US Department of Transportation’s

The Smart City Challenge

Don Halligan
March 22, 2016
USDOT Expectations for the Smart City Challenge

- Encourage cities to put forward their best and most creative ideas for innovatively addressing the challenges they are facing.

- Address how emerging transportation data, technologies, and applications can be integrated with existing systems in a city to address transportation challenges.

- **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 anticipated benefits from advanced technologies and Smart Cities

Technology convergence will revolutionize transportation, dramatically improving safety and mobility while reducing costs and environmental impacts

Benefits
- Order of magnitude safety improvements
- Reduced congestion
- Reduced emissions and use of fossil fuels
- Improved access to jobs and services
- Reduced transportation costs for gov’t and users
- Improved accessibility and mobility

Connected Vehicles
Vehicle Automation
Mobility on Demand
Machine Learning
Big Data
Internet of Things

Connected-Automated Vehicles

Smart Cities
The Smart City Challenge - Technology Elements

**Technology Elements (Highest Priority)**

- Vision Element #1: Urban Automation
- Vision Element #2: Connected Vehicles
- Vision Element #3: Intelligent, Sensor-Based Infrastructure

**Innovative Approaches to Urban Transportation Elements (High Priority)**

- 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 (Priority)**

- Vision Element #10: Architecture and Standards
- Vision Element #11: Low-Cost, Efficient, Secure, & Resilient ICT
- Vision Element #12: Smart Land Use
Baltimore City as an Applicant

- Soon after the NOFO was issued the City began discussing with UM, JHU & BMC

- Ideas were quickly developed and UM lead a team to pull together an application.

- B’SMArt built off of ongoing transportation plans, programmed project and Community Development work.

- Provide resources designed to attract new businesses and spur economic development
The Challenge
The Challenge

- A recent Harvard study reveals that a person born in a low-income community in Baltimore has the least chance of ascending out of that income group in the entire nation.
- Historically underserved communities with mostly minority residents in West Baltimore have some of the highest poverty rates and poorest access to opportunities.

The estimates in the map above and table below show the percentage earnings gain from growing up in each county relative to an average place for children in low-income families. Lighter colored areas are places that produce higher earnings levels. Click here for estimates for all counties in the U.S.
TRYING TO ACCOMPLISH...

Multi-faceted approach focused on Hubs in existing system and use of technology to create opportunities to:

- Access jobs/job training
- Education
- Health care
- Other vital services
# Proposal - Key Elements & Partnerships

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<tr>
<th>USDOT Vision Elements</th>
<th>Baltimore Smart City Vision Elements</th>
<th>Goals Achieved</th>
<th>Risk</th>
<th>Key Partners*</th>
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<td>Automated and Dynamic Shuttle Services</td>
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<td>Automated Mag-Lev Personal Rapid Transit (PRT)</td>
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<td>Automation for Parking, Freight and Safety</td>
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<td><strong>2. Connected Vehicles</strong></td>
<td>Next Generation Low-Cost V2X and V2I Technologies</td>
<td>S,M,G,E,J</td>
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<td>U Maryland, U Michigan, Eberle Design, Econolite, Port of Baltimore, Veniam, Telogis, Cybergy, GOVonomy</td>
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<td></td>
<td>Connected Smart Signal and Traffic Management</td>
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<td>Outsourced Wider-Area Connected Vehicle Tech.</td>
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<td>CV-Enabled Mesh Network for Public Access to Internet</td>
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<td><strong>3. Intelligent, Sensor-Based Infrastructure</strong></td>
<td>Users, Vehicles and Cell Phones as Probe Sensors</td>
<td>S,M,E</td>
<td></td>
<td>U Maryland, TomTom, INRIX, HERE, Ford, Telogis, Google/Waze, Google/Waze,</td>
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<td>Smart Infrastructure Sensors and Virtual Sensors</td>
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<td>Performance Monitoring and Prediction</td>
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<td><strong>5. User-Focused Mobility Services and Choices</strong></td>
<td>Ecosystem for Mobility-on-Demand (MOD) Services</td>
<td>M,G,E,J</td>
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<td>Lyft, GM, Ford, Split, Transit Choices, Commuter Connections, CMTA, MDOT, MTA, Sidewalk Labs, AARP</td>
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<td>Incentive-Based Demand Management for Optimization</td>
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<td>Real-Time Traveler Information for All</td>
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<td>Vehicle/Bike/Ride Sharing Services with Job Creation</td>
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<td>Crowd-Sourced Urban Delivery with Job Creation</td>
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<td>Dynamic Freight Trip Planning Service</td>
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<td>7. Partnerships</td>
<td>Discussed separately in Section 5 of the proposal</td>
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<td>EV Infrastructure and Incentives</td>
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<td>Cleaner Energy Sources for Smart Grid</td>
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<td>9. Connected, Involved Citizens</td>
<td>Rate Your Ride and Rate Baltimore</td>
<td>E,J</td>
<td>CMTA, U. Maryland, Community Associations</td>
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<td>Open Data Portal for Promoting Entrepreneurship</td>
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<td>10. Architecture and Standards</td>
<td>Bandwidth, Storage, Security, Privacy, etc.</td>
<td>S,M,G</td>
<td>Cisco, Verizon, Bosch, GE, INRIX, U. Maryland</td>
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<tr>
<td>11. Low-Cost, Efficient, Secure and Resilient ICT</td>
<td>Low-Cost ICT in West Baltimore and more</td>
<td>S, M, E,J</td>
<td>Cisco, Verizon, Bosch GOVnomy</td>
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<td>Economic and Land Development in West Baltimore</td>
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The Field of Applicants

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

5 Smart City Challenge Finalists to be announced in March at SXSW

1 Smart City Challenge Winner announced in June

#DOTSmartCity
www.transportation.gov/smartcity

U.S. Department of Transportation
The Short-List

The seven cities selected as finalists are:

- Austin, Texas
- Columbus, Ohio
- Denver, Colorado
- Kansas City, Missouri
- Pittsburgh, Pennsylvania
- Portland, Oregon
- San Francisco, California
Proposals

**Austin, Texas**
- Expanding traffic monitoring capabilities region-wide (now just citywide), and using that information to help manage traffic flows after collisions.

**Columbus, Ohio**
- Increasing access to jobs, linking neighborhoods and improving real-time information in a sustainable, safe way.

**Denver, Colorado**
- Mobility on Demand Enterprise - apps and interactive kiosks in collaboration with Xerox and Panasonic (exclusive partners). Denver’s existing two million lineal feet of fiber is available and will be harnessed for this initiative.
- Transportation Electrification – grow vehicle electrification and the sharing economy.
- Intelligent Vehicles – Partner with CDOT to expand its connected vehicle program into the urban environment.

**Kansas City, Missouri**
- 14 Information kiosks along streetcar corridor described as similar to seven-foot iPhones and everyone will be able to sync kiosk information with their iOS or Android phone via an app.
- Cisco, Sprint & Google Fiber exclusive partners on dynamic street lights along corridor
- Develop AV regulations
Proposals

Pittsburgh, Pennsylvania
- City of Pittsburgh, Carnegie Mellon University (MetroLabs), the University of Pittsburgh, the Port Authority, and various non-profit and community stakeholders.
  - smarter transit corridors and connections,
  - bridging the digital divide and building greater equity in city neighborhoods,
  - realizing the value of new energy opportunities, and
  - reaching those impacted by displacement or isolation

- Portland, Oregon
  - Data & information exchange platform in two corridors in the City.
  - Open platform for safe interaction of system users, providers and entrepreneurs to connect and interact to improve transportation system performance by sharing real time info and analytics.

- San Francisco, California
  - Get in front of the next phase of the sharing economy, partner with tech, communications, and transportation companies to start planning for integration of ride-hailing with existing transit assets.
Winner take all?

“Mobileye” is to outfit the winning city’s entire fleet of buses with their driver assistance safety technology - it includes V2I and V2P in a single unit.

“Flow” a budding service from Google’s Sidewalk Labs will put 100 kiosks in winning city of DOT’s Smart Cities Challenge, to be installed in four targeted neighborhoods.

The kiosks will provide Internet access to anyone in a 150-foot radius and be outfitted with sensors that could theoretically track noise pollution levels, identify air quality issues and monitor the number of street parking spaces available.
What’s next?

- How can smart technology also serve as an economic development tool?
- Is there a value proposition to the region inherent in the sharing economy? What are the issues (e.g. Industry/Union opposition)
- Can smart grid infrastructure and public internet/wi-fi/smart phone portals benefit the regions’ communities (especially those that are economically challenged and communities of color)?
- How might we ensure access to all parts of the region – how can these be usable by people without smartphones and credit cards?
- How (and to what extent) can the sharing economy support service demand and spur economic development? How do we encourage it? How do we regulate it?
- How might the procurement process be improved to purchase (and package) transportation infrastructure and transportation services?
- What “next-generation” logistics/operations systems offer the greatest ROI for the Port, communities and businesses
- What regulatory/legal and legislative tune-ups should be considered?
- How might we most effectively partner with interested companies to provide services people and businesses in the region need to compete and succeed in the global economy?
What’s next?

EXPRESS DRIVE –

- GM announced that later this year they will provide all-in rental cars to Lyft drivers, who will pay between $99/week plus mileage and nothing at all, depending on how many Lyft rides they provide using the vehicles.

- Going live first in Chicago with 500 vehicles, all of a single model — the Chevy Equinox — Express Drive will then roll out to three more cities — Boston, Washington, DC and Baltimore — before expanding elsewhere (and potentially to other car models).

- Lyft and GM believe that Express Drive will help the pair lay the infrastructure for fleets of self-driving cars down the road. But one of the more immediate aims of Express Drive is simply to put more Lyft vehicles on the streets today.

UBER –

- 1/5 of all rides in Maryland (September 2015) originated in West Baltimore.
What’s next?

- Working with the Greater Baltimore Committee to jointly create a transportation technology group to learn and share knowledge of innovative transportation technology and service innovations that are appropriate for the Baltimore Region.

- Current thinking on the group includes interested members from the:
  - BRTB
  - Private industry and association representatives,
  - Not-for-Profit groups
  - Federal government, and
  - Academia

- Together the group would build off of each other's insights to learn about new technologies and determine applicability of technologies that may address known needs in the Region.
What’s next?

Robots will rule the world and enslave humanity.
Sharing blurring boundaries of mobility silos:

The single-modal user: Baby Boomer / Gen X

The inter-modal user: Gen Y / Gen Z

own car  either—or  use transit

The inter-modal user: Gen Y / Gen Z

and

GM  Audi  CAR2GO  BlaBlaCar  UBER  Ajelo  BRIDJ  MTA Maryland  TAXI
Consider:

Traditional rental sector
- Car rental
- B&B and hotels
- DVD rental
- Equipment rental
- Book rental

2013:
- $15 bn
- $240 bn

2025:
- $335 bn

Sharing economy sector
- Car sharing
- P2P accommodation
- Music/video streaming
- Online staffing
- P2P lending

Source: PwC, 2014
A large portion of the future workforce will be freelancers, contractors, and temp workers – eroding the morning commute: