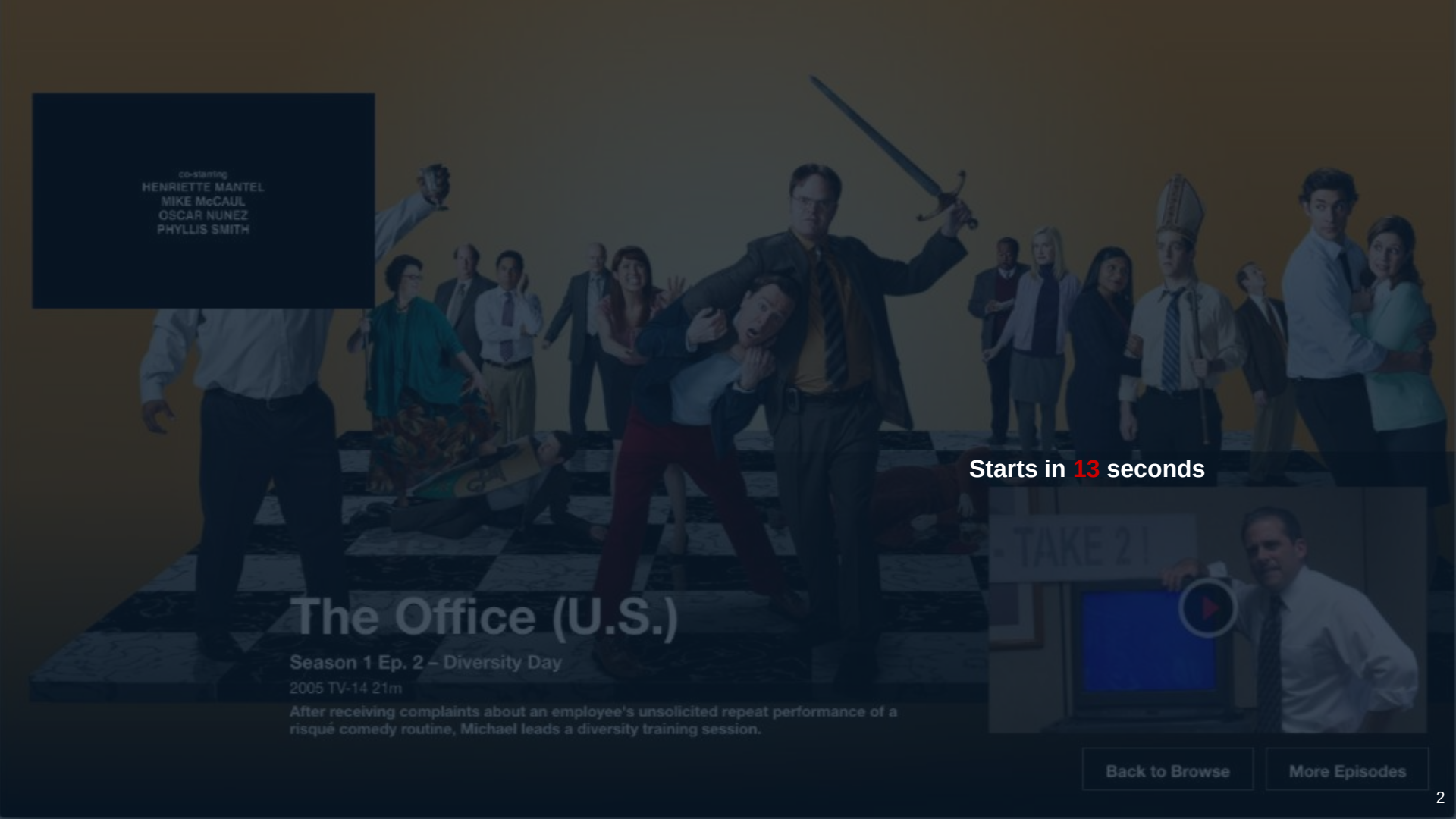
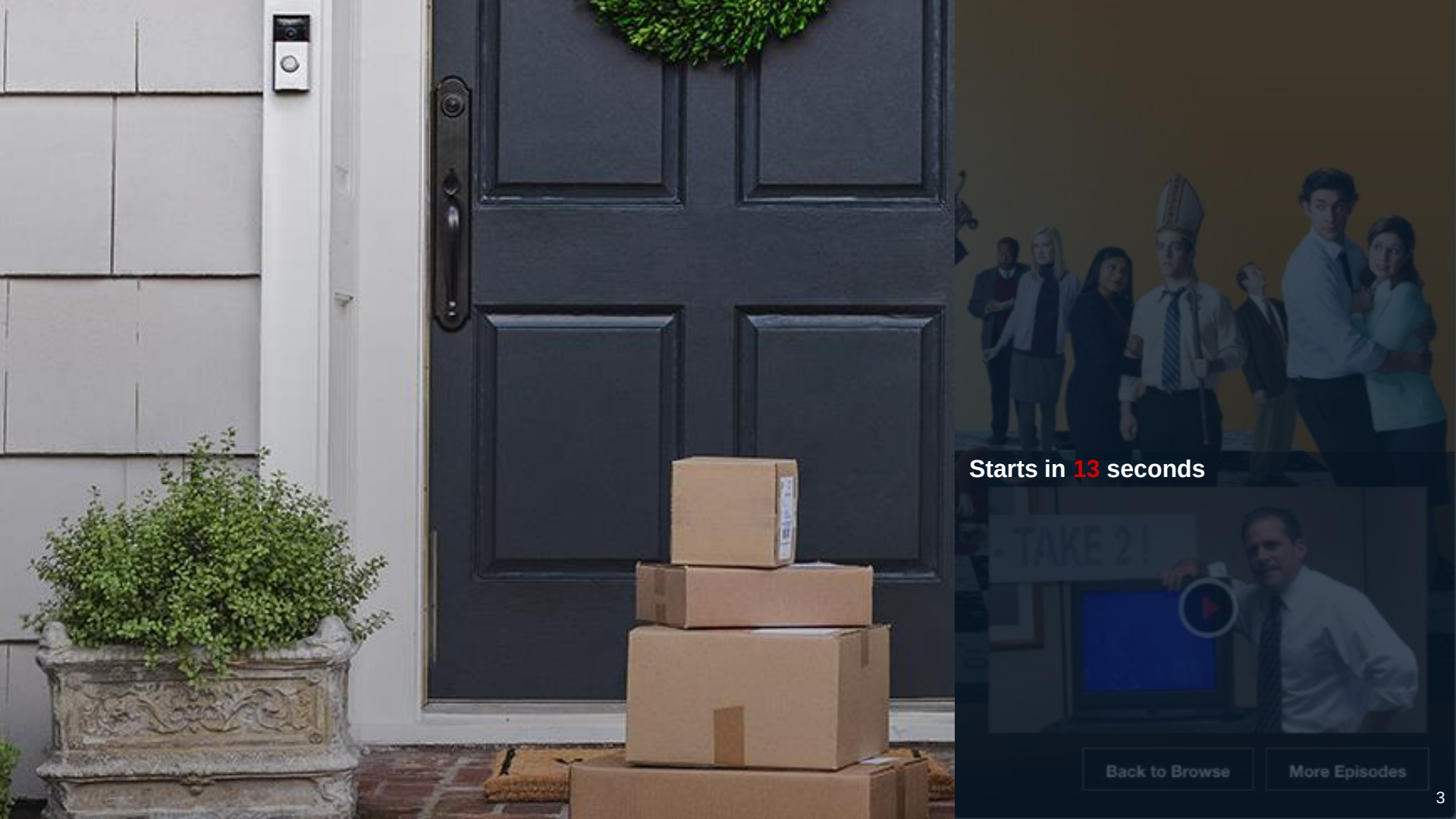
TTTF

TEXAS TECHNOLOGY TASK FORCE


co-starring
HENRIETTE MANTEL
MIKE McCAUL
OSCAR NUNEZ
PHYLLIS SMITH
Starts in 13 seconds
TAKE 21
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.
Back to Browse
More Episodes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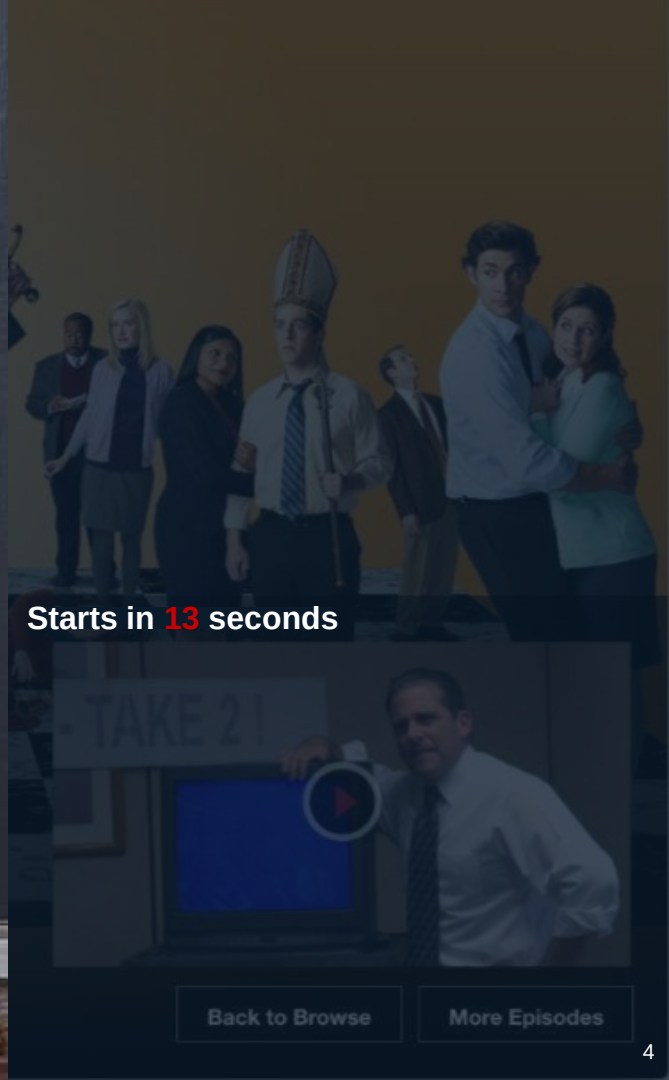
TAKE 2!
Back to Browse
More Episodes

390 m
Green St
and then
This route is 10 min faster than A308 - Hampton Court Rd
Green St
B375 - Thames St
Halliford Rd
Loudwater Rd
B375 - Fordbridge Rd
16:04
45 min • 25 km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TAKE 2!
Back to Browse
More Episodes

OVERVIEW

RECENT ACTIVITIES

TECHNOLOGY UTILIZATION PLAN

TODAY'S AGENDA

OVERVIEW

RECENT ACTIVITIES

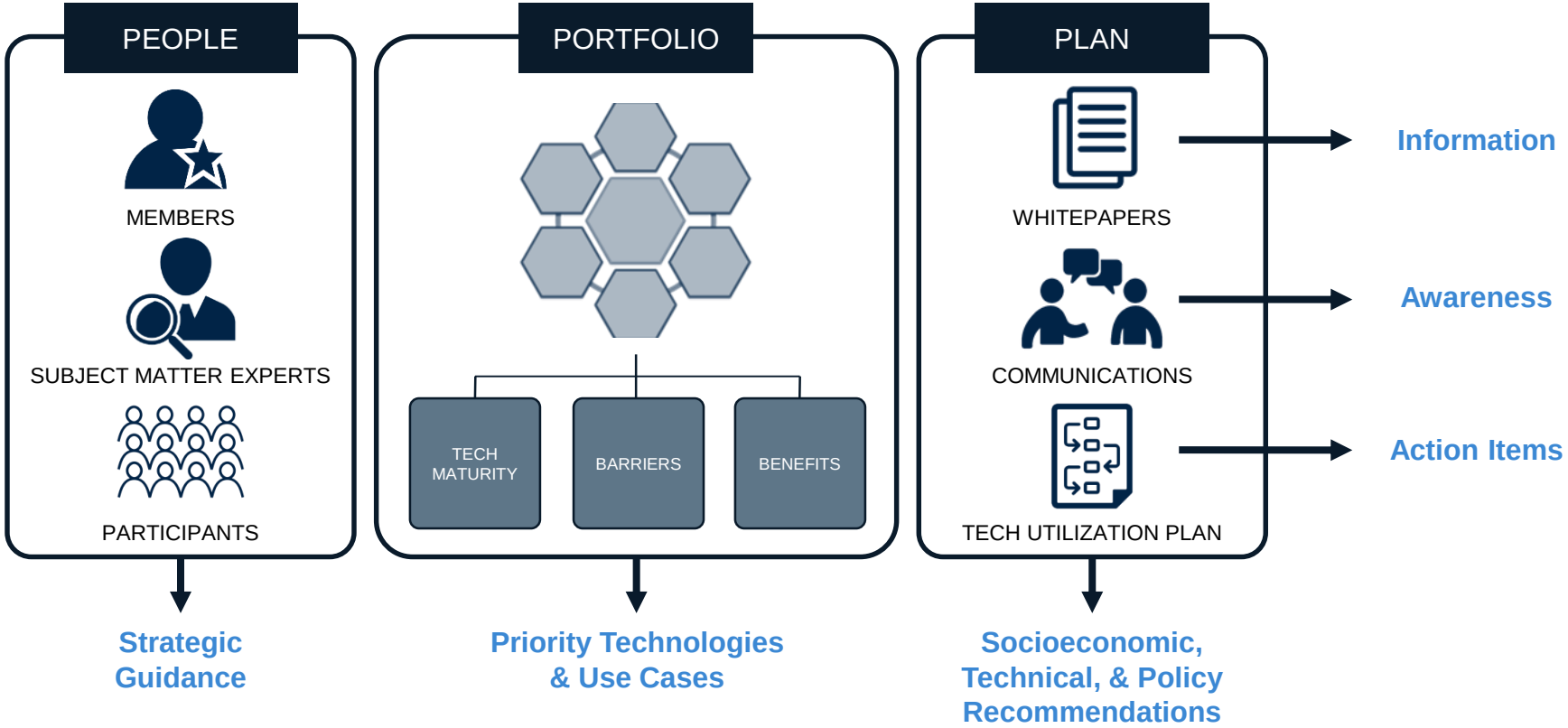
TECHNOLOGY UTILIZATION PLAN

TODAY'S AGENDA

TxDOT Innovative Initiatives

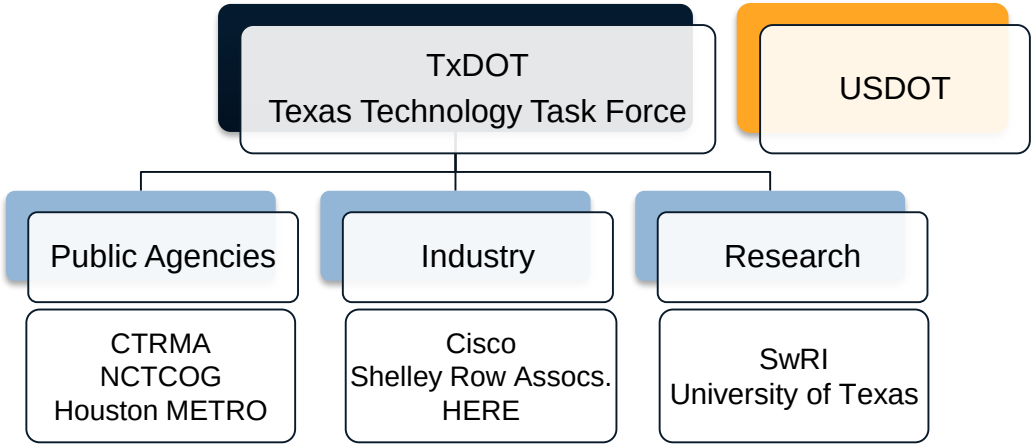
	TEXAS TECHNOLOGY TASK FORCE	STATE TRANSPORTATION INNOVATION COUNCIL	TEXAS INNOVATION ALLIANCE	GOVERNOR'S CONNECTED & AUTOMATED VEHICLE TASK FORCE
Primary Audience	TxDOT	TxDOT RTI	Texas Public Agencies & Research Institutions	Governor's Office & Texas Legislature
Planning Horizon	Long-Term	Short-Term	Short-Term	Short-Term
Unique Value	Discovery & Strategy	Implementation & Scaling	Tactics & Implementation	Policy

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

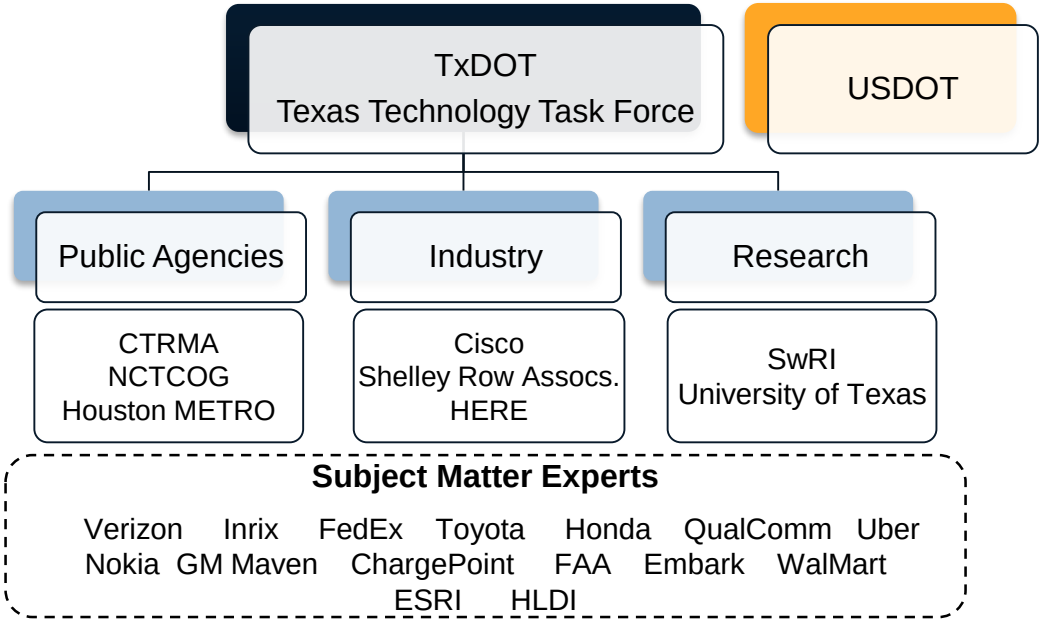
Overview: People

Task Force Membership



Overview: People

Task Force Membership



Overview: People

Task Force Membership

TxDOT
Texas Technology Task Force

USDOT

Public Agencies

CTRMA
NCTCOG
Houston METRO

Industry

Cisco
Shelley Row Assocs.
HERE

Research

SwRI
University of Texas

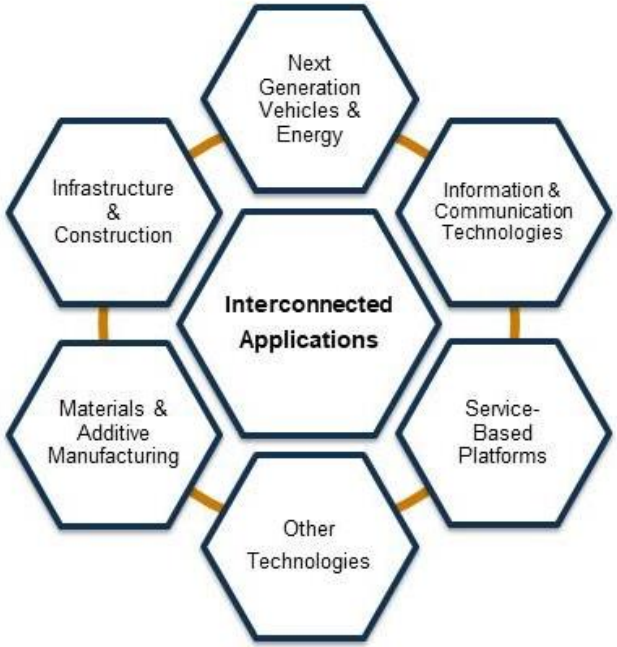
Subject Matter Experts

Verizon Inrix FedEx Toyota Honda QualComm Uber
Nokia GM Maven ChargePoint FAA Embark WalMart
ESRI HLDI

Participants

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

Overview: Portfolio



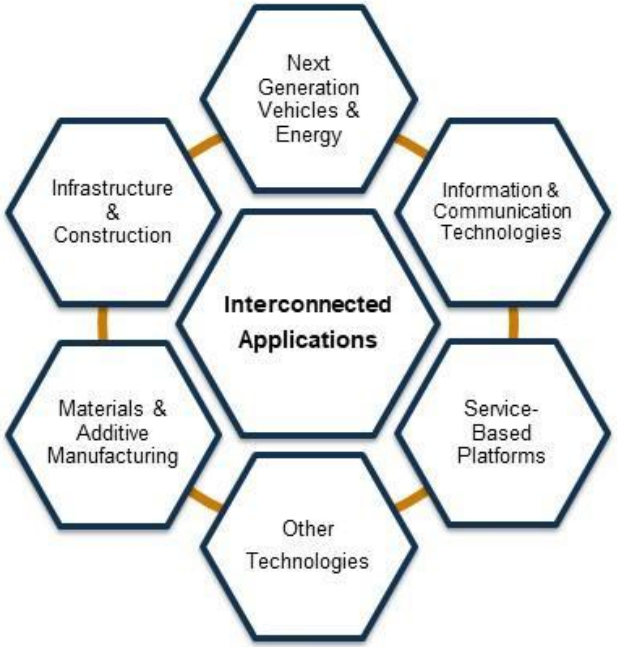
Overview: Portfolio

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

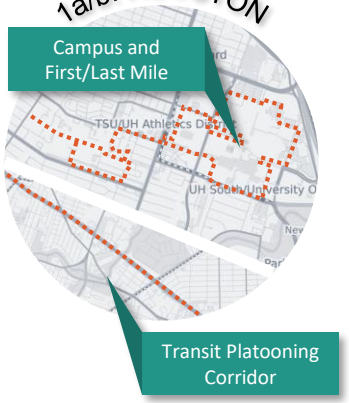
Recent Activities

- 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

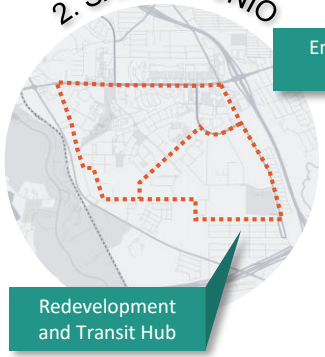
Recent Activities: Automated Vehicle Activities

TEXAS ★
AUTOMATED PORTFOLIO

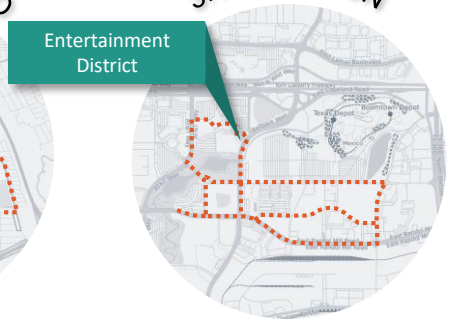
1a/b. HOUSTON



2. SAN ANTONIO

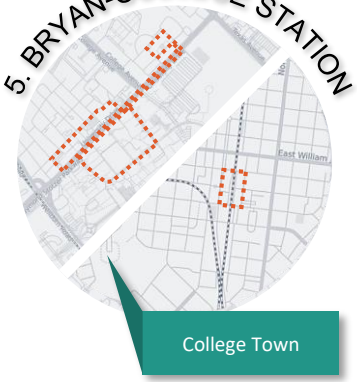


3. ARLINGTON

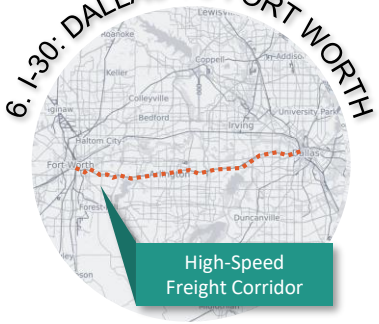


4. FRISCO

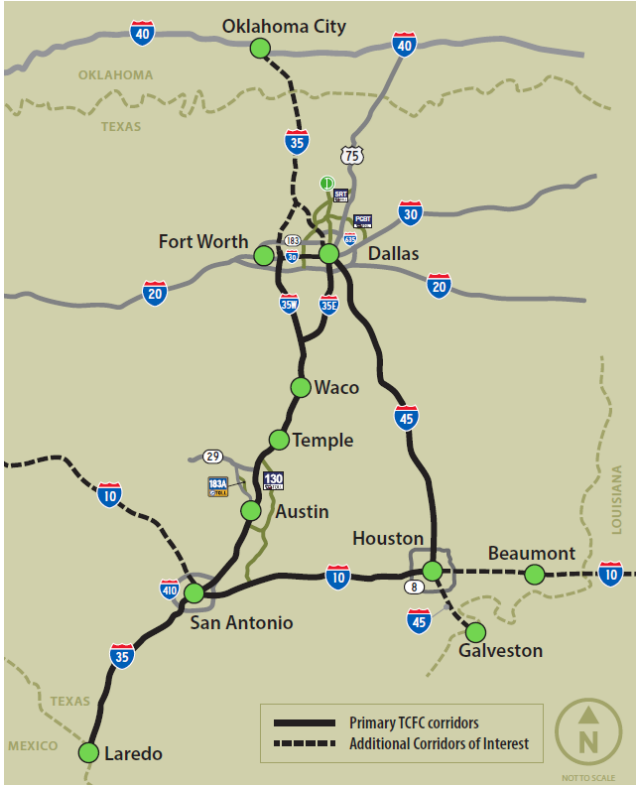
5. BRYAN-COLLEGE STATION



6. I-30: DALLAS TO FORT WORTH



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

OVERVIEW

RECENT ACTIVITIES

TECHNOLOGY UTILIZATION PLAN

TODAY'S AGENDA

Technology Utilization Plan

>> A strategic document to guide the anticipation and inclusion of advanced technologies for the Texas transportation system and within TxDOT

Emerging Technology Evaluation	Best Practices & Lessons Learned	Recommendations & Utilization Roadmap
Spring 2019	Fall 2019	Spring 2020

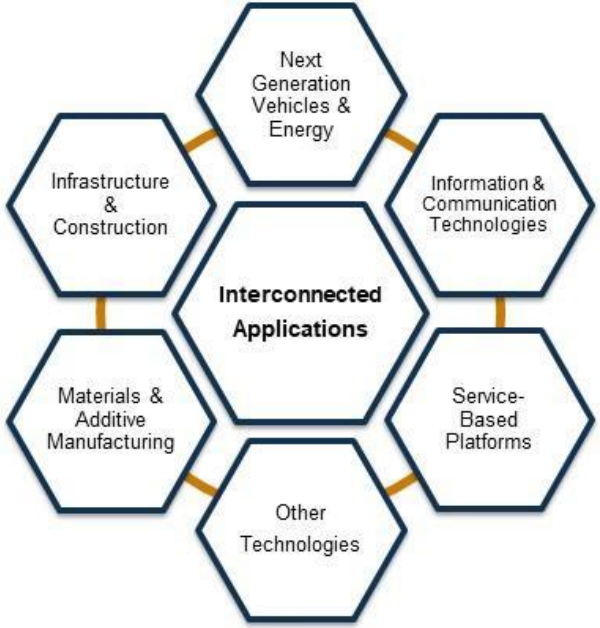
Technology Utilization Plan

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

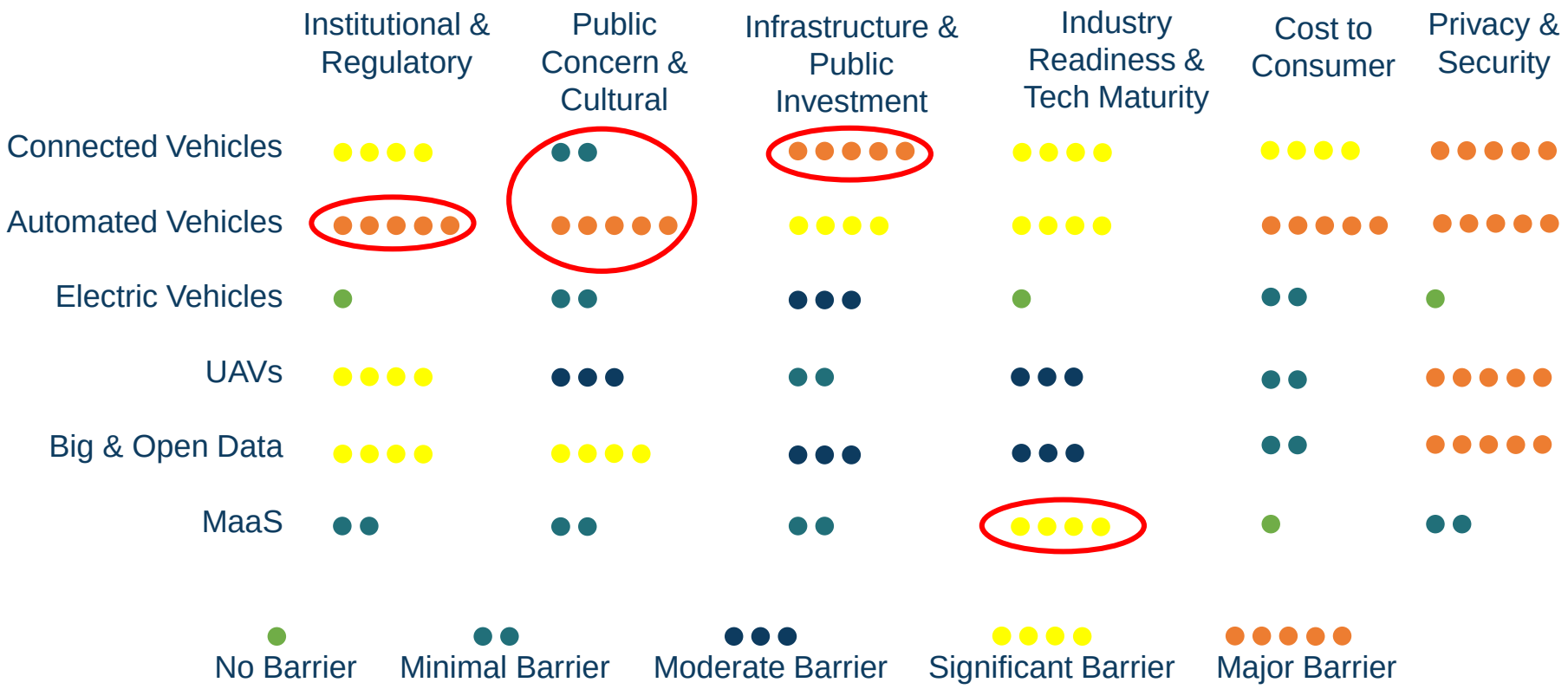
Mobility-as a Service

Applications
- Integrated Trip Planning
- Single Payment Platform
- Travel Behavior Incentives

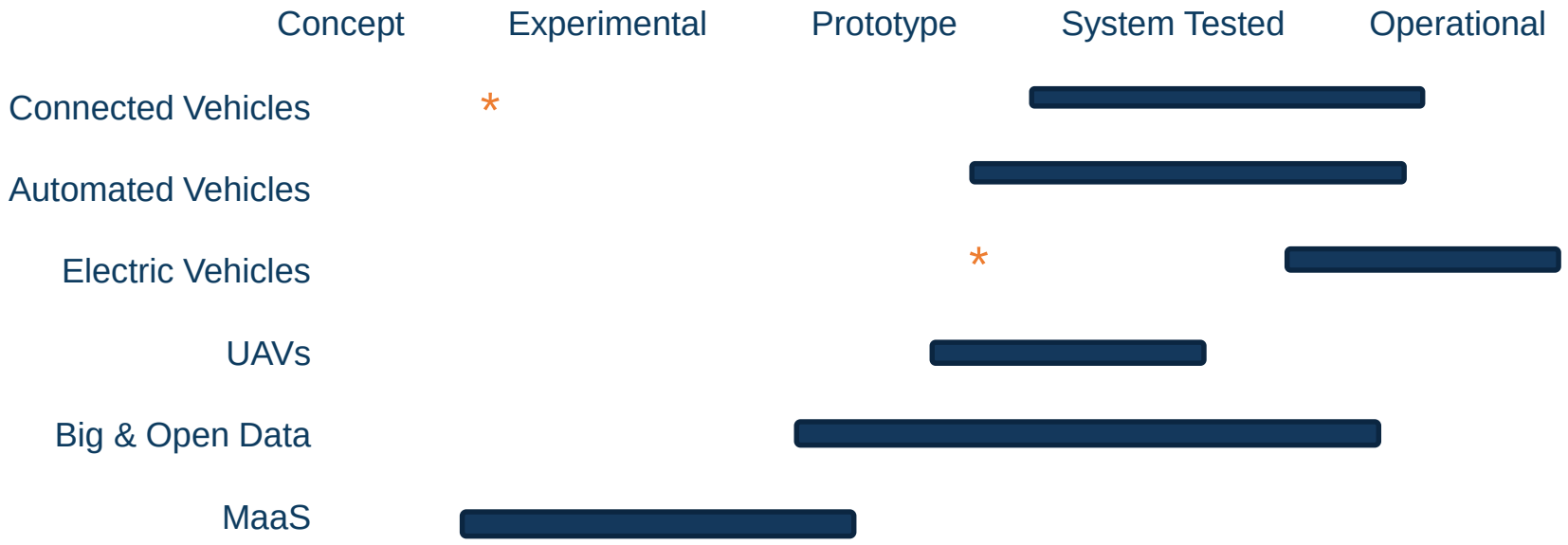
Public, Private, or Public-Private

Priority Technologies (Goal Assessment)

Priority Technologies (Deployment Barriers)



Priority Technologies (Goal Assessment)



Synthesize Best Practices (Phase 2)

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

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

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

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

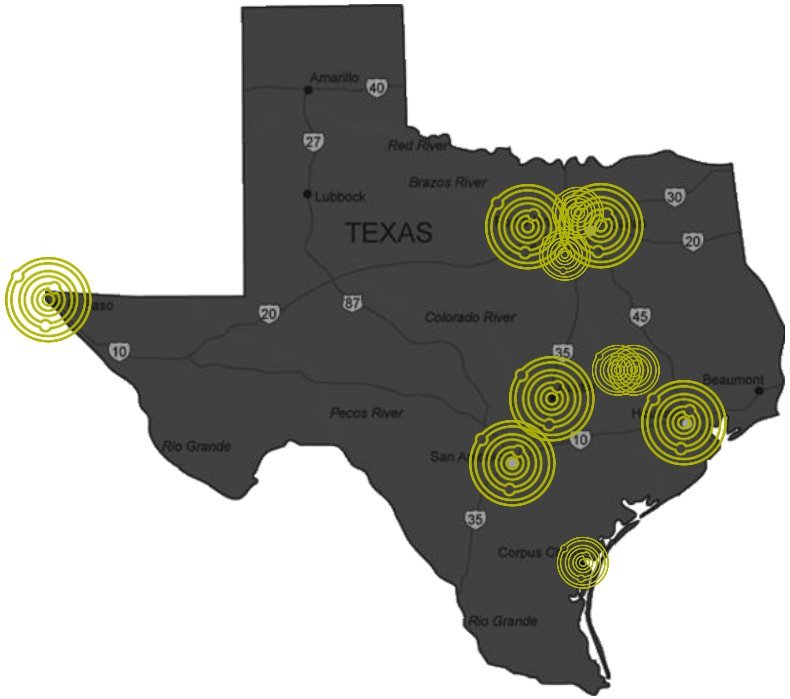
3:30 PM | Closing Remarks & Next Steps

4:00 PM | Adjourn

TTTF

TEXAS TECHNOLOGY TASK FORCE

Texas Innovation Alliance



TEXAS INNOVATION ALLIANCE

From Smart City to Smart State

THE UNIVERSITY OF TEXAS AT AUSTIN

Texas Department of Transportation

CITY OF AUSTIN FOUNDED 1839

Texas Innovation Alliance: Communities of Practice

SMART Cities LAB
www.smartcitieslab.org

TEXAS INNOVATION ALLIANCE

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

Texas Mobility Summit

SAN ANTONIO, TX

The Texas Mobility Summit is 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

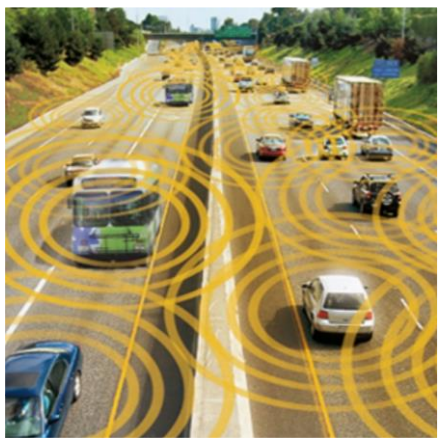
https://ctr.utexas.edu/texas-mobility-summit/

Critical Topics in Transportation Technology

A SERIES OF WHITE PAPERS

SCENARIO PLANNING FOR TRANSPORTATION TECHNOLOGY

Opportunities & processes for understanding impacts of technology

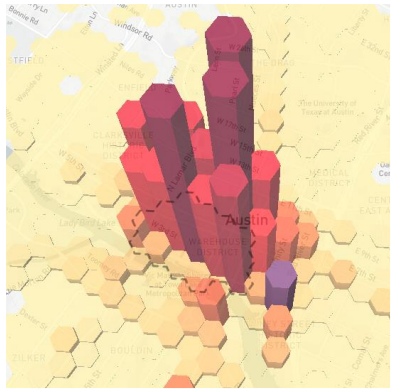


CONNECTED VEHICLES: A FRAMEWORK FOR TEXAS

Lessons learned from deployments and opportunities for Texas

DATA SHARING: CHALLENGES & OPPORTUNITIES.

Understanding data sharing challenges, mechanisms, and opportunities



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.

A CLOSER LOOK

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

KEY TAKEAWAYS

Future Considerations

Future Forces

Engaging Stakeholders

Driving Towards Goals

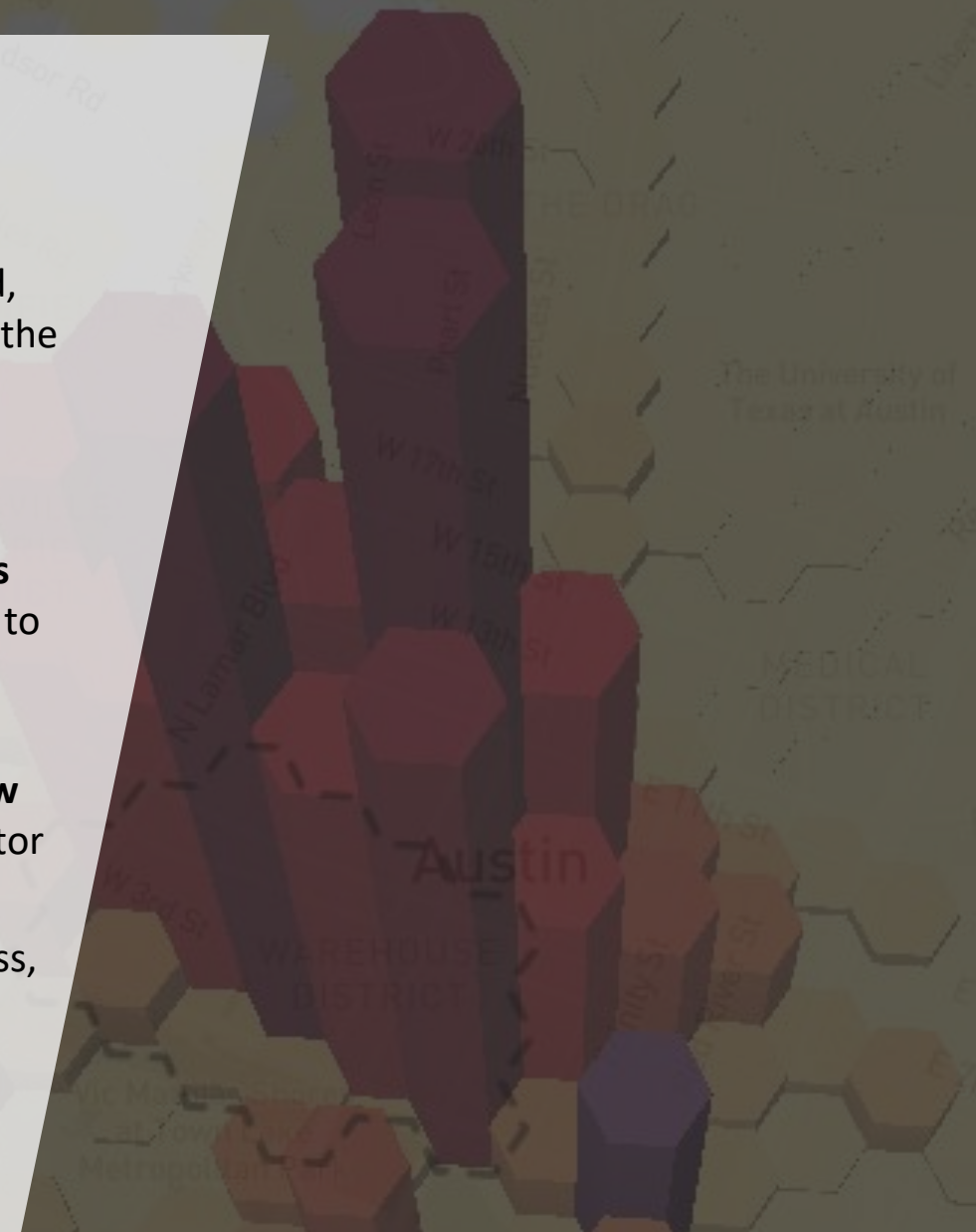
Opportunities for Texas

- 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.



A CLOSER LOOK

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

KEY TAKEAWAYS

Future Considerations

Privacy & Security

Rapidly Advancing Standards

Third Party Involvement

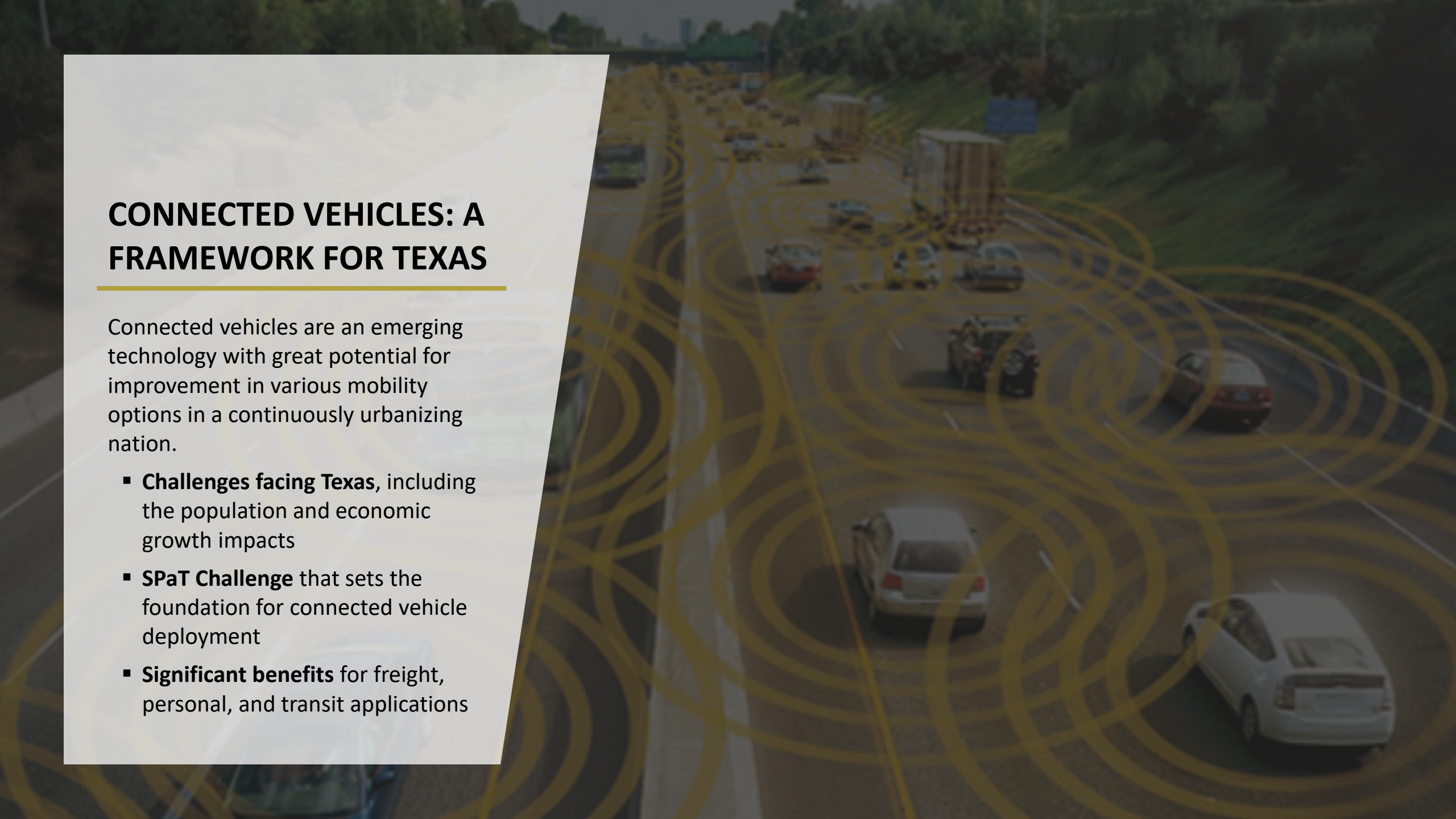
Opportunities for Texas

- 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



A CLOSER LOOK

WYDOT

Freight safety and economic efficiency

UDOT

Smart transit signal priority

CITY OF AUSTIN

Understanding of system and infrastructure implementation

KEY TAKEAWAYS

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

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.

A CLOSER LOOK

DENVER REGIONAL TRANSPORTATION DISTRICT

Public transit tickets can now be purchased in the Uber app.

CITY OF CENTENNIAL, CO

Lyft and Via contracted to provide first mile/last mile 'carpool' solution.

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.

DALLAS AREA RAPID TRANSIT

DART GoPass app now displays TNC and micromobility options.

PINELLAS SUNCOAST TRANSIT AUTHORITY

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

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

North Central Texas
Council of Governments

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)

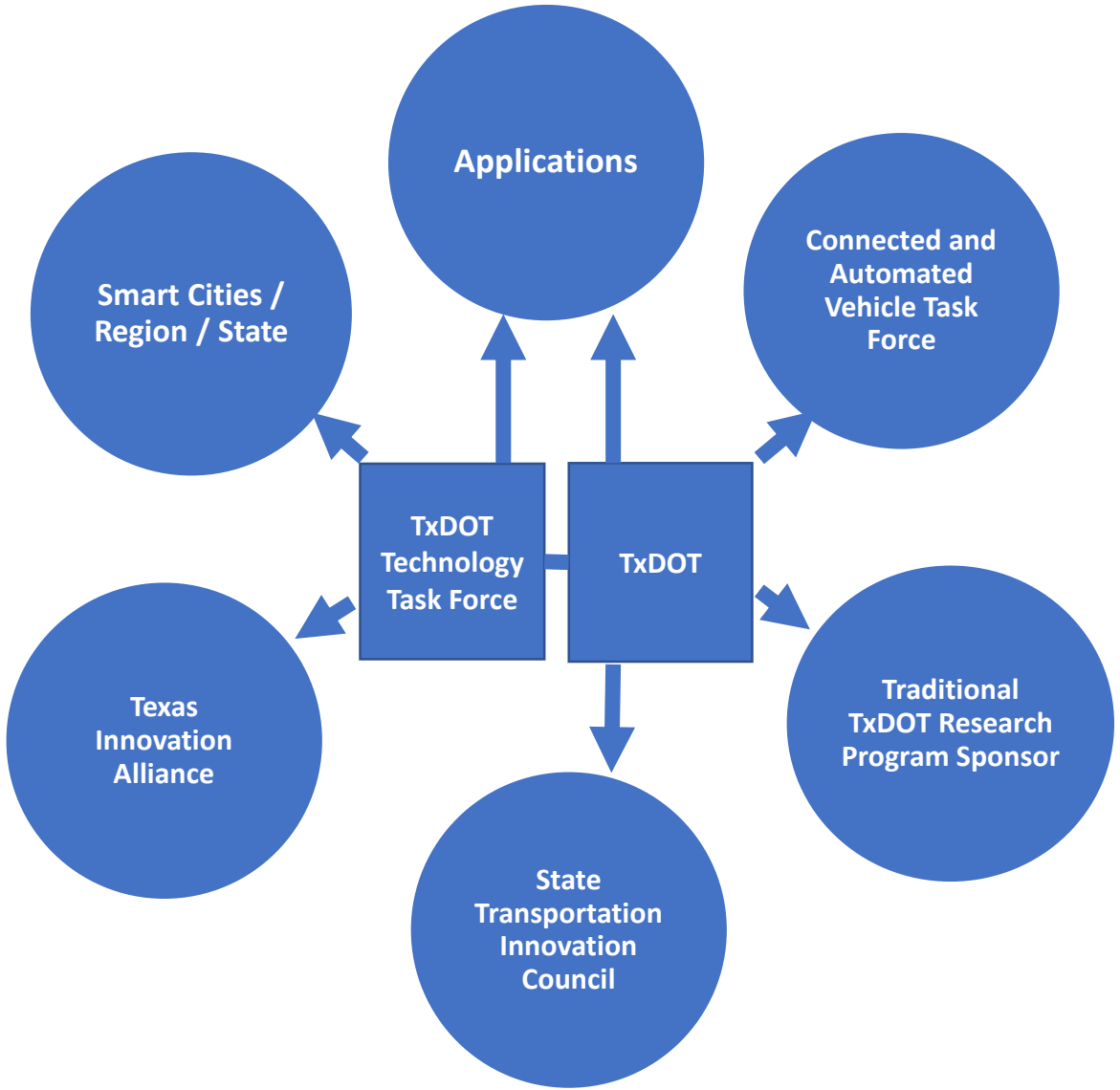
Big Data

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

ALLIANCE TEXAS

Opportunity Thrives Here

Texas Technology Task Force

July 30, 2019

ALLIANCE TEXAS

A Pioneering Vision

Master Planned Development of 26,000 Acres

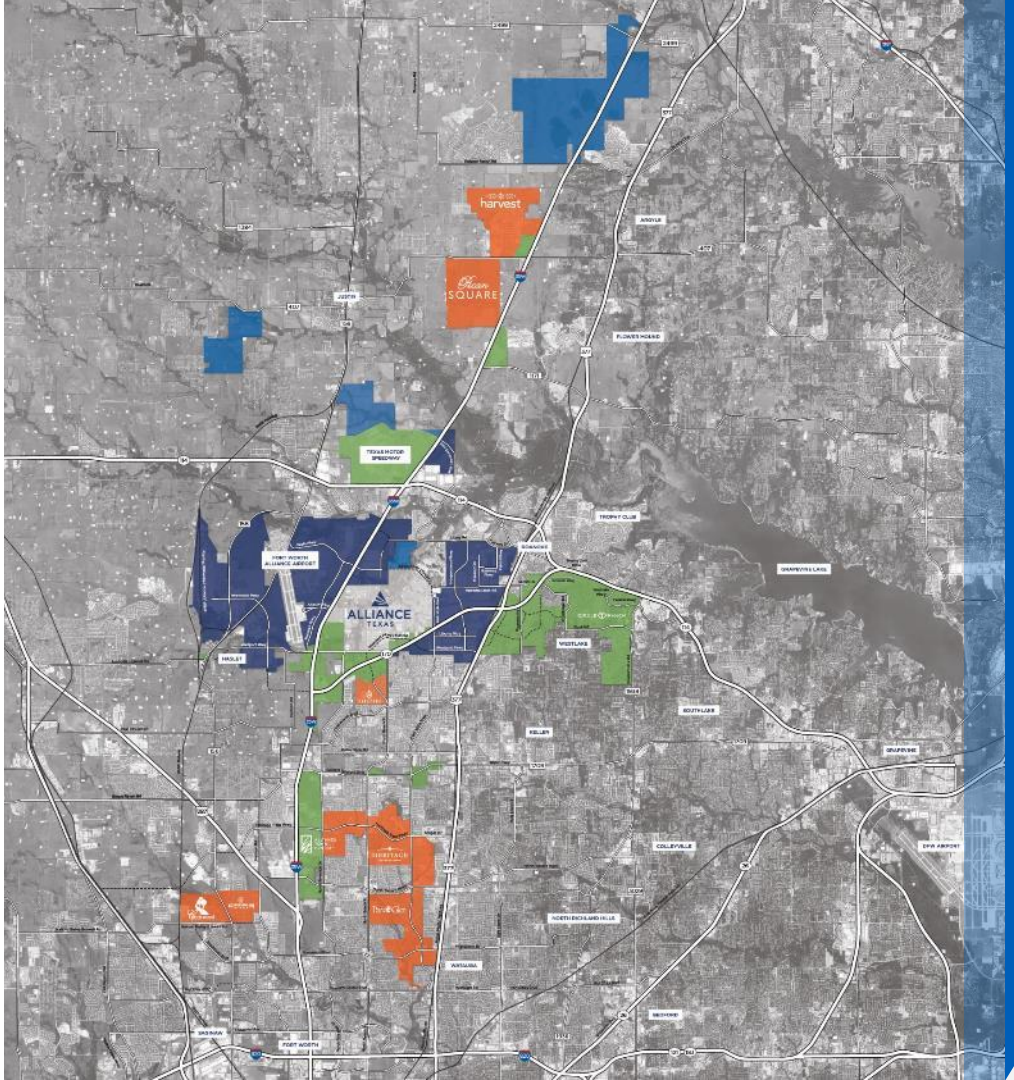
ALLIANCE TEXAS

$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



Alliance

With world-class logistics, supply chain, and transportation infrastructure, Alliance delivers exceptional opportunities for global leaders & growing organizations.

ALLIANCE
TEXAS

Hillwood Mobility Journey

Where we are today…

Constructing a vertiport network in partnership with Uber Elevate

Amazon Air will open first of its kind regional air hub at the Fort Worth Alliance Airport

Incubating mobility start-up, **Booster Fuels**, throughout Hillwood properties

Partnering with AT&T on 5G network and with Drive.Ai on AV Shuttle Pilot at Frisco Station

Where we want to go…

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

ALLIANCE TEXAS

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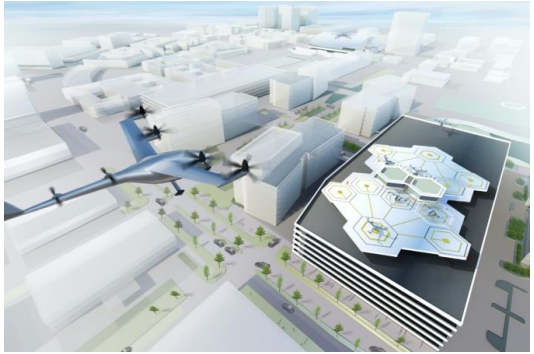
Future of Mobility



HILLWOOD
A PEROT COMPANY®

AllianceTexas Mobility Innovation Zone

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.

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Corporate Residents

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.

Future of Mobility

AUTOMOTIVE	AEROSPACE/ AVIATION	FINANCIAL SERVICES	LOGISTICS	E-COMMERCE/ TECHNOLOGY	PHARMA / HEALTHCARE	CONSUMER GOODS & SERVICES
Bridgestone	GDC Technics	charles SCHWAB	BNSF Railway	amazon	AmerisourceBergen	BEHR
Ford	RECARO	Mercedes-Benz Financial Services	CEVA	LG Electronics	CookChildren's Health Care System	Cargill
ATD American Tire Distributors	leidos	Fidelity	DB SCHENKER	facebook	CardinalHealth	Callaway
GM	DynCorp International	Deloitte.	NFI	Walmart	GALDERMA	Coca-Cola
Hyundai	Rolls Royce		exel	Texas Instruments	Medical City Alliance	General Mills
tucker	ATAC A Textron Company		XPOLogistics	AT&T	McKESSON	KRAFT
VW	Robinson		GE Transportation	FedEx Supply Chain	PATTERSON DENTAL	StanleyBlack&Decker
	HILLWOOD AIRWAYS		Ryder		Texas Health Harris Methodist Hospital Alliance	Nestlé
	BELL		FedEx Express			
			ups			

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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

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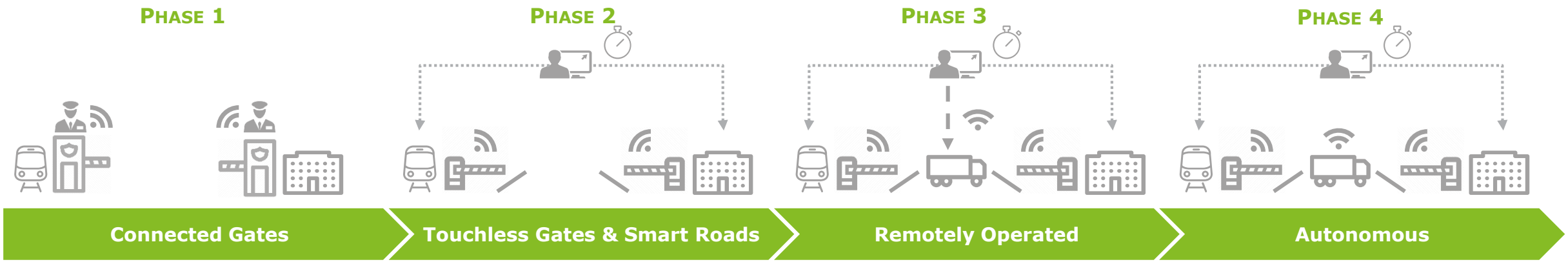
USE CASE OVERVIEW

Supply Chain Innovation Use Case at Alliance



Smart gate tech installed at the BNSF intermodal yard & customer distribution center allowing for faster processing

Touchless gate and smart road system enables seamless integration to optimize scheduling

Remotely operated truck between the two gates using private roads

Autonomous truck operates between the two gates, scaling to longer, more complex routes

Physical & Digital Integration Across the Supply Chain

- Increase supply chain efficiency
- Provide real-time visibility on cargo movement
- Enable greater optimization to reduce costs

BNSF Intermodal • Distribution Centers • Truck OEMs • Digital Platform Provider • Transportation Mgmt. Authority • Communications

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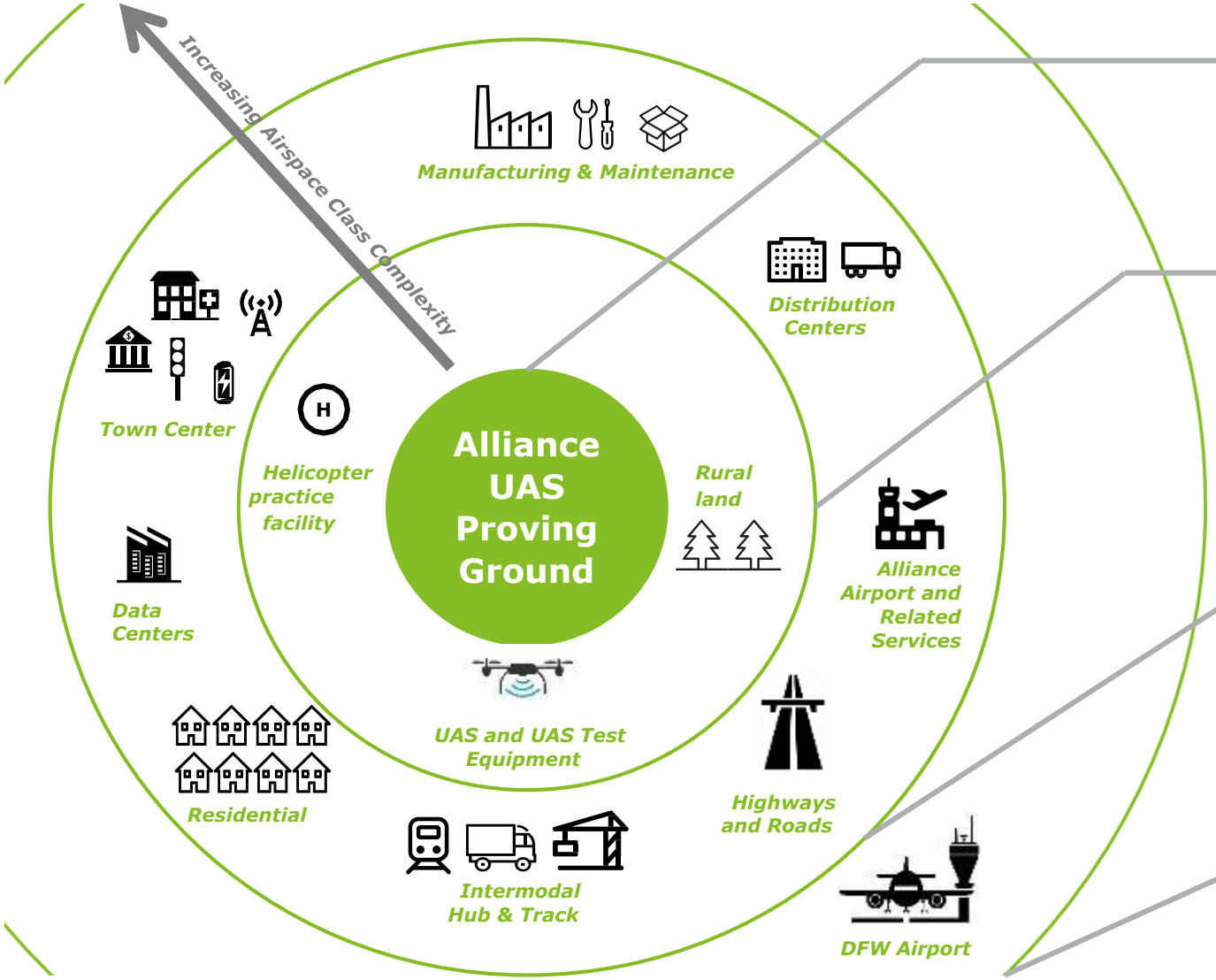
USE CASE OVERVIEW

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.

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Convergence of Wearables and Transportation

Bryan Groden
Gartner, Inc.

July 30, 2019

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The Convergence of Wearables and Transportation…

Where are We Going?

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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

Jewelry/Accessories

Watches
Belts
Pendants
Tags/Trackers

Smart wig

Carryable or pocketable

Bags
Tags
E-cigarettes

Selfie drones

Hands

Sensor gloves
Rings
Finger sensors

Fingernail displays
Smart fingernails

Clothing

Fashion
Sports and fitness
Safety clothing

Sartorial robotics

Quantified-self

Fitness bands
Biosensors

Subcutaneous sensors

Feet

Shoes
Insoles

Pets

Pet fitness
Tracking
Pet toys

Remote control

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Key Issues

1. Why do it?
2. Choosing the right solution.
3. Common challenges and solutions to deploy wearable technology.

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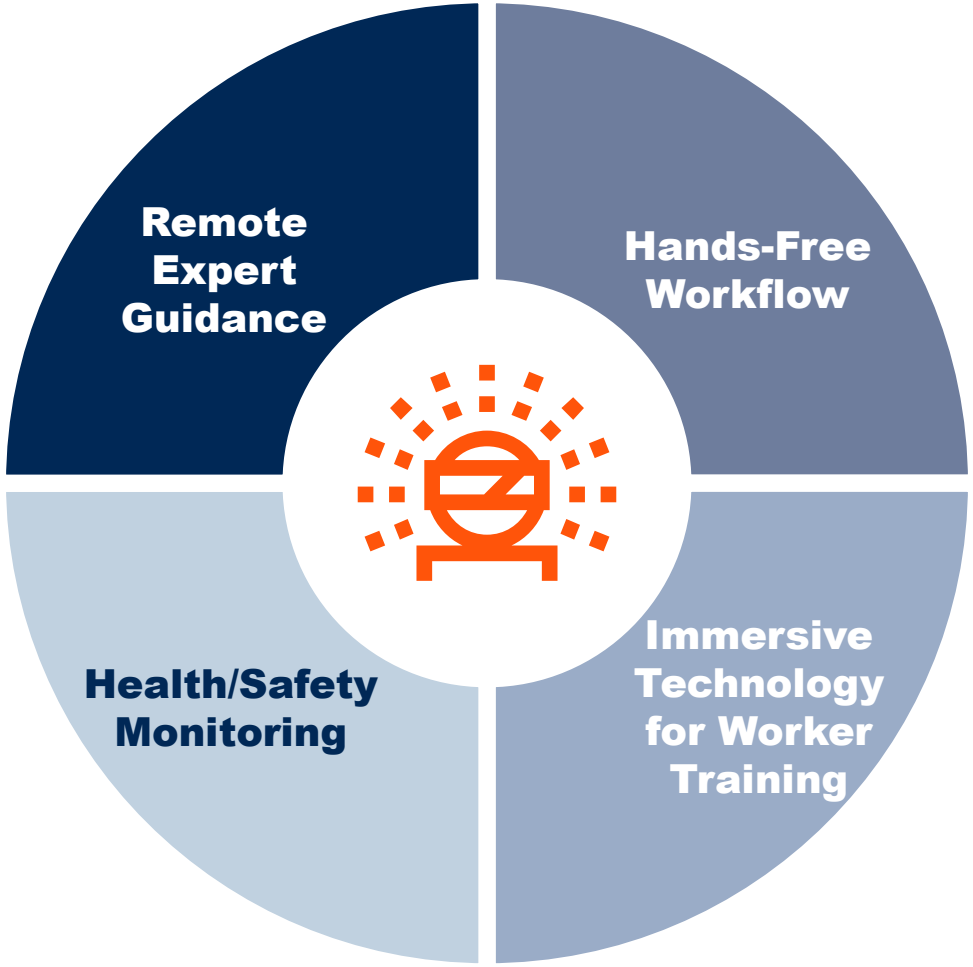
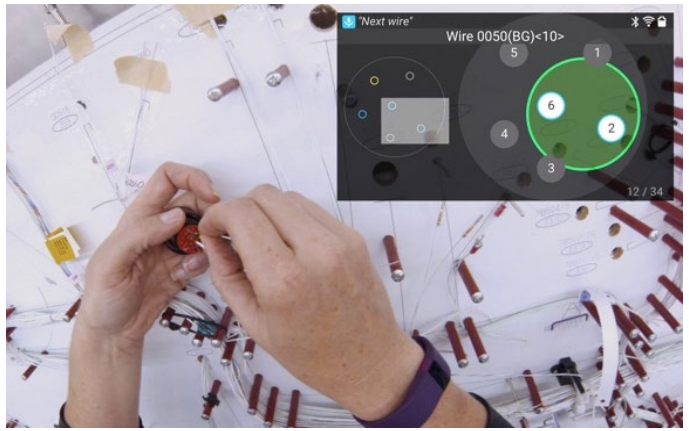
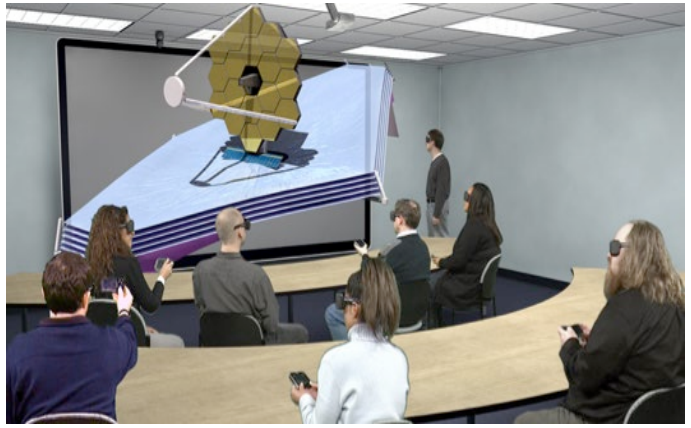
The Four Most-Common Enterprise Wearable Use Cases







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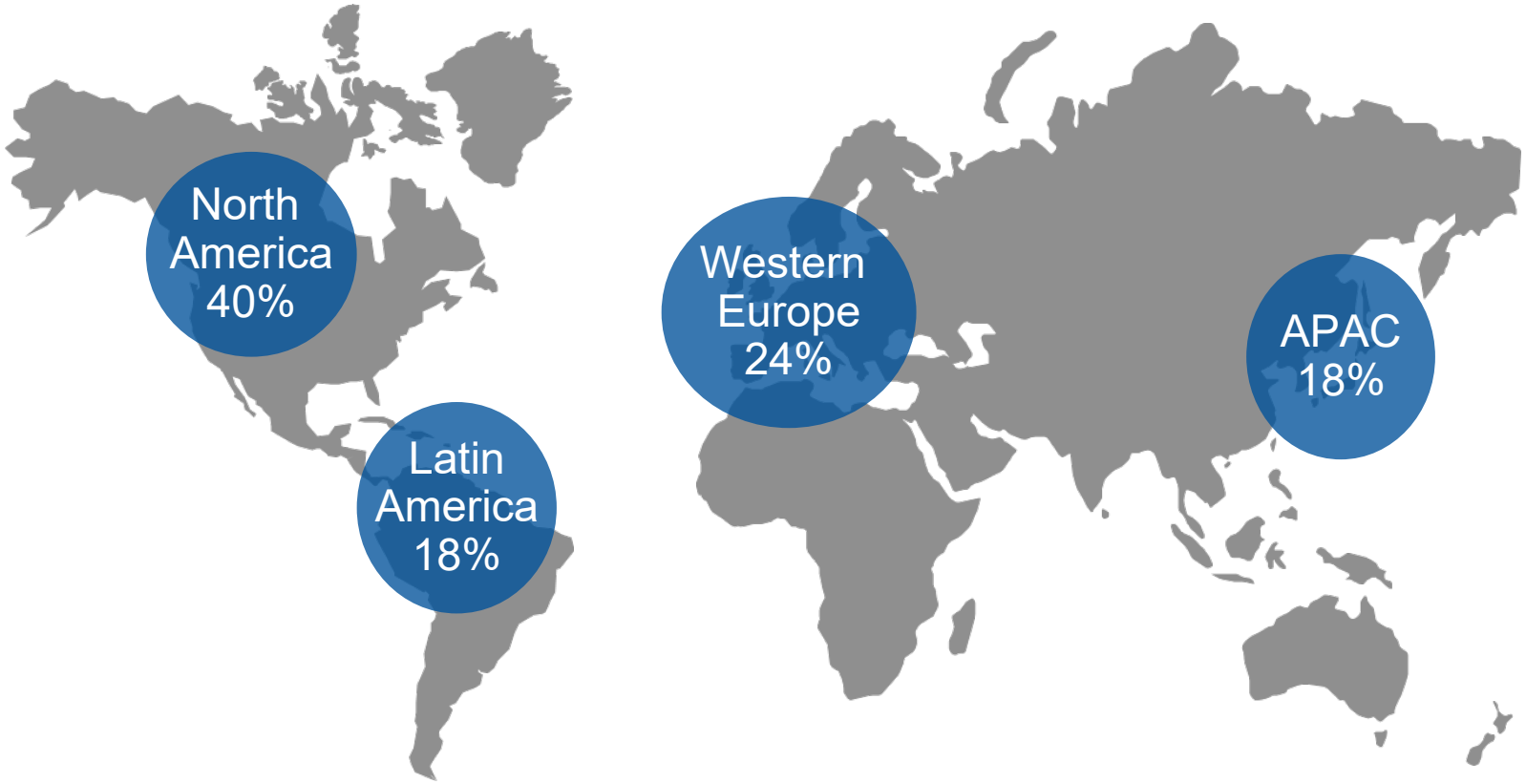
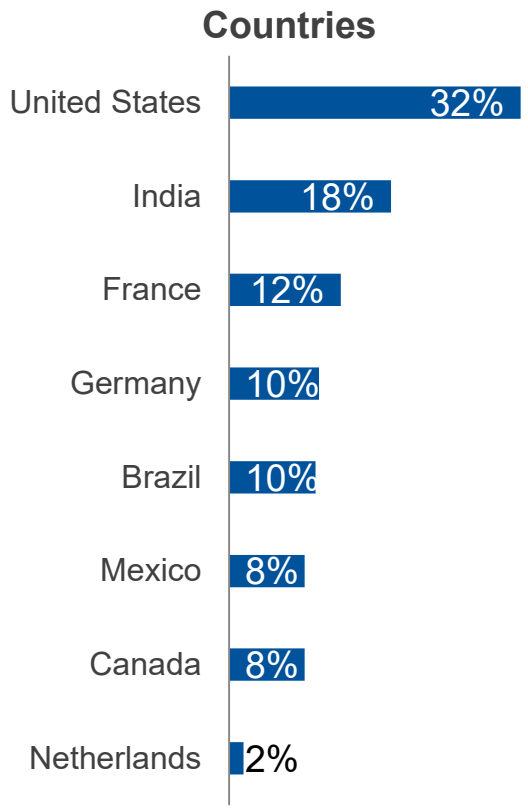
Gartner Survey Respondent Profile – Location





Base: All respondents, n=252

SS01. Where is your primary workplace located?

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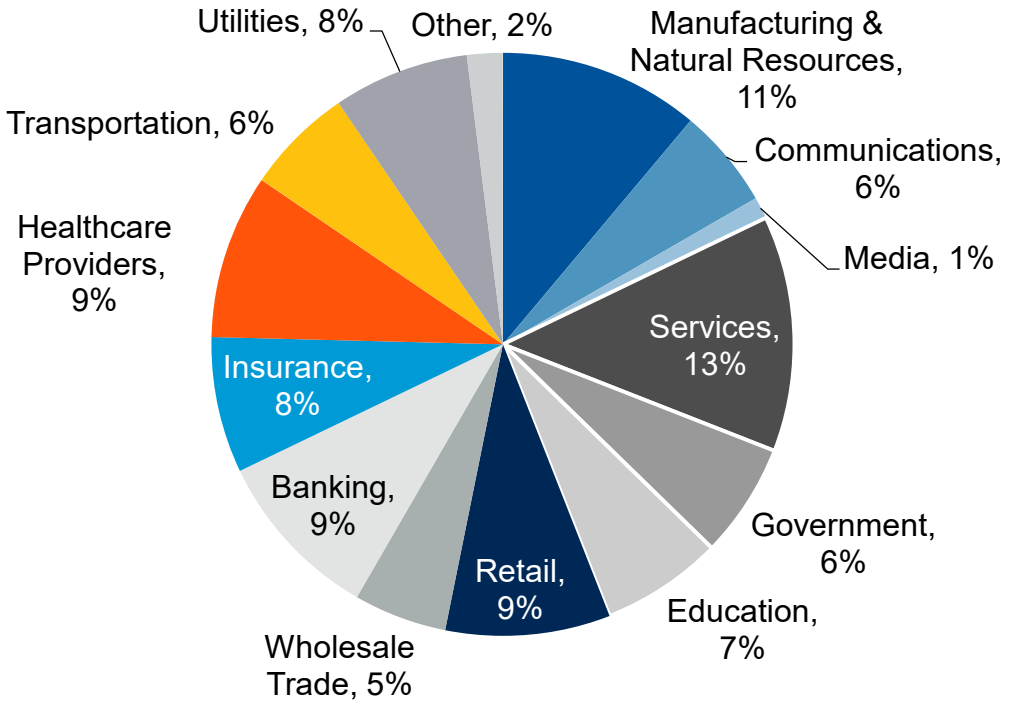
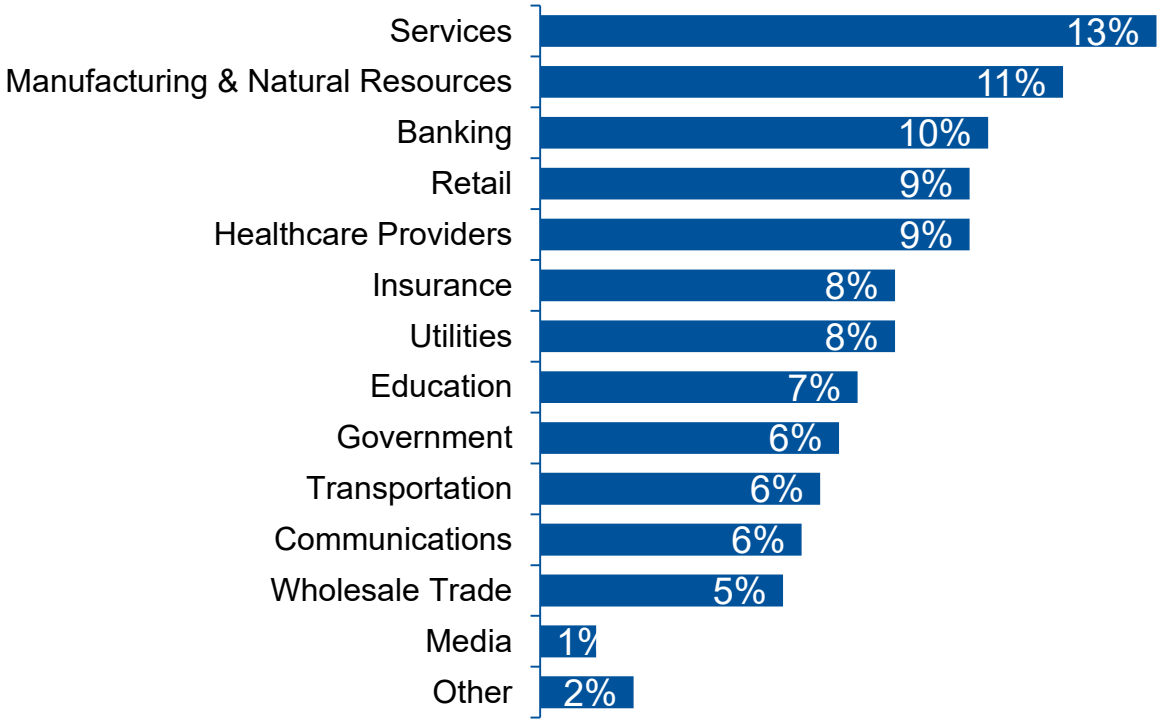
Gartner Survey Respondent Profile – Industry





Base: All respondents, n=252

INDUSTRY. Industry Roll-up

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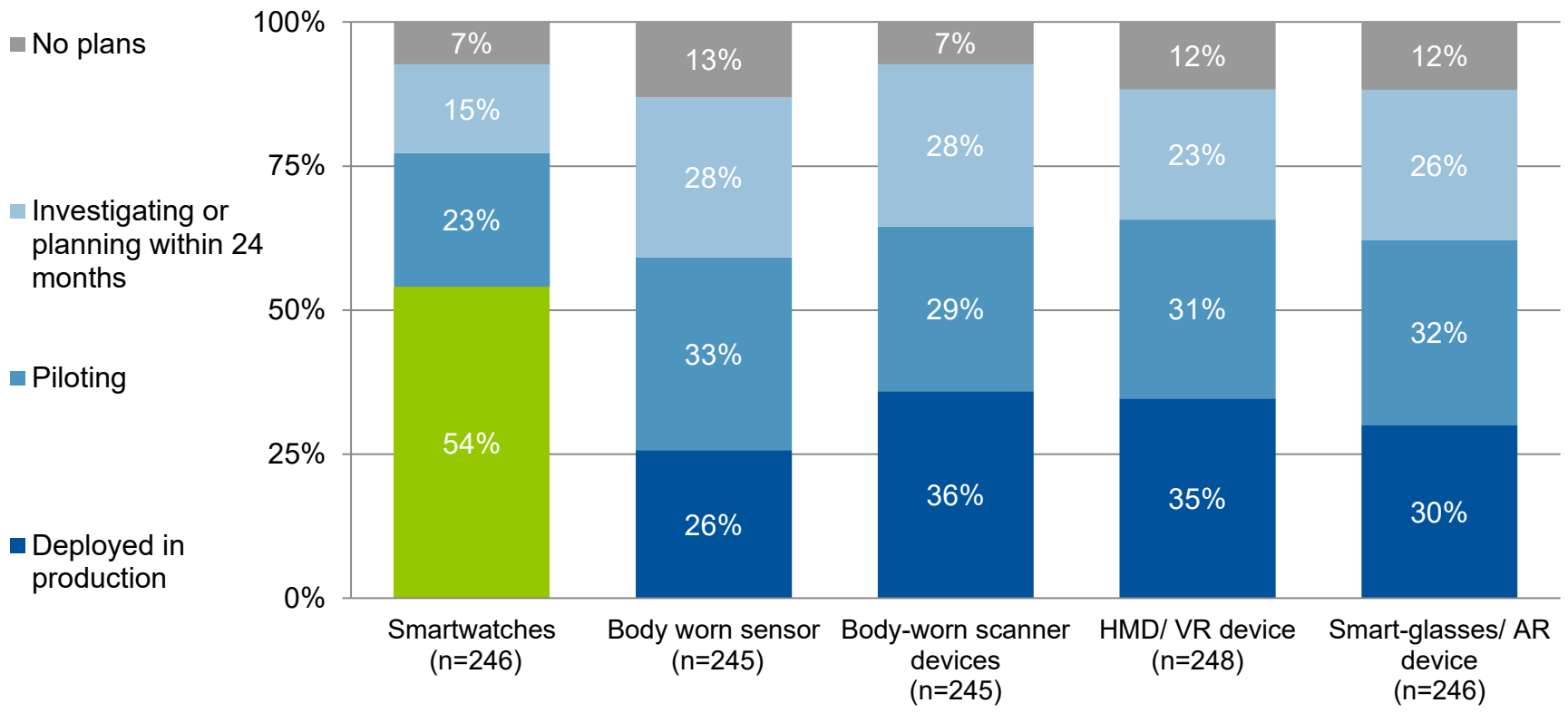
Gartner Survey – Implementation Status



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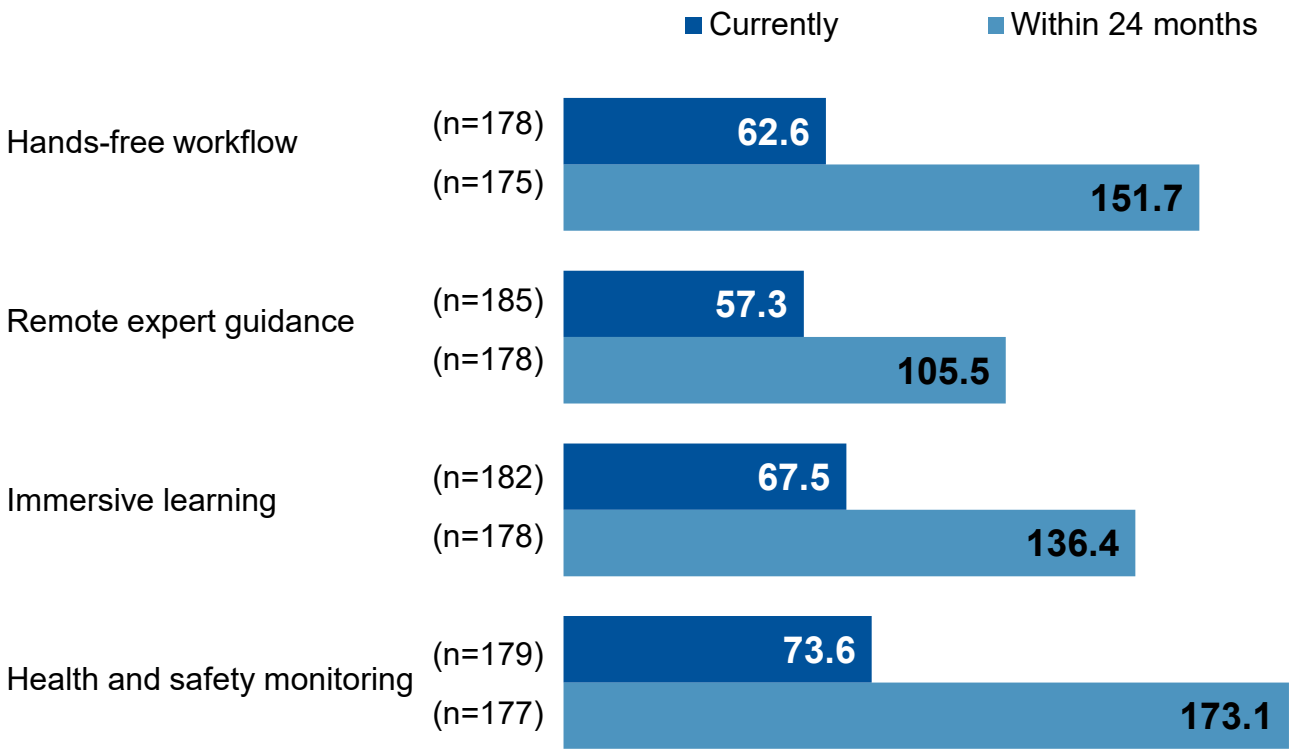
Gartner Survey – Current and Anticipated Usage

Number of devices deployed



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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.

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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 — Remote Expert Guidance, Hands-Free Workflow, Health and Safety Monitoring, Immersive Training

Emerging — AR/VR Sales and Marketing, AR/VR Design, AR Medical

Front Line Worker-Focused ← → **Knowledge Worker-Focused**

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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

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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

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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

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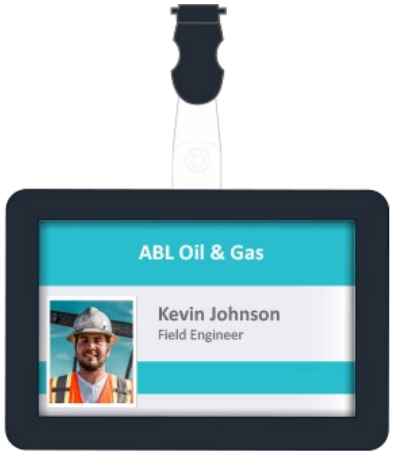
Use Cases: Lone Worker Protection



- 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

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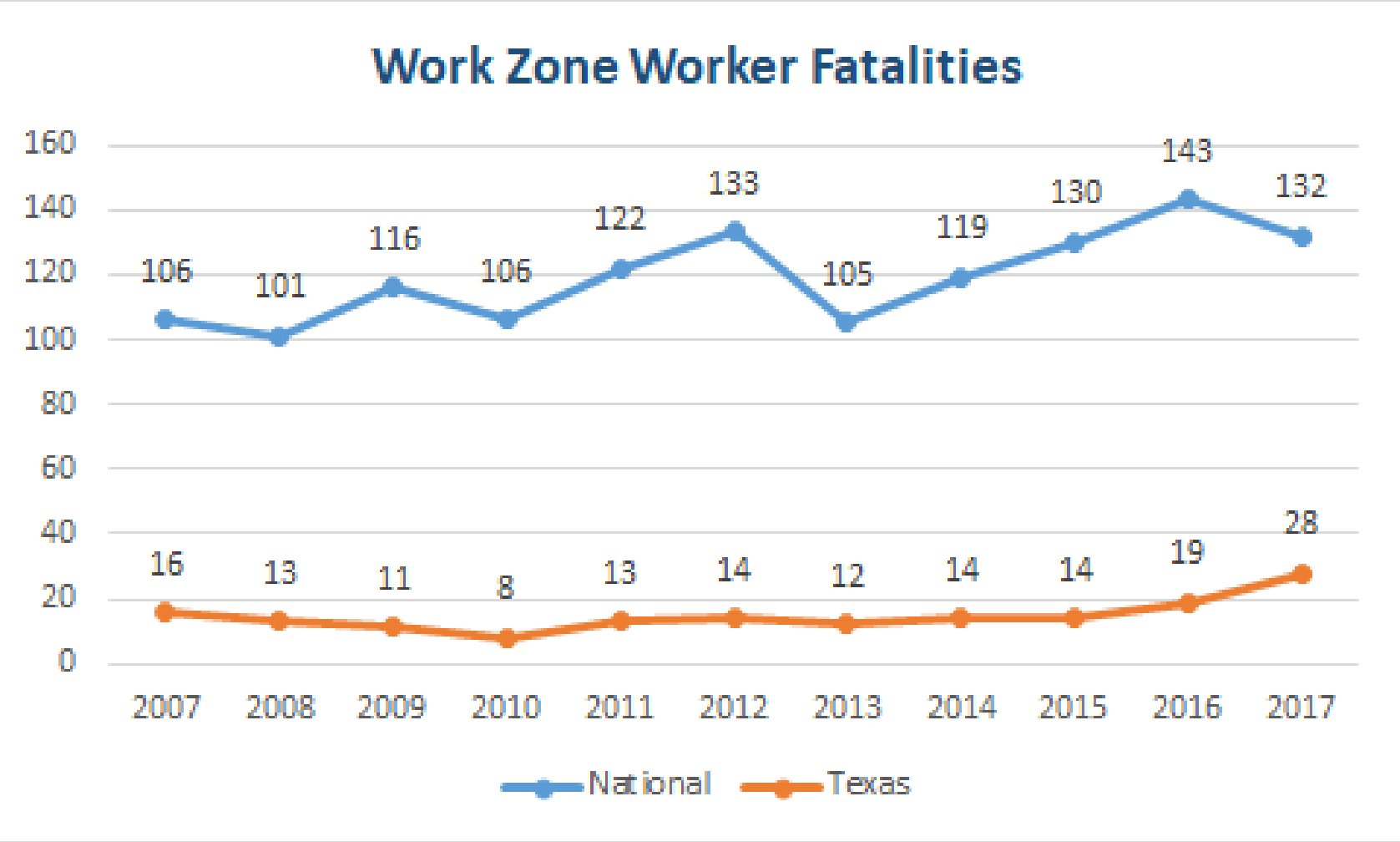
Use Cases: Work Zone Safety



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.

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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

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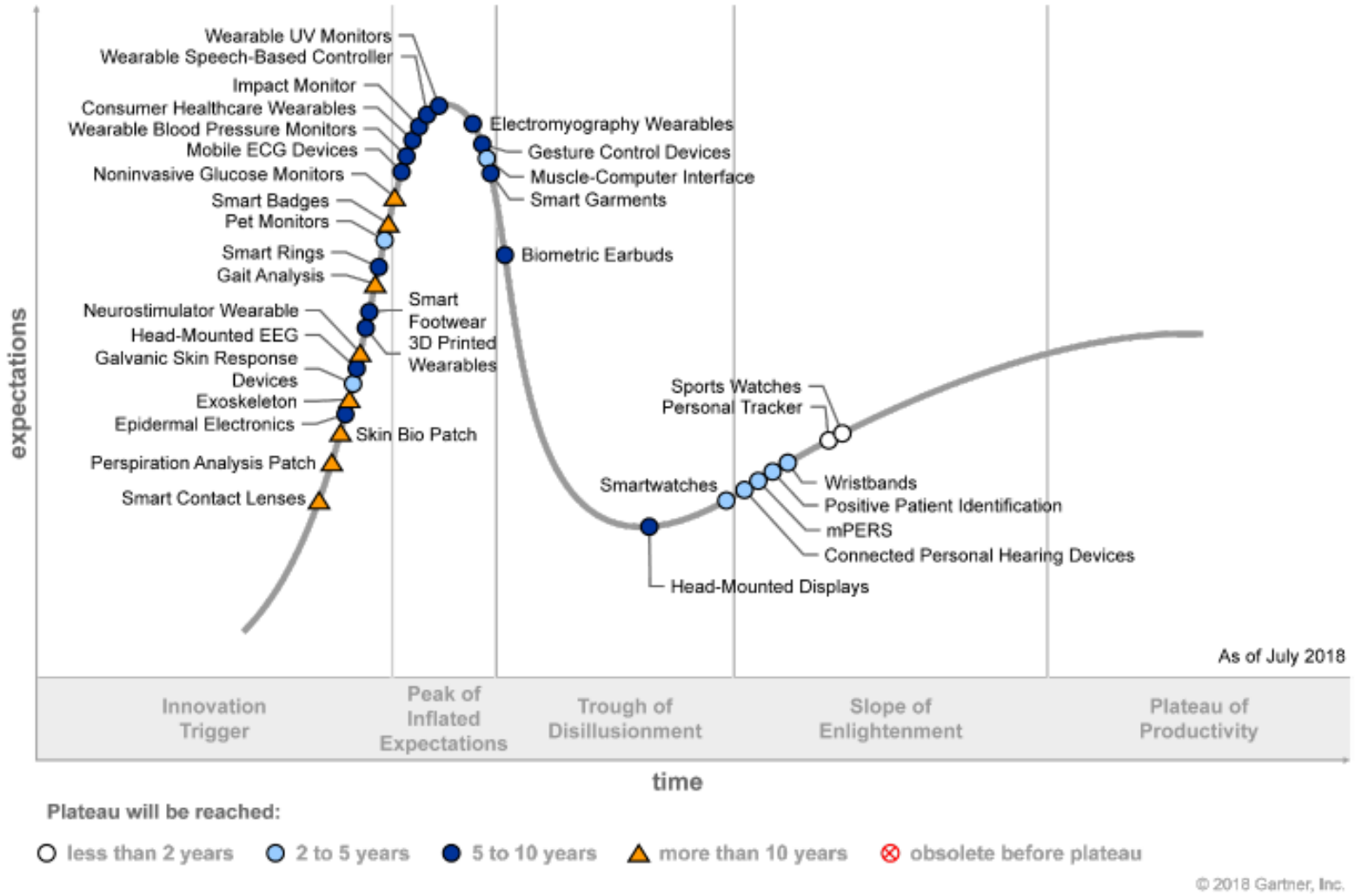
Hype Cycle for Wearable Devices, 2018



Source: Gartner (July 2018)

- 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.

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Case Study – Port of Brisbane and Queensland Trucking Assoc.

Gartner listed SmartCap as one of its "Cool Vendors in Asia/Pacific, 2016"

- 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.

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Case Study – BP

Gartner listed FieldBit as one of its "Cool Vendors in Enterprise Wearable and Immersive Technologies" in 2018.

- 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.

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Key Issues

1. Why do it?
2. Choosing the right solution.
3. Common challenges and solutions to deploy wearable technology.

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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.

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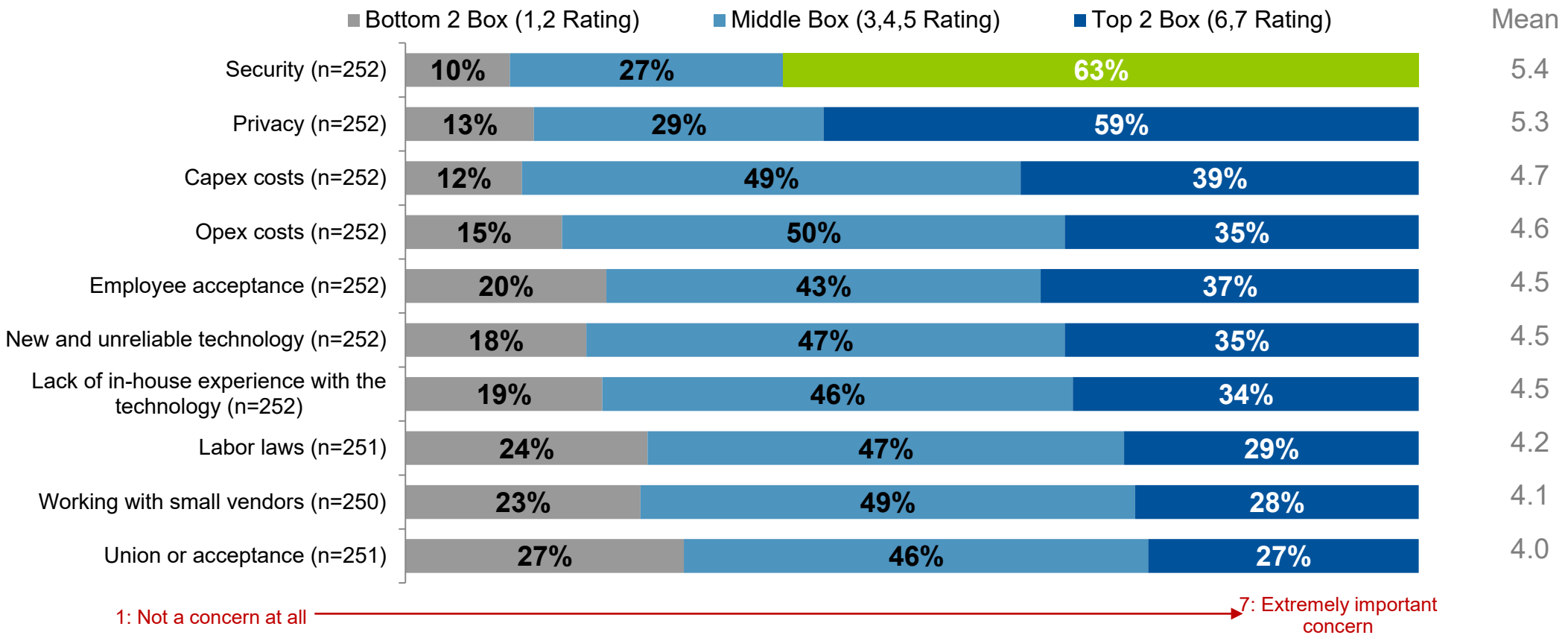
Deployment of Wearables will Encounter Many Challenges

To what extent is each of the following a concern with the deployment of wearables at your organization?



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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

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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)

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Recommended Gartner Research – Autonomous and Connected Vehicles, Mike Ramsey (Sr. Director, Analyst)

- Best Practices for Making Money From Connected Vehicles, Part 1: Strategy and Organization
- Best Practices for Direct Monetization of Connected Vehicles, Part 2
- Best Practices for Making Money From Connected Vehicles, Part 3: Indirect Monetization
- 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

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Wearable Management Is Part of Unified Endpoint Management

From "Magic Quadrant for Unified Endpoint Management Tools," 23 July 2018 (G00354834)

- 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

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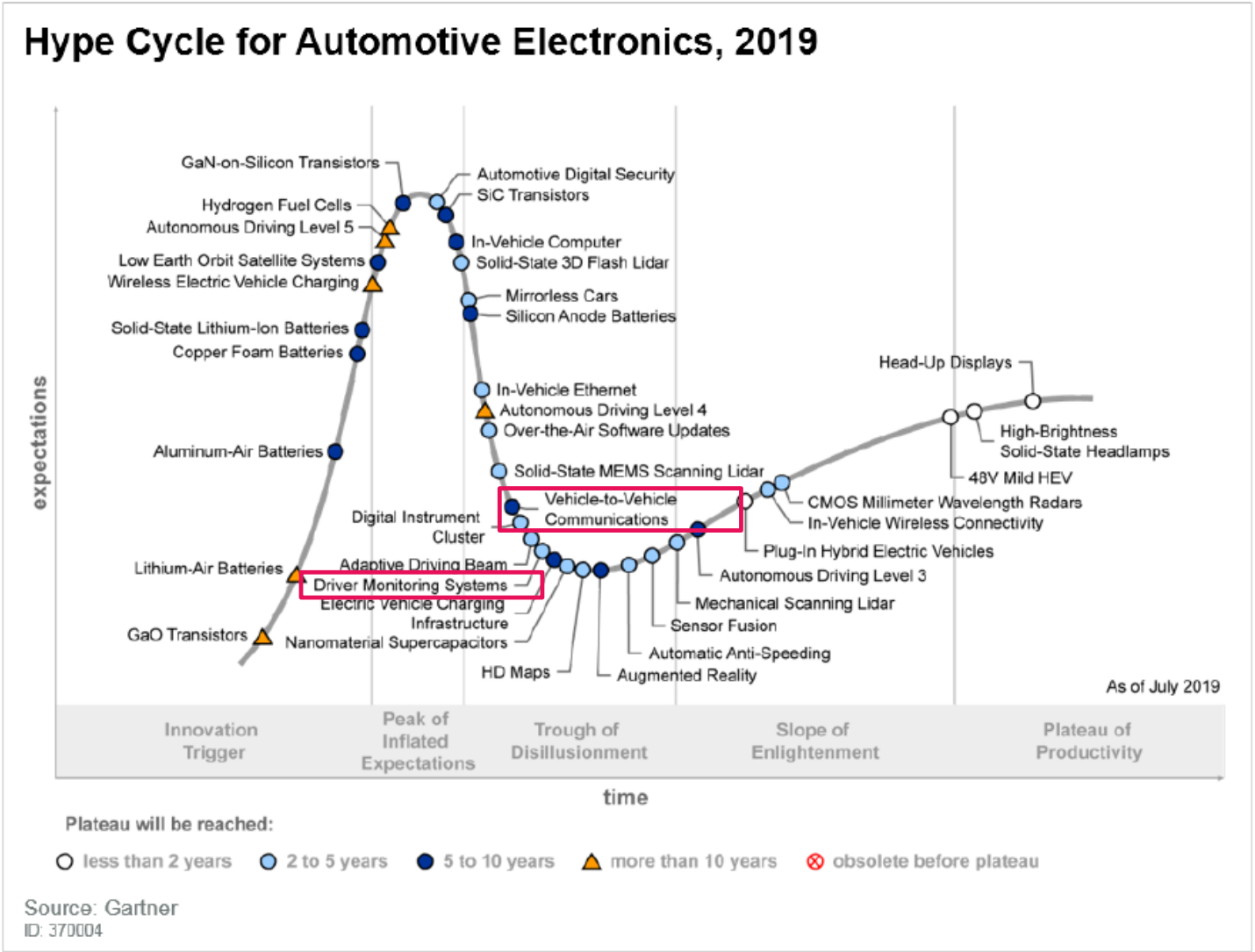
Advances in Automotive Electronics Technologies Can Help Significantly Improve Highway Work Zone Safety



- **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.

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TEXAS DEPARTMENT OF TRANSPORTATION

CONNECTED AND AUTONOMOUS VEHICLE (CAV)

Task Force Update

July 30, 2019

CAV Task Force Need

TEXAS TECHNOLOGY TASK FORCE

TEXAS INNOVATION ALLIANCE

TMS TEXAS MOBILITY SUMMIT

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.

Office of the Texas Governor | Greg Abbott

Texas Department of Transportation

CAV Task Force Composition

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

CAV Task Force Website

TxDOT staff is developing a website that will 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.

CAV Task Force Meeting

The first meeting is being planned for early September at the TxDOT Greer Building, 1st 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.

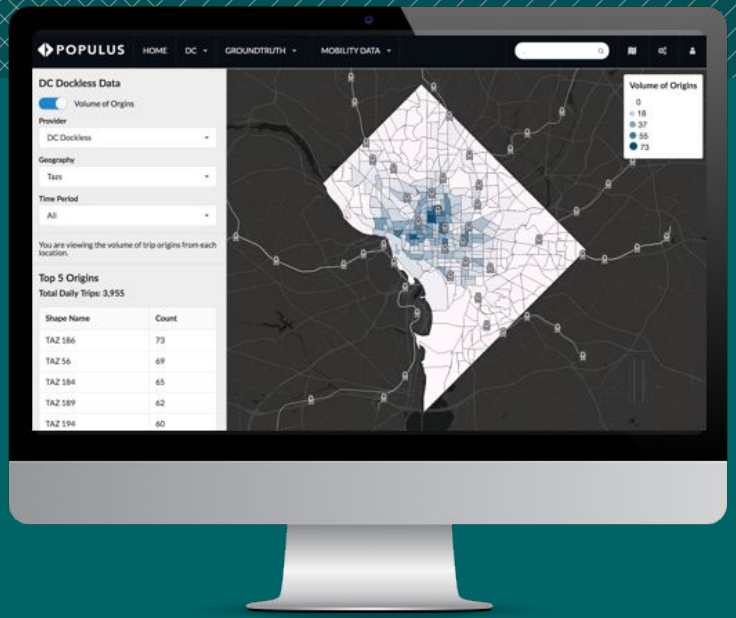
Invitations will be emailed in the near future.

CAV Task Force Contact

Questions or comments please contact:

Zeke Reyna
Strategic Planning Division, TxDOT
(512) 517-1749
Zeke.Reyna@txdot.gov

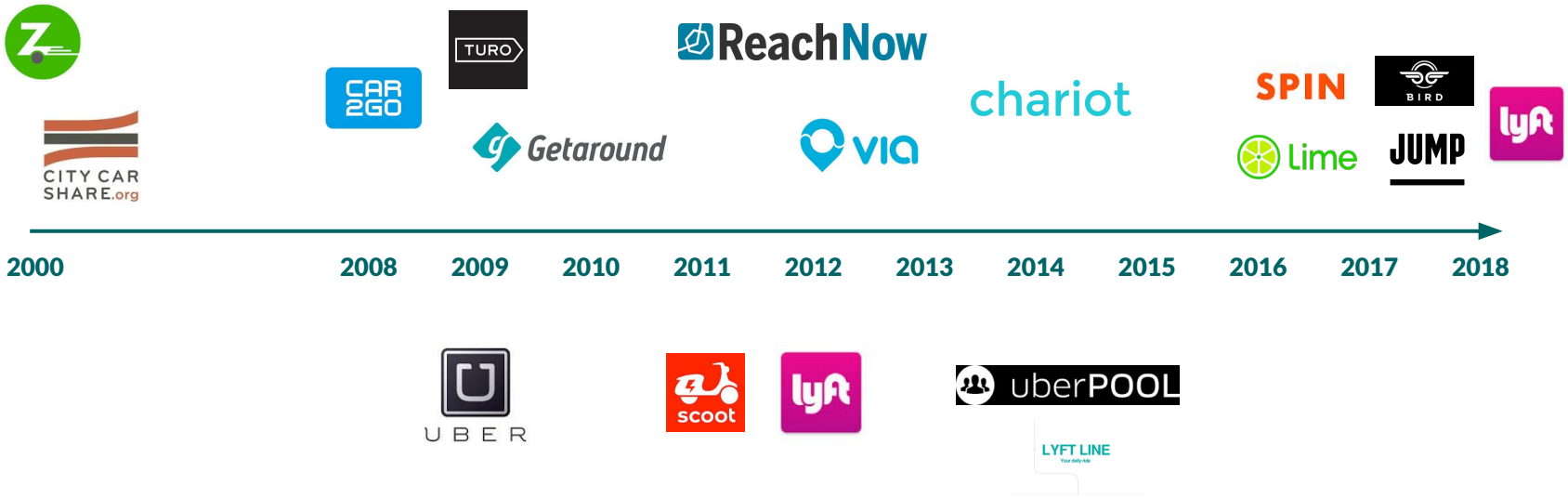
CITIES & MOBILITY DATA: Solutions for Protecting Privacy While Giving Transportation Planners the Data They Need to Plan for the Future



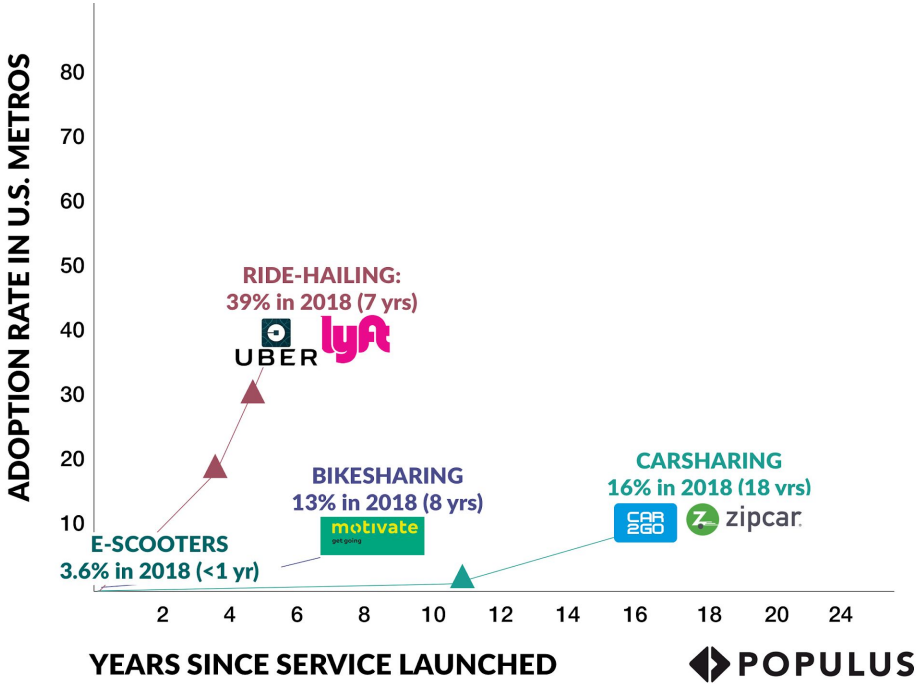
Kansas Waugh
Director of Mobility Partnerships, Populus
@populus_ai

POPULUS

SHARED MOBILITY SERVICES HAVE RAPIDLY EVOLVED IN CITIES



ADOPTION OF NEW MOBILITY SERVICES IS ACCELERATING



Source: The Micro-Mobility Revolution, A Populus Research Report, July 2018

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 raise more money faster than prior mobility service providers

THE PROBLEM

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**.

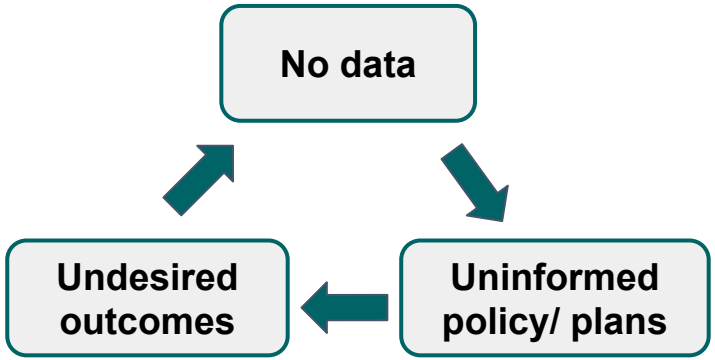
POPULUS

THE IMPORTANCE OF DATA FOR MANAGING MOBILITY SERVICES

Cities need data to developed 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



DOCKLESS MOBILITY HAS BEEN EASILY AND QUICKLY REGULATED

Cities from coast to coast have begin 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

DOCKLESS MOBILITY PERMITS

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

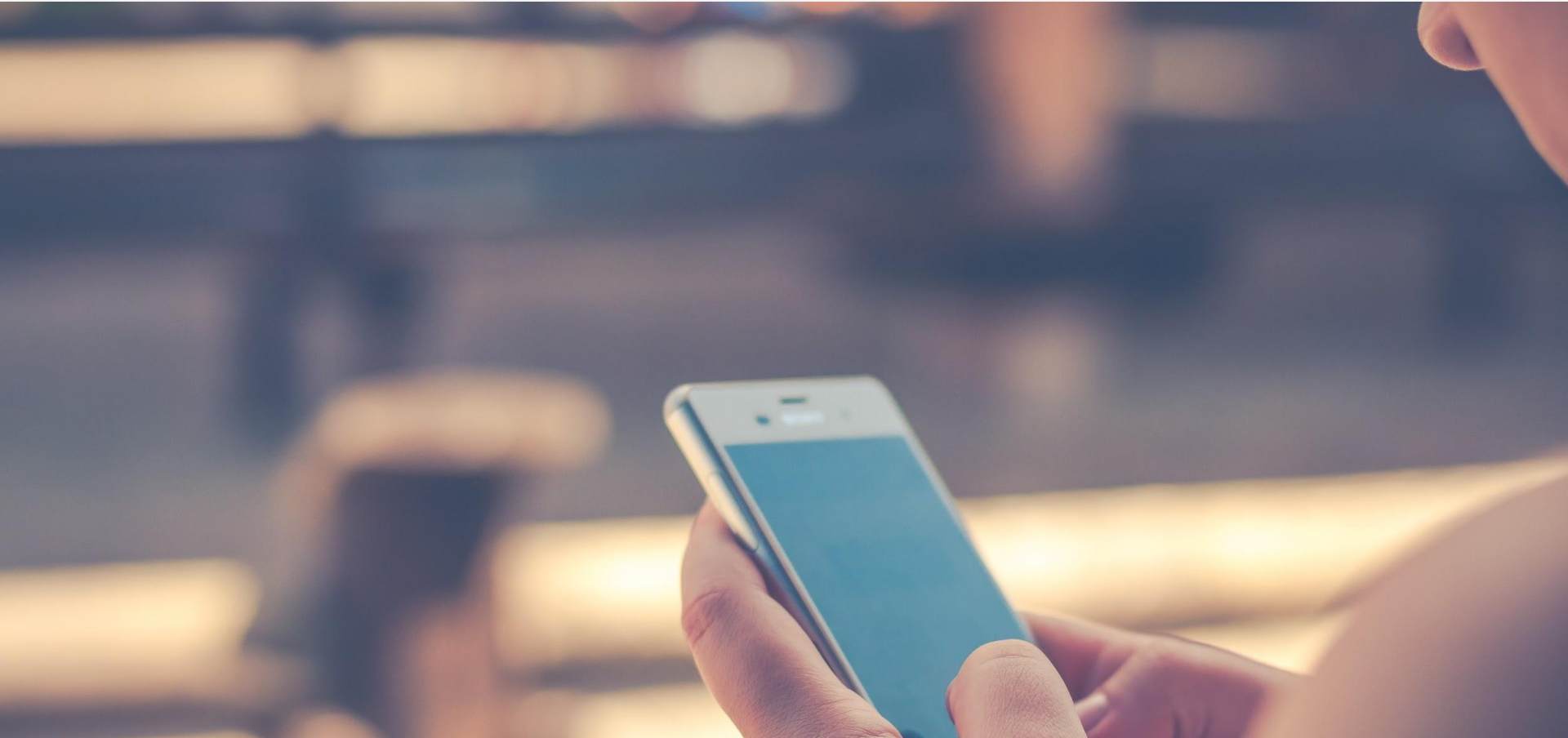
REQUEST DATA THROUGH INDUSTRY STANDARDS

- 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

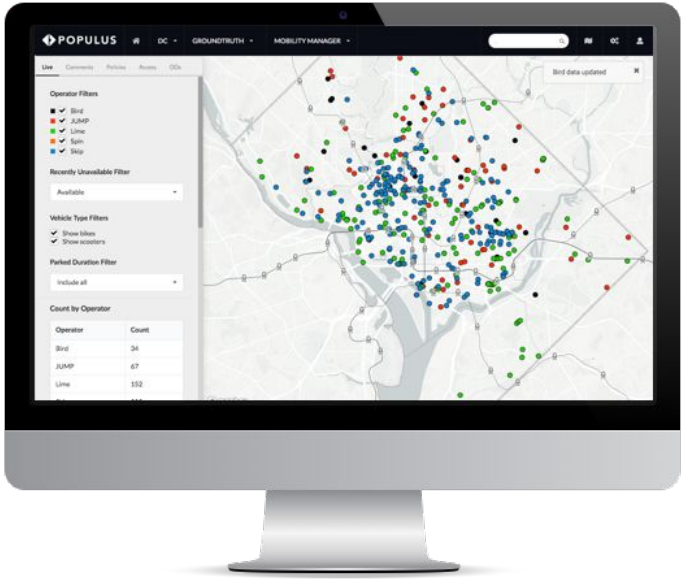
BEST PRACTICES FOR MANAGING PRIVACY

RECOGNIZE THAT GEOLOCATION DATA IS PERSONAL, AND TREAT IS 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

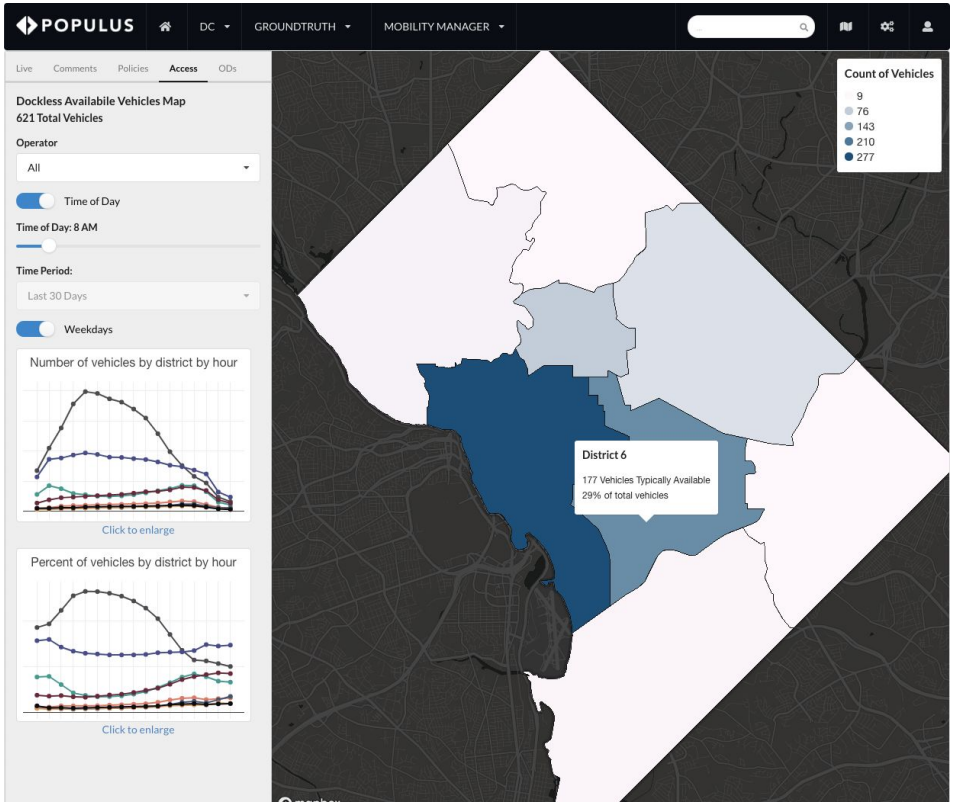
EVALUATING EQUITABLE ACCESS TO MOBILITY SERVICES

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:

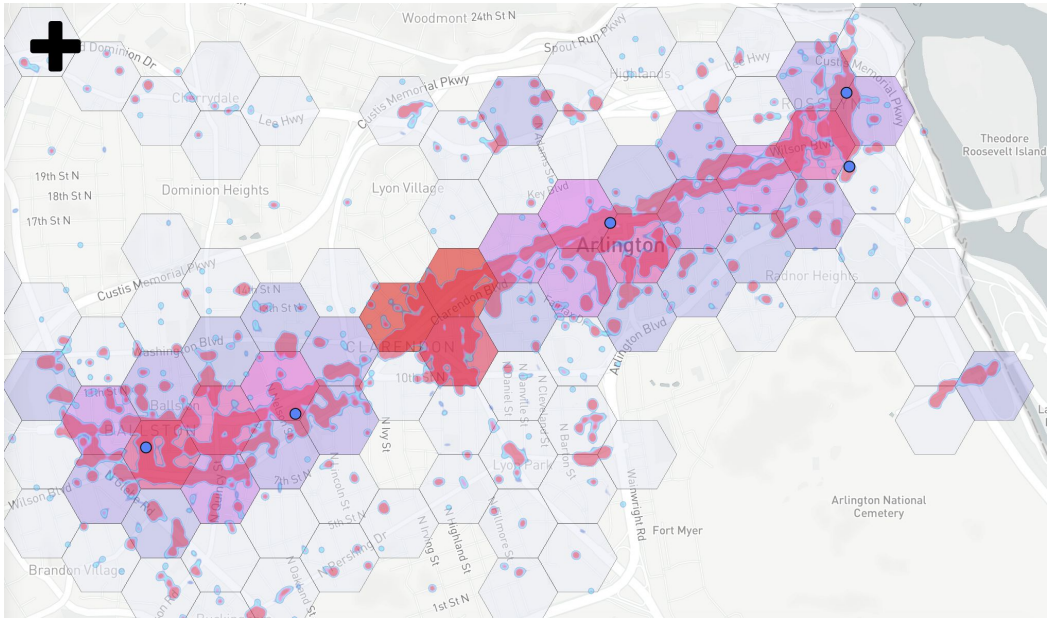
- Incentivizing placement of a specific # or % of vehicles in underserved communities.
- Developing a low-income program for new mobility services and to <u>measure</u> progress.



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



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1. Design
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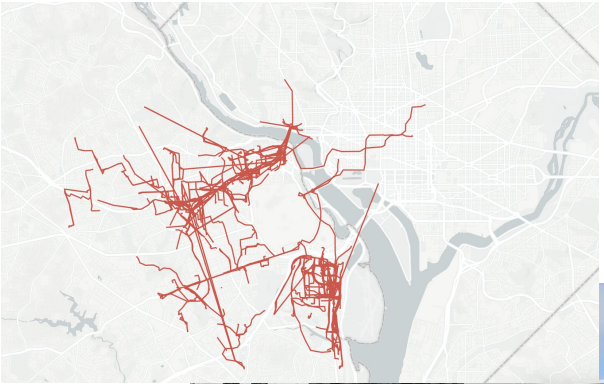
3. Evaluate

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

BETTER DATA HELPS CITIES EXPAND BIKE/SCOOTER INFRASTRUCTURE

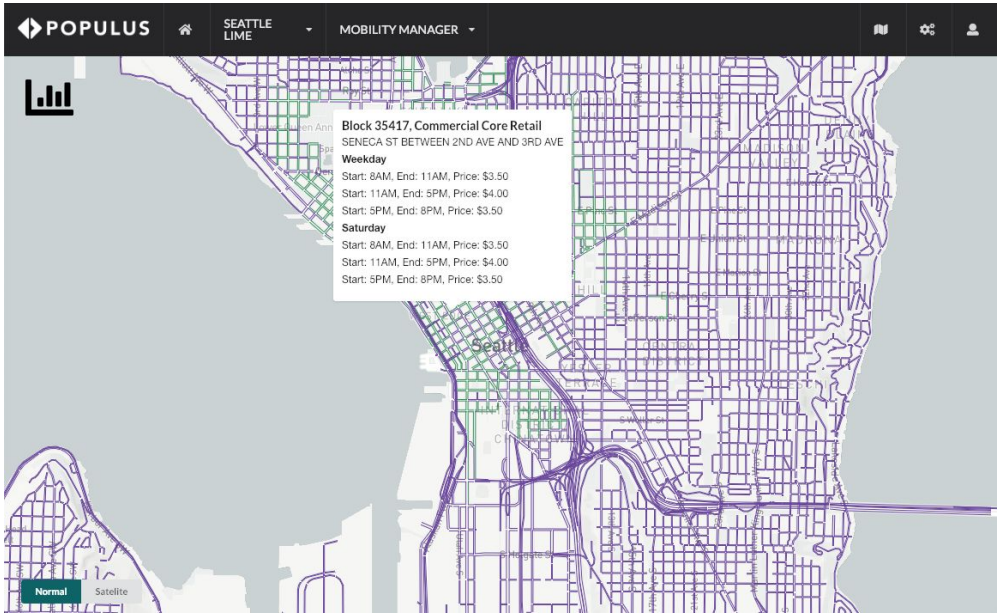
Cities that receive detailed trip data can now harness GPS trace data to plan safer routes for bicycling and scooter infrastructure such as protected lanes.



VALIDATING USE OF SHARED MOBILITY CURBSIDE UTILIZATION

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.

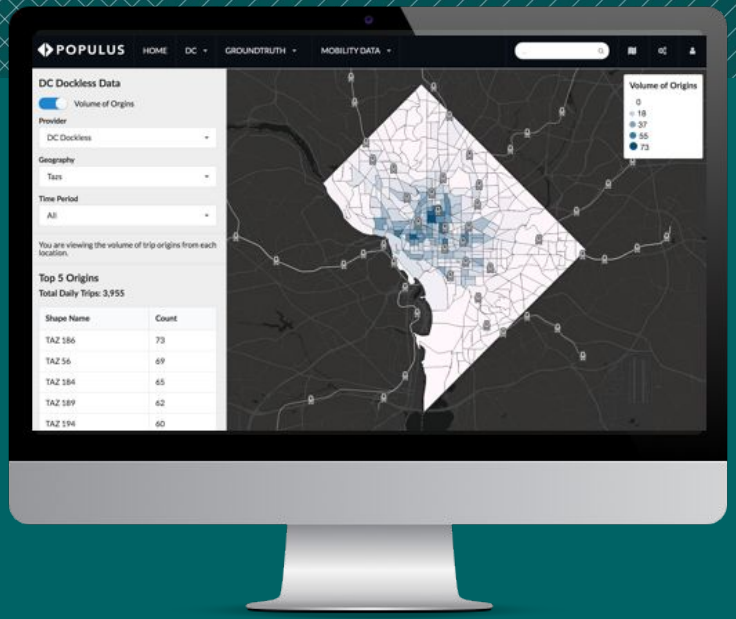
FINDING THE RIGHT BALANCE

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



POPULUS

A data platform for cities to manage the future of mobility

waycare

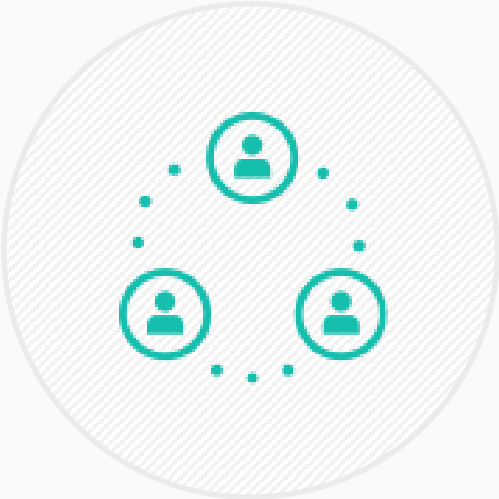
AI-Driven Mobility Solutions for Smart Cities

TTTF TEXAS TECHNOLOGY TASK FORCE

July 30th 2019

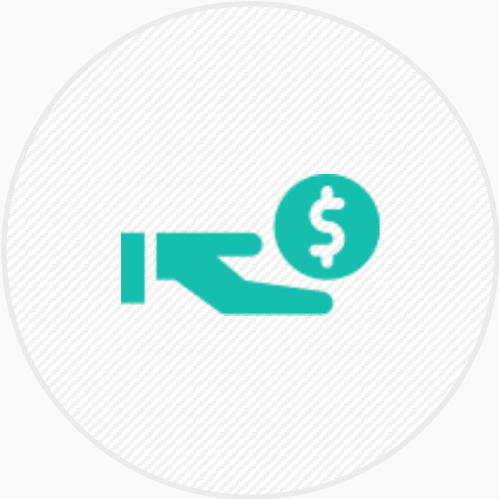
Our roads today face a multi-faceted challenge

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.

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Our cars are getting smarter,
our roads are not.

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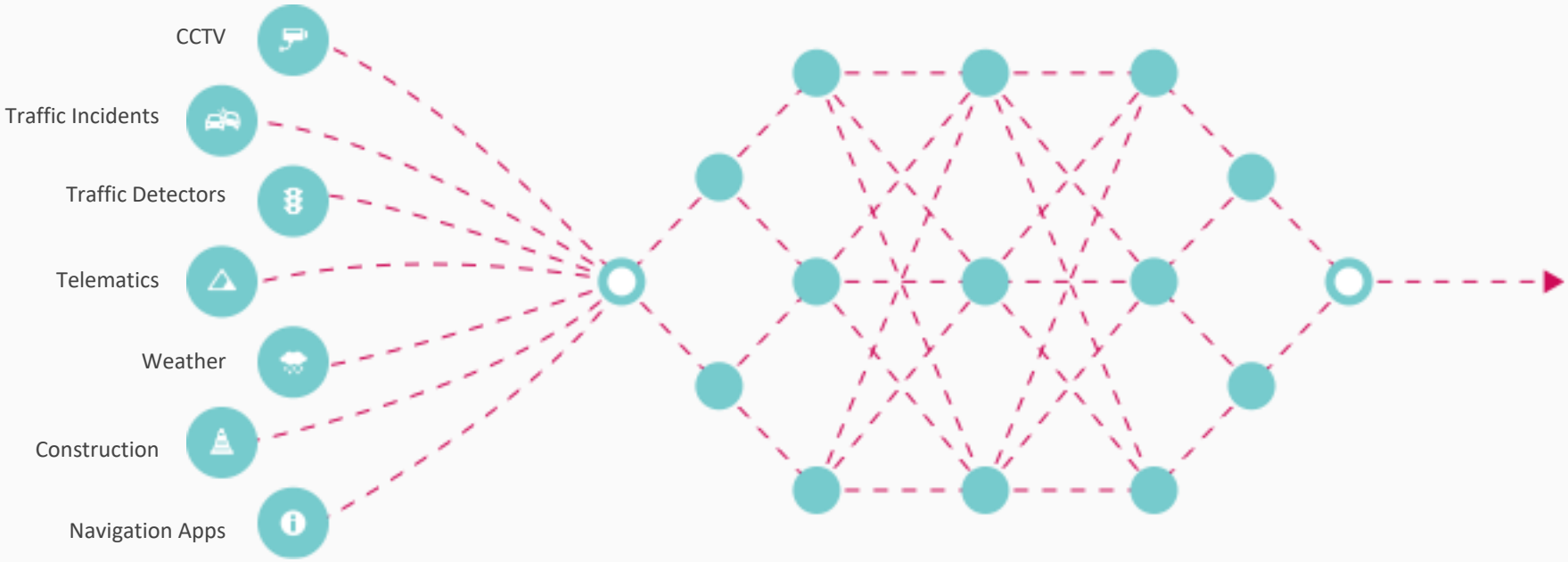
Generating data-driven insights…



Waycare AI Driven advanced analytics

Actionable insights

- Incident Management
- Proactive incident detection
- Irregular traffic congestion
- Intersection malfunctions
- Pothole detection
- etc.

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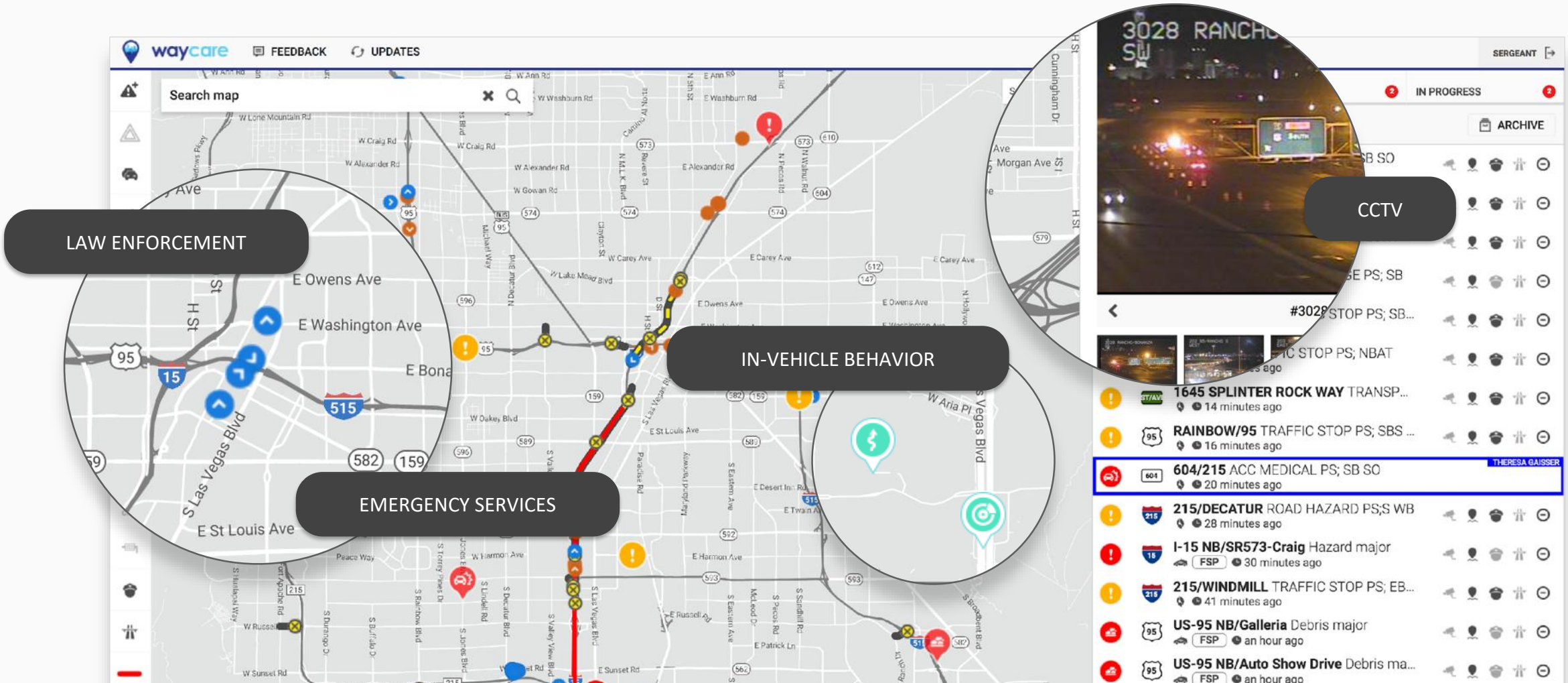
We built the worlds first cloud based, AI-driven mobility ecosystem

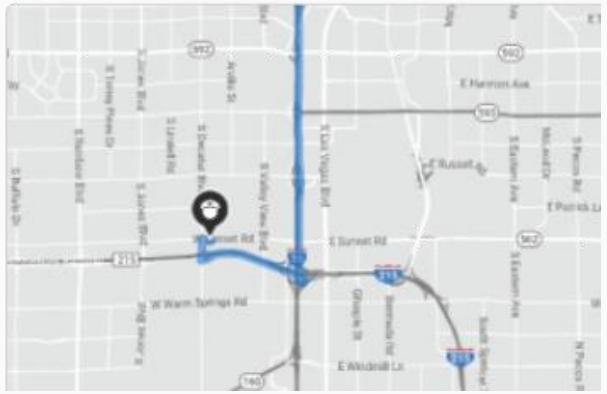


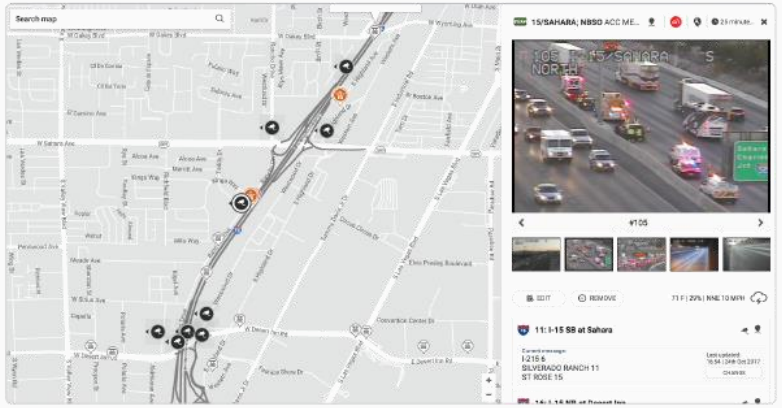
Improving Traffic Incident Identification and Response

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





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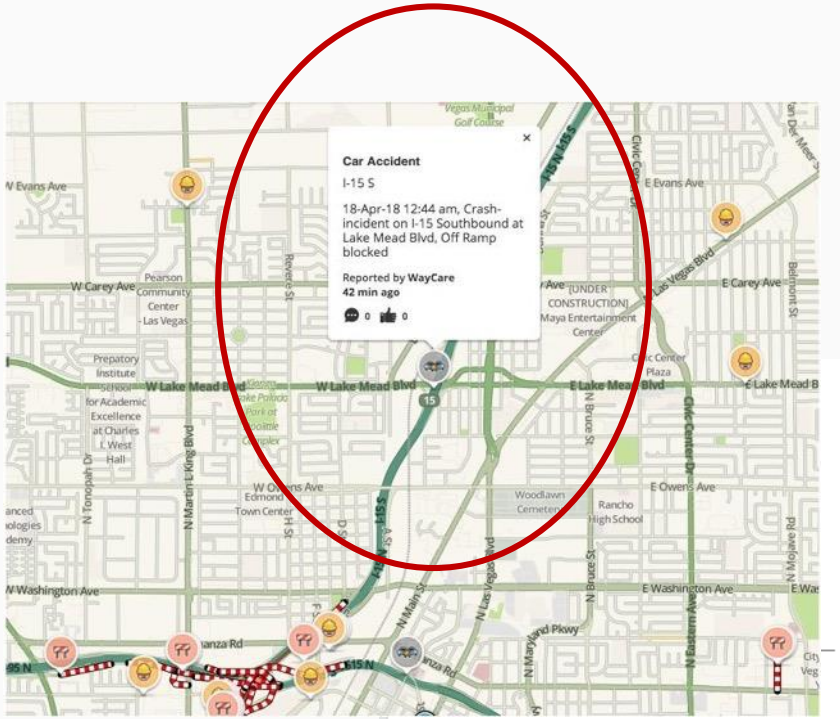
Real-time and direct communication to the public



- ☐ Use other routes
- ☐ Expect delays
- ☐ Shoulder available
- ☐ Truck involved
- ☐ Secondary
- ☐ Injury/fatality

Memo

- ☑ Report to waze
- ☑ Send to gov-delivery
- ☐ Select a camera view

Auto removal t...
1 hours

CANCEL DONE

Example of alerts:

- Road incidents
- Road closures
- Blocked lanes
- Debris
- Construction
- Roadside help
- Traffic hazards
- Weather hazards

Public Outreach (Twitter, text, email):

290 Jan 2017 vs. **1,233** Jan 2018

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Empowering Cross-Agency Collaboration

Traffic Control

Freeway
Service Patrol

Law
Enforcement

Emergency
Services

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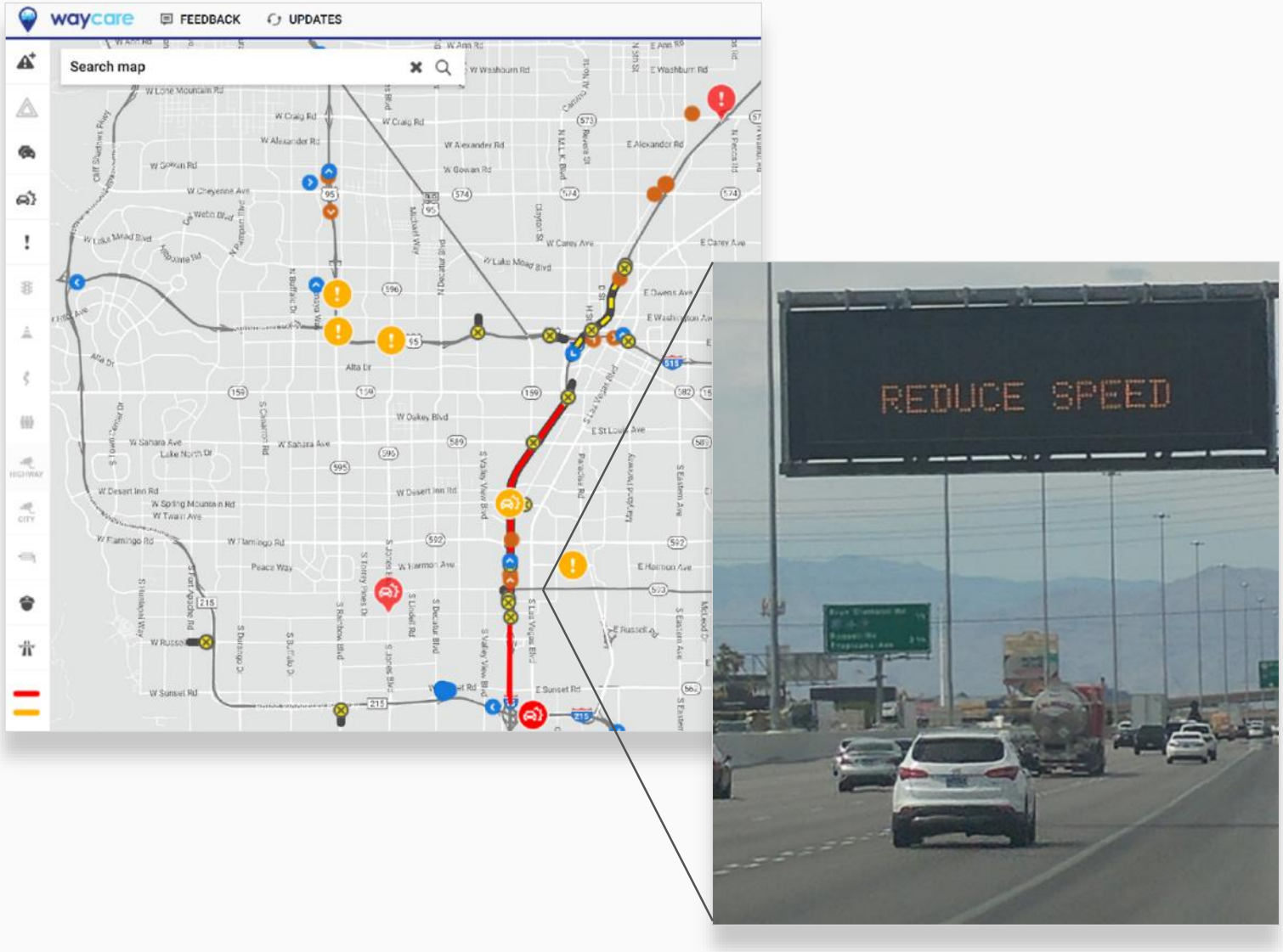
Enabling proactive traffic crash prevention

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

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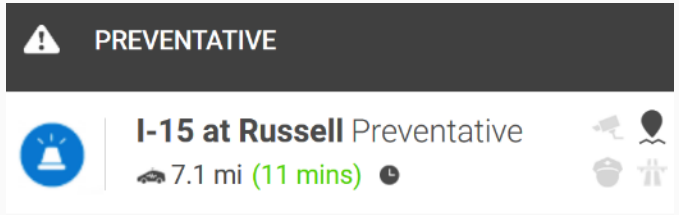
Waycare's predictive analytics reducing primary crashes

1 **WAYCARE** ALERTS OF REQUIRED ACTION



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

4 **POLICE** PROACTIVELY POSITIONED

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

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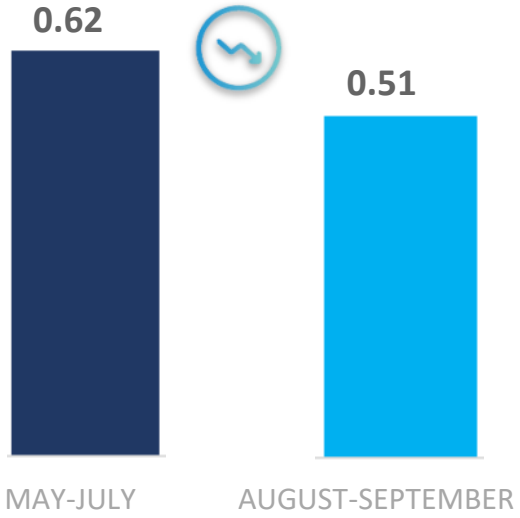
Waycare Proactive Crash Prevention Impact Report:

I15 & Russell NB - August through September 2018

17% **REDUCTION IN PRIMARY CRASHES**

Reduction reflects an average of **37 CRASHES PREVENTED PER YEAR**

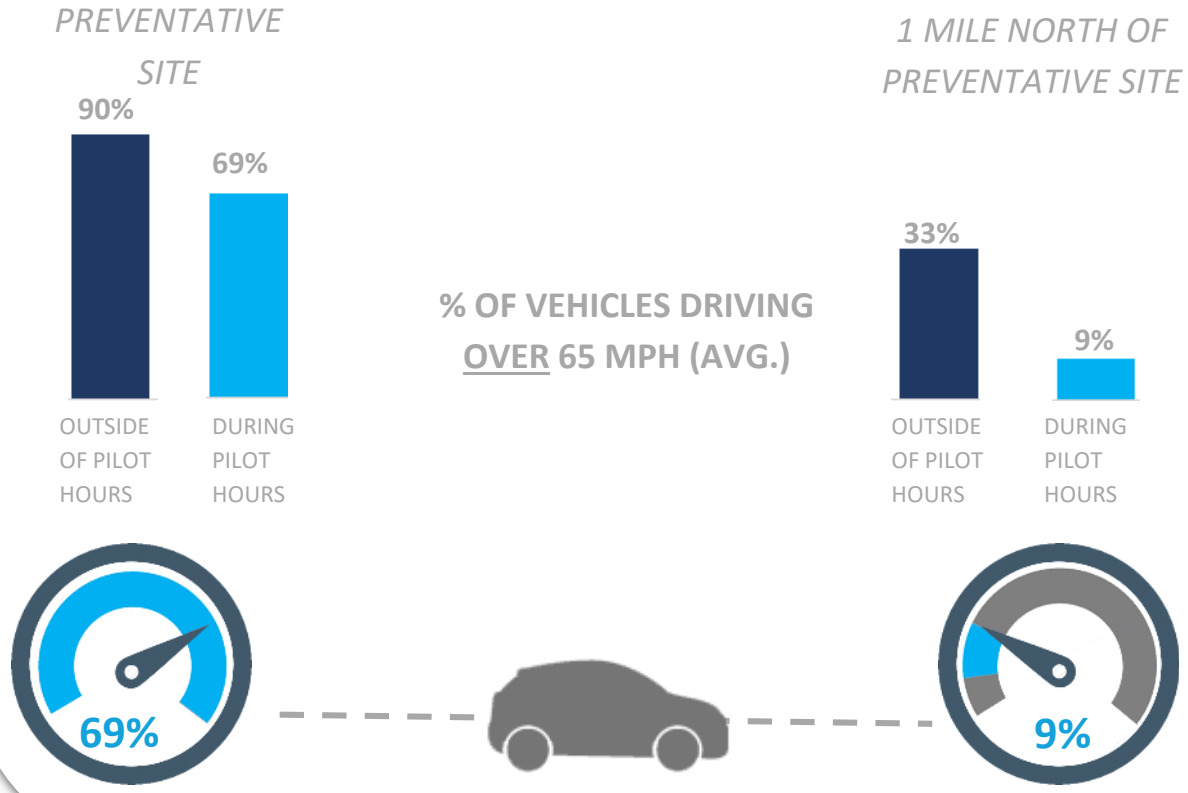
DAILY AVERAGE CRASHES



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

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

IMPACT ON SPEED



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

Waycare Partners

Strategic partnerships across the mobility sector

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Adoption of autonomous vehicles will be contingent on the public sector managing the mobility ecosystem

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Thank you

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DATA EXCHANGE

TxDOT IMD

Mobility Data Sharing Efforts

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 incentive 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.