U.S. Department of Transportation

US Department of Transportation's

The Smart City Challenge

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Baltimore Metropolitan Council

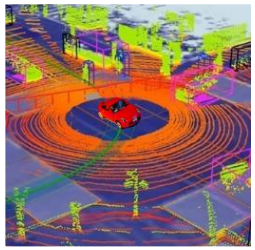
USDOT Expectations for the Smart City Challenge

- 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

- Connected Vehicles
- Vehicle Automation



Connected-Automated Vehicles

- Mobility on Demand
- Machine Learning
- Big Data
- Internet of Things

Smart Cities

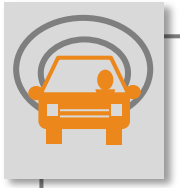
Benefits

- 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

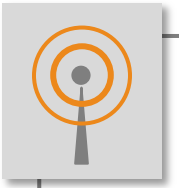
The Smart City Challenge - *Technology Elements*

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

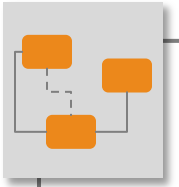
Vision Element #6
Urban Delivery and Logistics

Vision Element #7
Strategic Business Models & Partnering

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

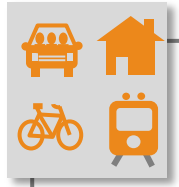
Vision Element #9
Connected, Involved Citizens

Smart City Elements *(Priority)*



Vision Element #10
Architecture and Standards

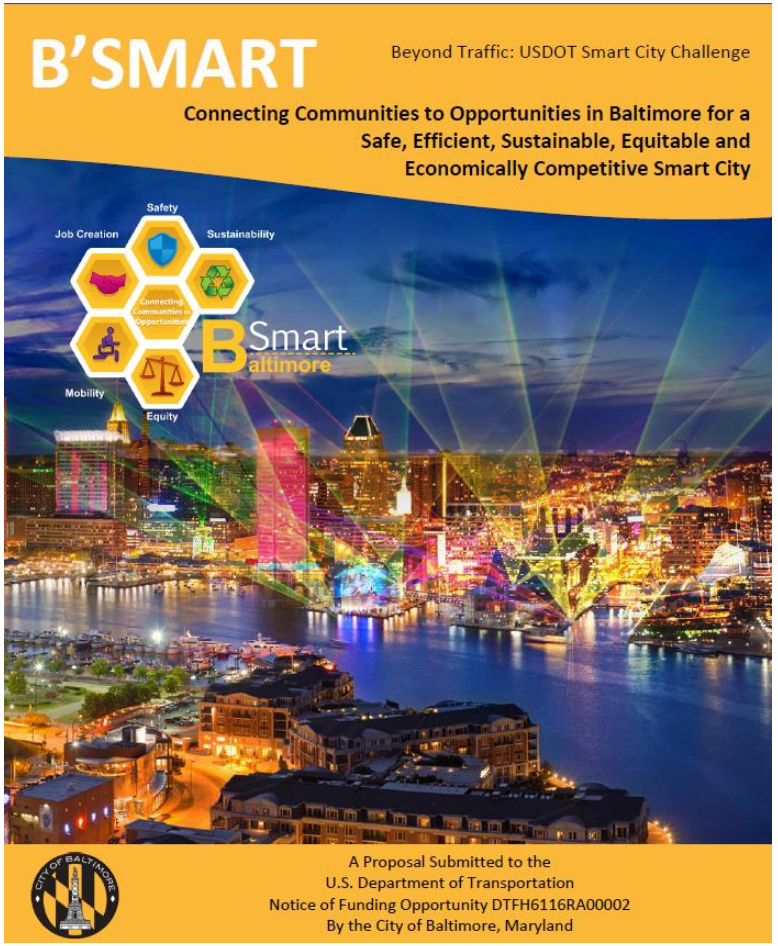
Vision Element #11
Low-Cost, Efficient, Secure, & Resilient ICT



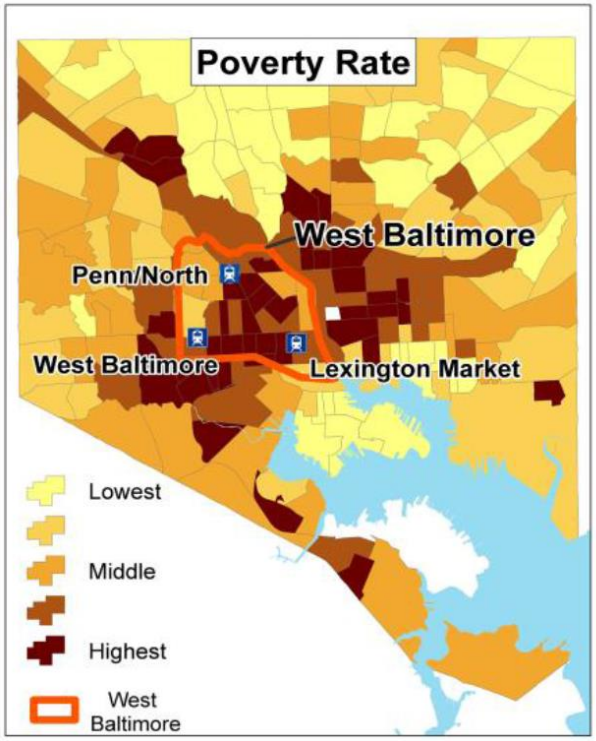
Vision Element #12
Smart Land Use

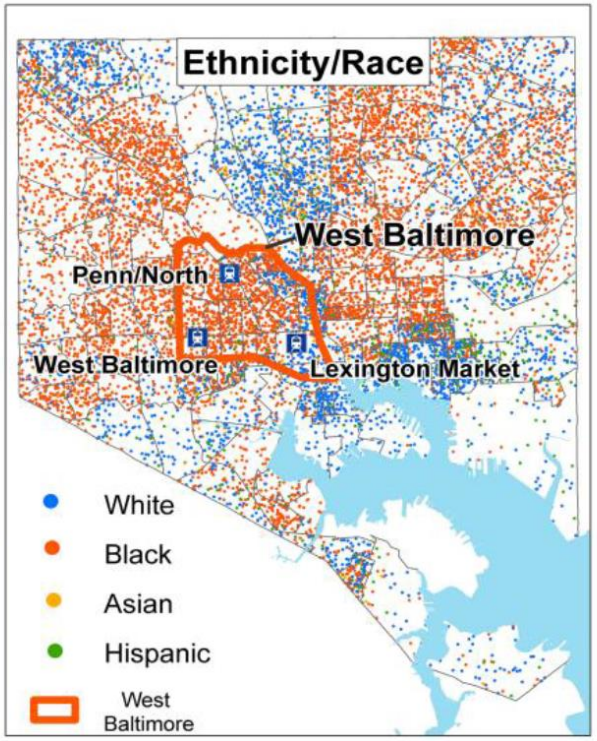
Baltimore City as an Applicant

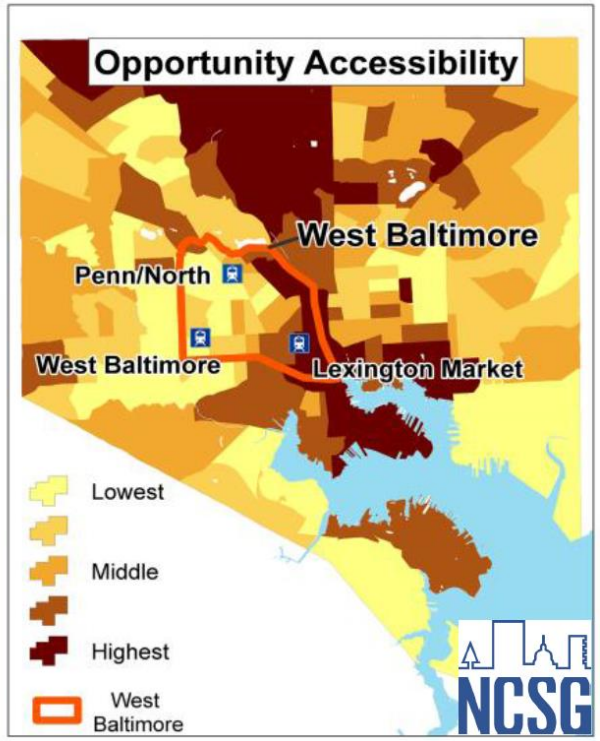
- Soon after the NOFO was issued the City began discussing with UM, JHU & BMC
- Ideas were quickly developed and UM lead a team to pull together an application.
- B’SMART built off of ongoing transportation plans, programmed project and Community Development work.
- Provide resources designed to attract new businesses and spur economic development



The Challenge

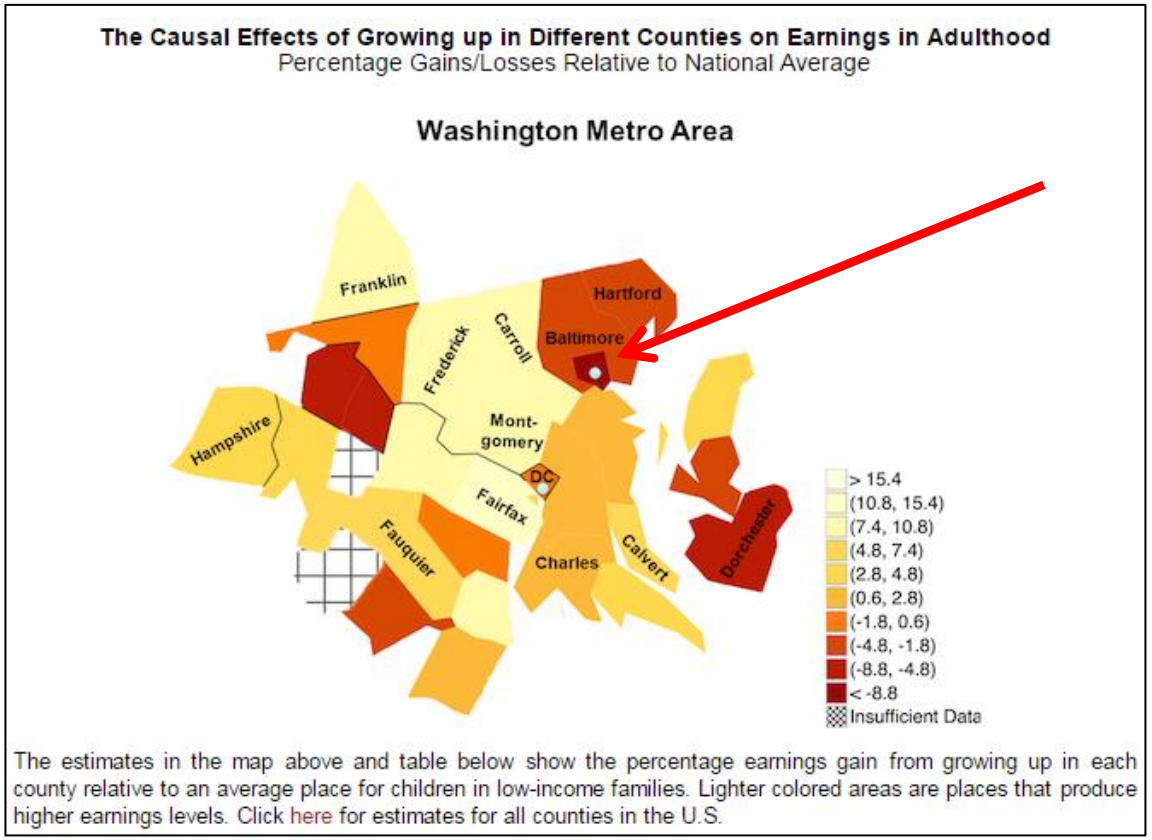






The Challenge

- 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.



http://www.equality-of-opportunity.org/

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

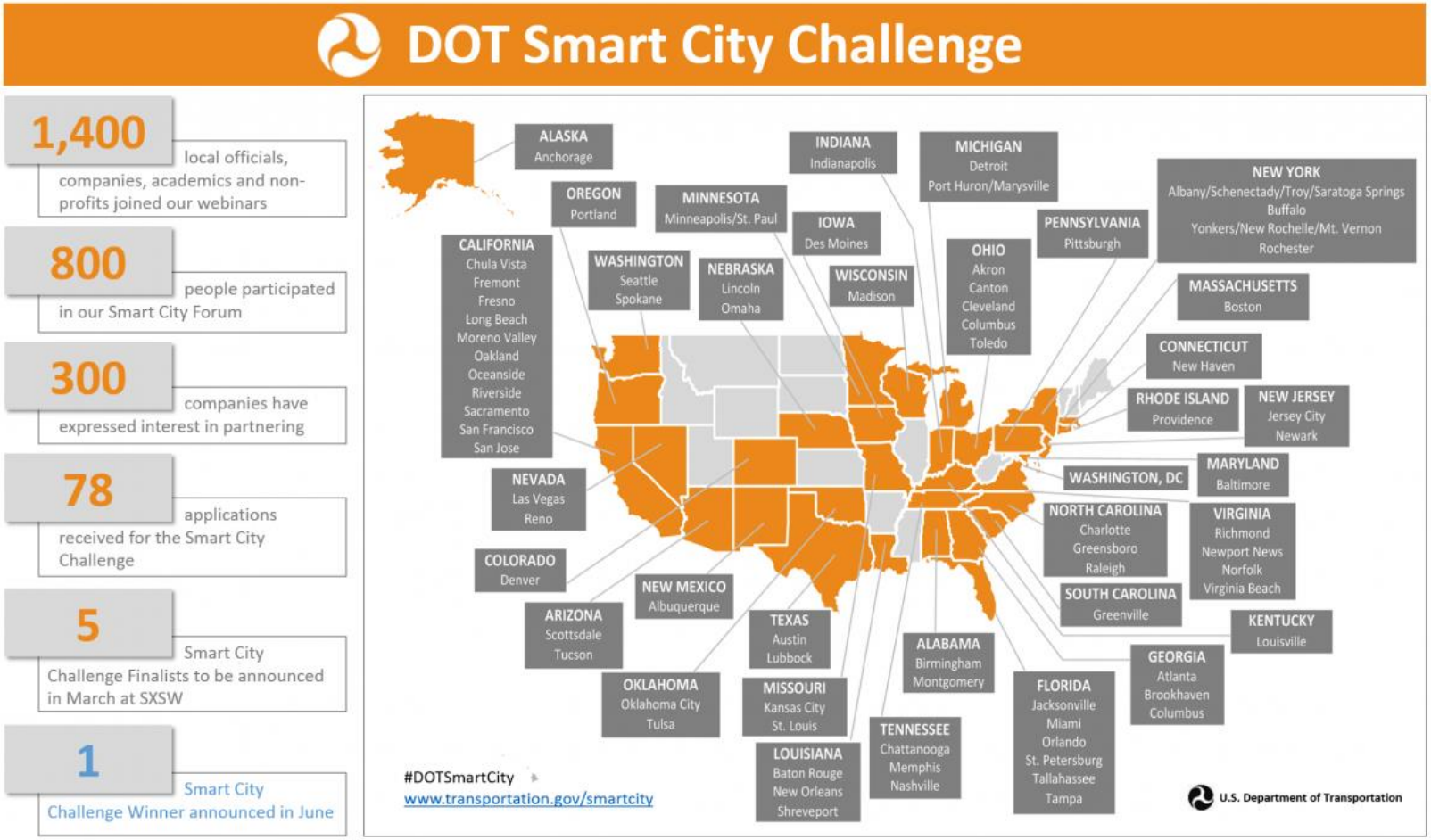
Proposal- Key Elements & Partnerships

USDOT Vision Elements	Baltimore Smart City Vision Elements	Goals Achieved	Risk	Key Partners*
1. Urban Automation	Electric and Automated Vehicle Sharing-Ride Sharing Automated and Dynamic Shuttle Services Automated Mag-Lev Personal Rapid Transit (PRT) Automation for Parking, Freight and Safety	S,M,G,E	◆◆◆◆	Ford, GM, Lyft, Bosch, Verizon, GE, Voyage Control, SkyTran, SidewalkLabs, U Michigan GOVonomy
2. Connected Vehicles	Next Generation Low-Cost V2X and V2I Technologies Connected Smart Signal and Traffic Management Outsourced Wider-Area Connected Vehicle Tech. CV-Enabled Mesh Network for Public Access to Internet	S,M,G,E,J	◆◆◆◆	U Maryland, U Michigan, Eberle Design, Econolite, Port of Baltimore, Veniam, Telogis, Cybergy, GOVonomy
3. Intelligent, Sensor-Based Infrastructure	Users, Vehicles and Cell Phones as Probe Sensors Smart Infrastructure Sensors and Virtual Sensors	S,M,E	◆◆	U Maryland, TomTom, INRIX, HERE, Ford, Telogis, Google/Waze,
4. Urban Analytics	B'Smart Urban Analytics Platform Performance Monitoring and Prediction	S,M,G	◆◆	U Maryland, Johns Hopkins U, Urban Insights, BU-BNIA
5. User-Focused Mobility Services and Choices	Ecosystem for Mobility-on-Demand (MOD) Services Incentive-Based Demand Management for Optimization Real-Time Traveler Information for All Vehicle/Bike/Ride Sharing Services with Job Creation	M,G,E,J	◆◆◆◆	Lyft, GM, Ford, Split, Transit Choices, Commuter Connections, CMTA, MDOT, MTA, Sidewalk Labs, AARP

Proposal- Key Elements & Partnerships

USDOT Vision Elements	Baltimore Smart City Vision Elements	Goals Achieved	Risk	Key Partners*
6. Urban Delivery and Logistics	Connected and Automated Port Crowd-Sourced Urban Delivery with Job Creation Dynamic Freight Trip Planning Service	S,M,G,E J	◆ ◆ ◆	Port of Baltimore, Roadie, Under Armour, Voyage Control, Veniam, Cybergy
7. Partnerships	Discussed separately in Section 5 of the proposal		◆	All
8. Smart Grid, Roadway Electrification and Electric Vehicles	Vehicle Electrification EV Infrastructure and Incentives Cleaner Energy Sources for Smart Grid	M,G,J	◆ ◆ ◆	GE, Ford, BG&E, BEVI, TimberRock, EnviroBro, NREL, Cybergy, MEA, MCEC, MDCC, MDE,
9. Connected, Involved Citizens	Rate Your Ride and Rate Baltimore Open Data Portal for Promoting Entrepreneurship	E,J	◆ ◆	CMTA, U. Maryland, Community Associations
10. Architecture and Standards	Bandwidth, Storage, Security, Privacy, etc.	S,M,G	◆	Cisco, Verizon, Bosch, GE, INRIX, U. Maryland
11. Low-Cost, Efficient, Secure and Resilient ICT	Low-Cost ICT in West Baltimore and more	S, M, E,J	◆	Cisco, Verizon, Bosch GOVnomy
12. Smart Land Use	Innovation Village Economic and Land Development in West Baltimore	M,G,E,J	◆	Sagamore Dev., Abell Found., Coppin State U

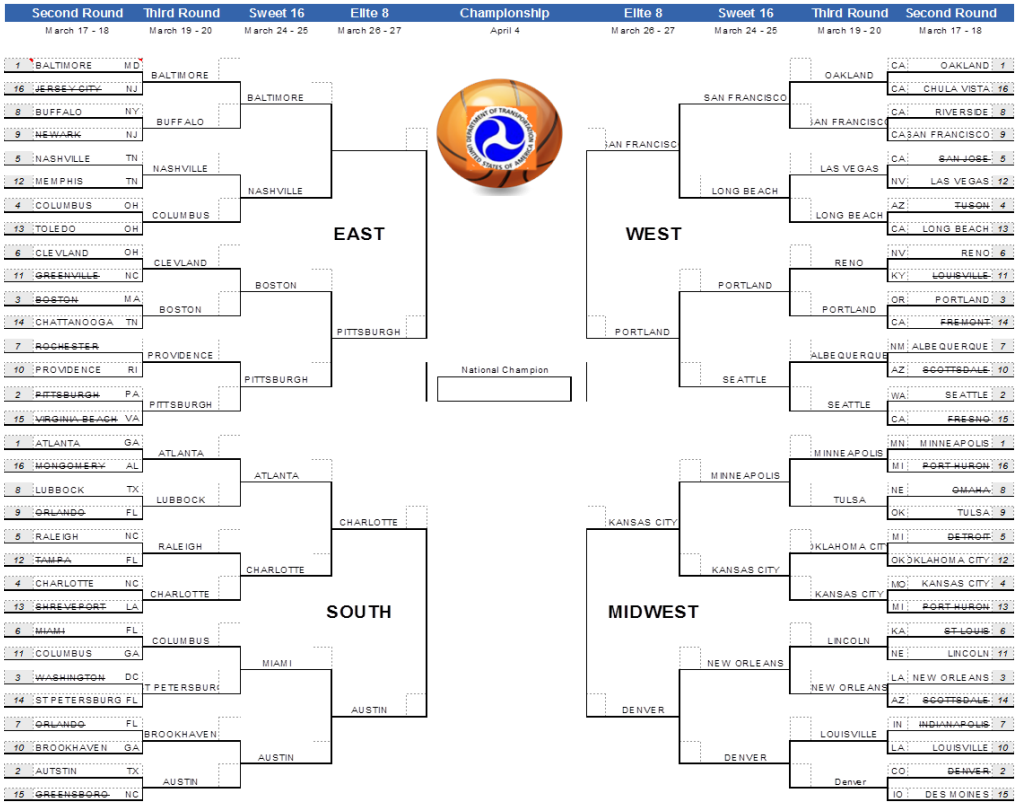
The Field of Applicants



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.

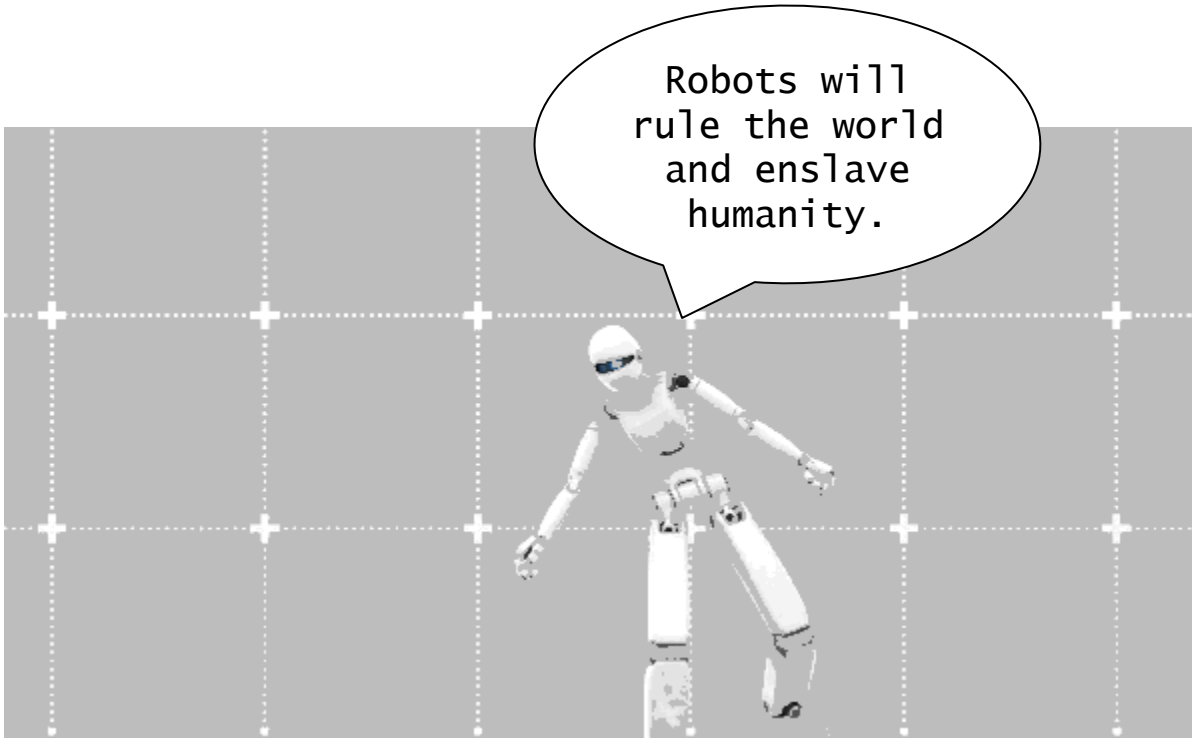
What's next?

- 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.

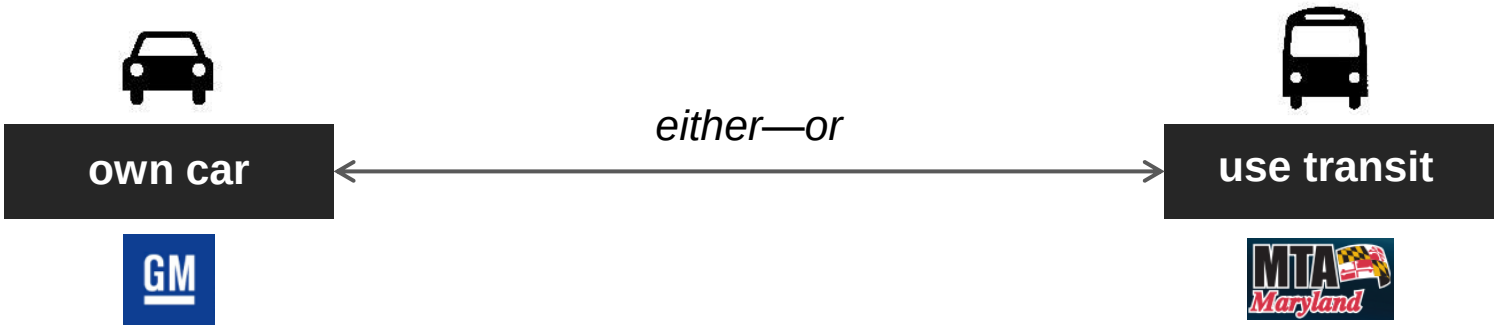
- Current thinking on the group includes interested members from the:
  - BRTB
  - Private industry and association representatives,
  - Not-for-Profit groups
  - Federal government, and
  - Academia

- 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?

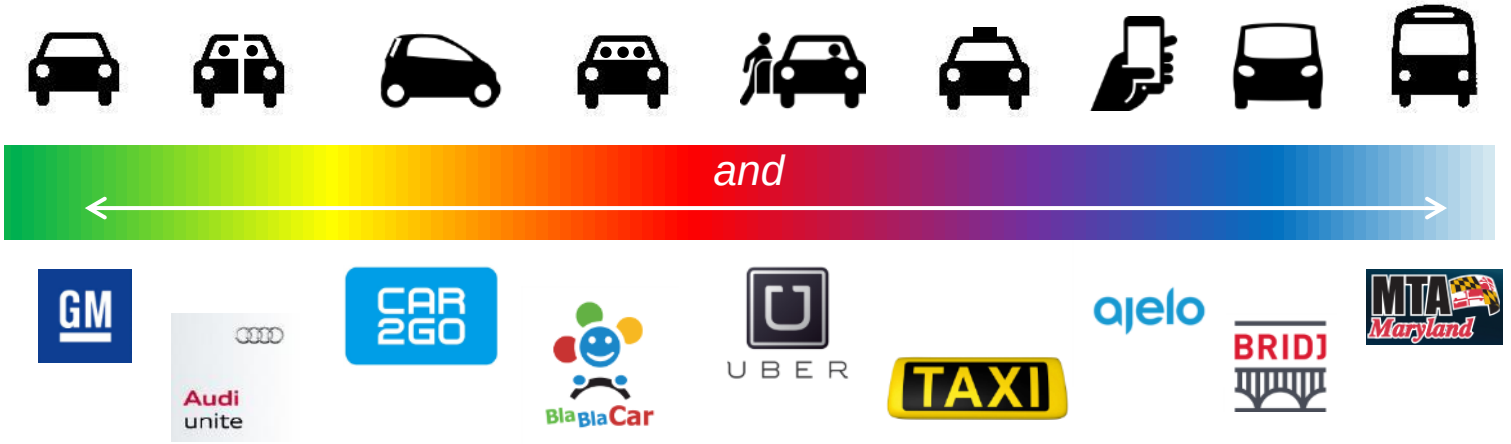


Sharing blurring boundaries of mobility silos:



The single-modal user

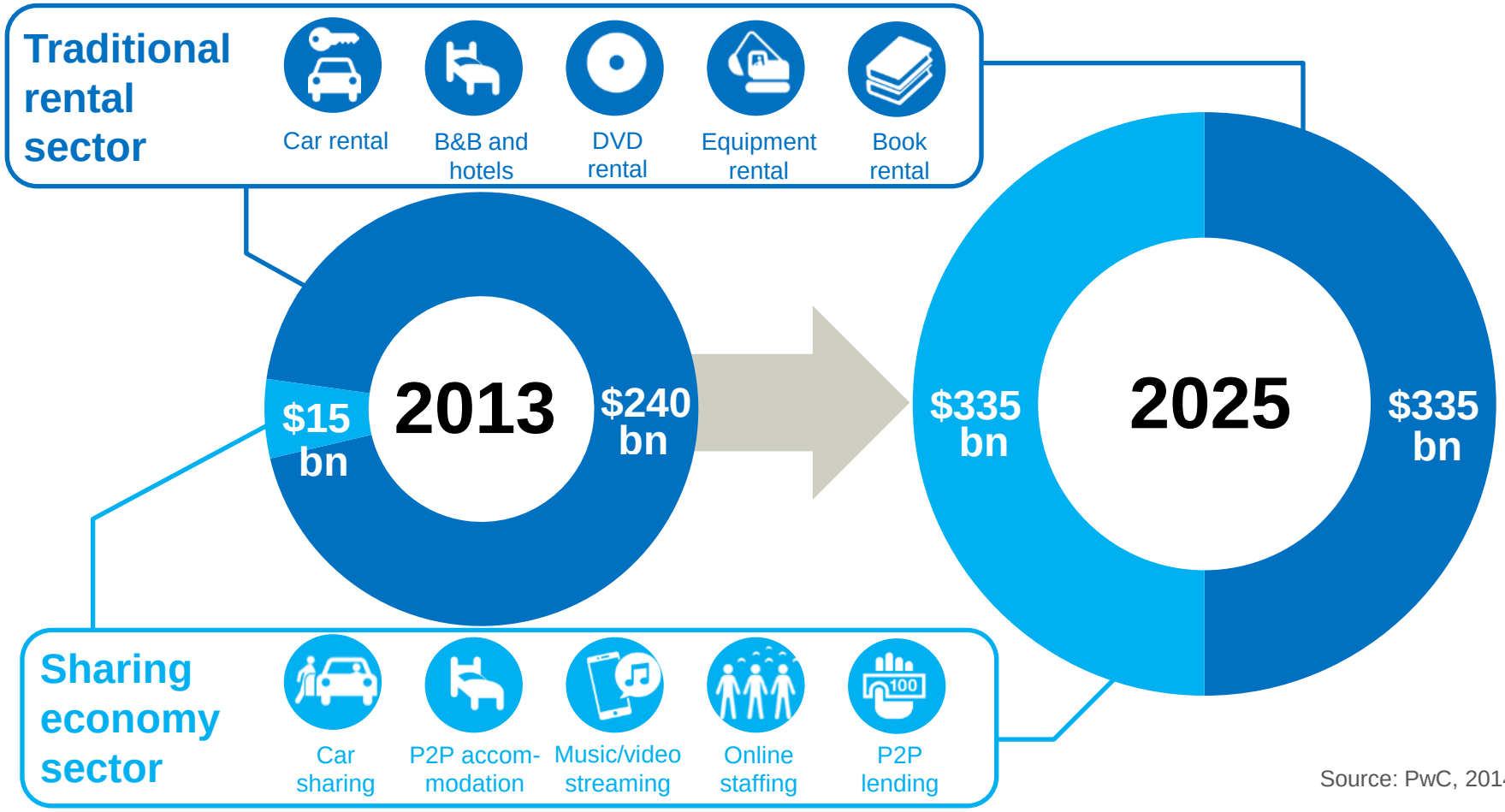
Baby Boomer / GenX



The inter-modal user

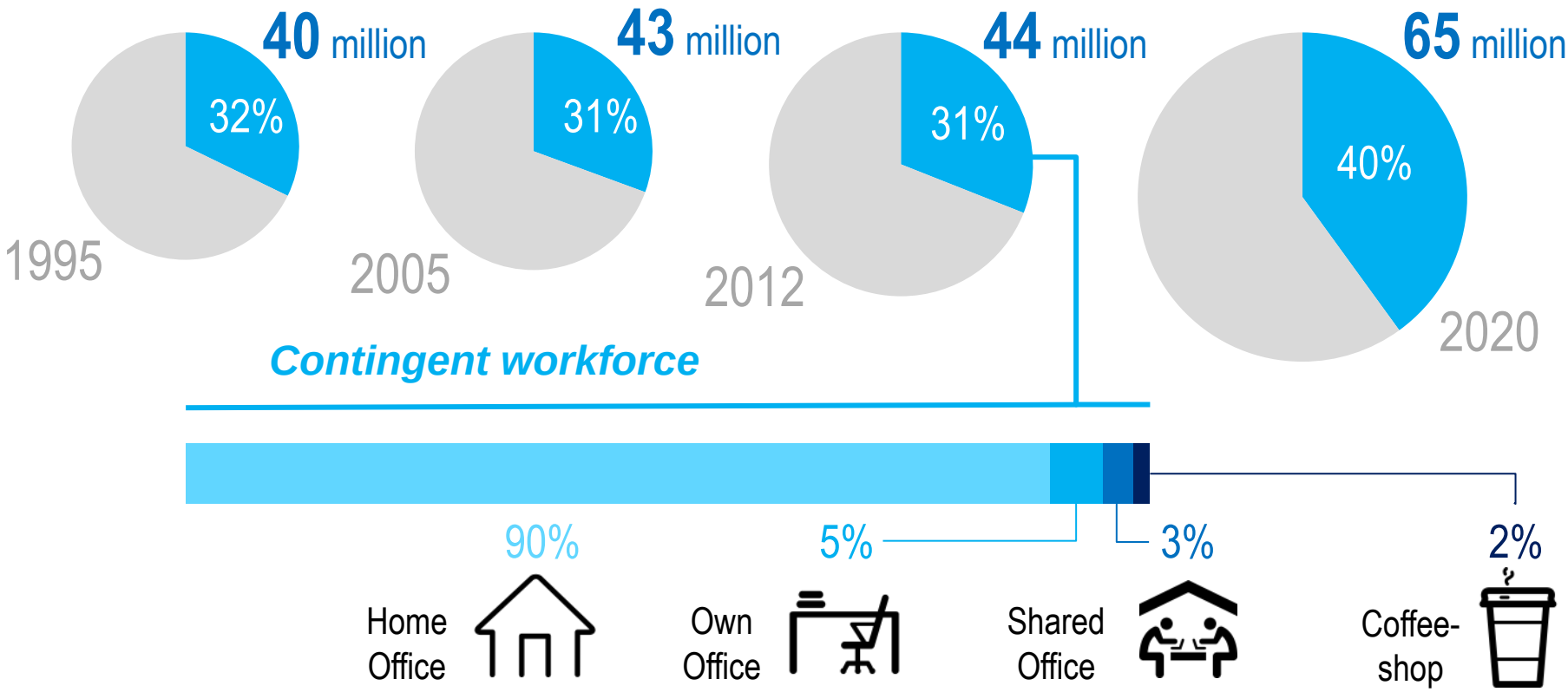
Gen Y / Gen Z

Consider:



Source: PwC, 2014

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



Source: http://blog.mavenlink.com/the-new-independent-workforce-2/ (2012)