

# Madison Smart City Initiatives and Connected Park Street Corridor Project

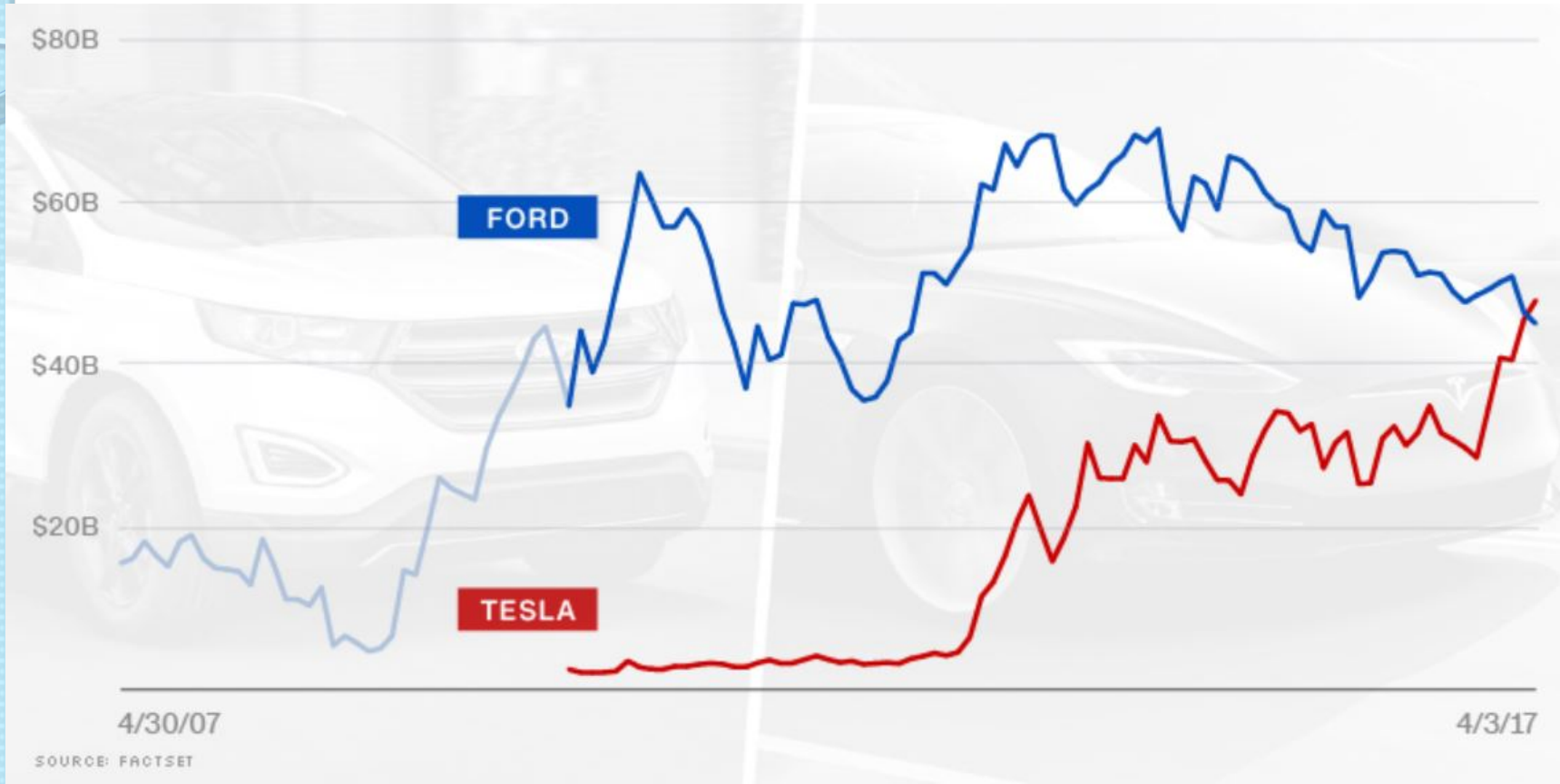
Yang Tao, PhD, PE  
Traffic Engineering Division

PBMVC  
June 27, 2017



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# Something “Unthinkable”

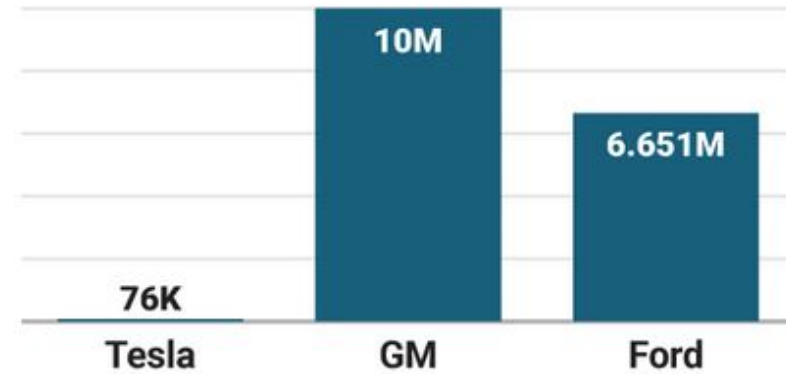


# The New Most Valuable Automaker in US

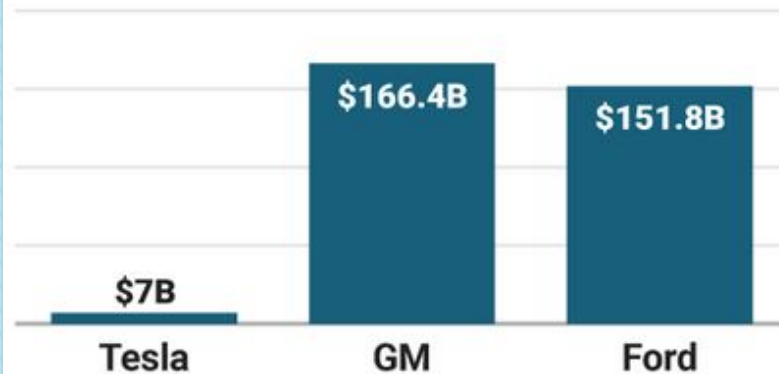
## Market cap (as of April 10, 2017)



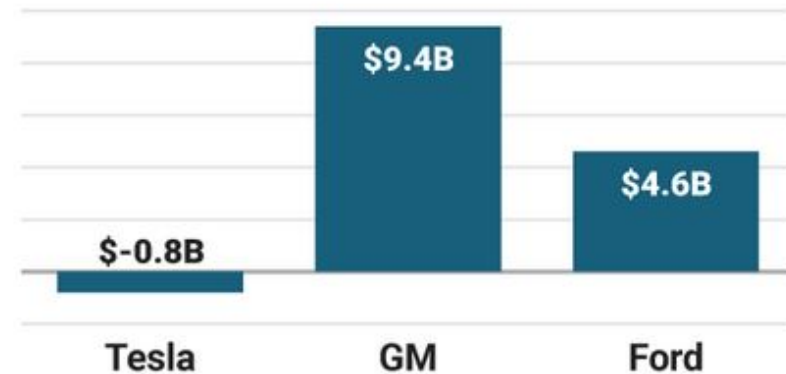
## Vehicle deliveries in 2016



## Revenue in 2016



## Net income/loss in 2016



# Crazy Market or What?



# The Future Might be Crazy



**ForIn2020** @ForIn2020

3 Apr

@elonmusk @waltmossberg @mims @defcon\_5 Stock price reflects the future (potential) of the company, not the present... #101



**Elon Musk** ✓

@elonmusk

Follow

@ForIn2020 @waltmossberg @mims @defcon\_5 Exactly. Tesla is absurdly overvalued if based on the past, but that's irrelevant. A stock price represents risk-adjusted future cash flows.

3:01 PM - 3 Apr 2017

604 1,715



“We will see more change in the industry in the next 5 to 10 years than we have in the last 50.”

MARY T. BARRA,  
CHAIRMAN AND CEO, GENERAL MOTORS



“The challenge is that we don’t know what’s coming but we know it’s coming. We all have to learn to change on a dime.”

PAM O’CONNOR,  
COUNCILWOMAN, CITY OF SANTA MONICA, CA



# The **BIG** change

By 2030, Driverless technology will be deployed in fleets of taxis and buses.



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# CITY OF THE FUTURE

TECHNOLOGY & MOBILITY





# Uber starts self-driving car pickups in Pittsburgh

Posted Sep 14, 2016 by [Signe Brewster \(@signe\)](#)



Next Story



**B**eginning today, a select group of Pittsburgh Uber users will get a surprise the next time they request a pickup: the option to ride in a self driving car.



# The Smart City Challenge

- December 7, 2015: USDOT announcement
- \$40 million to one mid-sized city (population: 200,00 to 850,000)
- Vulcan Inc. to contribute an additional \$10 million
- Other private partners to provide additional incentives





# DOT Smart City Challenge

**1,400**

local officials, companies, academics and non-profits joined our webinars

**800**

people participated in our Smart City Forum

**300**

companies have expressed interest in partnering

**78**

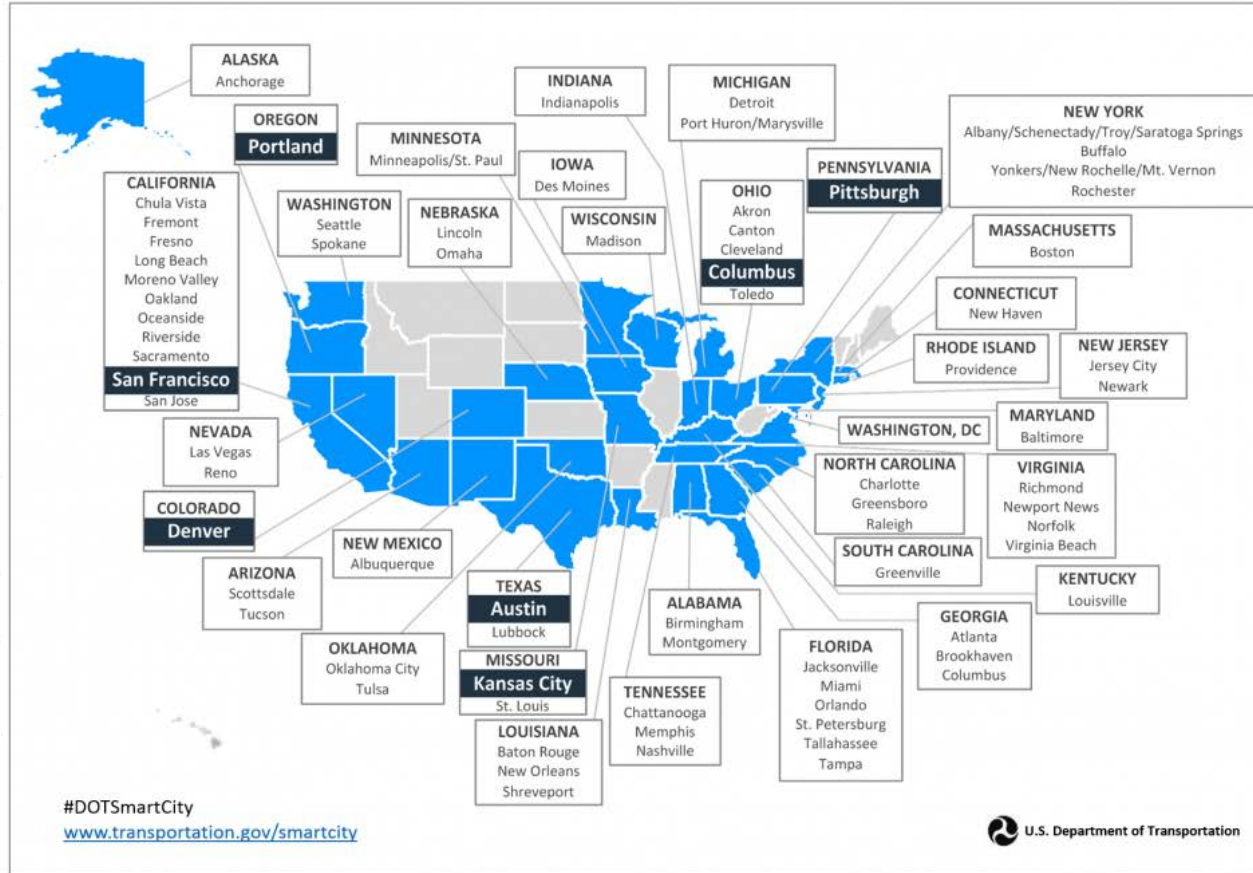
applications received for the Smart City Challenge

**7**

Smart City Challenge Finalists announced in March at SXSW

**1**

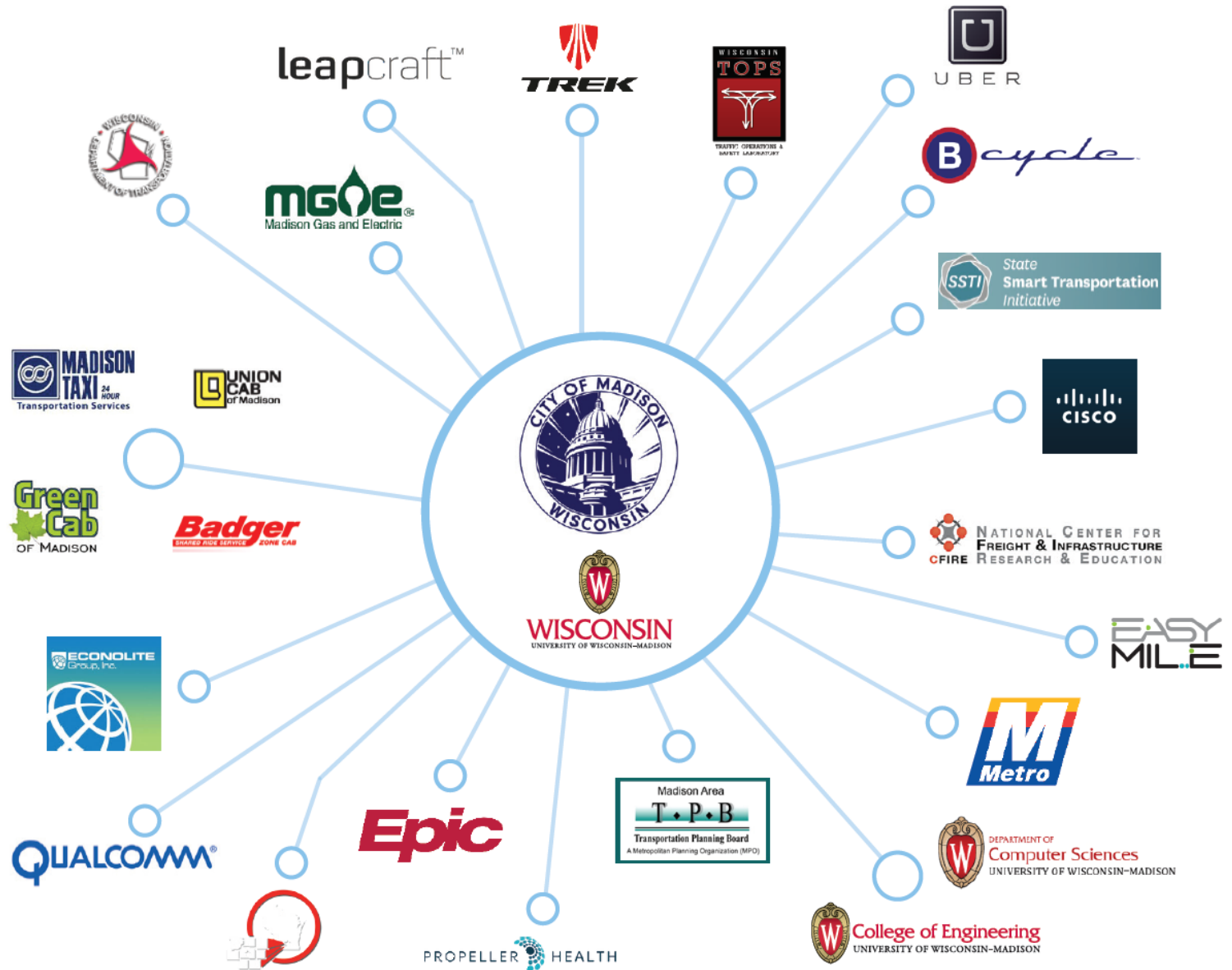
Smart City Challenge Winner announced in June



#DOTSmartCity  
[www.transportation.gov/smartcity](http://www.transportation.gov/smartcity)

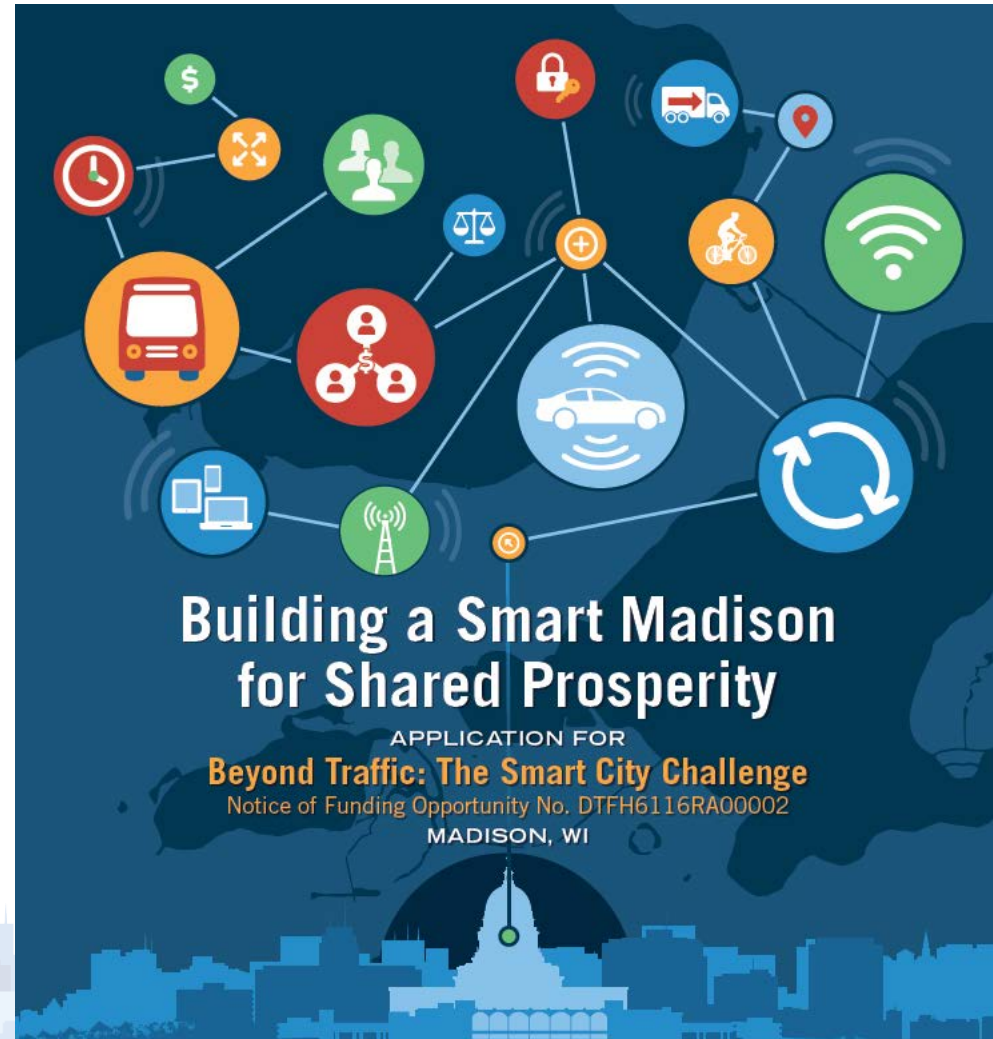


# Madison Smart City Partners



# Madison's Proposal

- Intelligent data collection, analysis, and sharing
- Autonomous, connected, and electric vehicles
- Smart infrastructure



# Intelligent Data Collection, Analysis, and Sharing

- Shared Madison data platform
- Performance analytics
- Ridesharing and microtransit algorithm
- Algorithms for real-time processing and sharing data from all sources
- Application developments
- Smart Parking algorithms
- A single fare payment system
- Smart freight delivery
- Real-time transportation system simulations for decision making



# Autonomous, Connected and Electric Vehicles

- Autonomous microtransit pilots
- Innova Dash electric vehicles
- Mobility on Demand jitney services
- DSRC radio installations at all signalized intersections and RR crossings, and on all transit buses and select taxis
- EV parking spaces with smart chargers



# Smart Infrastructure

- Network of thermal and environmental sensors, and air quality sensors
- Four adaptive corridors
- City-owned 4G network and connect all public safety, public works and transit vehicles
- Smart grid improvements
- Advanced collision avoidance systems
- Accelerated deployment of ITS Strategic Plan







POLITICO

# Morning Transportation

*A daily speed read on transportation and infrastructure*

POLITICO

**ALAS, NO FLYING CARS:** It's another whole month before the Department of Transportation announces the five finalists of its \$40 million Smart City Challenge innovation grant [at SXSW](#), but MT persuaded some of the 78 cities in the running to give an advance peek at their pie-in-the-sky transportation proposals. We'll be previewing some of these projects over the next few days. First up: Madison, Wis. The city's proposal to DOT centers on the creation of a "Shared Madison Data Platform" that "will provide the open source information, infrastructure, and accessibility to develop tools to foster a more efficient and equitable transportation system."

**Rideshare and live maps and microtransit fleets, oh my!** The platform, Madison official say, will pool data from infrastructure throughout the city, as well as public and private vehicles. "Some of the initial applications developed on the Platform will include a ridesharing algorithm that allows members of the public to connect and share rides for mutual benefit, a live map showing current road conditions, and a single-payer system for all transportation modes. Most importantly, the Platform ... will have the capability to evolve to handle driverless microtransit fleets in the future." Not quite flying cars, but big promises nonetheless!



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# Columbus was the Winner

- Announced June 23, 2016
- Leveraged \$50 million in USDOT and Vulcan funding into an additional \$90 million match
- \$22 million public, \$53 million private, \$17 million Institutional/Non-Profit
- Demonstrated more value than any other applicants



# 16 cities join T4America's Smart Cities Collaborative to tackle urban mobility challenges together



**Transportation**  
for America

18 Oct 2016 | Posted by [Stephen Lee Davis](#) | [0 Comments](#) | [cities](#), [Press Releases](#), [sidewalk labs](#), [smart cities](#)

**In a new collaborative supported by Sidewalk Labs, cities will work together to create policies, pilot emerging technology & share insights to improve transportation in cities small and large.**

**Washington, DC; New York, NY** – Transportation for America (T4A) and Sidewalk Labs announced today the sixteen members of a new T4A Smart Cities Collaborative to explore how technology can improve urban mobility, creating a tangible new opportunity for the scores of ambitious cities that did not win or weren't eligible for USDOT's Smart City Challenge. Over the coming year, the collaborative will bring together these cities to tackle the challenges related to implementing smart city policies and projects – sharing best practices and technical assistance, and piloting new programs.

[Nearly 60 cities applied to be a part of the collaborative](#), which will hold its first meeting in Minneapolis on Nov. 9-10, 2016.

“We're in the midst of the most transformational shift in urban transportation since the start of the interstate era more than 50 years ago. And just like that era, cities have enormous potential to help or harm their residents with the decisions they make,” said **James Corless, Director of T4America**. “It's incredibly encouraging to see this long list of cities proactively shaping the future to ensure that this monumental shift in transportation doesn't shape their cities without their input and produce a new generation of transportation haves and have-nots.”

“We have spent the past several months speaking directly with cities across the country, and what we've heard is mobility is a major issue across the board. Cities know that technology offers ways to improve mobility, but exactly how to realize its potential isn't obvious,” said **Sidewalk Labs Chief Policy Officer Rohit T. Aggarwala**. “Cities understand that they need to work together, but the question has always been how best to band these municipalities in partnership. This collaborative will be an unprecedented step in unifying these urban areas and accelerate solutions that provide affordable, efficient ways to get around.”

# Smart Cities Collaborative

- **Austin, TX**
- **Boston, MA**
- **Centennial, CO**
- **Chattanooga, TN**
- **Denver, CO**
- **Lone Tree, CO**
- **Los Angeles, CA**
- **Miami-Dade County, FL**
- **Madison, WI**
- **Minneapolis/St. Paul, MN**
- **Nashville, TN**
- **Portland, OR**
- **Sacramento, CA**
- **San Francisco, CA (joined later)**
- **San Jose, CA**
- **Seattle, WA**
- **Washington, DC**



Photo by Roman Kruglov via Flickr



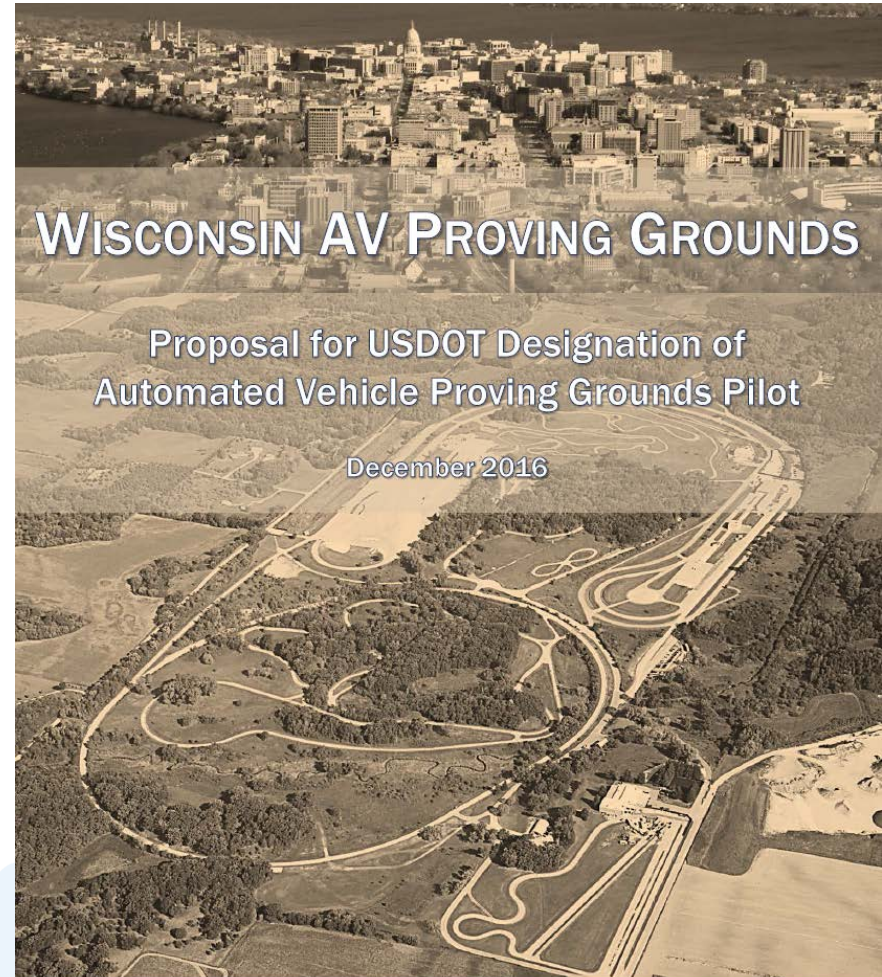
# Smart Cities Collaborative

A learning and support network providing direct technical assistance  
to leading edge cities advancing smart urban mobility strategies



# USDOT AV Proving Grounds

- City of Pittsburgh and the Thomas D. Larson Pennsylvania Transportation Institute
- Texas AV Proving Grounds Partnership
- U.S. Army Aberdeen Test Center
- American Center for Mobility (ACM) at Willow Run
- Contra Costa Transportation Authority (CCTA) & GoMentum Station
- San Diego Association of Governments
- Iowa City Area Development Group
- **University of Wisconsin-Madison**
- Central Florida Automated Vehicle Partners
- North Carolina Turnpike Authority





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PROVING GROUNDS

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GTiMA

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MGA Research Corp.

Road America

UW-Madison Transportation Services

# USDOT Designated AV Proving Grounds



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# Driverless Future

- Potentially tremendous amount of benefits:
  - Transportation safety
  - Mobility and environment
  - Equity for seniors, disabled and other underserved
  - Economic development
- The self-driving future: utopia vs. dystopia
- Collaboration across sectors is needed for the greater public good:
  - Governmental policy
  - Academic research
  - Industry cooperation
  - Public engagement



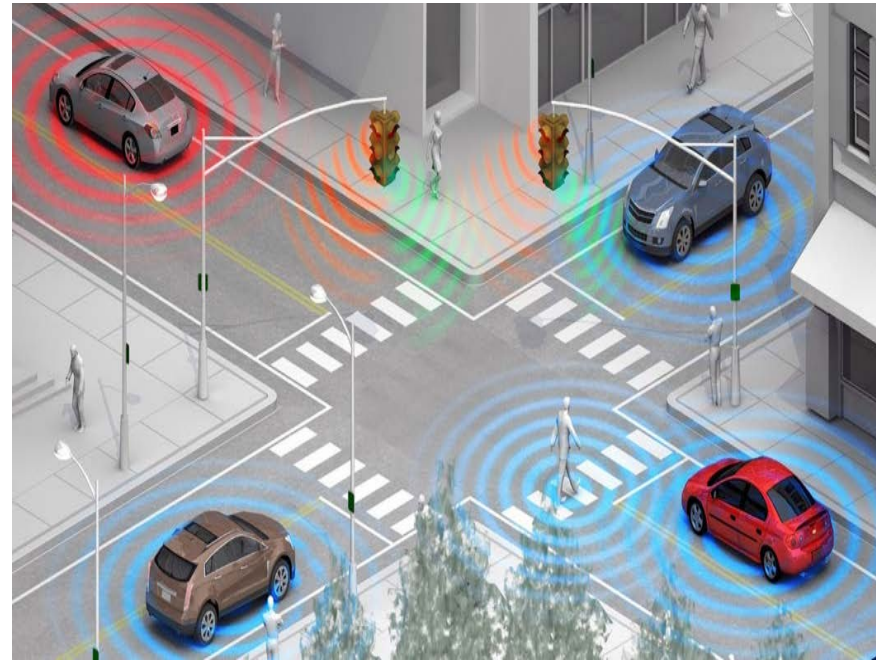
# Connected Park Street Corridor

- Inspiration
  - Needs on Park Street
  - Smart City
  - The SPaT Challenge
- Wisconsin's first CV infrastructure
- One of the first cities in the nation to meet the V2I DC deployment goal



# The SPaT Challenge

- Signal Phase and Timing (SPaT)
- Can be obtained from a traffic signal controller via a query protocol and can be broadcast by most DSRC Roadside Units (RSU)
- 20 intersections in 50 states by 2020



# Connected Park Street Corridor

- Primary arterial connection from Beltline to downtown Madison and UW
- Major transit corridor
- Primary special events route
- Emergency route for fire station
- Emergency route for regional medical facilities
- Interchanges with freeway
- Freight operation
- Low income residents



# Project Scope

- Pilot and deploy connected vehicle technology to improve:
  - Safety
  - Mobility
  - Bus on-time performance
  - Equity
- Dedicated short range communication (DSRC)
- Vehicle to infrastructure (V2I), Vehicle to Vehicle (V2V), Vehicle to Everything (V2X, pedestrians, bicycles, wheelchairs, etc.)



# Project Outcome

- Next generation Transit Signal Priority (TSP)
- Improved safety, especially for vulnerable road users
- Improved mobility, especially during special events
- Improved transportation equity
- Test corridor for private sector for V2I, V2V and V2X applications
- Establish Madison and Wisconsin as the Upper Midwest hub for CV & AV



# Project Team

- City of Madison
- UW-Madison TOPS Lab
- Econolite
- Madison Metro
- UW-Madison Computer Science
- WisDOT (potentially)
- Other Private Partners



# Project Timeline

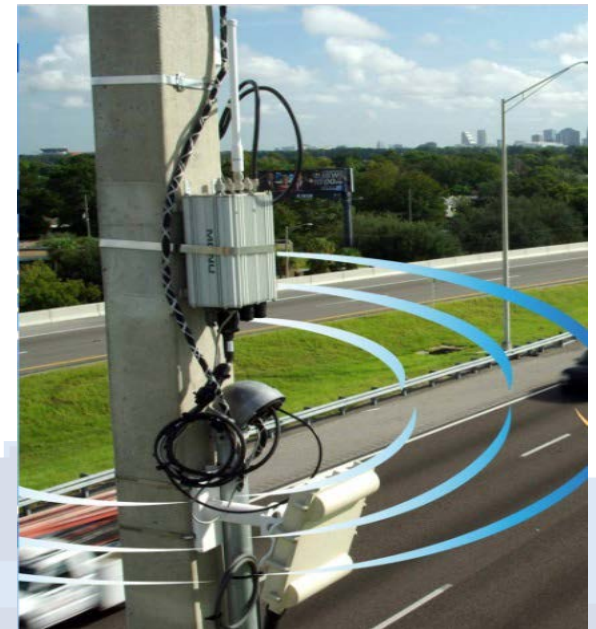
- Phase I: Preparation and Initial SPaT Testing
- Phase II: Transit Signal Priority (TSP) via Multi-Modal Intelligent Traffic Signal System (MMITSS)
- Phase III: Full Implementation of Transit Signal Priority (TSP)
- Phase IV: Expanded Onboard Units (OBU) and V2X Applications





# Project Cost and Funding

- Estimated project cost:  
\$1 to \$4 Millions
- Potential Funding:
  - Federal grants
  - Private partners
  - City share



# NOCoE Featured Projects



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# NOCoE Featured Projects

**NOCoE** National Operations Center of Excellence  
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Map Satellite

NORTHWEST TERRITORIES

ALBERTA

BRITISH COLUMBIA

**Description:** The City of Madison, in collaboration with UW-Madison, will equip 20-30 intersections with the DSRC technology along the 4-mile long Park Street/Fish Hatchery Road corridor. The City Traffic Engineering Division and UW TOPS Lab will coordinate with Madison Metro Transit to install onboard units on busses that run the corridor multiple times per day. The initial step provides priority to busses behind schedule, leveraging open-source software – the prototype Multi-Modal Intelligent Traffic Signal System (MMITS) with Transit Signal Priority (TSP) available via the Open Source Application Development Portal. Success for the initial deployment will be measured through improved travel-time and on-time reliability of transit vehicles, while causing minimal adverse effects on other road users. Then onboard units will be installed on select fire trucks, ambulances and taxis that frequently use the route. Eventually applications will be developed for vehicle-to-pedestrian and vehicle-to-bicycle communications. The test-bed will also be open to other private partners for testing and research purposes.

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