCE</strong></td>
<td>Texas Public Agencies &amp; Research Institutions</td>
<td>Short-Term</td>
<td>Tactics &amp; Implementation</td>
</tr>
<tr>
<td><strong>GOVERNOR’S CONNECTED &amp; AUTOMATED VEHICLE TASK FORCE</strong></td>
<td>Governor’s Office &amp; Texas Legislature</td>
<td>Short-Term</td>
<td>Policy</td>
</tr>
</tbody>
</table>
Overview

**Overview**

**PEOPLE**
- MEMBERS
- SUBJECT MATTER EXPERTS
- PARTICIPANTS

**PORTFOLIO**
- TECH MATURITY
- BARRIERS
- BENEFITS

**PLAN**
- WHITEPAPERS
- COMMUNICATIONS
- TECH UTILIZATION PLAN

**Information**
**Awareness**
**Action Items**

**Strategic Guidance**

**Priority Technologies & Use Cases**

**Socioeconomic, Technical, & Policy Recommendations**
Overview: People

Task Force Membership

- TxDOT
  - Texas Technology Task Force

  - Public Agencies
    - CTRMA
    - NCTCOG
    - Houston METRO

  - Industry
    - Cisco
    - Shelley Row Assocs.
    - HERE

  - Research
    - SwRI
    - University of Texas

  - USDOT
Overview: People

Task Force Membership

- TxDOT
  - Texas Technology Task Force

Public Agencies
- CTRMA
- NCTCOG
- Houston METRO

Industry
- Cisco
- Shelley Row Assocs.
- HERE

Research
- SwRI
- University of Texas

Subject Matter Experts
- Verizon
- Inrix
- FedEx
- Toyota
- Honda
- Qualcomm
- Uber
- Nokia
- GM
- Maven
- ChargePoint
- FAA
- Embark
- Walmart
- ESRI
- HLDI
Overview: People

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- FAA
- Embark
- Walmart
- ESRI
- HLDI

Participants
- DPS
- DMV
- TDI
- TxDOT Freight
- TxDOT IMD
- TxDOT Gov't Affairs
- TxDOT TPP
- TxDOT Commission
- Industry
- Local Agencies
- Research

USDOT
Overview: Portfolio

Interconnected Applications

- Next Generation Vehicles & Energy
- Information & Communication Technologies
- Service-Based Platforms
- Other Technologies
- Materials & Additive Manufacturing
- Infrastructure & Construction
Overview: Portfolio

**Next Generation Vehicles & Energy**
- Automated Vehicles
- Connected Vehicles
- Electric Vehicles
- Unmanned Aerial Vehicles

**Infrastructure & Construction**
- Infrastructure Enhancements
- Construction Techniques
- Solar Powered Highways

**Materials & Additive Manufacturing**
- Self-Healing Pavements
- Nanotechnologies
- 3D Printing

**Other Technologies**
- Robotics
- Virtual/Augmented Reality
- Hyperloop

**Information & Communication Technologies**
- Cloud Computing
- Crowdsourcing
- Blockchain
- Big Data & Open Data
- Cybersecurity
- RFID
- Cloud & Edge Computing
- Data Standards & Interoperability
- Machine Learning & AI
- Telecommunications

**Service-Based Platforms**
- Mobility on Demand
- Micromobility
- Transportation Subscription Services
- Freight Brokerage
- Uber Elevate
- Last Mile Delivery
Overview: Plans & Deliverables

**White Papers**
- Scenario Planning
- Data Sharing
- MaaS
- Connected Vehicle Applications

**Communications Plans**
- Stakeholder Map & Collaboration Strategy
- Project Website

**Technology Utilization Plan**
- Evaluation
- Best Practices & Lessons Learned
- Utilization & Recommendations
OVERVIEW

RECENT ACTIVITIES

TECHNOLOGY UTILIZATION PLAN

TODAY’S AGENDA
Recent Activities

▪ Feb. Task Force Conference Call

▪ Conferences
  – Smart Cities Connect
  – ITS America
  – Automated Vehicle Symposium

▪ Grant Applications
  – Automated Driving Systems
  – ATCMTD
  – IMI

▪ Recent Deliverables
  – 4 Whitepapers
  – Technology Utilization Plan

▪ Other Efforts
  – Texas Connected Freight Corridors
  – STIC Meeting (August 1)
  – Texas Innovation Alliance
Recent Activities: Automated Vehicle Activities

1. HOUSTON
   - Campus and First/Last Mile
   - Transit Platooning Corridor

2. SAN ANTONIO
   - Entertainment District
   - Redevelopment and Transit Hub

3. ARLINGTON

4. FRISCO
   - Mixed-Use Retail

5. BRYAN-COLLEGE STATION
   - College Town

6. I-30: DALLAS TO FORT WORTH
   - High-Speed Freight Corridor

Texas Automated Portfolio

Active
Planned

The University of Texas at Austin July 30, 2019
Recent Activities: Texas Connected Freight Corridors

**Vision:** Deploy a sustainable connected vehicle environment along the Texas Triangle to showcase up to 12 applications to achieve safety, mobility, and economic benefits

**ConOps Workshop Highlights**

- Participants included core team, local public agencies, TxDOT Districts, freight carriers, and automated freight companies
- Received input on two scenarios: 1) Truck driver perspective and 2) public agency perspective
- Public sector prioritized *wrong way driving* and *queue warning*; private sector prioritized *truck parking availability* and *road weather warning*; both recognized value of *work zone warnings*
- Private sector offered guidance of best way to consume data generated by project, open API and audible alerts
>> A strategic document to guide the anticipation and inclusion of advanced technologies for the Texas transportation system and within TxDOT

Technology Utilization Plan

Emerging Technology Evaluation

Best Practices & Lessons Learned

Recommendations & Utilization Roadmap

Spring 2019  Fall 2019  Spring 2020
Technology Utilization Plan

Next Generation Vehicles & Energy
- Automated Vehicles
- Connected Vehicles
- Electric Vehicles
- Unmanned Aerial Vehicles

Infrastructure & Construction
- Infrastructure Enhancements
- Construction Techniques
- Solar Powered Highways

Materials & Additive Manufacturing
- Self-Healing Pavements
- Nanotechnologies
- 3D Printing

Other Technologies
- Robotics
- Virtual/Augmented Reality
- Hyperloop

Information & Communication Technologies
- Cloud Computing
- Crowdsourcing
- Blockchain
- Big Data & Open Data
- Cybersecurity
- RFID
- Cloud & Edge Computing
- Data Standards & Interoperability
- Machine Learning & AI
- Telecommunications

Service-Based Platforms
- Mobility on Demand
- Micromobility
- Transportation Subscription Services
- Freight Brokerage
- Uber Elevate
- Last Mile Delivery
Technology Utilization Plan

1a Prioritization of most impactful transportation technologies

1b Identification of use cases and applications

2 Evaluation of goal alignment and deployment barriers

3 Assessment of technology maturity
Priority Technologies

- Connected Vehicles
- Autonomous Vehicles
- Electric Vehicles
- Big & Open Data
- Mobility as a Service
- Unmanned Aerial Vehicles
Priority Technologies (Applications, Environments, and Use Cases)

**Connected Vehicles**
- Type of CV System
  - Vehicle-to-Vehicle
  - Vehicle-to-Infrastructure
  - Vehicle-to-Everything
- Applications
  - Safety
  - Mobility
  - Environment
  - Traveler Information
- Telecommunication Technology
  - DSRC
  - 5G

**Autonomous Vehicles**
- Environments
  - Freight
    - Long haul
    - Last mile delivery
    - Platooning
  - Transit
    - Low Speed Transit shuttles
    - Autonomous Buses
    - Platooning
  - Passenger
    - Shared Fleet
    - Personal Vehicle
  - Levels of Automation
  - Rural vs. Urban

**Electric Vehicles**
- Environments
  - Passenger
  - Freight
  - Transit
  - Urban vs. Long-haul
- Technology Considerations
  - Battery
  - Charging infrastructure
Priority Technologies (Applications, Environments, and Use Cases)

**Unmanned Aerial Vehicles**
- Applications
  - Package Delivery
  - Monitoring/Inspection
  - Emergency Response
- Environments
  - Urban
  - Rural

**Big & Open Data**
- Applications
  - Operations
  - Traveler Information
  - Mobility-as-a-Service
  - Regulatory Uses
  - Long-range Planning

**Mobility-as-a-Service**
- Applications
  - Integrated Trip Planning
  - Single Payment Platform
  - Travel Behavior Incentives
- Public, Private, or Public-Private
<table>
<thead>
<tr>
<th>Technology</th>
<th>Safety Impact</th>
<th>Congestion Impact</th>
<th>Sustainability Impact</th>
<th>Access Impact</th>
<th>Maintenance Impact</th>
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<tbody>
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<td><img src="image" alt="Red Circle" /></td>
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<tr>
<td>Big &amp; Open Data</td>
<td><img src="image" alt="Green Circle" /></td>
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- **Negative Impact**
- **Somewhat Negative Impact**
- **No Impact**
- **Somewhat Positive Impact**
- **Positive Impact**
### Priority Technologies (Deployment Barriers)

<table>
<thead>
<tr>
<th>Technology</th>
<th>Institutional &amp; Regulatory</th>
<th>Public Concern &amp; Cultural</th>
<th>Infrastructure &amp; Public Investment</th>
<th>Industry Readiness &amp; Tech Maturity</th>
<th>Cost to Consumer</th>
<th>Privacy &amp; Security</th>
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</table>

- **No Barrier**
- **Minimal Barrier**
- **Moderate Barrier**
- **Significant Barrier**
- **Major Barrier**
Priority Technologies (Goal Assessment)

<table>
<thead>
<tr>
<th>Concept</th>
<th>Concept</th>
<th>Experimental</th>
<th>Prototype</th>
<th>System Tested</th>
<th>Operational</th>
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<tbody>
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<td>Connected Vehicles</td>
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<tr>
<td>Automated Vehicles</td>
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</table>
Synthesize Best Practices (Phase 2)

Survey

Best Practices & Lessons Learned

Literature Review

Expert Interviews
In the Headlines:

Despite High Hopes, Self-Driving Cars Are ‘Way in the Future’

UPS Wants to Go Full-Scale With Its Drone Deliveries

SXSW 2018: Wyoming’s Plan to Connect Semi Trucks and Reduce Traffic Deaths

Cruise, GM’s Driverless-Car Unit, Delays Robot-Taxi Service

Cruise CEO says company needs to log more test miles before launching service, declines to offer new timeline

Cities Can See Where You’re Taking That Scooter

As electric vehicle production ramps up worldwide, a supply crunch for battery materials is looming

NYC Pilot Program Allows Vehicles To ‘Talk’ To Each Other

Thanks to technology developed by Los Angeles (and opposed by Uber), they know more about the movement of dockless vehicles than ever before.
OVERVIEW

RECENT ACTIVITIES

TECHNOLOGY UTILIZATION PLAN

TODAY’S AGENDA
Today’s Objectives

- Identify the trends and technologies driving innovation in freight and logistics
- Discover new trends and emerging technologies impacting critical mobility spaces, including mobility-as-a-service, connected vehicle applications, long-range planning, and data management
- Discuss technological and institutional advancements that will enable next-generation mobility data sharing
Today's Agenda

9:00 AM | Welcome & Opening Remarks

9:30 AM | Progress Update

**9:45 AM | Panel Presentations: Freight & Logistics**

11:00 AM | Break

11:15 AM | Update on the Texas Innovation Alliance & Task Force Whitepapers

11:35 AM | CAV Roadway Project

12:00 PM | Lunch: The Convergence of Wearables and Transportation

1:00 PM | Break

1:15 PM | The Texas Connected and Automated Vehicle Task Force

**1:30 PM | Panel Presentations: Mobility Data-Sharing across Sectors and Jurisdictions**

3:30 PM | Closing Remarks & Next Steps

4:00 PM | Adjourn
From Smart City to Smart State
Texas Innovation Alliance: Communities of Practice

ARLINGTON | AUSTIN | BRYAN / COLLEGE STATION | CORPUS CHRISTI | COLUMBUS | DALLAS
DENVER | DETROIT | EL PASO | FT WORTH | HOUSTON | KANSAS CITY | LOS ANGELES | LOUISVILLE | OMAHA
PITTSBURGH | PORTLAND | SAN ANTONIO | SAN FRANCISCO | SEATTLE | SOUTH BEND
Texas Innovation Alliance: Communities of Practice

Equity & Access

Seamless Mobility

Energy & Sustainability

Real-Time Data

MONTHLY DEEP-DIVES: 11 in 2019

Automated Vehicles for Aging & Disability Populations
Dockless Mobility Safety
Single Payment Platform
Mobility Data Lakes

Mobility Data Specification
Displacement & Gentrification
Congestion Pricing
The Texas Mobility Summit is a three-day event designed to shape the future of Texas mobility through public-private dialogue.

**Date:** November 17-19  
**Demo Day Location:** Alamodome  
**Conference Location:** Hilton Palacio del Rio

https://ctr.utexas.edu/texas-mobility-summit/
Critical Topics in Transportation Technology

A SERIES OF WHITE PAPERS
SCENARIO PLANNING FOR TRANSPORTATION TECHNOLOGY
Opportunities & processes for understanding impacts of technology

DATA SHARING: CHALLENGES & OPPORTUNITIES.
Understanding data sharing challenges, mechanisms, and opportunities

CONNECTED VEHICLES: A FRAMEWORK FOR TEXAS
Lessons learned from deployments and opportunities for Texas

MOBILITY AS A SERVICE: WHAT CAN IT DO FOR TEXANS?
An evaluation of MaaS pilots and their potential
SCENARIO PLANNING FOR TRANSPORTATION TECHNOLOGY

A new wave of scenario planning mostly takes broad outlooks, synthesizing trends in freight, climate, technology, and demographics to generate divergent scenarios.

- **Engaging & Educating Leadership,** This process can also help agencies to convey critical information to policy-makers and elected officials who make future investment decisions.

- **Engaging Stakeholders,** Before deriving plausible scenarios, public agency partners need to collaboratively frame the analysis, defining the scope and establishing a common understanding to build upon.

- **Engaging Industry,** work with industry technology developers and deployers for mutually beneficial information exchange.
FHWA Scenario Planning for CAV: Guidance for practitioners & Cost-Benefit framework

MnDOT State CAV Workshops: Inspired by FHWA Use Cases & Timelines with 4 levers (ACES)

FDOT Statewide Leadership and Scenario Tailoring: ACES & geared toward MPO long-range plans

Bay Area MTC: Future Mobility Research Program (pooled study) & Horizons / Three Futures

Delaware Valley Regional Planning Commission: Future Group & sketch level modeling of impacts

RECOMMENDATIONS
Future Considerations

- Future Forces
- Engaging Stakeholders
- Driving Towards Goals

Opportunities for Texas

- Set an Objective and a Priority Environment
- Define Driving Forces
- Down-select Scenarios
- Project Scenario Outcomes
- Identify Indicators and Actions
DATA SHARING: CHALLENGES & OPPORTUNITIES

Our future transportation system will be more connected, automated, interactive, electrified and shared. What are the opportunities and challenges in sharing and utilizing new mobility data?

- Data can help **measure progress towards public goals** such as reducing congestion, expanding equitable access to transportation, and improving safety. Without data, it is unclear which direction we are headed.
- Sharing of data is likely to **facilitate the growth of new mobility services** and create a win-win for the public sector and private operators.
- Many **open questions remain** about ownership, access, privacy, and trust.
EMPOWERING A PARTNERSHIP ECOSYSTEM
Catalyzing innovation & insights

SPUR RESEARCH
Form university partnerships for policy & technical analysis

BETTER INFORMED OWNERS & OPERATORS
Better information on safety, congestion, & more

MOBILITY SERVICE CREATION
Catalyze new services & industry growth

ENHANCED CUSTOMER SERVICE & TRANSPARENCY
Increase public communication & trust

Unlocking Opportunities
Future Considerations

- Privacy & Security
- Rapidly Advancing Standards
- Third Party Involvement

Opportunities for Texas

- Framework or common priority use cases
- Identify the data sources (for sharing and receiving)
- Build partnerships & manage relationships
- Peer exchange and lessons learned
- Data management and protections plans
CONNECTED VEHICLES: A FRAMEWORK FOR TEXAS

Connected vehicles are an emerging technology with great potential for improvement in various mobility options in a continuously urbanizing nation.

- **Challenges facing Texas**, including the population and economic growth impacts
- **SPaT Challenge** that sets the foundation for connected vehicle deployment
- **Significant benefits** for freight, personal, and transit applications
WYDOT
Freight safety and economic efficiency

UDOT
Smart transit signal priority

CITY OF AUSTIN
Understanding of system and infrastructure implementation
Future Considerations

- DSRC v. Cellular
- Lack of national standards
- Limited public knowledge and awareness

Opportunities for Texas

- Establish common roadmaps
- Consider other cities’ perspectives
- Keep informed on technology advancements
- Define implementation goals
- Encourage public engagement and support

KEY TAKEAWAYS
MOBILITY AS A SERVICE: WHAT CAN IT DO FOR TEXANS?

What if users bought trips themselves instead of owning the means of transportation? That could:

- **Decrease Car Ownership** by connecting users with multimodal options.
- **Reduce Vehicle Miles Traveled** thus reducing injury, congestion, and emissions
- **Increase accessibility** by giving users more options to meet their specific transportation needs.
DENVER REGIONAL TRANSPORTATION DISTRICT
Public transit tickets can now be purchased in the Uber app.

CITY OF SANTA MONICA, CA
Lyft app offers scheduling information for public transit.

SUN METRO
El Paso, TX is rolling out city wide bus rapid transit.

CITY OF ARLINGTON, TX
Low-performing bus route replaced with on-demand Via rideshare service.

CITY OF CENTENNIAL, CO
Lyft and Via contracted to provide first mile/last mile ‘carpool’ solution.

PINELLAS SUNCOAST TRANSIT AUTHORITY
Low-performing bus routes replaced with or complemented by subsidized TNC trips. Offered heavily discounted rides to night shift workers.

DALLAS AREA RAPID TRANSIT
DART GoPass app now displays TNC and micromobility options.
KEY TAKEAWAYS

Future Considerations

- Competition for market share
- Lack of data-sharing standards
- Limited public knowledge and awareness

Opportunities for Texas

- Reduce congestion and roadway death
- Offer users more choice in meeting their mobility needs
- Address transportation & land use together
- Extend options to high-transportation-need populations
- Increase economic competitiveness
BUSINESS STRUCTURE FOR TxDOT TECHNOLOGY TASK FORCE: IDEAS FOR DISCUSSION

Michael Morris, P.E.,
Director of Transportation
North Central Texas Council of Governments

July 30, 2019
TEXAS TECHNOLOGY TASK FORCE

1. Incubator for Ideas
2. Technology Transfer
3. Broker of Technology Deployment
4. Coordination of Technology Research (?)
1. INCUBATOR FOR IDEAS

Topics
Silo Busting
Role of Universities
Place for Young Smart People
Economic Development for Texas
2. TECHNOLOGY TRANSFER
(Dozens of Strategies)

Big Data
Blockchain
Unmanned Aircraft
Electric Vehicle Batteries as a Component of the Energy Grid
3. BROKER OF TECHNOLOGY DEPLOYMENT: “6 COMPONENT PROGRAM”
4. COORDINATION OF TECHNOLOGY RESEARCH (?)

Participate in the “6 Component Program”
Go Alone
TxDOT Technology Task Force Accepts and Holds (?)
TxDOT Technology Task Force Sponsors and Holds
TxDOT Technology Task Force Sponsors and Send to “6 Component Program”
ADMINISTRATION OF TECHNOLOGY DEPLOYMENT:
SPECIFIC EXAMPLE OF “ACCEPTS AND HOLDS”

NCTCOG: $ 2M (Approved RTC, Surface Transportation Block Grant)

TxDOT Partner?
NEW FREEWAY GEOMETRIC DESIGN FOR AUTONOMOUS AND ELECTRIC VEHICLES

(Examples)

Electronic Variable Speed Limits
Signage Within Vehicle
New Autonomous Vehicle Input (I to V)
Sensors vs. Striping
Dynamic Safety Triggers
Eliminate “Shy” Distance
Narrower Lanes
Induction Charging for Electric Vehicles
DSRC/5G Integration
Fiber +
Technology Thoroughfares vs. Frontage Roads
Opportunity Thrives Here

Texas Technology Task Force

July 30, 2019
A Pioneering Vision

Master Planned Development of 26,000 Acres
$9.8 billion invested
$76 billion economic impact
45 million SF developed

507 corporate residents
70 top ranked companies
61,602 total employees

Fastest growing area of the nation’s fastest growing large city (500,000+)

Population of 2 million within 20 miles of AllianceTexas
With world-class logistics, supply chain, and transportation infrastructure, Alliance delivers exceptional opportunities for global leaders & growing organizations.
**Hillwood Mobility Journey**

**Where we are today...**

- Constructing a vertiport network in partnership with Uber Elevate
- Incubating mobility start-up, **Booster Fuels**, throughout Hillwood properties

**Where we want to go...**

- Amazon Air will open first of its kind regional air hub at the Fort Worth Alliance Airport
- Partnering with AT&T on 5G network and with Drive.AI on AV Shuttle Pilot at Frisco Station

Enable innovation and economic growth through the AllianceTexas platform to build new partnerships, scale emerging mobility solutions and drive integration.
AllianceTexas Mobility Innovation Zone

Leveraging the AllianceTexas platform, Hillwood is convening corporates, start-ups, academics, policy makers and more to create a Mobility Innovation “do-tank” for partners to develop, test, scale and commercialize advanced mobility technology, policy, partnerships and business models.
AllianceTexas has attracted some of the world’s most globally recognized brands, across an array of industries, that can be partners in the Mobility Innovation Zone.

<table>
<thead>
<tr>
<th>Corporate Residents</th>
<th>Automotive</th>
<th>Aerospace/Aviation</th>
<th>Financial Services</th>
<th>Logistics</th>
<th>E-Commerce/Technology</th>
<th>Pharma/Healthcare</th>
<th>Consumer Goods &amp; Services</th>
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<tr>
<td>Deloitte.</td>
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<td>GDC Texas Co.</td>
<td>Charles Schwab</td>
<td>BNSF</td>
<td>Amazon</td>
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Initial Use Cases for Implementation

While there are intriguing use case opportunities across all four quadrants, Hillwood has chosen two to focus on initially.

Use Case 1: Airspace Testing Zone
- Zone to test and scale UAS commercial use cases in a “sandbox” environment unique in its proximity to rural, suburban, urban and highly trafficked air space and also with access to key intermodal logistics players.

Use Case 2: Integrated Freight Management
- Movement between an intermodal yard and nearby DC with AVs, digital platforms, and physical / digital integration.
Supply Chain Innovation Use Case at Alliance

**USE CASE OVERVIEW**

**Phase 1**
- Connected Gates
  - Smart gate tech installed at the BNSF intermodal yard & customer distribution center allowing for faster processing

**Phase 2**
- Touchless Gates & Smart Roads
  - Touchless gate and smart road system enables seamless integration to optimize scheduling

**Phase 3**
- Remotely Operated
  - Remotely operated truck between the two gates using private roads

**Phase 4**
- Autonomous
  - Autonomous truck operates between the two gates, scaling to longer, more complex routes

**Physical & Digital Integration Across the Supply Chain**
- BNSF Intermodal
- Distribution Centers
- Truck OEMs
- Digital Platform Provider
- Transportation Mgmt. Authority
- Communications

- Increase supply chain efficiency
- Provide real-time visibility on cargo movement
- Enable greater optimization to reduce costs
UAS Proving Ground Use Case at Alliance

**Phase 1: UAS Proving Ground Set-Up**
Transform pieces of existing airfields and private land into a UAS proving ground by adding UAS-support infrastructure.

**Phase 2: Research-Based Testing**
Set-up operations to fly UASs for testing and research uses at Alliance (e.g., pre-commercial safety case, BVLOS flight, counter-UAS, etc.).

**Phase 3: Commercial-Based Testing**
Expand operations at airfield to fly UASs for commercial uses at further distances (e.g., heavy cargo delivery, high-risk inspection, etc.).

**Phase 4: Restricted Airspace**
Extend testing and commercial operations to be in class B airspace, such as DFW airport airspace.
Convergence of Wearables and Transportation

Bryan Groden
Gartner, Inc.

July 30, 2019
The Convergence of Wearables and Transportation…

Where are We Going?
Wearables Today – So Much More Than Smartwatches

Audio and video
- Headsets
- Glasses
- Contact lenses

Medical and safety
- Audio and visual aids
- Cycle helmet
- Medical sensors
- Smart prosthetics

Hands
- Sensor gloves
- Rings
- Finger sensors
- Fingernail displays
- Smart fingernails

Clothing
- Fashion
- Sports and fitness
- Safety clothing
- Sartorial robotics

Jewelry/Accessories
- Watches
- Belts
- Pendants
- Tags/Trackers
- Smart wig

Quantified-self
- Fitness bands
- Biosensors
- Subcutaneous sensors

Carryable or pocketable
- Bags
- Tags
- E-cigarettes
- Selfie drones

Pets
- Pet fitness
- Tracking
- Pet toys
- Remote control

Feet
- Shoes
- Insoles
Key Issues

1. Why do it?

2. Choosing the right solution.

3. Common challenges and solutions to deploy wearable technology.
The Four Most-Common Enterprise Wearable Use Cases

- Remote Expert Guidance
- Hands-Free Workflow
- Health/Safety Monitoring
- Immersive Technology for Worker Training
SS01. Where is your primary workplace located?

Base: All respondents, n=252

North America 40%
Latin America 18%
Western Europe 24%
APAC 18%

Countries
- United States: 32%
- India: 18%
- France: 12%
- Germany: 10%
- Brazil: 10%
- Mexico: 8%
- Canada: 8%
- Netherlands: 2%
Gartner Survey Respondent Profile – Industry

**Base: All respondents, n=252**

**INDUSTRY: Industry Roll-up**

- **Services**: 13%
- **Manufacturing & Natural Resources**: 11%
- **Communications**: 6%
- **Media**: 1%
- **Utilities**: 8%
- **Wholesale Trade**: 5%
- **Healthcare Providers**: 9%
- **Retail**: 9%
- **Banking**: 9%
- **Insurance**: 8%
- **Education**: 7%
- **Transportation**: 6%
- **Government**: 6%
- **Healthcare Providers**: 9%
- **Other**: 2%

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Gartner Survey – Implementation Status

- **Smartwatches** (n=246): 54% No plans, 26% Investigating or planning within 24 months, 23% Piloting, 7% Deployed in production
- **Body worn sensor** (n=245): 7% No plans, 28% Investigating or planning within 24 months, 29% Piloting, 33% Deployed in production
- **Body-worn scanner devices** (n=245): 7% No plans, 28% Investigating or planning within 24 months, 31% Piloting, 35% Deployed in production
- **HMD/ VR device** (n=248): 12% No plans, 23% Investigating or planning within 24 months, 32% Piloting, 30% Deployed in production
- **Smart-glasses/ AR device** (n=246): 12% No plans, 26% Investigating or planning within 24 months, 30% Piloting, 13% Deployed in production
Gartner Survey – Current and Anticipated Usage

Number of devices deployed

- **Hands-free workflow**
  - Currently: 62.6%
  - Within 24 months: 151.7%
  - (n=178)(Currently), (n=175) (Within 24 months)

- **Remote expert guidance**
  - Currently: 57.3%
  - Within 24 months: 105.5%
  - (n=185) (Currently), (n=178) (Within 24 months)

- **Immersive learning**
  - Currently: 67.5%
  - Within 24 months: 136.4%
  - (n=182) (Currently), (n=178) (Within 24 months)

- **Health and safety monitoring**
  - Currently: 73.6%
  - Within 24 months: 173.1%
  - (n=179) (Currently), (n=177) (Within 24 months)
Strategic Planning Assumption

By 2024, the average enterprise wearable deployment will have grown by a factor of 10x from fewer than 100 devices in 2019.
Wearables — Key Use Cases Through 2024

Remote Expert Guidance
- Field services, field maintenance, transportation, manufacturing, energy, utilities

Hands-Free Workflow
- Warehousing and distribution, manufacturing, healthcare, utilities, energy

Health and Safety Monitoring
- Hazardous environments, field workers, first responders, military personnel

Immersive Training
- Healthcare, first responders, military, sports, manufacturing, transportation

AR/VR Sales and Marketing
- Every industry where experiencing some aspect of a product is vital

AR/VR Design
- Represents a revolution for architecture, design and engineering

AR Medical
- Enormous potential for more advanced, less intrusive surgery

Current

Emerging

Front Line Worker-Focused

Knowledge Worker-Focused
Use Cases: Remote Expert Guidance

Using a device camera, centralized personnel receive a live view of the field employee’s environment and task being performed.

Allows the expert to provide audio guidance and visual cues through annotation capabilities that display as an overlay on the remote worker’s field of view.

- Signal controller repairs
- Vehicle emergency repairs
- Inspections
- May also include worker training and quality control

Sample Vendors: Fieldbit; FLIR; Fujitsu; Google; OverIT; PTC; Scope AR; Ubimax; Vuzix
Use Cases: Fatigue Detection

Driver fatigue detection devices assess/determine whether a driver is starting to experience fatigue and is in the danger of falling asleep.

Includes a wide range of devices, such as fitness trackers, wearable cameras, smartwatches, wearable fabrics and head-mounted displays (HMD).

Most common technologies assess heart rate, head position, eye movement, steering pattern, brain activity, skin conductance and muscle activity.

- Snow and ice control operations
- May also detect possible driver impairment (drug/alcohol)

Sample Vendors: Bosch Sensortec; Eyeris; Ford; Fujitsu; Hexoskin; Optalert; Smart Cap
Use Cases: Worker Health Assessment

- **Galvanic skin response (GSR) sensors** measure electrical conductivity of the skin to help understand a user’s physiological and psychological condition.

- **Smart watches, bracelets and rings** (some integrated with GSR sensors) can monitor heart rate, body temperature, respiration rate, as well as assess fatigue and stress levels to help identify potential instances of:
  - Heat exhaustion
  - Heart attack/stroke
  - Epileptic seizures
  - Dehydration

- Newer **smart rings** can also monitor UV exposure.

**Sample Vendors:** Empatica; Mindfield Biosystems; Moodmetric; NeuLog; Sentio Solutions; Shimmer
Use Cases: Lone Worker Protection

• Lone worker protection (LWP) devices use technologies that determine whether a worker is in distress and notify a service center, which assesses the situation.

• Basic devices can be activated by the user pressing a button or a cord being ripped.

• More-complex devices may include fall detection, lack-of-motion detection and sudden vertical movement detection.

• Also supports worker location tracking.

**Sample Vendors:** ecom; SoloProtect; Sonim Technologies
Use Cases: Work Zone Safety

The number of work zone worker fatalities – both nationally and in Texas – are not falling.

Also, this data does not reflect the incidence of serious injuries resulting from highway work zone accidents.

Source: Bureau of Labor Statistics include both traffic-related and non-traffic-related occupational accidents.
Use Cases: Work Zone Safety

- **Collision Avoidance:** Smart vests and hard hats equipped with RFID tags or Bluetooth beacons to warn equipment operators of workers in near proximity. May also trigger audible alarm to worn workers of potential equipment impacts.

- **Newer (connected) vehicles** are being equipped with object recognition detection – using C-V2X or DSRC technology...as well as Driver Monitoring Systems (DMS).

**Sample Vendors:** Audi; Autotalks; BMW; Caterpillar; Ford; Liebherr; Manitowoc; Mercedes-Benz, Volvo
 Enterprise adoption of smartwatches remains slow but is expected to grow over the next 5 years.

 Many remaining wearable technologies are still positioned early in hype cycle as products and vendors continue to evolve.
Case Study – Port of Brisbane and Queensland Trucking Assoc.

- In December 2018, the Port of Brisbane and the Queensland Trucking Association (QTA) began a 12-month pilot of the "SmartCap" as part of its two-year Heavy Vehicle Safety Around Ports project.
- SmartCap is a wearable technology that measures fatigue. Inserted into a cap or hardhat, the SmartCap headband measures changes in a person's electroencephalogram (EEG) and provides accurate, real-time measurements of alertness to operators and drivers.
- Six transport companies - with a total of 60 drivers - are participating in the pilot.
- Brisbane port roads have a high number of heavy vehicles using their network, making it an ideal location for the pilot. Learnings will be shared with other Australian ports.

Gartner listed SmartCap as one of its “Cool Vendors in Asia/Pacific, 2016”
Case Study – BP

- Fieldbit Hero has been operational at BP Lower 48 at sites in Texas, Wyoming and New Mexico since 2017. Over this time, BP has seen improvements in the safety and efficiency of its field service operations, most notably with a reduction in production losses, well downtime and travel expenses by field personnel.
- Fieldbit Hero uses real-time video to allow experts in a central control room to see what the field technician sees, ensuring an accurate problem diagnosis.
- Using augmented reality, Fieldbit Hero then enables the expert to superimpose easy-to-understand visual instructions and real-time data from control systems in the technician's field of view as the technician works on the equipment fix.
- Experts use a secure Fieldbit web portal to communicate with remote on-site technicians equipped with a mobile device or ODG R7 smart glasses.
- In addition, Fieldbit Hero helps BP Lower 48 preserve the practical field services knowledge of its workforce by organically capturing the knowledge created during the service process.

Gartner listed FieldBit as one of its “Cool Vendors in Enterprise Wearable and Immersive Technologies” in 2018.
Key Issues

1. Why do it?

2. Choosing the right solution.

3. Common challenges and solutions to deploy wearable technology.
Picking the Right Vendor Is Key to Any Successful Deployment

- Determine the stability of wearables’ vendors by assessing production capacity and redundancy in component suppliers.
- Pick solutions that can be managed with existing tools like UEM/EMM when possible.
- Minimize the impact of the rate of change in technology:
  - Commitments to product availability.
  - Choose a standardized platform (e.g., Android).
  - Guarantees for availability of updates.
  - Target solutions that have easy integration points.
Key Issues

1. Why do it?
2. Choosing the right solution.
3. Common challenges and solutions to deploy wearable technology.
Deployment of Wearables will Encounter Many Challenges

<table>
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<tr>
<th>Concern</th>
<th>Bottom 2 Box 1,2 Rating</th>
<th>Middle Box 3,4,5 Rating</th>
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<td>Labor laws (n=251)</td>
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<td>Working with small vendors (n=250)</td>
<td>23%</td>
<td>49%</td>
<td>28%</td>
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<tr>
<td>Union or acceptance (n=251)</td>
<td>27%</td>
<td>46%</td>
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To what extent is each of the following a concern with the deployment of wearables at your organization?

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<td>Working with small vendors</td>
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<tr>
<td>Union or acceptance</td>
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1: Not a concern at all
7: Extremely important concern
Keys to a Successful Wearables Deployment

- Define your use case before evaluating technology
- Engage with lines of business to identify the impacts of wearable technology
- Involve labor from the initial design phase of any project to its completion
- Enlist HR and legal teams to review potential restrictions and compliance requirements on the use of devices
- Identify risks and potential unintended consequences (e.g., security concerns)
- Pilot as a small solution with willing employees but plan to expand as technology and use cases evolve
Recommended Gartner Research – Wearable Tech

- **Magic Quadrant for Unified Endpoint Management Tools**
  Chris Silva, Rob Smith, Manjunath Bhat and Others (G00354834)

- **Predicts 2018: Mobile, Endpoint and Wearable Computing Strategies**
  Rob Smith, Chris Silva, Michael Silver and Others (G00342408)

- **Best Practices to Augment Employees With Wearable Technologies**
  Rob Smith (G00317260)

- **Enterprise Wearable Technology Must Be Adopted Using a Risk-Based Approach**
  Chris Silva (G00314075)

- **Identify Innovative Opportunities for Wearables in Your Organization**
  Bryan Taylor and Angela McIntyre (G00331890)
Recommended Gartner Research – Autonomous and Connected Vehicles, Mike Ramsey (Sr. Director, Analyst)

- Best Practices for Direct Monetization of Connected Vehicles, Part 2
- Hype Cycle for Connected Vehicles and Smart Mobility, 2018
- Toolkit: Assessing Your Digital Business Platform in Automotive and Smart Mobility
- Cool Vendors in Automotive and Smart Transportation

For information, please contact your Gartner representative.
Wearable Management Is Part of Unified Endpoint Management

- Unified Endpoint Management (UEM) is a single console to manage mobile, client, wearable and some IoT devices in a single console.
- Combines Master Data Management (MDM) MDM, EMM and CMT tools.
- UEM continues to evolve

Sample Vendors:
Apple;CommuniTake;Google;Lookout;Microsoft;SOTI;Symantec;Veracode;Zebra;Zimperium
Advances in Automotive Electronics Technologies Can Help Significantly Improve Highway Work Zone Safety

- **Driver Monitoring Systems (DMS)** are automotive safety technologies that could have a significant impact on reducing motor vehicle accidents caused by driver fatigue or distraction.

- **Vehicle-to-Vehicle (V2V) use cases** enable safer driving performance with near real time communications (<10 ms) offering tremendous business and public safety impacts.
CONNECTED AND AUTONOMOUS VEHICLE (CAV)

Task Force Update

July 30, 2019
CAV Task Force Need
What is the CAV Workgroup?

The CAV internal Workgroup was established to create a coordinated and centralized forum to better facilitate TxDOT’s efforts towards connected and autonomous vehicles.

Will provide TxDOT leadership and staff with a singular place of contact to coordinate what CAV tasks (research, grant submissions, etc.) the department is actively undertaking.

Will recommend the Department’s long term strategy for connected and autonomous vehicles.
What is the CAV Task Force?

At the request of Governor Greg Abbott, TxDOT began formation of a statewide CAV Task Force.

The CAV Task Force will be composed of other state agencies, public institutions, and private industry stakeholders.
Over 100 individuals and groups have expressed interest in participating in the Task Force.

The Task Force will consist of a small number of voting members and a larger, more broad body of participating members.

Voting membership will be made up of public agencies and institutions, as well as a member from each representative stakeholder area.
What is the CAV Task Force Focus?

The CAV Task Force is focused on being a statewide single source of information for those wishing to engage Texas on CAV, and a hub for the exploration of CAV policy issues.
CAV Task Force Benefits to Texas

SAFETY FIRST

OPPORTUNITY

OPPORTUNITY

THE DAY TEXAS HAD ALL 4 SEASONS IN ONE DAY

12-26-15
TxDOT staff is developing a website that will be broken down into three distinct areas:

1. Provide the public with insight into the task force,
2. Enable interested stakeholders an ability to request contact information for areas of operation across Texas, and
3. Create a platform to submit TxDOT research ideas.
The first meeting is being planned for early September at the TxDOT Greer Building, 1\textsuperscript{st} Floor, Ric Williamson Hearing Room.

Meeting will focus on scope and mission of task force, as well as an introduction of members and the expectation of the path forward.

Invitations will be emailed in the near future.
Questions or comments please contact:

Zeke Reyna  
Strategic Planning Division, TxDOT  
(512) 517-1749  
Zeke.Reyna@txdot.gov
CITIES & MOBILITY DATA: Solutions for Protecting Privacy While Giving Transportation Planners the Data They Need to Plan for the Future

Kansas Waugh
Director of Mobility Partnerships, Populus
@populus_ai
SHARED MOBILITY SERVICES HAVE RAPIDLY EVOLVED IN CITIES
ADOPTION OF NEW MOBILITY SERVICES IS ACCELERATING

KEY FACTORS HAVE LED TO RAPID GROWTH

1. **GPS:** smartphone adoption has risen from 35% in 2011 to 77% in 2018

2. **Traffic:** in multiple major cities, it is likely faster to bike or scooter trips that are 3 miles or less

3. **Venture capital:** these companies have raised more money faster than prior mobility service providers

Source: The Micro-Mobility Revolution, A Populus Research Report, July 2018
Private mobility services are being launched in cities at an unprecedented pace.

Cities are largely in the dark about how new mobility services are changing how we move in cities.

Only cities have the ability to make policy and planning decisions about the public right of way.
THE IMPORTANCE OF DATA FOR MANAGING MOBILITY SERVICES

Cities need data to develop informed policies and transportation plans. Their goals typically are to steer progress towards:

1. **Safety**: reducing transportation-related injuries and fatalities.
2. **Equitable access**: improving availability and accessibility of transportation services to people of all backgrounds.
3. **Efficiency**: prioritizing efficient use of public space, and reducing transportation energy use/climate impacts.

CITIES ARE LOOKING OUT FOR THE COMMON GOOD

No data → Undesired outcomes → Uninformed policy/plans
DOCKLESS MOBILITY HAS BEEN EASILY AND QUICKLY REGULATED

Cities from coast to coast have begun to rapidly adopt dockless mobility regulations since 2018

- Fleets are owned
- Vehicles are small
- Vehicles are stationary (for a significant portion of time)
- Shared best practices between cities
Most city councils have approved dockless mobility permitting policies which include:

1. **Safety requirements**: insurance requirements, information operators must communicate to users of systems, and vehicle requirements.

2. **General parking restrictions**: general guidelines related to where scooters/bikes cannot be parked, and potentially language reserving the city’s right to designate incentivized or dis-incentivized (fined) parking areas.

3. **Data sharing requirements**: real-time or archival reports on vehicle fleet size/availability, trips, and incidents (e.g. complaints, safety, etc.).

4. **Fees**: fees for submitting a permit application, a flat annual fee for operating a program if awarded a permit, and a per vehicle fee for operating.
COMMON MICROMOBILITY DATA REQUIREMENTS

COMMONLY REQUESTED DATA POINTS FROM OPERATORS

- Trips
- Vehicles
- Maintenance logs
- Complaints
- Injuries

REQUEST DATA THROUGH INDUSTRY STANDARDS

- GBFS (General Bike Feed Specification) is commonly required for public-facing APIs of vehicle locations (for example to third-party apps).
- MDS (Mobility Data Specification), introduced by LADOT, is now being used widely to require trip, vehicle status, and route data.

COLLECT SURVEY DATA TO ANSWER KEY QUESTIONS

- Many key policy questions cannot be answered with GPS based locational data alone. They require asking people to respond to a survey.
- Cities should require that operators collect data in a consistent format approved by the city.
WHAT ARE THE IMPLICATIONS OF REQUIRING PERSONAL DATA?
GPS TRACE DATA CAN EASILY BE USED TO RE-IDENTIFY INDIVIDUALS
BEST PRACTICES FOR MANAGING PRIVACY

- Recognize that geolocation data is personal, and treat it as highly sensitive.
- Develop necessary agreements and policies regarding data use, storage, and sharing.
- Partner with trusted third parties that meet security requirements of operators and cities.
CITIES NEED INFORMATION, NOT DATA FOR THE SAKE OF DATA

Ultimately, city policymakers and transportation planners want access to data to manage the future of transportation.

KEY EXAMPLES
- Vehicle and fleet compliance
- Equity analysis
- Harnessing data for new infrastructure
- Pricing to efficiently allocate public space
EVALUATING EQUITABLE ACCESS TO MOBILITY SERVICES

Equitable access to new mobility services by disadvantaged communities is a key concern for cities.

With access to real-time and historical data, cities can better design for equity.

Key examples:
- Incentivizing placement of a specific # or % of vehicles in underserved communities.
- Developing a low-income program for new mobility services and to measure progress.
DATA-DRIVEN DESIGN FOR MICROMOBILITY PARKING

Through Populus Mobility Manager, we deliver heat maps of scooter parking events, and user-friendly tools to design new bike and scooter corrals for cities to:

1. Design
2. Communicate
3. Evaluate

www.populus.ai
DATA-DRIVEN DESIGN FOR MICROMOBILITY PARKING

Through Populus Mobility Manager, we deliver heat maps of scooter parking events, and user-friendly tools to design new bike and scooter corrals for cities to:

1. Design
2. Communicate
3. Evaluate

1 PARKING SPOT FOR A CAR >> 15 BIKES AND SCOOTERS

www.populus.ai
Cities that receive detailed trip data can now harness GPS trace data to plan safer routes for bicycling and scooter infrastructure such as protected lanes.
As we look to the future, many cities are exploring strategies for more efficient curbside utilization:

- Allocating parking for car-sharing vehicles with higher trip utilization rates than personally-owned vehicles.
- Creating pick-up/ drop-off zones for fleet vehicles.
- Pricing and incentivizing public space for shared fleets, including curbs and sidewalks, for micromobility parking.

Lime and Populus announced a new partnership to validate use of on-street parking for their free-floating car-sharing vehicles, the LimePod, for a city.
Data is an important and powerful way for cities to communicate the need to redesign our streets for a safer, more equitable, and more efficient transportation future.

When it comes to data privacy and security, it is important that cities and operators identify appropriate solutions, so that planners and policymakers have access to the information they need to plan for the future of mobility.
THANK YOU

Kansas Waugh, Director of Mobility Partnerships
kansas@populus.ai | www.populus.ai
AI-Driven Mobility Solutions for Smart Cities
Our roads today face a multi-faceted challenge

- Road Infrastructure is outdated and relies on old legacy systems.
- Inter-agency communication and collaboration is poor.
- Cities have limited access to advanced analytics.
- Updating public infrastructure is very expensive.
Our cars are getting smarter, our roads are not.
Generating data-driven insights...

Waycare AI Driven advanced analytics

CCTV
Traffic Incidents
Traffic Detectors
Telematics
Weather
Construction
Navigation Apps

Actionable insights
- Incident Management
- Proactive incident detection
- Irregular traffic congestion
- Intersection malfunctions
- Pothole detection
- etc.
We built the world's first cloud-based, AI-driven mobility ecosystem.
Improving Traffic Incident Identification and Response

Automated Incident Identification

Early in-vehicle incident and integration with traffic systems allow quick reporting to all responding agencies.

- **12 minutes** average faster response time
- **20%** increase in identified incidents
- **180%** viewership of outgoing alerts
Real-time and direct communication to the public

Example of alerts:
• Road incidents
• Road closures
• Blocked lanes
• Debris
• Construction
• Roadside help
• Traffic hazards
• Weather hazards

Public Outreach (Twitter, text, email):

<table>
<thead>
<tr>
<th>290 vs. 1,233</th>
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<tr>
<td>Jan 2017</td>
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Empowering Cross-Agency Collaboration

- Traffic Control
- Freeway Service Patrol
- Law Enforcement
- Emergency Services
Enabling proactive traffic crash prevention

Hazardous road prediction

Forecasting the most dangerous road segments enables to proactively warn drivers and to optimize the allocation of agencies resources.

Proactive prevention goals

- Reduction of primary crashes
- Speed
- Aware driving
Waycare’s predictive analytics reducing primary crashes

1. **WAYCARE** ALERTS OF REQUIRED ACTION

   **PREVENTATIVE**

   I-15 at Russell Preventative
   
   7.1 mi (11 mins)

2. **DMS #1 SET TO PRELIMINARY WARNING**

3. **DMS #2 SET TO PRELIMINARY WARNING**

4. **POLICE PROACTIVELY POSITIONED**
Waycare Proactive Crash Prevention Impact Report:

I-15 & Russell NB - August through September 2018

17% REDUCTION IN PRIMARY CRASHES

Reduction reflects an average of 37 CRASHES PREVENTED PER YEAR

DAILY AVERAGE CRASHES

0.62

0.51

REDUCTION IN NUMBER OF CRASHES DURING ACTIVE PREVENTATIVE COMPARED TO PREVIOUS MONTHS.

IMPACT ON SPEED

91% of drivers slowed down below 65 MPH after the preventative site

12% REDUCTION IN SPEED AT PREVENTATIVE SITE DURING PILOT HOURS COMPARED TO MAY THROUGH JULY 2018

% OF VEHICLES DRIVING OVER 65 MPH (AVG.)

PREVENTATIVE SITE

OUTSIDE OF PILOT HOURS

DURING PILOT HOURS

90%

69%

1 MILE NORTH OF PREVENTATIVE SITE

OUTSIDE OF PILOT HOURS

DURING PILOT HOURS

33%

9%
Waycare Partners

Strategic partnerships across the mobility sector
Adoption of autonomous vehicles will be contingent on the public sector managing the mobility ecosystem.
Thank you

WWW.WAYCARETECH.COM

PAUL.ZAMSKY@WAYCARETECH.COM
DATA EXCHANGE

TxDOT IMD
Establishing DriveTexas as the integrated data source for road condition
- Implemented a road condition data API to emergency response agencies
ATMC data (LoneStar) provides road condition and operations data locally through C2C protocol
Video sharing pilot underway to share video throughout the state and with cities
Texas Connected Freight Corridors project
- Instrument the Texas Triangle (IH10, IH30, IH35 and IH45) with roadside units and Fleet vehicles and partners (HEB)
- Provide freight operators and drivers with info and warnings to improve safety and mobility
  - Warnings for traffic queues, work zones, low bridge heights, weather (heavy rain, ice, fog), wrong-way drivers
  - Equipped truck will get braking warnings from other equipped trucks
  - Info on traffic conditions, route guidance, border wait times
- In planning and high level design until Feb 2020
Mobility Data Sharing Efforts

Houston ConnectSmart - Advanced Demand Management (ADM) and Traffic Management Systems & Operations (TSMO) improvements. Start planning in the fall. 3 year project starting 7/15/19 - deployment July 2020

- The ADM portion will provide data to users in HOU on alternative routes, alternative means of transport, suggestions to change their travel times to take a less congested alternative, and have a points system to incentivize users to choose a route that reduces congestion.

- The TSMO portion is a bunch of advanced analytics primarily aimed at TranStar so we can make better data-driven decisions as part of our day-to-day traffic management responsibilities.

Lidar data sharing pilot

- Provide construction project information to OEMs in support of AVs

WAZE Connected Citizen Partner

- Sharing road condition data
- Working towards consuming data to inform incident management
Needs to support continued efforts

- Data integration versus sharing – one view of the state
- Data standards – customized data models limit sharing/integration
- Sharing must address safeguarding privacy, ensuring security, and limiting liability
- Need an open approach to data sharing with the understanding that “many eyes” are needed to extract value and intelligence from large and complex datasets.
- Access to data products (dashboards, reports) is often not under the same usage restrictions as with traditional systems, which limit the number of users out of necessity.
- Data products can be available as downloads directly from cloud storage or through an API running on the cloud infrastructure.
- Data being shared, especially to the public, is devoid of any sensitive data
- Encryption methods used to obfuscate shared sensitive data are updated frequently to give the best protection. (multiple public data sets can be combined to produce PII)
- Different versions of datasets are created based on who they need to be shared with
- Beyond sharing data, data analysis process code is also shared
- In addition to sharing historical data, live data streams are established
Data standard efforts

- **Work Zone Data Working Group** - define features, attributes and vocabulary needed to model work zone activity data (Work Zone Data Specification)

- **NCHRP study 08-119** develop tools, methods, and guidance for improving data integration, sharing, and management practices to enable transportation agencies, in collaboration with private-sector and public-sector stakeholders, to make better planning and operations decisions. Secondary benefits will be increased uniformity of data across states and improved consistency of practice.