

SMART CITIES, CONNECTED COMMUNITIES:

Using Technology to Meet the Needs of
West Baltimore Residents



October 2018

by **Willow Lung-Amam, Ariel Bierbaum, Sheri Parks, Lauren Stamm, Gail Sunderman, and Gerrit-Jan Knaap** in partnership with



ABOUT THIS REPORT

In 2017, a team of technical and social scientists from four Baltimore-area universities—the University of Maryland-College Park (UMD), the University of Baltimore, John Hopkins University, and Morgan State—smart city technology providers, local government leaders, and community-based organizations led by the National Center for Smart Growth Research and Education (NCSG) and the College of Information Studies (iSchool) at UMD were awarded a National Science Foundation (NSF) Smart and Connected Communities Planning Grant (SCC-1737495). With additional funding from Enterprise Community Partners, the project team sought to understand how investments in smart cities technology could improve the lives of residents in low-income neighborhoods. To address this question, the project team worked with neighborhoods in West Baltimore, Maryland, with the goal of creating a strategic plan for smart city investment that would meet the community’s needs.

The project team worked in three primary groups focused around issues of data access and use, community engagement, and technology strategies and innovations. A data guide that lays the foundation for a Smart Cities Data program, produced by the Center for Government Excellence (GovEx) at Johns Hopkins University can be found at https://govex.jhu.edu/wp-content/uploads/2018/05/SMARTCITIES_GUIDE_FINAL-1.pdf. This report presents the findings of the community engagement group.

ABOUT THE AUTHORS

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INTRODUCTION

Free public WiFi, autonomous vehicles, web-based curricula, personal health monitors and smart transit hubs have the potential to radically change how transportation, education, public health, and economic development are organized and delivered. In the past, however, the adoption of new technologies has often created what is known as the “digital divide” and exacerbated disparities in income and wealth across individuals and communities. The extent to which these and other smart cities technologies can increase access to opportunity, enhance social mobility, and mitigate the digital divide is an important yet underexplored question. As cities such as Baltimore, Maryland increasingly pursue smart cities investments, understanding the negative as well as positive impacts of these investments for low-income communities is critical to ensuring equitable development in metropolitan areas across the U.S. and the world.

Between the summer of 2017 and 2018, a team of technical and social scientists from four Baltimore-area universities, smart city technology providers, local government leaders, and community-based organizations led by UMD’s National Center for Smart Growth Research and Education (NCSG) worked together to begin to fill this important gap in knowledge about smart city interventions. The project asked how investments in smart city technologies can improve the lives of residents of low-income neighborhoods. To address this question, the project team worked with neighborhoods in West Baltimore, Maryland, with the goal of creating a strategic plan for smart city investment that would meet community needs.

As part of this project, the community engagement group, led by a team of UMD faculty, worked in partnership with



Figure 1. Neighborhood concerns expressed by participants in first-round focus group. Drawing by Lucinda Levine

scholars at Morgan State University, the City of Baltimore, and community-based organizations to engage West Baltimore residents about their needs, priorities, and concerns and to leverage their creative thinking toward smart city solutions. The team conducted focus groups and administered written surveys to residents to understand the following questions:

- 1 What are West Baltimore residents' top concerns and priorities for improving the neighborhood?**
- 2 How do West Baltimore residents currently access and use technology?**
- 3 What barriers and limitations do West Baltimore residents face in accessing technology?**
- 4 How do West Baltimore residents envision technology helping to improve the neighborhood, particularly in addressing their top concerns?**
- 5 Given that the City of Baltimore is already investing in smart city technologies, how can these investments be best leveraged to meet the needs of West Baltimore communities?**



Our findings suggest that residents of West Baltimore have a number of concerns about their neighborhood, but are most concerned with issues of job access and neighborhood safety. Many residents lack a home computer, and instead rely primarily on public computers at schools or libraries. Given the lack of home computers, many use their phones to complete tasks that are often considered to require a computer, such as applying for jobs and completing homework. They most often use their cell phones to access the internet, but many have intermittent, unreliable, or slow service.

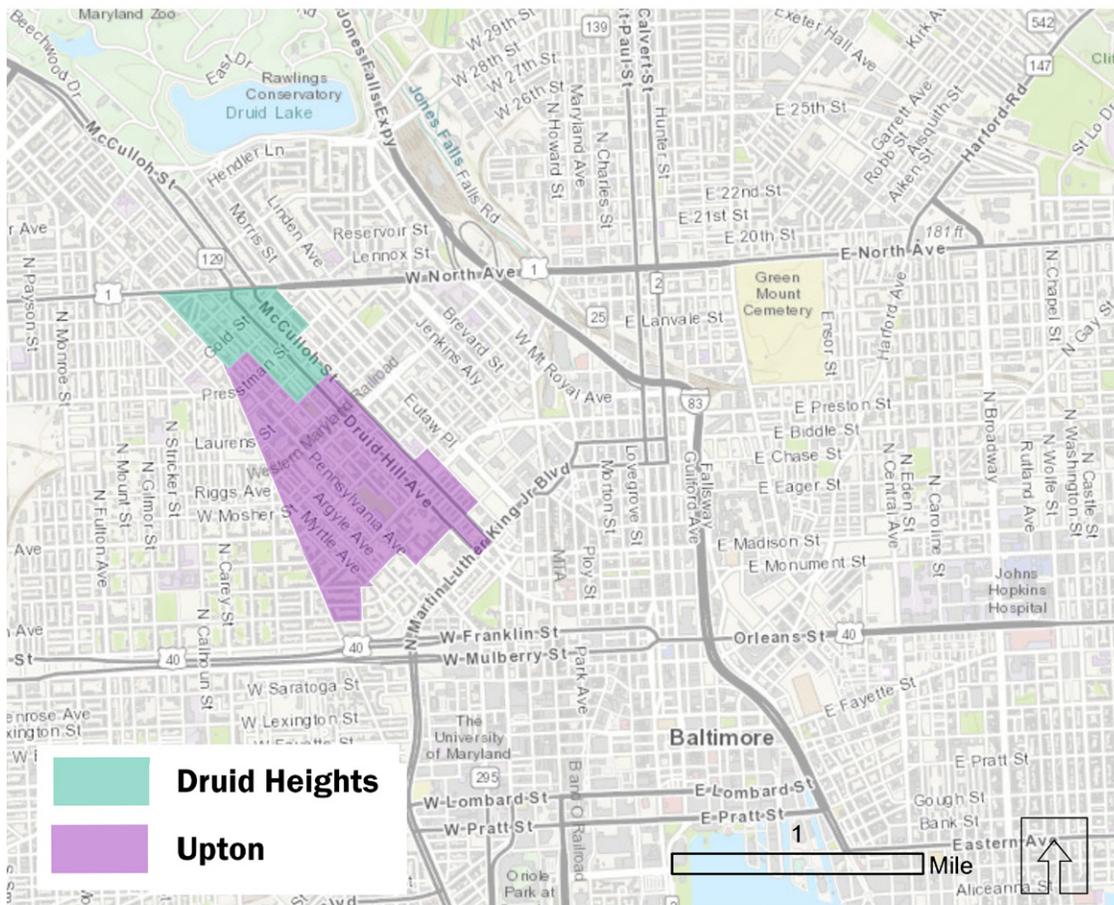
These opportunities and limitations suggest different pathways to addressing critical neighborhood concerns with smart city solutions. Solutions should focus not only on the technology itself, but also on training and educating residents, expanding access to data collected by technology, and improving the neighborhood's internet access. Smart city ideas currently being implemented or on the horizon in Baltimore have mixed reviews from residents. Successfully implementing these and any smart city plan, policy, or technology should rely on deep engagement that leverages the ingenuity and knowledge within low-income communities, builds trust, expands neighborhood equity, and meets the needs of diverse residents.



WEST BALTIMORE DEMOGRAPHICS

The West Baltimore study area (census tracts 1402, 1403, 1702, 1703—see Appendix I) includes neighborhoods served by the project’s community partners: the Mount Royal CDC, Upton Planning Committee, and Druid Heights CDC.

According to the 2016 American Community Survey, study area residents are predominately African-American (92%). Of those over the age of 25, just 15.4% have attained a bachelor’s degree or higher. More than half of the residents are at 149% of the federal poverty level or below. Though there is diversity within the study area, the vast majority of housing units are occupied by renters (81.5%). The neighborhood’s median income ranges from \$10,021 to \$16,193, and the unemployment rate is 15.6%, compared to 5.8% for the city as a whole.¹



¹Bureau of the Budget and Management Research. *Baltimore City Economic Indicator Report*. Baltimore, MD, 2017.

Table 1: Demographics of the West Baltimore Study Site by Census Tract

	Census Tract 1402	Census Tract 1403	Census Tract 1702	Census Tract 1703	Total Study Site
Total population	2,592	2,832	3,001	1,827	10,252
AGE					
Under 5 years	12.3%	5.7%	9.8%	6.4%	8.7%
5 to 17 years	32.6%	20.3%	18.7%	16.1%	22.2%
18 to 24 years	6.6%	13.7%	13.9%	14%	12%
25 to 44 years	26.1%	27.5%	20.9%	22.2%	24.3%
45 to 54 years	7.2%	12.4%	13.2%	12.9%	11.4%
55 to 64 years	10%	11.1%	11.1%	13.8%	11.3%
65 to 74 years	3.7%	5.8%	7.6%	10%	6.5%
75 years and over	1.5%	3.4%	4.8%	4.7%	3.6%
Median age (years)	22	33	29	38	
SEX					
Male	42.7%	49.9%	47.9%	40.8%	45.9%
Female	57.3%	50.1%	52.1%	59.2%	54.1%
RACE AND HISPANIC OR LATINO ORIGIN					
White alone, not Hispanic or Latino	3.2%	4.5%	6.6%	1.2%	4.2%
Black or African American alone, not Hispanic or Latino	94.8%	90.4%	89.1%	95.5%	92%
Asian alone, not Hispanic or Latino	0%	2.5%	1.9%	2.3%	1.7%
Hispanic or Latino origin (of any race)	0.80%	1.00%	0.20%	0.40%	1%
EDUCATIONAL ATTAINMENT					
Population 25 years and over	1,257	1,705	1,727	1,160	5,849
Less than high school graduate	31.3%	22.5%	29.7%	19.1%	25.8%
High school graduate (includes equivalency)	33.4%	36.4%	32.6%	27.3%	32.8%
Some college or associate's degree	22.3%	22.8%	25.8%	34.7%	25.9%
Bachelor's degree	11.1%	10.6%	5.8%	9.7%	9.1%
Graduate or professional degree	1.8%	7.8%	6.1%	9.1%	6.3%
Median income (dollars)	15,863	13,420	10,021	16,193	
POVERTY STATUS IN THE PAST 12 MONTHS					
Below 100% of the poverty level	56.6%	42.6%	52%	31%	46.8%
100 to 149% of the poverty level	12.5%	15%	15.2%	17%	14.9%
At or above 150% of the poverty level	30.9%	42.4%	32.8%	51%	38.3%
RENTER/OWNER OCCUPIED HOUSING UNITS					
Total households	900	1,031	1,318	761	4,010
Owner-occupied housing units	12.2%	26.2%	5.3%	38.5%	18.5%
Renter-occupied housing units	87.8%	73.8%	94.7%	61.5%	81.5%
UNEMPLOYMENT RATE					
Unemployment (Population 16 years and over)	10.5%	12.7%	19.9%	20.2%	15.6%

Source: 2016 American Community Survey

RESEARCH APPROACH

Between December 2017 and June 2018, the research team conducted ten focus groups and administered 116 written surveys to West Baltimore residents. This included two rounds of community focus groups. The first round of seven community conversations with diverse neighborhood residents identified their neighborhood concerns, technology access and barriers, and their ideas about how to address neighborhood concerns with technology. Written surveys were administered to focus group participants to gain a broader sense of these questions. The second round of focus groups were three community conversations focused on gathering feedback from residents about specific smart city investments, including those already underway or on the horizon in the City of Baltimore.

Dr. Parks facilitated the focus groups. Other UMD faculty and students facilitated small group discussions and/or aided in logistical planning. Staff at Upton Planning Committee, Mount Royal CDC, and Druid Heights CDC helped organize the focus groups, including outreach to participants and logistics at the different locations.

Most focus groups were held as large group discussions. However, based on the size of the group and participants' preferences, smaller break-out groups were sometimes conducted to discuss particular issues raised in the large group discussion.

FOCUS GROUPS (PHASE 1)

The first round of focus groups engaged residents in conversations about four main issues:

- 1 Concerns about their neighborhoods and priorities for neighborhood improvement**
- 2 Use and access to different forms of technology, including hardware (cell phones, computers) and the internet**
- 3 Barriers and limitations in accessing technology**
- 4 Ideas about how technology could be leveraged to improve the neighborhood, particularly in addressing their top concerns**



Focus groups were held at the following locations, each of which engaged different demographic groups in the neighborhood:

- **Furman Elementary School** is a charter school in West Baltimore. The focus group was held in December 2017. The participants included parents of students at the school and a neighborhood police officer. The session was structured as a group discussion.
- **McCulloh Homes** is a Baltimore public housing development. The focus group was held in December 2017. The majority of participants were senior and disabled residents who lived in the housing complex. The focus group was structured as a large group discussion.
- Founded in 1905, **Arch Social Club** is a neighborhood institution providing dance classes, concerts, and galas for club members, as well as their families, friends and guests. At the focus group, held in January 2018, all participants were adults over 35, many of whom were club members. Several non-club members were young professionals associated with Innovation Village, an initiative focused on attracting startup companies and tech-related employers to West Baltimore. The focus group was structured as a large group discussion, followed by smaller conversations organized around specific issues raised by the larger group.
- **Druid Heights CDC** is of important institution in the Druid Hill neighborhood that provides a range of community services and builds homes in the neighborhood. Two first-round focus groups were held at this location. The first was in January 2018 with teenagers and adults held in coordination with the CDC's monthly community meeting. It was structured as a large group discussion, followed by smaller conversations organized around specific issues raised by the larger group. The second focus group was in February 2018 with youth (ages 13-18) and a few parents.
- **Robert C. Marshall Recreation Center** is operated by the Baltimore City Department of Recreation and Parks. The focus group was held in February 2018 with youth (ages 14-18) who attend the center's afterschool programs and several adult parents and recreation center leaders.
- **Renaissance Academy High School** is located in West Baltimore but serves students throughout Baltimore through the city's school choice program. The focus group was held in February 2018 with the school's students (ages 16-18) and a few administrators and teachers.



SURVEY

Surveys asked about residents' demographics, neighborhood concerns and priorities, employment, and use and access to technology. Surveys were conducted at all of the first-round focus groups, except Robert C. Marshall. Two iterations of the survey were administered. The first was piloted with focus group participants at Furman Elementary, McCulloh Homes, Arch Social Club, and Druid Heights CDC, with a total of 82 adult respondents. After analyzing results from the first version, the survey was revised to clarify the questions and improve response rates. Many questions remained the same. The second survey iteration included separate versions for youths (under 18 years old) and adults. Participants at the second Druid Heights CDC focus group and Renaissance High School completed the new survey. A total of 34 residents filled out the revised survey, including 28 youths.

All first-round focus group participants who completed the survey were given a \$15 gift card to Save-A-Lot, a local grocery store. Table 2 shows the demographics of those first-round focus group participants who completed a survey. Appendix I compares the focus group demographics to the demographics of the West Baltimore study area.

FOCUS GROUPS (PHASE 2)

After completing a first round of focus groups and surveys, the community engagement team analyzed the results and worked with the technology team at Morgan State University and Baltimore City's Office of Information and Technology to explore smart city interventions that could address the residents' concerns.

The team and community-based partners then reached out to each of the original focus group community facilitators to schedule follow-up focus groups. The goal of second-round focus groups was to present findings from the first round, and seek residents' feedback on smart city investments underway or on the horizon in the City of Baltimore as well as other investments that could be useful in addressing their concerns.

The team conducted three second-round focus groups at the following locations:²

- In June 2018, 12 adults participated in a second-round focus group at **Arch Social Club**. Ten of the 12 participants were male.
- In June 2018, 15 participants, most of whom were youth (ages 13-16), along with three adults participated in a second-round focus group at **Robert C. Marshall Recreation Center**.
- In May 2018, 15 teenagers participated in a second-round focus group at **Renaissance Academy High School**.

² The other first-round focus group locations were contacted, but were not able to pull together a second-round focus group in the time permitted for this study.

Table 2: Demographics of First-Round Focus Group and Survey Participants ³

Focus Group Location	Furman Elementary	McCulloh Homes	Arch Social Club	Druid Heights 1	Druid Heights 2	Renaissance High School	Total
Number of surveys	3	38	18	23	17	17	116
AVERAGE MONTHLY HOUSEHOLD INCOME*							
	\$1,016	\$535	\$2,178	\$3,011	No responses	\$300	
GENDER							
Male	33%	55%	82%	35%	93%	93%	66%
Female	67%	45%	12%	65%	7%	7%	33%
AGE							
Under 13					14%	0%	2%
13 years					0%	0%	0%
14 years					21%	0%	3%
15 years					14%	0%	2%
16 years					7%	40%	7%
17 years					21%	33%	8%
18 years					7%	7%	2%
Under 18 years**	0%	0%	0%	13%	0%	0%	3%
18 to 24 years	0%	0%	0%	17%	7%	7%	5%
25 to 34 years	67%	0%	0%	0%	7%	13%	5%
35 to 44 years	33%	3%	11%	13%	0%	0%	6%
45 to 54 years	0%	36%	22%	4%	0%	0%	16%
55 to 64 years	0%	36%	44%	17%	0%	0%	22%
65 or older	0%	21%	6%	13%	0%	0%	10%
PRIMARY RACIAL/ETHNIC IDENTITY							
Black/African American	100%	97%	88%	91%	100%	85%	93%
White/Caucasian	0%	0%	6%	9%	0%	8%	4%
Hispanic/Latino	0%	3%	0%	0%	0%	0%	1%
Asian Pacific Islander	0%	0%	0%	0%	0%	0%	0%
Other	0%	0%	6%	0%	0%	8%	2%
HIGHEST LEVEL OF EDUCATION*							
Some high school			15%	25%	0%	0%	10%
High school or GED	67%	84%	54%	40%	50%	50%	58%
Associates degree	0%	0%	0%	10%	0%	0%	3%
College degree	0%	4%	23%	5%	50%	0%	9%
Some graduate school						75%	4%
Masters	0%	4%	8%	10%	0%	25%	7%
PhD, MD, JD	0%	0%	0%	10%	0%	0%	3%
Other	33%	8%	0%	0%	0%	0%	4%

Blank cell indicates that answer choice was not available on that version of the survey

* Only answered by adults, when youth were provided a separate version of the survey

** Category used for youth taking the initial version of the survey, which did not have a separate version for youth

³ Survey respondents were also asked what neighborhood they lived in. More than half of the respondents (58%) live within the West Baltimore study area. Almost a third (29%) live in other neighborhoods in Baltimore, most of whom reside north of the study area. Eight percent of respondents live within Baltimore County, beyond the city limits.

A total of 42 residents participated in the second-round focus groups. Participants were provided with \$15 gift cards to Save-A-Lot for their participation.

Second-round focus groups were all conducted as large group discussions. They began with a presentation of the results from the first-round groups, including residents' top concerns and priorities, and their ideas for engaging residents' ideas for leveraging technology to improve the neighborhood, given their existing technology access and barriers. The facilitator then presented smart city investments underway or on the horizon in the City of Baltimore as well as other technology ideas generated in discussions between the engagement team and Morgan State University.

The Baltimore City Office of Information and Technology and Morgan State University representatives were invited to attend all second-round focus groups to facilitate discussion about these technologies. Shonte Eldridge, Baltimore City Deputy Chief of Operations and Smart City Strategist, attended the focus group at Robert C. Marshall and responded to participants' concerns and questions. Also present at second-round focus groups were graphic artists, who depicted the community conversations as they occurred (see Figures 3-5). These illustrations were later given to the respective community groups that hosted the focus groups.



Figure 3. Key concerns and ideas from participants in the second-round focus group at Renaissance Academy. Drawing by Art Hondros

Safety and security, particularly violent crime. Participants of all ages raised concerns about crime and safety. Students discussed the frequency of school lockdowns and the need for better security in school. Adults discussed the need to conceal technology outside the home so that they would not be robbed and concerns about children being outside after dark. Seniors at McCulloh Homes were particularly concerned about the security of their building and the effectiveness of existing security cameras. In the second iteration of the survey, public safety was among participants' top neighborhood priorities, and nearly half (46%) of residents identified public safety among the top three services that they would most like to see improved.

Job opportunities. Access to jobs and job training was consistently identified as a priority across focus groups. Participants discussed the need for more job opportunities both inside and outside the neighborhood, and training to ensure that they had the skills to get the jobs, especially for those with a history of substance abuse or a criminal record.

Retail and other neighborhood investments. Participants were frustrated by having to leave the neighborhood to shop and by the lack of small businesses in the neighborhood. Of specific concern to participants at Arch Social Club was the lack of economic investment in the neighborhood, including few job opportunities and limited retail investment in the area, particularly compared to other parts of the city.

Quality, reliable transportation. Many participants frequently use public transportation, particularly buses, and were frustrated by what they perceive as the city's slow, unreliable, and indirect service in the neighborhood. Participants were confused and upset by new bus routes introduced in June 2017 that lengthened their commute times by adding additional transfers and wait times. Teens, in particular, were affected by a month-long subway closure that increased their commute times to school. Many also expressed frustration that public transportation routes did not get them where they needed to go efficiently, if at all.

Opportunities for youth outside of the home. Parents frequently discussed the lack of neighborhood childcare and afterschool options. Some noted the need for creative opportunities for youth, such as an arts center or maker-space. Youth were particularly concerned about the recent closures of recreation centers throughout the neighborhood and the limited number of afterschool activities available to them.

Healthy neighborhood food options. Participants described the limited variety of healthy food choices at neighborhood grocery stores, and the high cost of buying groceries at corner stores. Many leave the neighborhood to purchase groceries.

Community ownership and resources. Participants were frustrated by the lack of ownership they felt over their neighborhoods. They frequently noted that very few local businesses are owned by neighborhood residents. Participants also discussed the barriers to increasing ownership of homes and businesses by residents, including that many residents lack access to financial resources because of poor credit and limited income.

TECHNOLOGY USE, ACCESS, AND LIMITATIONS

Discussions about technology use, access, and limitations occurred largely in first-round focus groups, but also emerged in some second-round focus group discussions. The survey contained several questions regarding these issues. The following common themes and ideas emerged.

Computer access. Many homes do not have computers, and residents depend on publicly available spaces, such as schools or libraries, for computer access. About a fifth (21%) of survey respondents do not have regular access to a computer. Most respondents access the computer at the library (34%), at home (39%), and at school or work (36%). For comparison, the 2017 American Community Survey reported that 67% of Baltimore City residents have either a desktop or a laptop.⁴ Computers available at schools and libraries have significant limitations. They are only available during certain hours, and often have time limits and printing restrictions, which can make them less reliable for work or school needs. Seniors at McCulloh Homes also mentioned a need for more available places to charge phones, so their batteries will not die in case of an emergency.

Cell phone access and data. The majority of participants (91%) who completed the first-round survey have a cell phone. Among those, 67% have monthly plans that include talk, text, and data for internet. Of the respondents, 17% rely on a prepaid phone service.



Table 3: Cell phone plan first-round survey responses	
Type of phone plan	
Talk/text/data for internet	67%
Prepaid phone	17%
Talk/phone only	3%
Talk/text	6%
Not sure	7%

Cell phone use. Many residents use their phones to complete tasks often considered computer-necessary. Seniors at McCulloh Homes typically use their phones to pay bills and make calls to friends and family. Other adults use their

⁴ 2017 American Community Survey, 1 year estimates.

phones to search for and apply for jobs, or look for housing. Youth commonly use social media and do homework online on their phones.

Internet access and use. The majority of participants (62%) in the first-round survey use the internet “very frequently” and most often access the internet through their cell phones. They most often access the internet at home (76%), but a third of participants rely on the library for internet access. Many participants use the internet to search for information about a range of everyday issues, such as health care, politics, social services, and recipes.

Table 4: Internet use and access from first-round survey responses	
How often participants use the internet:	
Very frequently	62%
Occasionally	19%
Rarely	11%
Never	8%
Locations where participants access the internet:	
Home	76%
Library	33%
School/work	27%
<i>Note: participants were asked to check all answers that applied.</i>	
Participants most often access the internet with:	
Laptop	15%
Desktop	10%
Cell phone	60%
Tablet	2%

Internet affordability. Households that meet certain eligibility requirements (income, children in public schools, etc.) qualify for low-cost, limited monthly internet service from Comcast. However, participants expressed a need for more affordable internet options and more free WiFi hotspots throughout West Baltimore (see Table 6). Many participants, especially teens, know where they could access free internet, noting particular locations, such as the downtown area, in and around school buildings, and at malls. One resident noted that other residents sit on her stoop to access her WiFi network, which she called a common practice in the neighborhood. However, participants were also aware of the limits of free WiFi, including geography, use, time, and registration requirements. Many, especially teens, have developed resourceful ways to work around these limitations. For example, one teen creates new email addresses to use on a network that restricts time for each user.

Data speed and reliability. Many participants were frustrated with slow connections that make working remotely and doing other everyday activities on

the internet challenging. One in five participants in the survey’s second version agreed with the statement: “my internet is too slow” and 21% agreed that their internet connection drops frequently or is unreliable. Teens in particular discussed the need for faster, more reliable internet access.

Table 5: Data speed and reliability second-round survey responses	
My internet is too slow.	
Agree	20%
No opinion	17%
Disagree	63%
My connection drops or is unreliable.	
Agree	21%
No opinion	14%
Disagree	66%

Technology training and education. Many participants expressed the desire for more training and education about technology, particularly for seniors and formerly incarcerated residents who often lack basic computer skills. Participants noted that many residents have a limited understanding of the range of uses of technology, such as programs to improve computer literacy and other skills that can help residents find and apply for jobs and address other critical community needs. Parents noted particular challenges with finding educational content for their children. On the other hand, some students discussed an over-reliance on technology in the classroom and need for more instruction delivered by teachers, rather than via technological supplements, such as Apex and Kahoot.

Privacy and surveillance. As participants navigate free WiFi networks throughout the city, many were concerned about surveillance of their online activities. Some see data surveillance as a cost of using publicly accessible WiFi or the internet more broadly, while others were concerned with how their data was being monitored and used. Teens tended to be less concerned than adults about issues of data privacy, and instead were more concerned with restriction of their use in public spaces. They expressed concerns about hostility from businesses and harassment in other public places where they often go to access WiFi such as the local mall, which enforces a curfew for teens without parents.

Safety concerns. Participants, especially adults, expressed concerns about using technology outdoors or in public places. They feared that this would make them the target of crime, particularly in the many neighborhood areas that are not well lit. Participants expressed a need to conceal phones in public and concern that larger technological devices, such as tablets or computers, are difficult to conceal. Parents noted challenges with filtering internet content for their children to ensure appropriate use and content.



POTENTIAL SOLUTIONS

From focus groups and surveys, we identified several ideas about technology interventions that can meet key community needs and priorities in West Baltimore.

The construction and maintenance of technological interventions can provide jobs for neighborhood residents. Residents want to be producers or facilitators of technological interventions as well as users. Access to employment and job training programs are a top priority for participants. The construction and maintenance of new technology can involve residents. For example, installing fiber optic cable could be an opportunity to train and employ West Baltimore residents with vital technological skills. Regardless of what technology is introduced, residents made clear that the way new technology is implemented is incredibly important. One participant at Arch Social Club said, “...as a community and as a people we need to be able to decide for ourselves how we want to apply the technology and what we want to use it for. We’re not interested in it being used for further surveillance of us, or anything like that. We would like access to information, broadband technology, WiFi technology, so we can be able, as a community, have access to information.” Participants want to own, manage, and maintain new technology and use the construction of smart city infrastructure as a way to generate new jobs for West Baltimore residents.

Residents want access to the data collected in and about their neighborhood. Residents repeatedly mentioned the need for better access to data being collected about their neighborhood. When neighborhood data are shared with residents, they can better inform city officials and others about what is missing or can be improved. For instance, providing residents with greater access to crime data already collected by public cameras would facilitate better community-police relationships and help to develop more effective solutions to community safety, a top neighborhood priority.

Improve access to internet and online resources through expanded free WiFi hotspots. In each discussion, participants brainstormed a number of locations that could serve as free WiFi hotspots (Table 6). Overall, participants favored indoor locations, particularly given the safety concerns at outdoor locations. Many parents did not want to provide an incentive for kids to stay outdoors. However, some argued that outdoor locations would make WiFi more publicly accessible, and if public spaces were “secured,” they could be safe environments for using technology. Newly revitalized parks could benefit from WiFi hotspots or other technology resources as a way to draw residents out of their homes and activate neighborhood spaces.

Table 6: Potential hotspot locations identified by first-round focus group participants

	Furman Elementary	McCulloh Homes	Arch Social Club	Druid Heights 1	Robert C. Marshall	Druid Heights 2	Renaissance High School
INDOOR LOCATIONS							
Malls							●
Inside residences at McCulloh Homes		●					
Community centers	●						
Schools	●			●			
Libraries				●			
Druid Heights CDC				●			
Cyber café		●		●			
Restaurants							●
TRANSPORTATION							
Subway cars and stations		●		●			
Buses		●					
OUTDOOR LOCATIONS							
Peace Park, KaBOOM! Playground				●			
Gas stations				●			
Secure public spaces		●		●			
Entire downtown							●



Improve neighborhood safety through improved access to technology tools, data, and internet. Public safety is a top concern for many residents. Participants suggested that technology be leveraged as a tool to help residents track public safety in the neighborhood. Participants want better access to data collected about neighborhood crime (e.g., from existing police or private surveillance cameras) and more opportunities to document and track conditions and incidents themselves. Given that recent recreation center closures have limited opportunities for positive youth activities, participants saw their reopening, coupled with technology resources, as a strategy for providing needed access to computers, the internet, and training on computer and technology-related jobs and software.

Improve access to employment and other resources through mobile applications. Access to jobs and job training was a top priority for participants. Given that most residents rely primarily on their cell phones, participants suggested creating a mobile application and database to provide information about job opportunities in and around West Baltimore. Other participants discussed the possibility of using mobile applications as a kind of neighborhood listserv to share information and resources with their neighbors, including employment opportunities. To combat the lack of grocery store and healthy food options in West Baltimore, one participant suggested the need for a delivery service app to facilitate the delivery of groceries from different neighborhoods around the city.

BALTIMORE'S SMART CITY TOOLKIT

Throughout the two rounds of the focus groups, but particularly in the second-round groups, participants discussed smart city technologies currently underway or on the horizon in Baltimore and other cities around the nation. Participants offered varied opinions about their utility in meeting the needs of West Baltimore residents.

Smart Trash Cans. West Baltimore does not currently have trash cans on the street, so participants viewed Smart Trash Cans as an improvement and opportunity to clean up their neighborhood. However, participants raised concerns about the cost of the investment and the retention of sanitation jobs once the technology is implemented throughout the city.

Smart Street and Traffic Lights. Participants were concerned with how smart street lights would work and be maintained by the city. They pointed out that the city has not maintained the existing infrastructure in the neighborhood. At Robert C. Marshall, participants were particularly concerned with whether smart traffic lights would give preference to certain kinds of vehicles, such as emergency vehicles.



Blue light cameras. Differing opinions were expressed about the current use of technology tools used to address public safety in the neighborhood. Some suggested that “blue light cameras” were useful because of the frequency of crime in the neighborhood, while others expressed both serious doubts about their effectiveness and concerns about neighborhood surveillance. Participants pointed out that data collected from cameras were not always used to effectively solve neighborhood crime, and many expressed concerns about the types of data being collected and their limited access to those data.

ShotSpotter. Participants often discussed the use of ShotSpotter as another form of surveillance. Participants were also concerned with issues of neighborhood or racial profiling. One participant said that after being alerted of gunshots through the device, police may come to the neighborhood where the incident took place, and consider all area residents as a potential culprit. Some participants felt that such technology was not needed, as people already call the police when shots are fired. They viewed ShotSpotter technology as something that would decrease resident involvement in their community as they came to rely on the technology rather than residents to monitor their neighborhood.

Driverless buses. When posed with the concept of driverless buses (i.e. autonomous vehicles), many participants seemed uncomfortable with the idea. Several stated that they did not trust a bus without a driver, and that like all technology, believed that the bus could be hacked. Additionally, the function of a bus driver is not only to operate the bus, but also to ensure the safety and security of passengers by maintaining a sense of order and civility among passengers.

Free WiFi. The provision of publicly available free internet throughout West Baltimore was widely perceived by participants as having a positive impact on the neighborhood. Among the range of benefits that participants pointed to included better access to transit information, easier access to the resources students need to complete their homework, and better access to information about jobs and employment services.



As Baltimore and many other cities around the U.S. and the world pursue smart cities investments, the findings of this report point to ways these investments can help close, rather than exacerbate, extant opportunity gaps for low-income neighborhoods. It underscores the value of engaging residents so that investments meet residents' needs and priorities. Planning for smart city technologies with communities builds trust and rapport with technology providers, city agencies and officials, and ensures that investments work for communities, not just in them.

This study showed that West Baltimore residents were most concerned with issues of neighborhood safety and job access. However, adopting technologies, such as blue light cameras or ShotSpotter, to address issues of crime without first creating transparency and taking into account residents' concerns can lead to an increase in distrust between police and the communities they serve. Residents expressed clear interests in having access to the data collected about their community as well as concern about barriers that make such access difficult, such as a lack of home computers and unreliable internet access. They also offered solutions to overcoming these barriers that showed a sophisticated knowledge of technology and resourcefulness and creativity in maximizing the limited technology they have access to. As cities invest in new technologies, they must also invest in uncovering the human asset potential inherent within low-income communities.

More broadly, our engagement pointed to the following values that should serve as the basis of any smart city planning strategy in West Baltimore:

Repair and build trust through community engagement. Participants repeatedly mentioned a lack of trust between themselves and civic institutions, including university researchers, city government and police, and some community-based organizations. For residents to feel they are included and respected in the process, close attention must be paid to ensuring that their feedback is sought and adhered to at all points in the process. Participants suggested that outreach efforts seek to personally engage with community members, that experts take a backseat to existing community leaders, and that city officials build reciprocal relationships, in which community members and smart city planners and providers learn from each other.

Counter negative stereotypes with an assets-based orientation.

Participants expressed concerns about the negative ways that media and others outside their neighborhood portray the West Baltimore community. Taking an asset-based orientation to neighborhood technology investments highlights the existing strengths and resources in the community. These strengths can be



leveraged in a design process or intervention. Any interventions or strategies should not reinforce negative stereotypes of the neighborhood or residents.

Facilitate equity, access, and choice. Participants repeatedly noted the inequalities between their neighborhoods and others throughout the city and the region. On a number of different issues—from food and retail services to internet infrastructure and transportation—residents felt that they do not have equal access to basic services and amenities as higher-income neighborhoods. Many said they felt stranded in their neighborhood with limited resources and unreliable transportation. Many also felt that residents had little control over the few resources that were within the community and expressed an interest in more ownership and control of new neighborhood technology. Interventions should seek to address inequalities between West Baltimore and other neighborhoods and empower residents with greater choice and access to opportunities currently not available in the neighborhood.

West Baltimore residents are diverse. Our focus groups included diverse participants, including teenagers, young adults, adults with and without children, and senior citizens. They came from a range of socioeconomic and educational backgrounds. While there were many commonalities, each group voiced specific concerns that are important to consider in designing future smart cities implementations. When possible, technologies should be designed to meet common needs across groups, but attention should be paid to the limitations or opportunities that interventions provide for specific groups, especially for the most vulnerable groups.

West Baltimore is a community that has an incredible amount of talent, capabilities, and ideas for neighborhood improvement. Like many low-income communities of color, it also has challenges that emerge from decades of underdevelopment. The key to a successful smart city strategy relies on effective engagement that seeks to not only inform residents about new technologies and city plans, but also understands how these platforms can be used to meet critical community concerns. In so doing, cities need not rely solely on their own expertise, but should seek out the talents and creative solutions inherent within communities.



APPENDICES

Appendix I. Focus Group Demographics vs. Study Area Demographics		
Category	Census data for selected tracts (ACS 2016)	Survey responses
Total population	10,252	116
AGE		
Under 5 years	9%	0%
5 to 17 years	22%	25%
18 to 24 years	12%	7%
25 to 44 years	24%	11%
45 to 54 years	11%	16%
55 to 64 years	11%	22%
65 or older	10%	10%
SEX		
Male	46%	66%
Female	54%	33%
RACE AND HISPANIC OR LATINO ORIGIN		
White alone, not Hispanic or Latino	4%	4%
Black or African American alone, not Hispanic or Latino	92%	93%
Asian alone, not Hispanic or Latino	2%	0%
Hispanic or Latino origin (of any race)	1%	1%
EDUCATIONAL ATTAINMENT		
Less than high school graduate	26%	10%
High school graduate (includes equivalency)	33%	58%
Some college or associate's degree	26%	3%
Bachelor's degree	9%	9%
Graduate or professional degree	6%	10%

Appendix II. Neighborhood Challenges and Priorities		The following table represents neighborhood challenges and priorities as identified by the first- and second-round focus group participants									
		FIRST ROUND						SECOND ROUND			
Focus Group		Furman Elementary	McCulloh Homes	Arch Social Club	Druid Heights 1	Robert C. Marshall	Druid Heights 2	Renaissance High School	Renaissance High School	Arch Social Club	Robert C. Marshall
Demographic		Parents	Seniors	Adults	Adults, Teens	Youth	Youth	Teens	Youth	Adults	Teens
Limited access to healthy food				•	•						
Limited array of options available at grocery stores					•						
Bodegas and corner stores sell food at higher prices				•							
Lack of retail and other investment in neighborhood				•	•					•	
Very few small businesses, retail options, and coffee shops				•	•						
Lack of investment										•	
Lack of community ownership and financial resources				•	•			•			
Many do not have credit				•							
Technology education				•							
Need for computer literacy among elderly population, youth and formerly incarcerated				•							
Too much reliance on technology for educational purposes in school							•				
Few opportunities for youth outside of the home		•			•					•	
Not enough afterschool programs, especially with evening or weekend hours					•						
Lack of childcare		•									
Recent closure of recreation centers (ex. Shake and Bake Center)					•						
Need for art/maker space										•	
Lack of job opportunities				•					•	•	
Especially for those with history of substance abuse or criminal record				•					•	•	
Need for job access and training				•						•	
Safety and security concerns, particularly violent crime		•	•	•		•		•		•	
Within McCulloh Homes building			•								
Using technology outside of homes, fear of robbery/crime		•				•					
Penn-North library is in a dangerous area, concern for parents/kids		•									
Effectiveness of existing security cameras (get cut off, bad lighting, tape recorded over)			•							•	
Frequent school lockdowns								•			
Access to quality, reliable transportation		•		•		•	•	•		•	
Cancellation of Red Line				•						•	
Confusion about new bus routes (CityLink)				•		•		•			
Not reliable		•		•							
Not going to the places needed				•							
Too slow							•				
Closure of subway						•		•			
Homelessness				•							
Access to technology						•	•	•	•	•	•
Need for faster internet connection							•				
Cost of internet								•			
Need for more access to internet						•		•	•	•	•
Negative portrayal in the media				•						•	
Lack of trust in city						•			•	•	•
Between public housing staff and residents						•					
Between community and police										•	
In city, to maintain infrastructure										•	
In technology											•