U.S. Department of Transportation
Federal Highway Administration

Northeast Autonomous Vehicle Summit

Town Hall Panel 1

U.S. DOT Smart City Challenge

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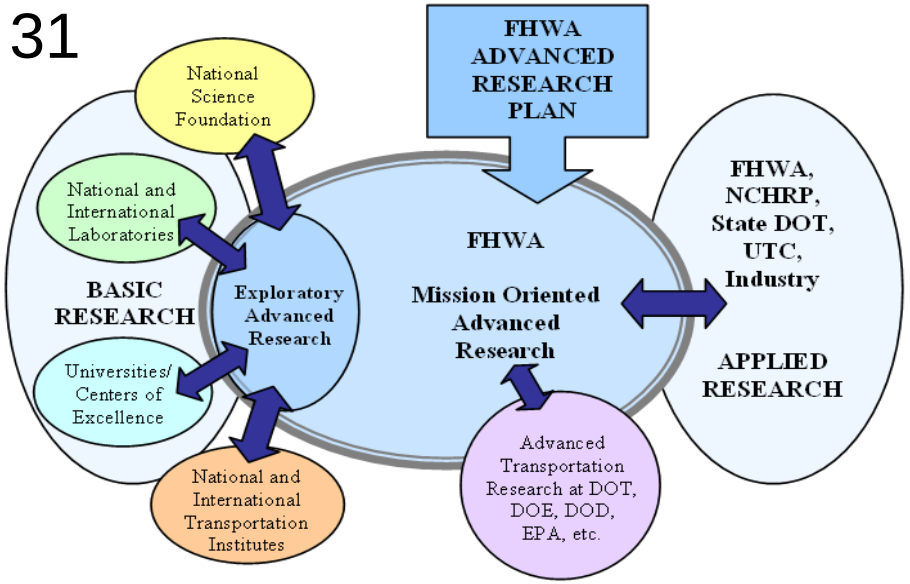
Turner Fairbank Highway Research Center

- **Research Capabilities**
  - 20+ labs, 110 Federal, 175 contractors
  - National Research Fellows, visiting researchers
- **Research Funding**
  - $100M per year

Exploratory Advanced Research

Status

- Solicitations: 8
- Projects awarded: 75; Active 31
  - $76 M Federal
  - $29 M Match



Focus Areas

- Connected highway systems
- Human behavior and travel choices
- Breakthrough concepts in material science
- Technology for assessing performance
- New technology and advanced policies for energy and resource conservation

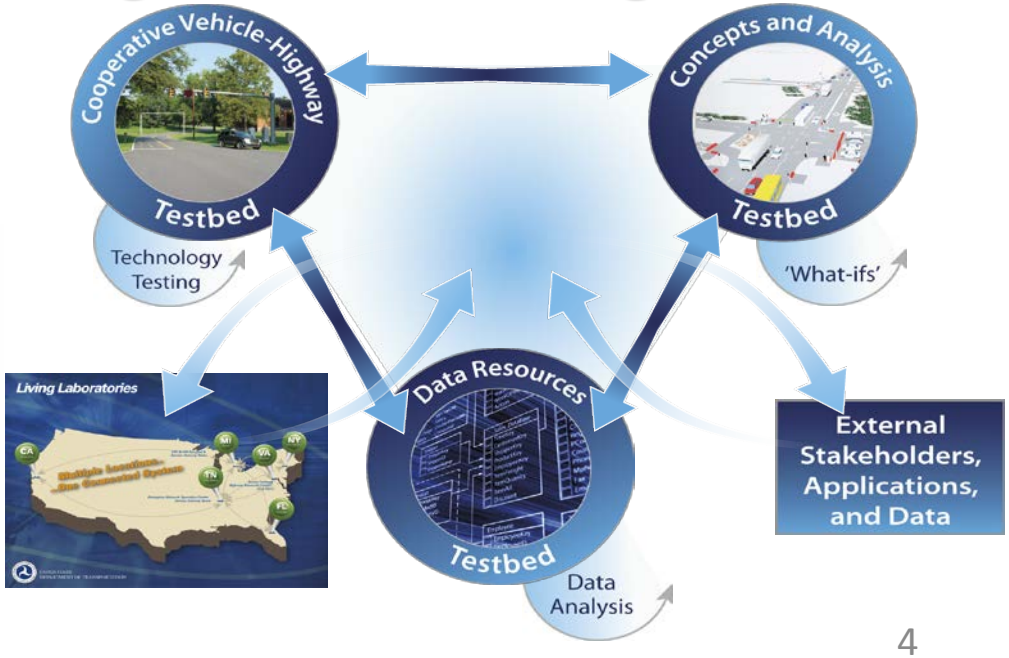
Operations Focus Areas

Enabling Technologies

Concepts and Analysis

Operations Applications

Linking Testbeds to Living Laboratories



Cooperative Adaptive Cruise Control (CACC) Research

GlidePath Prototype Application

- Test examines the environmental and fuel economy benefits of partial-automation on a Ford Escape Hybrid
  - Overrides human longitudinal control, allowing the vehicle to travel at optimum speed to proceed through an intersection without stopping at red lights
  - Connected Vehicle-to-Infrastructure (V2I) technology combined with partial automation
- The Result: **22% fuel economy improvement** with partial automation versus 7% with manual driving
- Next phase of research will test the application in multi-intersection environments

Credit: USDOT

Tech Timeline

Photo: Getty Images

General Motors (GM) Introduces the automated highway system at the New York World's Fair **1939**

Invention of Cruise Control **1967**

Invention of Anti-Lock Braking Systems **1978**

The Internet becomes publicly available **1993**

Automated Highway Simulation in San Diego, CA **1997**

1930 | 1940 | 1950 | 1960 | 1970 | 1980 | 1990

First image of automated vehicles surfaces in an advertisement by American electric **1957**

Eureka **PROMETHEUS Project** becomes the first autonomous vehicle project **1987**

GM introduces the first in-car navigation system- Guidestar **1995**

Photo: General Motors

Traffic Jam Assist and CACC are Level 2 Automation breakthroughs **2016**

Continental launches the Road Database Project **2015**

2050 | 2040 | 2030 | 2020 | 2010 | 2000

All cars are autonomous **2050**

Truck platooning a reality **2040**

Uber Fleet is driverless **2030**

Photo: UBER

Google X launches self-driving car project **2010**

Photo: Google

Photo: DARPA

DARPA Grand Challenge kicks of military automated vehicles **2004**

3G mobile data connectivity is on the rise **Early 2000s**

Photo: Blackberry

We Are On the Verge of A Transformation

Connected Automation

Information & Communications Technology

SMART CITY

Internet of Things

Photo: World Bank

Photo: Pixabay

The Smart City Challenge

- Encourage cities to put forward their best and most creative ideas for innovatively addressing the challenges they are facing.
- Demonstrate how advanced data and intelligent transportation systems (ITS) technologies and applications can be used to reduce congestion, keep travelers safe, protect the environment, respond to climate change, connect underserved communities, and support economic vitality.

USDOT Vision Elements

TECHNOLOGY ELEMENTS

Vision Element #1
Urban Automation

Vision Element #2
Connected Vehicles

Vision Element #3
Intelligent, Sensor-Based Infrastructure

INNOVATIVE APPROACHES TO URBAN TRANSPORTATION ELEMENTS

Vision Element #4
User-Focused Mobility Services and Choices

Vision Element #5
Urban Analytics

Vision Element #6
Urban Delivery and Logistics

Vision Element #7
Strategic Business Models & Partnering

Vision Element #8
Smart Grid, Roadway Electrification, & EVs

Vision Element #9
Connected, Involved Citizens

SMART CITY ELEMENTS

Vision Element #10
Architecture and Standards

Vision Element #11
Low-Cost, Efficient, Secure, & Resilient ICT

Vision Element #12
Smart Land Use

The Smart City Challenge

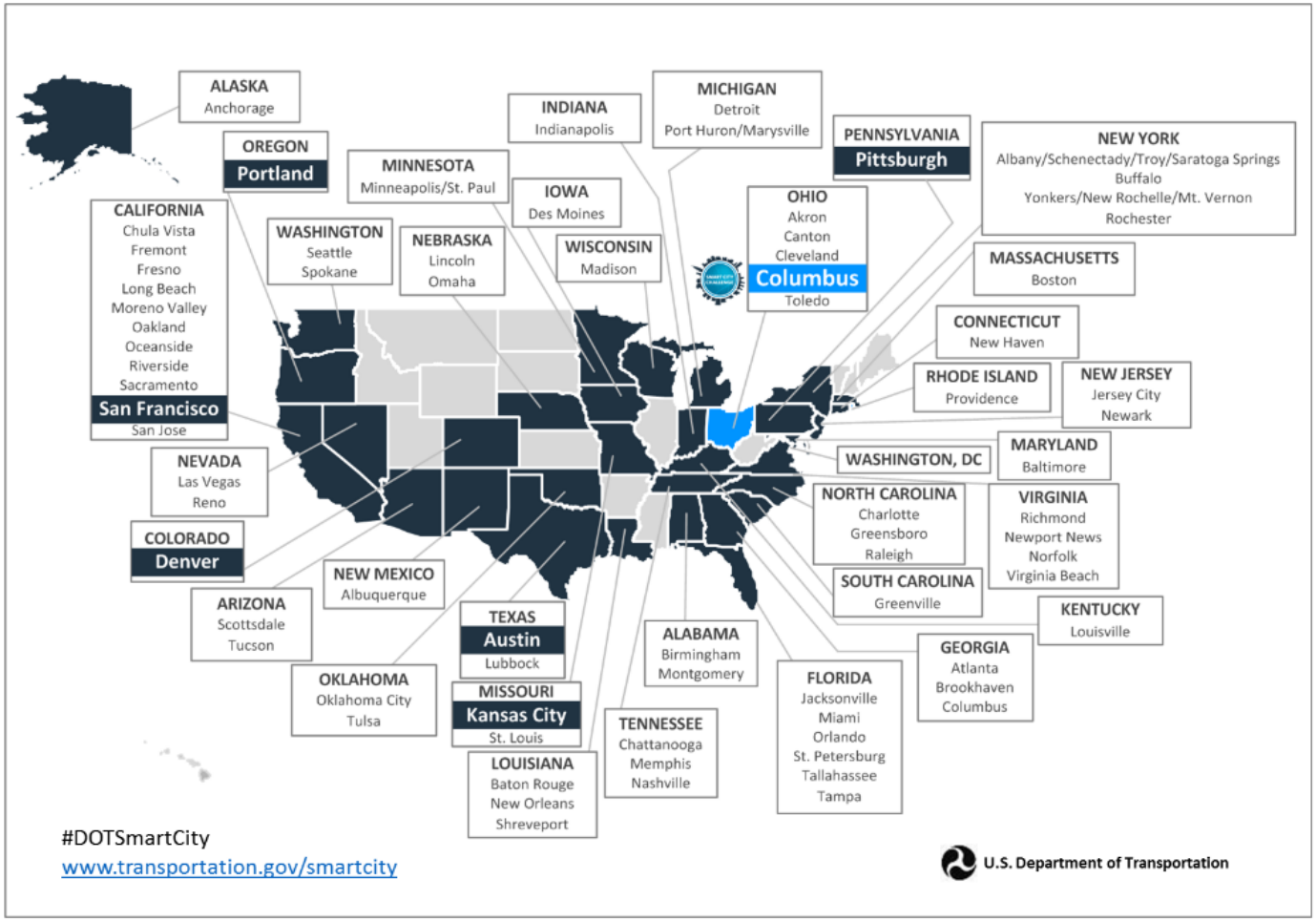
$500 million in partnerships identified in by the seven Smart City Challenge Finalists

150+ partnerships identified by the Smart City Challenge Finalist

78 applications received for the Smart City Challenge

7 Smart City Challenge Finalists announced in March 2016

1 Smart City Challenge Winner



SMARTCOLUMBUS

VISION | ACCESS TO JOBS | SMART LOGISTICS | CONNECTED RESIDENTS | CONNECTED VISITORS | SUSTAINABLE TRANSPORTATION

ENABLING TECHNOLOGIES

Columbus Connected Transportation Network (CCTN)

Integrated Data Exchange

Enhanced Human Services

Electric Vehicle Infrastructure

DEPLOYMENT

RESIDENTIAL DISTRICT

COMMERCIAL DISTRICT

DOWNTOWN DISTRICT

LOGISTICS DISTRICT

OUTCOMES

SAFETY

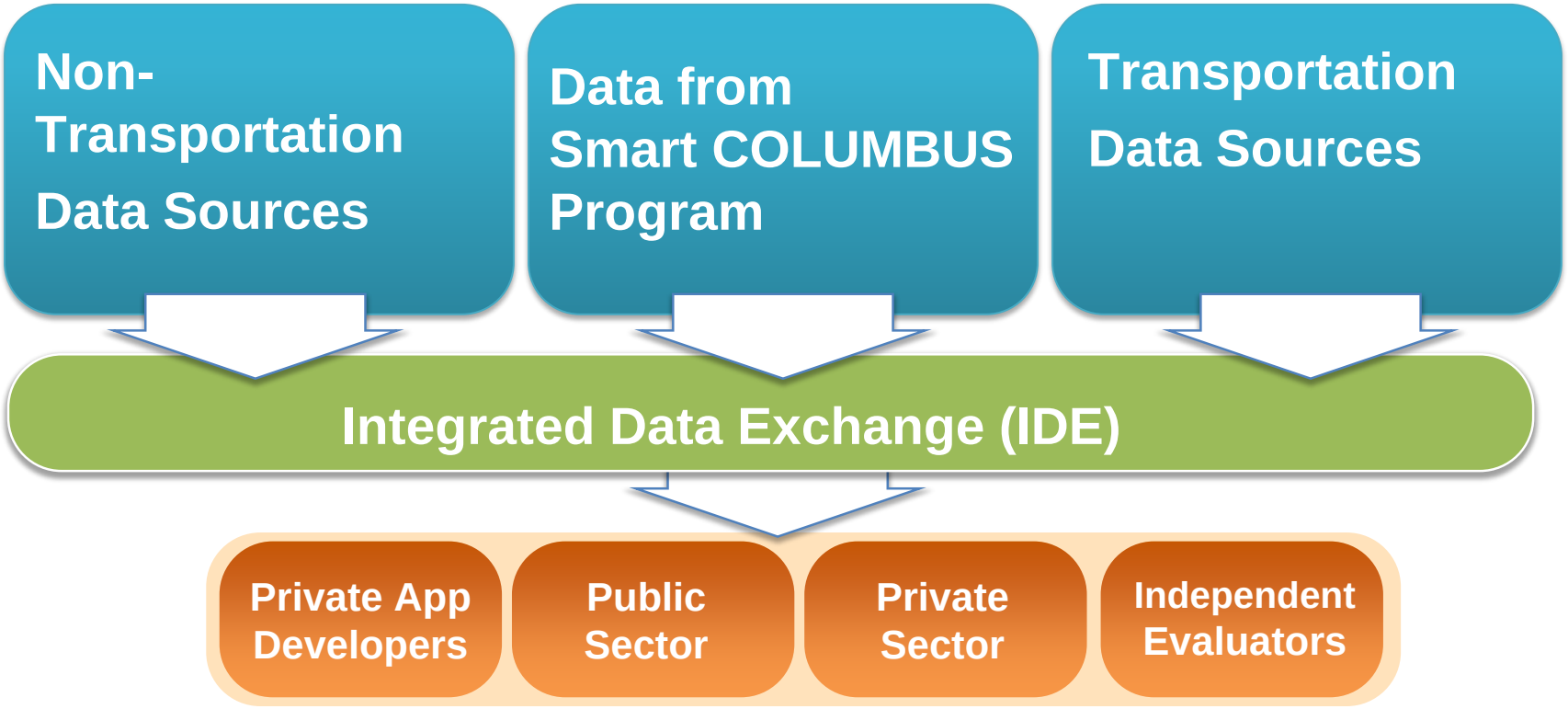
MOBILITY

LADDERS OF OPPORTUNITY

CLIMATE CHANGE

Source: The City of Columbus

Integrated Data Exchange (IDE)



Source: The City of Columbus

Resources / To Learn More

SAXTON LABORATORY Driving Future Highways

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RESOURCES

FHWA Office of Operations:

- FHWA Office of Operations Website: http://ops.fhwa.dot.gov/
- Turner-Fairbank Highway Research Center Website: http://www.fhwa.dot.gov/research/tfhrc/offices/operations/

ITS-JPO:

- Automated Vehicles: https://www.its.dot.gov/automated_vehicle/
- CV Pilots: https://www.its.dot.gov/presentations/egan_smith/FutureTransportationCV-AV.pdf
- Research Data Exchange: https://www.its-rde.net/

Smart City Challenge:

- Finalist Cities & Applications: https://www.transportation.gov/smartcity/7-finalists-cities/
- Advanced Technology Grants: https://www.transportation.gov/Briefing-Room/Advanced-Technology-Transportation-Projects/
- Smart City Challenge Resource Guide: https://www.transportation.gov/smartcity/otherfunding/

CACC:

- Video Link: https://www.youtube.com/watch?v=2-WoV8nKQUE