TransAtlantic Council on Migration

A Project of the ***Migration Policy Institute***

Smart Inclusive Cities:

How New Apps, Big Data, and Collaborative Technologies Are Transforming Immigrant Integration

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Table of Contents

Executive Summary

Smartphones—mobile phones that provide Internet access and connect users to applications (apps) that use the location of the phone to filter information—are most commonly thought of as a tool for convenience. But their potential to address social problems such as disaster response, public health, and public safety is attracting widespread attention. The corresponding opportunities for immigrant integration have not, thus far, been rigorously assessed. In theory, smartphones may offer an effective platform to engage hard-to-reach populations, since disadvantaged groups often use them to access the Internet instead of personal computers, and recent arrivals and temporary residents frequently use cellphones to keep in touch with family members at home.

Creative uses of smartphones to engage immigrant populations have mainly emerged at city levels. Cities in North America and Europe have introduced apps that: improve service access and delivery for disadvantaged and diverse populations, provide information and training to guide new arrivals, and strengthen local civic and political participation.

Creative uses of smartphones to engage immigrant populations have mainly emerged at city levels.

- ***Smarter city services.*** In several cities (e.g. New York and Chicago), one-stop apps provide a means for residents to access all city services through a single portal, reducing barriers for residents with limited English proficiency, those who prefer to avoid interaction with city officials, and those who lack institutional knowledge about which agency to contact. Since these apps often allow residents to send detailed location information with just one click, they also reduce the red tape involved in reporting neighborhood concerns. But they may create other problems, particularly as some cities move to a model where many services are accessed through one smartcard or phone app, which could cut off populations that lack the appropriate documentation. And the data they generate may empower those who can afford to make choices about where to settle or access services—not those most in need of assistance.
- ***Tailored apps for new arrivals.*** Smartphones provide a significant additional advantage over existing technology: on-the-go learning. Immigrants can exploit otherwise unused time for training (for instance while travelling to work), download translation apps to facilitate day-to-day (or even urgent) interactions, and access increasingly sophisticated, personalized language-learning tools that provide tailored instruction in specific sectors or occupations. Meanwhile, apps have been developed to provide information on immigrant rights and to help train for citizenship tests. And educational online games and apps have been used to train people to navigate the local housing market and deal with landlords. The effectiveness of these tools depends on both access to a smartphone and a considerable level of digital literacy.
- ***Apps for civic engagement.*** Though not targeting immigrant populations specifically, many civic apps have been developed to help people volunteer, register to vote, reschedule jury service, participate in online forums, or give feedback on planning processes. By reducing the investments for participation and community engagement, these apps may help engage hard-to-reach communities, especially immigrants who are historically less likely to participate in city institutions. To be effective in penetrating under-represented communities, such programs need to be complemented by efforts to promote these tools to residents. Yet even if apps do begin to transform local citizenship, their capacity to bridge social divides remains unclear. Apps are no replacement for face-to-face interaction between social groups, essential for facilitating

integration and acclimatizing city residents to social change, and may ultimately encourage superficial forms of civic and political participation—"touchscreen citizenship."

Smartphone apps are just one of many tools to reach disadvantaged groups, and their potential to address social problems should not be overstated.

But new technologies could also have negative implications for diverse and disadvantaged populations. Smartphones are a central pillar of "smart cities"—the tendency of city services, buildings, transportation, and infrastructure to be connected to networks that, in turn, (alongside smartphones) generate huge datasets. As urban policymakers increasingly use these data to make decisions, residents who leave less of a data trail may be under-represented in the running and planning of future cities. A further risk is that new technologies (such as smartcards to access certain city services) might impose a barrier for those without documentation or with limited digital literacy.

Smartphone apps are just one of many tools to reach disadvantaged groups, and their potential to address social problems should not be overstated. Yet since immigrant integration requires a multipronged policy response, any additional tools—especially those that are low cost—should be explored. Promising ways forward for cities include encouraging civic hackers (developers who use data to create social and civic apps) to address immigrant integration needs, encouraging young people to develop programming skills through game development or intensive coding schools, and creating a one-stop app for new arrivals that consolidates information about services and host-country language training. If city leaders wish to "mainstream" immigrant integration into tech policy, they could consider how language barriers can be addressed through mobile services and websites, publicize city apps in immigrant neighborhoods, and develop safeguards to ensure that new technologies protect the vulnerable.

I. Introduction

The spread of smartphones—cellphones with high-speed Internet access and geolocation technology—is transforming urban life. While many smartphone apps are largely about convenience,[1] such as apps that tell people when the next bus is coming or identify vacant sparking spaces, policymakers are beginning to explore their potential to address social challenges from disaster response to public health.[2] Together with the increasingly networked nature of cars, mass transit, appliances, and infrastructure (increasingly referred to as the Internet of things), smart technologies are generating huge amounts of data, improving municipal decision-making, and changing the relationship between residents and city institutions.

These developments offer promising opportunities for immigrant integration. For disadvantaged and diverse populations, accessing city services through a cellphone can help overcome language or literacy barriers and thus increase interactions with city officials. For those with language needs, smartphones allow language training to be accessed anywhere and at any time—including during "dead time" such as a long commute to work—while tools such as Google Translate may facilitate everyday interactions or offer help

1 Beecham Research, *Smart Parking: Towards Building Smarter Cities* (Cambridge, UK: Beecham Research, 2014), www.beecham-research.com/files/BRL%20Smart%20Parking%20Report%20TOC%20&%20Summary.pdf.

2 See e.g. John Villasenor, "Looking for the Next Big Thing in Smartphones? Think Digital Inclusion in Developing Countries," *Forbes,* October 8, 2013, www.brookings.edu/research/articles/2013/10/08-next-big-thing-smartphones-digital-inclusion-developing-countries-villasenor.

during an emergency. More broadly, cities have begun mining the rich datasets that smartphones collect, to help attune services to the needs of their whole population. And a new crop of social and civic apps to bolster political and civic participation—from volunteering to feedback on planning processes—offer new tools to penetrate hard-to-reach populations, including newly arrived and transient groups.

Unlike previous technology waves—such as the rise of traditional mobile phones and e-government (the move to make services available online)—smartphones offer one particular advantage for reaching diverse and disadvantaged populations: ubiquity. Smartphone use is rising exponentially, especially among young people.[3] Mobile devices worldwide reached 7 billion by 2013, with smartphones accounting for 77 percent of the growth from the previous year. In North America, two-thirds of mobile devices are "smart," and by 2018, this figure is estimated to reach 93 percent (for Western Europe, the figures are 45 percent for 2013 and 83 percent for 2018.[4]

Since only one smartphone or tablet is needed to provide Internet access for a household (and these devices are cheaper than computers) smartphones may bring the Internet to families who would not otherwise have access to it. Some studies suggest that disadvantaged groups and minorities often leapfrog straight to smartphones rather than using personal computers to access the Internet, and are more likely to use the smartphone as their sole Internet device, suggesting that usage might be higher among immigrants too.[5] Smartphones also provide a different *kind* of access. Unlike websites, apps enable city residents to report problems from potholes to petty crime through the click of a button that automatically sends location information, thus eliminating some of the time and hassle of civic engagement.

Smartphones offer one particular advantage for reaching diverse and disadvantaged populations: ubiquity.

But these opportunities come with risks. Since smartphones can be expensive and require a certain level of digital literacy, some commenters think their use could widen the "digital divide" and exacerbate inequalities and social fissures.[6] By the same token, big data could empower those who can afford to avoid problem neighborhoods or be used to funnel city resources to places with the most outspoken or technologically rich residents.[7] While we are accustomed to lively debates about technology and privacy, these costs are more likely to fall on disadvantaged groups, especially unauthorized immigrants. For instance, as city services become linked with one another (as is happening in some localities through smart

3 Smartphone usage is much higher (83 percent) among 18-29 year olds than other groups (58 percent average). Pew Research Internet Project, "Cell Phone and Smartphone Ownership Demographics," www.pewinternet.org/data-trend/mobile/cell-phone-and-smartphone-ownership-demographics/.

4 Cisco, "Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2013-2018" (white paper, Cisco, February 2014), www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white_paper_c11-520862.html.

5 In the United States, minorities are more likely than white respondents to own a smartphone (62 percent of Hispanics and 59 percent of Blacks, compared to 53 percent of non-Hispanic whites). Among teens, 33 percent of those with Black parents accessed the Internet mostly on cellphones compared to 24 percent of those with white parents and 21 percent of those with Hispanic parents. See Pew Research Internet Project, "Cell Phone and Smartphone Ownership Demographics." Another report found that both lower socioeconomic groups and minorities are more likely to solely use smartphones for accessing the Internet. U.S. Department of Commerce, *Exploring the Digital Nation: America's Emerging Online Experience* (Washington, DC: U.S. Department of Commerce, 2013), www.ntia.doc.gov/files/ntia/publications/exploring_the_digital_nation_-_americas_emerging_online_experience.pdf.

6 For several versions of this complaint in the words of a number of technology experts, see Pew Research Center, *The Internet of Things Will Thrive by 2025* (Washington, DC: Pew Research Center, 2014), www.pewinternet.org/files/2014/05/PIP_Internet-of-things_0514142.pdf.

7 For example, Anthony Townsend warns of the dangers of "being left off the data map" and the potential for unequal services if cities allocate resources to places that report the most problems. See Anthony M. Townsend, *Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia* (New York: Norton and Co., 2013).

cards or smartphone apps), those who lack the appropriate documentation or who fear generating a data trail may find themselves cut off.

This report provides a first look at the opportunities and tradeoffs that smartphones and emerging technologies offer for immigrant integration, and how they might deepen—or weaken—city residents' sense of belonging. It first analyzes some promising practices—both city- and civil society-led—that have ramifications for immigrant integration, in the areas of opening up public services, personalizing training and services to the needs of new arrivals, and stimulating civic participation and social cohesion. Then it discusses some of the challenges and tradeoffs that policymakers need to attend to as smart cities evolve. Finally, it sets out some recommendations for policymakers.

II. "Smart" Approaches to Immigrant Integration

The opportunities that smartphones provide for immigrant integration fall into three main categories: reducing barriers to accessing services, improving information for newly arrived residents, and encouraging civic engagement. Not all of these practices affect immigrants alone, some are of importance to diverse and disadvantaged communities in general, and some to the population as a whole.

A. Improving Access to Services

1. Apps for Collaborative Services

Mobile apps are becoming a new frontline for city services. Smartphone apps can centralize the point of contact for city residents, reduce pressures on emergency call centers, and encourage collaboration in services and thus promote better decision-making. This centralization may be of particular importance for those, such as immigrants or disadvantaged groups, who lack institutional knowledge of city services and agencies, while the medium of an app (in contrast to a telephone hotline) could appeal to those with limited host-country language proficiency or who prefer not to interact directly with city officials. Apps fall into three main categories (although there is some overlap):

- ***One-stop apps.*** Some cities provide access to all city services through one portal, such as the 311 service available in a number of U.S. cities, including Chicago, New York, and Washington. Smaller cities are beginning to follow suit. For example, the city of Tempe, Arizona consolidated 200 city phone numbers into its 311 service.[8] While the 311 service predates smartphones, many cities also package hotline services into a smartphone app.
- ***On-the-ground reporting.*** Apps like EveryBlock in Chicago and CitySourced in several UK cities enable city residents to report problems from potholes and broken streetlights to petty crime with the tap of a finger. Since such apps use GPS to report the location of problems, they reduce the need of filling in location details, benefiting users and reducing bureaucracy. Some apps allow citizens to trace how the problems they report are solved, with important implications for transparency.[9]

8 Justine Brown, "Cities Aim to Slash 311 Costs Without Affecting Services," *Government Technology,* May 31, 2012, www.govtech.com/budget-finance/Cities-Aim-to-Slash-311-Phone-Bills-Without-Affecting-311-Services.html.

9 In Santander, Spain, the app to report city problems *El Pulso de la Ciudad* allows citizens to trace how incidents they report are ultimately dealt with and solved. Nick Michell, "New App Allows Citizens to Participate in City Development," *Cities Today*, June 12, 2013, http://cities-today.com/2013/06/new-app-allows-citizens-to-participate-in-city-development/#more-2692.

- ***Service information apps.*** These aim to improve city livability, for example by allowing residents to see whether parking places are available, as in the case of SFPark in San Francisco, or enable residents to both share and discover travel information on road conditions or public transportation, such as Smart Journey in Aberdeen, Scotland.

These city apps are promising and popular. But evidence on how they have changed city life—especially for immigrants and disadvantaged groups—is somewhat mixed. Evaluations of the 311 service (although not of the 311 app) find that expensive set-up and operation costs are usually more than outweighed by staff and energy reductions; for example water bills are lowered by quickly identifying broken hydrants.[10] But many of the positive effects on public health, social cohesion, and resident welfare are likely to be intangible or hard to quantify.

It is ... unclear whether immigrants and disadvantaged groups are reaping the benefits of these services to the same extent as other residents.

It is equally unclear whether immigrants and disadvantaged groups are reaping the benefits of these services to the same extent as other residents. In theory, 311 service has reduced almost all possible barriers to access by being universally available and accessible across mediums and in different languages. But a study of the New York service, albeit one that predated the smartphone app, found that low-income and minority neighborhoods (including those where immigrants live) report problems less frequently.[11] It may be that some groups prefer to deal with officials face-to-face, or are disinclined to use apps or hotlines because of lack of familiarity with these methods of interaction or different cultural norms. In the case of some immigrants, the experience of living in countries where services are scarce and corruption is high might result in low expectations of city responsiveness. If the city makes decisions about allocating resources based on the use of services such as apps or other technologies, this trend could have some troubling unintended consequences, meriting additional research.

10 For an overview, see Eric Jaffe, "Can Bloomberg's $9 Million Mayors Challenge Really Make a Difference?" *CityLab,* June 14, 2012, www.citylab.com/politics/2012/06/can-bloombergs-9-million-mayors-challenge-really-make-difference/2272/.

11 For a rich discussion of these issues, see Townsend, *Smart Cities*; for an analysis of the data, see Sarah Williams and Nick Klein, *New York Department of Sanitation 311 Complaint Spatial Analysis Assessment* (New York: Columbia University, 2007), www.s-e-w.net/DSNY/DSNYfinalreport_ver2.pdf.

Box 1. Background on the Smart Cities Movement

While forward-thinking mayors and tech nerds may read the term "smart city" as redundant, since much of their thinking is imbued with the question of how technology can improve urban life, the concept continues to attract buzz in policy circles. For example, the European Commission hosts a European Innovation Partnership on Smart Cities and Communities, the Smart Cities Council in the United States offers cities advice on financing and implementing smart policies, and cities frequently seek to rebrand themselves as "smart." While the term "smart city" is contested, discussion on smart or smarter cities revolves around four principles:

- ***Networked inanimate objects.*** Although smartphones are the emblem of the smart city, much of the smart city is invisible. The so-called Internet of Things—where everything from trains to streetlights is connected through sensors and machine-to-machine communications—is now a futuristic reality. Experts estimate that two non-computer objects are connected to the Internet for every cellphone.
- ***A deep commitment to data.*** "Big data" and "open data" have become omnipresent buzz words in tech policy to refer to the growth and availability of data. Many government and local authorities are committed to open data policies. For example, several cities including Chicago, Los Angeles, and Vienna have committed to publishing all spending data, while many local police forces release real-time crime data. Big data can also refer to the use of data collected by smartphones to improve city services.
- ***Citizen involvement.*** Getting ideas or feedback from citizens for urban planning or city services is often referred to as "crowdsourcing." Many elements of the smart city depend on the information that citizens inadvertently or intentionally provide through their phones or other means. Most apps are two-way: users get information (whether on bus times or parking spaces) but also contribute an additional data point through their usage.
- ***A focus on energy saving and mobility.*** Smartphones have proved their mettle when it comes to transportation and mobility; parking apps are thought to reduce congestion and energy use while evidence suggests that people are more inclined to use mass transit when they have tools to plan their journey. In some cities in Europe, the term "smart cities" is almost synonymous with "green cities." This focus on energy saving and transportation may explain why the implications for inclusion have not rigorously been assessed.

Other challenges stem from the anonymity of these services. In the city of Montevideo, Uruguay, the crime reporting app CityCop is thought to be heavily misused by people to report neighbors they dislike. CityCop has raised civil-rights issues since people can anonymously upload photos of suspected criminals. As these tools proliferate, there is a risk that people will use them to report neighbors who look different or whose behavior is out of the ordinary—one could imagine people reporting suspected immigration violations, for instance, on the basis of little more than a person's look or host-country language ability.

2. Transparency and Open Data

The city apps described above generate huge sets of geographical data about the crimes and problems reported in different neighborhoods. Hence they are often linked to commitments to publicize city data, which in turn can improve the accountability of city institutions to constituents and help secure confidence in city services.

Many local police forces release real-time crime data, and some cities publish data collected through

apps such as their 311 service. In theory, publication of spending data can reassure city residents that limited resources are being fairly allocated—and provide an incentive for city officials to use resources efficiently.[12] Opening up the black box of city services may also improve trust. In Chicago, a group of civic hackers (developers who mine data for a social cause) used city data to create ClearStreets, an app that visualizes roads that plows have cleared on snowy days, to test the widely held perception that plowing was inequitable (it is not).[13]

However, not all local authorities make their data available or formatted for public use. Privacy concerns often prevent publication of data most in demand by communities that lack trust in city institutions, such as minorities who feel unfairly targeted by law enforcement. Moreover, while open data can help city residents make decisions about which schools to send their children to, or which neighborhoods to live in, it risks further empowering the empowered—providing an opportunity only for those who have the means to use the information to avoid certain areas and schools.

Balancing openness with data protection is clearly a fine line. But, if these innovations become more widespread, they may eventually redefine the contract between service users and providers, by setting a new standard for responsive city services, and bolstering citizens' sense of stake in them.

3. Smart Residency Cards

As part of the process of making services "smarter," some cities now furnish residents with smartcards that unlock access to a plethora of city institutions and services. As yet, most of these are single use—namely for public transportation. However, some cities are experimenting with offering multiple services through one card that also serves as identification. For example, the Smartcard in Southampton (in the United Kingdom) gives residents access to libraries, leisure services, and buses, and can be used to pay tolls or even as identification.

While the services linked by smartcards are currently few, the use of smartcards and smart chips is likely to become more widespread. These developments may improve access to services for disadvantaged groups that find bureaucratic processes onerous, by consolidating the registration process for different city institutions. For people who lack a stable address or formal documentation, gaining access to all services through one channel could be a ticket to a normal urban life. This depends, however, on the process of registration, and whether cities decide to extend eligibility for city identification cards to unauthorized residents, as they have in Los Angeles, San Francisco, and Washington.

Currently, city ID cards and smartcards are a positive trend, providing convenience for residents, and in some cases, a form of identification for those who have none. But as smartcards evolve to provide access to more and more services and benefits, they may curtail, as well as facilitate, access. In the case that a large set of services are linked, unauthorized immigrants may find it more difficult to access basic services or be discouraged from applying for fear of generating a data trail.

B. Tailored Apps for New Arrivals

A number of apps have been developed to address specific needs faced by newly arrived immigrants, such as language training or information about rights, services, and naturalization. Some of the most innovative of these use serious games (games with a social, educational, or behavior-changing objective), which are thought to promote learning as they are designed to be replayed, encouraging practice and trial-and-error;

12 Evaluations of 311 services find that they improve transparency and residents' and employees' perceptions and expectations of city responsiveness. See, for example, Taewoo Nam and Theresa A Pardo, "Identifying Success Factors and Challenges of 311-Driven Service Integration: A Comparative Case Study of NYC311 and Philly311," *Proceedings of the 46th Hawaii International Conference on System Sciences*, January 2013, www.ctg.albany.edu/publications/journals/hicss_2013_philly-nyc311.

13 Sydney Brownstone, "Watch This Fascinating Animation of Chicago's Egalitarian Snow Plows," *Co.Exist,* December 12, 2013, www.fastcoexist.com/3023269/watch-this-fascinating-animation-of-chicagos-egalitarian-snow-plows.

are intrinsically motivating; and can facilitate social interaction.[14]

I. Apps for Language Learning

Language training in particular is an area where smartphones may enhance the opportunities already provided by technology and distance learning. Newly arrived immigrants face a number of obstacles to accessing training, including cost, compatibility with fluctuating schedules and shift work, transportation, and access to child care.[15] Online language learning tools now offer numerous possibilities for personalization and flexibility, such as work-focused language or high-level training in phrasal verbs and idioms, and diagnostic tools that focus on specific individual strengths and weaknesses.[16] While the opportunities that technology provides for learners to study at their own pace by slowing down or repeating lessons, practicing, and accessing materials from their own home have been widely recognized, the rise of smartphones offers a significant advantage: portability. Apps such as Skylab in the United States offer competitive and collaborative language games for employers to provide to their workers, with vocabulary tailored to sectors such as hospitality, food service, retail, and health care. These training tools can be accessed on the go, enabling learning to take place anywhere, including during travel time or breaks. Evaluations of these "smart" tools have been very positive.[17]

2. Apps for Rights and Naturalization

A number of apps have also been created to inform immigrants of their rights or help them study for citizenship tests. In the United States, the Immigration FAQs app breaks down immigration law on issues from investor visas to family-based immigration, while the *Derechos Herenica* app allows immigrants to look up rights relevant to their interactions with different government agencies.[18] The CitizenshipWorks app built on the successful website of the same name to provide a one-stop shop on naturalization, bringing together information, civics training, and access to legal advice.[19] One developer took advantage of the geolocation software built into smartphones to create an app that sends out a message with location details to family members, lawyers, and advocates when an unauthorized immigrant is arrested.[20]

3. Apps for Service Use and Settlement

Games have also been used to train disadvantaged groups on how to use public services or live independently.[21] These sorts of games could provide innovative tools for packaging together information on navigating local services for newly arrived immigrants.

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14 The InLiving game, a pilot project in the United Kingdom, sought to help young people in social housing become successful tenants by taking them through scenarios such as affordable credit and loan sharks, financial planning, and home contents insurance. Successful tenancies increased by 10 percent after the game was provided as part of the induction process for new tenants in a housing project. For discussion of this game and a number of other uses of games to motivate school dropouts to plan their return to education, provide access to vocational and careers information, and develop math skills, see James Stewart et al, *The Potential of Digital Games for Empowerment and Social Inclusion of Groups at Risk of Social and Economic Exclusion: Evidence and Opportunity for Policy* (Luxembourg: Joint Research Centre of the European Commission, 2013), http://ftp.jrc.es/EURdoc/JRC78777.pdf.

15 Meghan Benton, *Maximizing Potential: How Countries Can Address Skills Deficits within the Immigrant Workforce* (Washington, DC: Migration Policy Institute, 2013), www.migrationpolicy.org/research/maximizing-potential-how-countries-can-address-skills-deficits-within-immigrant-workforce.

16 For an overview of information and communications technology-based opportunities see Stefano Kluzer, Anusca Ferrari, and Clara Centeno, *Language Learning by Adult Migrants: Policy Challenges and ICT Responses* (Luxembourg: Joint Research Centre of the European Commission, 2011), http://ftp.jrc.es/EURdoc/JRC63889_TN.pdf.

17 For instance, the Words2Learn project for health sector-focused language learning found that the app accelerated learning and improved motivation. See National College Transition Network, "Linking Flipped Learning with Mobile Learning: Findings from the Words2LearnProject," www.collegetransition.org/about.currentprojects.mobilelearningproject.html.

18 Cristina Constantini, "Immigration: There's an App for That," *Fusion,* February 15, 2013, http://fusion.net/american_dream/story/immigration-related-smartphone-apps-11252#.

19 Ibid.

20 Ibid.

21 Stewart et al, *The Potential of Digital Games for Empowerment and Social Inclusion of Groups at Risk of Social and Economic Exclusion.*

While smartphones, mobile apps, and learning games provide a host of potential opportunities for supporting training and access to services for immigrant populations, they also raise a number of significant obstacles. Use of these tools depends not only on access to a smartphone, but requires a considerable level of digital literacy. Indeed, the trend for making all information and services available online can cause problems for those without these skills, for instance where language tests for residence or naturalization are only available online.[22] Moreover, the rapidly flourishing mobile health field—which has been more rigorously evaluated—may provide a cautionary tale for those who see apps as a silver bullet. For instance, some studies suggest that health apps have proliferated with little quality control.[23]

C. *Strengthening Urban Citizenship through Collaborative Technologies*

I. Apps for Citizenship and Cohesion

Civic innovation—where city residents use technology to shape the services and political systems that affect them, from discussion forums to apps for citizenship—is seen by some as a revival of local citizenship and a new way to bridge social divides. Yet others warn that the reinvigoration of democracy that the Internet was supposed to bring has not materialized.

Reducing the investments for participation and community engagement may help engage disadvantaged and hard-to-reach communities.

Civic apps have been developed to volunteer, register to vote, reschedule jury service, and even bring together diverse groups in online city squares. For example, the German BürgerForum was designed to strengthen social cohesion by randomly selecting 10,000 citizens, who participate in moderated online discussions on various topics. The European Union-funded project "My neighbourhood – My city" seeks to promote neighborliness in pilots in Lisbon, Milan, Aalborg, and Birmingham, for example, by using technology to make it easier for people to help out their neighbors with household chores.[24]

Reducing the investments for participation and community engagement may help engage disadvantaged and hard-to-reach communities, particularly immigrants who historically are less likely to vote, discuss politics, or have faith in political institutions. Moreover, many new city apps provide new opportunities for social interaction among groups that might not otherwise "meet"—in person or online. Among the finalists of the global AppMyCity! competition, three were about sharing and swapping resources (cars, household objects, and produce), and five others were about peer-to-peer information exchange.[25]

Of course, there are limitations to what technology can do for citizenship. E-voting may in some cases be a practical necessity for people with busy schedules or mobility issues, but using your smartphone to vote might sacrifice some of the gravitas and ritual of democratic processes for convenience, or increase opportunities for electoral fraud.

22 For discussion of the challenges that the requirement for digital competence poses in the Netherlands, see Marianne Driessen et al, *ICT Use in L2 Education for Adult Migrants: A Qualitative Study in the Netherlands and Sweden* (Luxembourg: Joint Research Centre of the European Commission, 2011), http://ftp.jrc.es/EURdoc/JRC59774_TN.pdf.

23 Sheryl A Bedno, "Public Health in the Smartphone Era," *Medscape Public Health,* December 18, 2012, www.medscape.com/viewarticle/776278_3.

24 European Commission, "My Neighbourhood: My City," http://ec.europa.eu/information_society/apps/projects/factsheet/index.cfm?project_ref=325227&export=pdf.

25 The winner was an Amsterdam-based app called Peerby enabling neighbors to share anything from tennis rackets to hammers. New Cities Foundation, "Peerby wins international AppMyCity! contest for best new urban app at New Cities Summit in Dallas" (news release, June 18, 2014), www.newcitiesfoundation.org/wp-content/uploads/2014/06/PDF-AppMyCity-2014-Winner.pdf.

2. Crowdsourcing and Inclusive Planning

Crowdsourcing is the idea that appealing to a larger pool of people will bring in new ideas, test proposals on a larger group, and ensure that city decisions are more responsive to the populations they serve. For example, the Amsterdam Smart City partnership spoke to 8,000 residents and uncovered a number of challenges that were not on the city's radar, such as the need for mobile phone charging stations for the homeless.[26] Methods for crowdsourcing include online collaborative documents and shared work spaces, large-scale deliberation forums, serious games, surveys, and tools that encourage participants to prioritize decisions or submit their own ideas. While these methods are on the rise, according to a recent global survey, more than half of cities do not source solutions from outside government.[27]

One of the main uses for crowdsourcing by cities is in the planning process. Immigrants and minorities have historically been under-represented both as urban planners and in planning meetings. Cities are therefore looking for opportunities to bring diverse voices into the fold. For example, Wikiplanning, an online system that has worked with cities such as San Jose, California to encourage community engagement in the planning process through collaborative technologies, claims a more diverse group of participants than usual city planning processes. Similar programs include Community Planit in Detroit and Block by Block, whose service is used in more than 60 cities across the United States.[28]

Efforts to aggregate opinions using the Internet often suffer from selection bias, especially in that they take views from people who are digitally savvy. Critical to the success of community planning projects is targeting under-represented groups through the most effective vehicle. The Wikiplanning project succeeds in increasing minority representation by advertising in specific underserved communities, through what it describes as "an aggressive outreach campaign" including contacting community leaders, advertising in targeted community media, and launching a print campaign in targeted neighborhoods.[29] Elsewhere, localities have complemented such efforts with training sessions on how to use online tools.[30]

As the turnover of city populations increases with the twin processes of urbanization and mobility, the circle of people with deep participation in city institutions (feedback on planning applications, membership of local political parties, volunteering, etc.) may shrink. Ultimately, cities may face the choice between maintaining traditional methods of civic engagement for a small group, or using every tool in the book, including tech tools, to include more people, but on a shallower basis. The emerging model of engagement—a kind of "touchscreen citizenship"—may be somewhat superficial, but may also, through its convenience, be more democratic.

III. Tradeoffs and Challenges

As cities work to mine the rich opportunities that the "smart" movement offers, disadvantaged groups and immigrants are one of many factors in their calculations. But if smart cities are to live up to their promise, they need to work for all residents. Many of the challenges that cities face as they become "smarter" have particular ramifications for disadvantaged and diverse communities.

26 Sascha Haselmayer, *Faster, Smarter, Greener: The State of City Innovation on Climate Change and Other Urban Challenges* (San Francisco: The Agile Cities Initiative, 2013), www.scribd.com/doc/142073088/FASTER-SMARTER-GREENER.
27 Ibid.
28 Stewart et al, *The Potential of Digital Games for Empowerment and Social Inclusion of Groups at Risk of Social and Economic Exclusion.*
29 Wikiplanning, "The Virtual Design Charrette," www.wikiplanning.org/index.php?P=virtualcharrette.
30 Matt Leighninger, *Using Online Tools to Engage—and by Engaged by—The Public* (Washington, DC: IBM Center for the Business of Government, 2011), www.businessofgovernment.org/sites/default/files/Using%20Online%20Tools%20to%20Engage%20The%20Public_0.pdf.

A. Addressing the Digital Divide

While minorities are over-represented among people with smartphones, they are also over-represented among those with no Internet access. For especially disadvantaged groups, the cost of the smartphone itself or a monthly contract may be prohibitive; newly arrived immigrants face the additional hurdle of getting approved for a mobile phone contract with limited credit history.

To address the problem of access, some school districts such as Los Angeles and Houston lend their students tablets, laptops, and even smartphones, in some cases alongside classes in digital citizenship. Although some of these programs have faced problems—from spiraling costs to schools getting locked into contracts with software providers whose preloaded curriculum content has become dated—they are widely thought to represent the future of personalized, collaborative learning.[31] However, the barriers might be much greater for adults—programs to give laptops to disadvantaged groups or immigrants are unlikely to play well in Europe, for instance, given the current high levels of anxiety about immigration.

In contrast to rural areas, cities rarely have to contend with issues of Internet or mobile coverage. Yet expensive data may be an additional barrier to access. A number of cities have introduced free Wi-Fi in certain areas, helping visitors and new arrivals alike with phone contracts from their home countries avoid high data roaming costs. Thus far, private Internet providers have resisted efforts by cities in the United States to roll out city-wide wireless networks,[32] but the proliferation of free Wi-Fi provided by various private and public organizations may eventually weaken their arguments and resolve.

Poor information and communications technology (ICT) skills are also a barrier to access among immigrant communities, especially older residents. Programs like the Smart Communities project in Chicago, providing Internet training in English and Spanish, have had promising results.[33] But for others, addressing the digital divide may require tapping into and developing existing skills. Studies have found that while minority and immigrant communities are highly adept at using different digital technologies, they are also more likely to use these tools for lifestyle activities rather than research. And educators warn against assuming that because children grew up in the age of the smartphone and tablet, they will be excited about using these for work.[34] Thus, addressing the digital divide may be as much about motivation and interest as adeptness at using a smartphone. Programs to enlist disadvantaged youth in game design, such as Aarhus Social and Healthcare College's work with young second-generation migrants in Denmark, are thought to be effective vehicles for motivating people to develop these skills.

A final facet of the digital divide is that smartphones—which minorities and disadvantaged groups are more likely to rely on as their main method of accessing the Internet—often display an inferior version of full websites, and thus may provide a second-class form of Internet access. In seeking to capitalize on the opportunities that smartphones offer, policymakers may have to walk a fine line between improving access among those who would not otherwise have a line to city services and perpetuating a two-tier system.

B. The Unintended Consequences of Big Data

"Data shadows"—the personal imprint we create through every digital interaction—have long been the source of privacy concerns. In a world where data is used to make many decisions, those who make

31 See *Education Week*, "Spotlight on 1-to-1 Computing," *Education Week,* February 5, 2014, www.edweek.org/ew/marketplace/products/one-to-one-computing.html.

32 For a discussion see Townsend, *Smart Cities.*

33 An evaluation found a 15 percentage point increase in Internet use compared with other residents between 2008 and 2011. Caroline Tolbert, Karen Mossberger, and Chris Anderson, *Measuring Change in Internet Use and Broadband Adoption: Comparing BTOP Smart Communities and Other Chicago Neighborhoods* (Springfield, IL: Partnership for a Connected Illinois, 2012), www.broadbandillinois.org/uploads/cms/documents/chicagosmartcommunitiespcireport4.pdf.

34 Larry Ferlazzo, "Simply Putting Tech In Front of Students Won't Engage Them: Teachers Q&A," *Education Week,* April 14, 2014, http://blogs.edweek.org/teachers/classroom_qa_with_larry_ferlazzo/2014/04/response_simply_putting_tech_in_front_of_students_wont_engage_them.html.

unconventional choices may be disadvantaged. Groups that pay (and are paid) in cash and do not have smartphones are less likely to show up in datasets. Those who report problems are more likely to be people whose voices are already being heard. If certain groups are systematically excluded from data maps that businesses and policymakers use to make decisions on where to set up shop or invest resources this could represent a new form of marginalization.[35]

In some instances, policymakers may face the choice of using rich datasets—many of which were collected by private companies and for different purposes—or making decisions on the basis of older, more limited data that is less likely to be skewed. Other privacy considerations stem from how data are used and who has access. The dystopian uses of big data, from advertising on trash bins that targeted smartphone users walking past[36] to collecting customer browsing data by tracking smartphone users as they walk around a store,[37] have been extensively documented. But discussions of the impact on groups that fear leaving a data trail, such as unauthorized migrants, are much rarer. The use of big data collected by private organizations in law and immigration enforcement is currently limited, but data sharing looks set to create additional questions regarding civil liberties—especially for those with insecure immigration status. The appropriate safeguards in the era of big data remain unclear.

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C. Sustainable Solutions versus Quick Fixes

Many of the most creative tools have been produced by the private sector and civil society. One of the most fruitful approaches taken by cities has been to host "hackathons" or offer prize money for creating apps. For example, in Washington, DC, the organizers of the Apps for Democracy competition (the first of its kind) estimated it had saved the city more than $2 million.[38] This model has now been rolled out worldwide.

Despite some successes, these competitions do not always create sustainable solutions. Many apps created by civic hackers, whether the result of competition or not, have a short shelf life. They are also frequently prototypes rather than refined models, and require funding to be sustained.[39] Finally, apps developed by hackers are often available only on one operating platform, which may exacerbate some of the exclusions described above. The fragmentation that emerges from different apps being developed on different platforms may provide indirect barriers to access. This includes limiting access to a tech-savvy elite, since knowing how to access these services through apps requires a considerable level of digital knowledge and literacy.

Funding and organization are critical to avoiding gimmicks. Public-private partnerships can provide a way to scale up prototypes created by civic hackers.[40] Technology commentators routinely point to the need for better organization of technology policy. Because city departments are often siloed, they are ill-suited to

35 See Jonas Lerman, "Big Data and Its Exclusions," *Stanford Law Review* 66, no. 55 (2013): 55-63, www.stanfordlawreview.org/online/privacy-and-big-data/big-data-and-its-exclusions.

36 Liz Enbysk, "London Dumps Its Smartphone-Tracking Trash Bins," *Smart Cities Council*, August 14, 2013, http://smartcitiescouncil.com/article/london-dumps-its-smartphone-tracking-trash-bins.

37 Stephanie Clifford and Quentin Hardy, "Attention Shoppers: Store is Tracking Your Cell," *New York Times,* July 14, 2013, www.nytimes.com/2013/07/15/business/attention-shopper-stores-are-tracking-your-cell.html?pagewanted=all&_r=1&.

38 For example, the apps included "BanksNearMeRightNow," which shows where the nearest ATMs are. See John O'Leary, "$2 Million Worth of Software for $50,000," *Governing,* August 5, 2009, www.governing.com/blogs/bfc/2-Million-Worth-of.html.

39 For discussion of this point, see Townsend, *Smart Cities*.

40 See, for example, Robert Puentes and Adie Tomer, *Getting Smarter About Smart Cities* (Washington, DC: Brookings, 2014), www.brookings.edu/research/papers/2014/04/23-smart-cities-puentes-tomer.

addressing cross-cutting issues like immigrant integration and technology. But several big U.S. cities have shown that creation of technology departments does not necessarily require big budgets or new posts. The Boston Mayor's Office of New Urban Mechanics had no budget in order to preserve a start-up feel, and instead formed *a network across departments.*[41]

Urban leaders and policymakers need to resist gimmicks, and continue to invest in traditional social services.

IV. Conclusions and Recommendations

New geolocation technologies, smartphones, and big data offer promising tools for improving access to public services and reducing barriers to participation. As these new technologies become embedded in urban living, they may ultimately raise the bar for local and national government responsiveness and citizen involvement. Nevertheless, urban leaders and policymakers need to resist gimmicks, and continue to invest in traditional social services. As Anthony Townsend, author of *Smart Cities¸* asserts: we need to "treat smart as an add-on, an upgrade, and not the end itself."

This new technological order also brings some risks. Chief among these is the concern that smartphones and their associated technologies will exacerbate the digital divide, by providing additional opportunities to hear from groups whose voices are already being heard. While smart cities can be empowering, the rise of big data also risks amplifying problems of social exclusion, as marginalized populations cannot afford to make use of information on unsafe neighborhoods or failing schools. Moreover, as decision-making processes become more and more informed by urban analytics, policymakers need to attend to the communities who leave less of a data trail.

A number of steps could help capitalize on the opportunities and mitigate these risks:

- ***Nurture tech civil society.*** App competitions, designed to encourage "civic hacking" are in vogue on both sides of the Atlantic. But they are usually open competitions, rather than calls to solve particular problems. Cities could create a competition for apps to help immigrants, and then publicize them among immigrant communities, since community-driven solutions are likely to be the most effective.
- ***Invest in tech human capital.*** Despite efforts to improve ICT skills, computer programming frequently suffers from poor branding in schools. Localities need to experiment with innovative ways to encourage young people to gain these skills, such as encouraging young people to design computer games, financing intensive coding training for young people,, or hosting app competitions for teen-agers.
- ***"Mainstream" integration into tech policy.*** As cities face rising foreign-born populations, they could explicitly embed the needs of immigrant communities into tech strategies. For example, cities could consider how language barriers might be addressed in health-care evaluation and management services, publicize city apps in immigrant neighborhoods, and develop safeguards to ensure that new technologies (as well as public services) meet the needs of the most vulnerable.

41 New Urban Mechanics, "Boston," www.newurbanmechanics.org/boston/.

- ***Consider creating a one-stop app for new arrivals.*** The most successful apps package information together in one easy-to-use tool. An app tailored to the needs of new arrivals that provided access to information about housing, employment rights, city services, naturalization, and language training, could be a relatively inexpensive complement to the physical "one-stop shops" that are popular in several countries that receive new arrivals.

The biggest challenge...may be to overcome the city center's negative image and the demographic patterns that have kept most immigrants in the suburbs.

Ultimately, it is unlikely that smartphones will provide an easy fix to immigrant integration challenges. But since they may help enhance the integration toolbox relatively cheaply, they are worth a closer look.

For more on MPI's Transatlantic Council on Migration, visit:
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The Migration Policy Institute is a nonprofit, nonpartisan think tank dedicated to the study of the movement of people worldwide. MPI provides analysis, development, and evaluation of migration and refugee policies at the local, national, and international levels. It aims to meet the rising demand for pragmatic and thoughtful responses to the challenges and opportunities that large-scale migration, whether voluntary or forced, presents to communities and institutions in an increasingly integrated world.

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