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11. The image of the smart city: surveillance protocols and social inequality

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INTRODUCTION

The field of surveillance studies has long been drawn to the technological transformation of urban infrastructures. If surveillance is central to the management of populations by modern institutions (Giddens 1987; Lyon 2001; Staples 2014), then the city presents itself as perhaps the most concentrated site for the exercise of control over complex flows – of bodies, data, vehicles, capital, and more (Crandall 2010; Graham and Marvin 2001). Surveillance in this sense is a process of systematically identifying discrete entities, tracking them through space and time, analyzing patterns, and regulating flows either directly, through intervention, or indirectly, through systems of constraint and affordance. Such processes increasingly define the character of cities.

The production of urban spaces through information systems is far from neutral (Cuff 2003; Thrift and French 2002; Wood and Graham 2006). Flows are often sorted according to their perceived value or risk, creating inequalities in the treatment and experiences of people. Thus, the relatively affluent might be expedited past checkpoints (for example, toll booths, security screening), while others are slowed down, harassed, or turned away. Bodies perceived to be threatening to the social order (for example, the homeless, refugees, racialized others) are cast as dangers to be managed through technological means (Monahan 2017). In these ways, dominant security cultures fuse with surveillance infrastructures such that the relatively invisible protocols that animate urban surveillance and assessment reproduce social inequalities in cities (Coaffee and Fussey 2015; Lippert and Walby 2013; Monahan 2010).

This orientation to surveillance provides a starting point for the critical investigation of security cultures and "big data" imperatives more broadly (Andrejevic 2014; Lyon 2014; Sadowski and Pasquale 2015). While the focus of this chapter is on a movement toward the rational management of cities through – and as – data, it is important to note the ways in which widespread festishization of data obscures the politics of information systems. As Shannon Mattern explains:

> The default recourse to data-fication, the presumption that all meaningful flows and activity can be sensed and measured, is taking us toward a future in which the people shaping our cities and their policies rarely have the opportunity to consider the nature of our stickiest urban problems and the kind of questions they raise. (Mattern 2013, p. 8)

This suggests that political effects are generated by the kinds of questions one asks of data, the kinds of protocols put into place to process them, and the invisible exclusion of things that are not as easily translated into data without violence, such as human experience and emotion.

FRAMING THE SMART CITY

Under the banner of "smart cities," regional governments around the world are embracing distributed sensor networks, video surveillance, and predictive analytics in hopes of solving a wide range of urban problems (Dodgson and Gann 2011; Galdon-Clavell 2013; Greenfield 2013; Shelton et al. 2015). There has been an explosion in investment in smart cities, with significant projected future growth globally: from $568 billion in 2013 to $1.4 trillion in 2020 (Razani 2016) and $3.48 trillion by 2026 (Persistence Market Research 2017). One goal of smart cities is to systematically collect and analyze data on all city flows and services, from traffic patterns to utility usage, in order to improve efficiencies and reduce costs. By plugging cities into big-data streams and employing algorithmic processing to interpret data, city managers aspire to rationalize the many interacting systems that constitute cities, which is seen as a vital practice when infrastructural and spatial constraints preclude expansion. Economic revitalization is an associated goal, whether for cities that have slid into post-industrial decay or for others that are desperately trying to maintain their competitive edge. Well-organized marketing campaigns by technology companies such as IBM and Cisco appeal to city planners in search of silver bullets to nurture creative industries, spark real-estate development, or lure businesses. A final dominant goal of smart-city initiatives relates to crime control and security provision. In the United States (US) context, for instance, police departments in major cities have drawn significantly upon funding from the Department of Homeland Security (DHS) to establish real-time crime centers, wide-area surveillance networks, mesh networks that catalog all proximate WiFi devices, and gunfire detection systems, just to list a few (McQuade 2016; Monahan 2012; Monahan and Mokos 2013).

Rather than view such developments as neutral, it is important to probe their underlying politics and ask what kinds of worlds are being created in the name of efficiency, economic growth, or security. Smart

cities depend upon widespread, integrated surveillance systems that fuse inseparably with the built world (Klauser 2017; Murakami Wood 2016). Such systems are predicated on inequalities.[1] They sort populations and flows differentially, determining which street traffic has priority, whose thermostats can be load-shifted to reduce demands on the electrical grid, or who lives in a criminal "hot spot" and should therefore be subject to more routine police scrutiny. As these sorting principles are infused in algorithmic code, they normalize and invisibly enforce the value systems of their programmers, typically without any public awareness or debate (Crang and Graham 2007; Kitchin and Dodge 2011; Leese 2014). In this sense, the systems undergirding smart cities are antidemocratic in their design and in many of their effects. Even if social inequalities were not aggravated by such systems, they would still privilege data that lent themselves to capture and optimization, most likely eroding other dimensions long associated with vibrant city life, such as walkable streets, spontaneous exchanges with others, or ambiguous terrain that invites exploration (Lynch 1984).

There are shared ideological underpinnings to smart city initiatives, even as such efforts vary radically across regions and countries. Notably, these schemes mobilize a neoliberal orientation to governance that positions the public sector as in the service of private companies that need to be enticed to remain or relocate to specific regions or that are critical providers of the technological systems in question. Through their smart-city marketing campaigns, technology companies cultivate a sense of vulnerability and competitiveness on the part of city planners. The threat of being left behind motivates costly investments in technological infrastructures at a time when most cities are struggling to maintain basic services for their residents. Similarly, while there is a sore need for basic public safety resources, as police departments have faced budget cuts along with the rest of the public sector during periods of economic recession, funding for high-tech policing and counterterrorism systems has increased (Hayes 2012). In accepting such funds, localities pass a large part of the available capital to the major technology companies that provide such systems, while the police adopt military-grade systems and counterterrorism tactics for routine policing (Greenwald 2014). In a more distributed way, the growing popularity of "311 apps" for mobile phones encourages individuals to report mundane problems in the city (for example, trash, burnt-out street lamps, illegally parked cars) (Ratti and Townsend 2011), but does not at all address problems of reduced funding for public agencies.[2] Such crowdsourcing, as one manifestation of smart cities, could therefore engender a greater push away from the collective, as people with the requisite resources become disillusioned with public services and seek

out private solutions, such as gated communities. Thus, increased social polarization and spatial segregation remain significant risks associated with smart-city developments.

While smart-city efforts are generally seen as more progressive in Western Europe, they nonetheless hew to these general neoliberal trends. For instance, Barcelona is celebrated for concentrating its smart-city plans on achieving environmental sustainability. Some of this city's systems are geared toward reducing water consumption, optimizing trash pick-up and recycling services, and installing energy-efficient streetlights in partnership with private companies that can use the lighting infrastructure to expand their mobile phone coverage (Scott 2014). Certainly these goals boost the "brand" of the city of Barcelona in ways that are less obviously socially divisive. That said, they still depend on opening up cities as markets for private companies, on one hand, and the generous public funding of those private companies for their various technological "solutions," on the other. These trends unfold under the umbrella of the European Commission's "Horizon 2020" initiative, which is providing up to €232 million for public and private sector partners for smart-city projects (European Commission 2015; Ismail 2016). Thus, public funding is key to the materialization of these developments, while the stipulations on that funding (for example, prioritizing sustainability or security) gives them their unique regional character and shape.

This chapter builds upon these observations to critically explore the potential dark side of smart cities. I draw upon a handful of case studies from US cities participating in IBM's Smarter Cities Challenge, analyze the values encoded in the respective systems, and discuss their likely impacts upon social relations and experiences. My analysis concentrates on the surveillance dimensions of the sensor and network systems upon which smart-city initiatives depend. Whereas in Kevin Lynch's (1960) classic book, *The Image of the City*, he collected mental maps from city residents to use as a resource for crafting design protocols for more livable spaces, the image of the smart city is being dictated almost entirely by technology companies either responding to previously identified problems or selecting problems based upon fit with their preferred high-tech solutions. Through such removed, rationalized plans, hidden technological protocols threaten to further normalize neoliberal arrangements and exacerbate social inequalities. These trends may be most glaring in the US context, but smart-city plans in other countries are certainly not immune to such dangers.

CASE 1: DURHAM, NORTH CAROLINA

As part of IBM's Smarter Cities Challenge, the city of Durham, North Carolina, sought assistance with the complex problem of youth dropping out of school, having difficulty finding jobs, and potentially entering into the criminal justice system. Six IBM employees, none from within the state or with any connections to the region, visited Durham for three weeks to engage in a rapid assessment of the field and propose solutions. While IBM touts its Smarter Cities Challenge program as a massive philanthropic initiative that has given "contributions valued at over $50 million" (IBM 2014) to cities around the world, this scheme, while allowing for an inflated tax write-off for IBM, does not provide any financial or technological resources to cities; rather, it graces cities with the presence of a team of its employees who invariably recommend costly tech-fix solutions. The team that visited Durham in 2012 did not deviate from this model.

One of the first things that IBM's Durham report does is reframe the problem in economic terms, with an emphasis on the potential financial drain on cities and regions. The authors claim:

> High school dropouts are an economic drain – over their working lives the average high school dropout costs taxpayers more than $292 000 in lower tax revenues, higher cash and in-kind transfer costs, and imposed incarceration . . . Today, the approximately 4000 disconnected youth in Durham comprise nearly $1.2 billion in lost economic value for the City. (IBM Smarter Cities Challenge 2012a: 5)

It is further presumed that being "disconnected" will lead youth toward "criminal and other non-productive behaviors" (IBM Smarter Cities Challenge 2012a, p. 8) that will burden cities with costs and deter economic development. This is clearly a sales pitch for city leaders, and it also provides them with the appearance of solid data from which they could draw to rationalize their support for IBM's solutions. Still, it is a radically narrow and insensitive framing that effectively negates the experiences of youth and the social costs they and their communities face in grappling with disenfranchisement.[3] After all, as the report notes, Black and Latino populations, which respectively make up 38 percent and 13.5 percent of the city's population, represent the most at-risk groups in Durham.[4]

At the core of IBM's recommendations is the development and implementation of a "Youth Services Care System" that will track student performance, use predictive analytics to identify those who are at risk and prompt intervention on the part of "case managers" or teachers, and coordinate support networks by allowing a host of organizations to share uniform, standardized data. The report laments the fact that

existing organizations – ranging from schools to juvenile justice to civil society groups – do not collect data in a similar way or share it fluidly; instead they are idiosyncratic with their data management and rely on information "silos," which are understood to be atavistic impediments to true progress. Thus, the report contends, heroic leadership is needed to align these disparate organizations behind the common goals of reducing service duplication and supporting youth. Because in IBM's eyes too much inclusion can lead to dysfunction (IBM Smarter Cities Challenge 2012a, p. 13), the report advises channeling stakeholder participation through the appointment of "champions" in the community and a chief executive officer (CEO) of a new center to oversee youth connection.

Elided in this short report is attention to the rich ecology of service support and civil society organizations that have emerged over time to meet specific community needs. Complaints about service duplication or information silos are premised on the assumption that there are sufficient existing resources for organizations to assist youth and communities completely, provided these organizations coordinate better through information technology systems of the kind sold by companies like IBM. It is no doubt an attractive narrative for policymakers who do not want to expend political capital advocating for additional funding for service organizations, but coordinating existing resources may be completely inadequate, and perhaps funds devoted to smart systems could be better invested in cash-strapped public sector and non-profit social service organizations that have a proven track record of assisting people in need.

Ultimately, its reductive framing of the problem and inattention to human capital undermines the viability of this report's solutions. First, the Youth Services Care System privileges a vision of technology-initiated individual intervention at the level of the student, as if larger systemic problems (for example, poverty, inadequate transportation, lack of child care, large class sizes) were subordinate, less important factors contributing to youth dropping out of school. Second, who are the people who are supposed to make such a system work in practice? The report suggests that overburdened teachers will take on the additional responsibility of entering early warning indicators for students, currently non-existent case managers will follow up, and tutors will then be available for identified at-risk students. The proposed big-data system will not substitute for these necessary human labor components. Nonetheless, the report is all too willing to criticize teachers who elect not to use social media for basic in-class communication:

> One youth stated, "My teacher asked us to write down our homework from the blackboard. We all just stared at it. Why couldn't the teacher just send me my

> homework via Facebook or tweet it to me?" Teachers may not be sufficiently assessed or trained for the challenges and requirements of today. (IBM Smarter Cities Challenge 2012a, p. 25)

In the unsympathetic view of IBM employees, sending homework to students via social media platforms should be something teachers are required to do. Finally, because youth and community services are not only the domain of government, IBM's proposed system would necessitate that civil society groups also purchase data management systems that could communicate with the larger Youth Services Care System. The report suggests that such organizations could "take advantage of IBM's Safety Net, which provides a cloud-based application that allows individual non-profit organizations (NPOs) to store and manage their data" (IBM Smarter Cities Challenge 2012a, p. 25). This application is currently being piloted and is not widely available, but when it is, it would no doubt come with a fee and system migration labor that most NPOs could not shoulder, even if they wanted to.

CASE 2: ST LOUIS, MISSOURI

When an IBM team visited St Louis, Missouri, its mandate was to make recommendations to improve public safety. City officials had been struggling to overcome the label of "most dangerous city in America" (IBM Smarter Cities Challenge 2011, p. 5), so the IBM Smarter Cities group focused on the need for better coordination among various actors in the criminal justice system, including police, courts, circuit attorneys, and probation and parole officers. Specifically, the authors of this report criticized the absence of standardized and shared data about individual offenders as they move through the criminal justice system, inadequate performance metrics and accountability structures, and non-integrated systems that lead to redundancy and information silos.

As with other Smarter Cities reports, the primary recommendations are for greater centralization, informatization, and privatization. It advocates for centralization through a CEO model of governance with the Mayor acting as the leader who needs greater authority to maintain accountability. Without providing any evidence, the authors claim: "Accountability can only exist when the citizens of St. Louis feel that one individual is responsible for the overall public safety strategy in the city . . . that responsibility should rest with the Mayor's Office" (IBM Smarter Cities Challenge 2011, p. 11). It is probably not coincidental that the Mayor agreed to the IBM "Challenge" and invited the team to assess the city's

public safety organizations and practices; it is potentially politically valuable for the Mayor to then reference a supposedly independent report that recommends he be granted greater authority. Still, this message is in keeping with IBM's Smarter Cities recommendations more generally, where in other documents they have advised mayors to "Think like a CEO" and eschew citizen forums that might expose one to people who care too deeply about the issues being discussed (IBM 2013, p. 3).

Informatization comes in the form of recommendations for an array of systems to track "top priority offenders" who might be more prone to recidivism, video arraignments and electronic monitoring of parolees to save time and resources, cloud computing platforms and dashboard interfaces to assist with intelligence-led policing, police patrol metrics and performance-based appraisal systems, and smart closed-circuit television (CCTV) systems that can ostensibly identify suspects automatically, flag crimes in progress, and store feeds for later pattern assessment. The report argues that such systems are necessary to connect information silos, make intelligent decisions, and enforce accountability, otherwise poor communication will lead to the inadvertent release of high-risk offenders who will make communities more dangerous (IBM Smarter Cities Challenge 2011, p. 12). Because the cost of such systems might be prohibitive, the IBM team implies that the systems will have a "force multiplier" effect of automating tasks and performing them better so that cities can cut personnel without sacrificing safety (IBM Smarter Cities Challenge 2011, p. 27).[5]

Privatization, especially in the form of public–private partnerships, is offered as a way to implement the many costly systems in question. The report recommends a modality of what critics would call "poverty capitalism," whereby electronic monitoring systems for parolees are outsourced to private companies that then charge those individuals for the service (Monahan 2017). According to some recent estimates, parolees can expect monthly charges of $35 to $100 and can face bill collection agencies, additional fees, and jail time if they fail to pay on time (Edsall 2014). Other than the purchase of new technological systems from the private sector, the report advises that where possible private companies should be contracted to manage data storage and processing, which it asserts "would greatly improve the city's efficiency and reduce the costs of many city government practices" (IBM Smarter Cities Challenge 2011, p. 38). Finally, the report recommends that the city "aggressively pursue federal grants to help fund new initiatives" (ibid., p. 25). Because some of the grants in question might require an academic research partner, the city is told to establish or leverage connections with criminologists at the University of Missouri, St Louis, who could then help the city qualify for "numerous federal grants" (ibid., p. 37). In typical neoliberal fashion,

if federal grants were obtained, one could imagine that private sector partners, such as IBM, would be more than willing to accept contracts to implement the systems in question.

Given the tense relationship of a predominately white police force with minority neighborhoods in St Louis, IBM's recommended solutions are unlikely to correct any problems of police abuse and community mistrust. The City of Ferguson, which is in the St Louis metro region, witnessed a major uprising by the public in 2014 to protest the fatal shooting of an unarmed black teenager, Michael Brown, by white officer Darren Wilson (Associated Press 2014). The police department's heavy-handed militarized response to the community's protest then led to the state Governor putting the Highway Patrol in charge of public safety and the US Justice Department investigating police conduct (Associated Press 2014; Berman 2014). The IBM report's emphasis on identifying "top-priority offenders" is unlikely to resolve any of these larger social and cultural problems, and it could exacerbate them. The report says community trust is vital for solving crimes, but then the authors flail as they propose harnessing social media to improve community trust in the police somehow (IBM Smarter Cities Challenge 2011, p. 31).

One could envision an entirely different set of analytic tools that might render abuse visible and assist with holding police accountable. Cities could establish racism and civil rights violation indicators by police department. Perhaps community members and city leaders should have access to "use of force dashboards" that illustrate patterns of abuse by officers. Metrics of the most militarized police forces could also be established and data circulated, fostering public debate about such things. If trust is important for public safety improvements to succeed, cities could try to utilize technology in truly innovative ways to further this goal.

CASE 3: PITTSBURGH, PENNSYLVANIA

The city of Pittsburgh, Pennsylvania, constrained its IBM Smarter Cities consultants by asking them to assist with technical aspects of an already formulated plan to increase multi-modal transportation in the city. Pittsburgh's vision is to reduce traffic congestion and create more vibrant, pedestrian-friendly cityscapes to lure tourists, businesses, and residents to the city center. In the IBM team's interpretation of this city plan, informatized transportation and parking systems will "empower citizens and visitors to contribute to the vibrancy of the economy" (IBM Smarter Cities Challenge 2012b, p. 3). As with other Smarter Cities reports, the underlying assumption is that cuts to city services are inevitable, but that

information systems and data analytics can compensate for such cuts and somehow help cities achieve their social and financial goals in spite of them. The authors mention that while an impressive 52 percent of city commuters take public transportation, the city nonetheless cut such services by 15 percent in 2011 (ibid., p. 3). Therefore, "the threat of more transit service reductions requires the City to identify innovative ways of optimizing its current systems" (ibid., p. 3). The report argues, in other words, that in hard times cities should channel scarce resources to private technology companies, because those investments will eventually pay off in ways that investing in public services will not.

Based on impressive examples of integrated, multi-modal transportation systems in other countries, a key factor in achieving success seems to be decentering the automobile (Woldeamanuel 2016). When built infrastructure, government policies, and cultural norms prioritize public transportation, biking, and walking, then people tend to choose those options over commuting in single-occupancy vehicles (Engwicht 1993). Moreover, without infrastructural support and costly subsidies for cars (for example, parking lots and roadways), disincentives for automobility can quickly outweigh the incentives, to the increased health of individuals and livability of cities (Cervero 1997; Engwicht 1993). Thus, it is surprising that the IBM team quickly dismisses possibilities for decentering automobility. Instead they advocate for things such as a costly "traffic management center," embedding sensors in all public and private parking spots so that car commuters can receive real-time information about where to park, and even transforming high-occupancy vehicle lanes (that is, car pool lanes) to "pay-to-play" lanes that can be accessed by drivers of single-occupancy vehicles for a fee (IBM Smarter Cities Challenge 2012b). These suggestions, if taken, would probably impede multi-modality in Pittsburgh because they would make car commuting even easier. Cities such as London have successfully implemented informatized congestion management systems to reduce the number of vehicles in the city each day, and charge fees for people who fail to comply (Leape 2006), but even as a non-binding "recommendation" this was viewed as non-viable by the IBM team, probably because it could be construed as being anti-car (IBM Smarter Cities Challenge 2012b, p. 14).

The few recommendations that the report makes for alternative modes of transport all hinge on information systems. For instance, the authors recommend high-tech bus stops with real-time information about bus arrivals, smart cards for paying bus fares, and bike-renting systems that manage payment details and track inventory. These could all be desirable improvements, but it is important to note that, rather than altering transportation infrastructure or changing existing resources in any substantial

way, IBM's goal is to generate and manage data. The report opines: "Data and data-driven analysis hold the power to transform the transportation landscape of Pittsburgh" (IBM Smarter Cities Challenge 2012b, p. 36). The authors even recommend investing in sophisticated modeling systems to predict changes in commuting patterns and transportation flows over time. For these few examples, though, it is not difficult to imagine other or complementary recommendations that emphasize materiality and resources over information systems and data. For instance, real-time information on buses could be augmented by an increase in available buses or routes; smart cards would not be necessary if the City of Pittsburgh, along with its local universities and businesses, subsidized public transportation entirely, making on-bus payments unnecessary and thereby speeding up service;[6] and if support of bicycling instead of car-driving is a goal, then installing safe, dedicated bike lanes buffered from the streets would likely motivate more people to bike than any bike rental scheme would.

It is not surprising that IBM, as a technology company, would recommend solutions that emphasize technology as the catalyst for city transformation. But because neither city infrastructure nor technological systems are value-neutral (Winner 1986), it is vital to question the underlying logic of these recommendations prior to their adoption or implementation. The discourse of these reports alone provides insight into the ideological underpinnings of the solutions in question. For instance, although there is almost nothing recognizable as scientific with the research the authors conducted for this report, they perform in a scientific discursive register to deflect in advance any criticisms of their self-interest or partial perspectives. Thus, they claim to have conducted "systematic research" and collected "facts" in order to arrive at recommendations that were "validated" against the findings of other "IBM global specialists" (IBM Smarter Cities Challenge 2012b, p. 5). Although City leaders may choose not to take IBM's recommendations, the claims of scientific research imply that the team's findings are impartial, accurate, and unassailable.

The grand narrative of this report invokes a sense of manifest destiny and evolutionary inevitability. The authors name a number of heroic actors (for example, "passionate citizens," "committed leaders," and "socially responsible corporations") who must be "empowered" by technology to overcome a series of daunting physical challenges introduced by nature (for example, "hills and slopes," "rivers," "weather conditions") because that is their right and their duty. If these actors fail to escort Pittsburgh into a new urban "renaissance," it will be because the city perishes in an evolutionary competition with other cities, because it neglects to reach its own potential to become a "mature" city that has harnessed fully the power of big data (IBM Smarter Cities Challenge 2012b). While

many people might agree with the need for robust multi-modal transportation systems in cities, this report's narrative simultaneously conjures myths of duty and inevitability while denying the constructed nature of these visions. After all, many of the problems cities face today are due to previous historical efforts to actualize industrial visions of the future; ones predicated on automobility, highways, and suburbs (Karvonen 2011; Lewis 1997). It should give one pause that these earlier visions were cultivated and funded by automobile industries, through advertising and impressive displays such as General Motors Corporation's "Futurama" exhibit and ride at the 1939 New York World's Fair (Marchand 1992). The new visions of smart cities are being shaped by technology industries that aspire to gain from lucrative contracts for their products and services. As cities jump on the "smart city" bandwagon, they may be repeating this pattern of following industry's self-interested vision, while offloading any social or environmental externalities to the public.

CONCLUSION

The way city needs are framed is undeniably consequential. In a sense, reports such as those produced by IBM highlight a range of insecurities while constraining how they might be addressed. The insecurities could be those of crime, deindustrialization, traffic, or unemployment, just to name a few, but data-driven solutions are presented as the universal response, regardless of the context. Even if cities do not adopt the approaches suggested by technology companies, the exercise of participating in such Smart City Challenges reinforces the dominant mythology of "big data" as the answer to problems that were previously viewed as intractable because of their complexity.

While the high-tech solutions of companies such as IBM may seem innovative, in actuality they are incredibly conservative. One unifying thread across smart-city discourses is that of system optimization: a promise of rationalizing city functions to be able to do more with less. Regardless of whether the systems in question achieve these goals, the very framing precludes revolutionary rethinking of city functions.[7] Instead, as the IBM reports make clear, the systems aspire to build upon existing logics, even if dysfunctional (for example, automobility, antagonistic policing). Discourses of technological neutrality – or of big data as a mystical crystal ball telling planners what to do – mask the politics of discursive framing, technological affordances, and built space.

Along the way, surveillance devices and functions are hard-wired into the city. Surveillance becomes the logic of the smart city. Some of the

control ramifications will be hard, such as the aggressive over-policing of minority neighborhoods, but many will be of a softer, more insidious nature. The importance of bodies or flows is increasingly determined by the amount, granularity, and value of data produced. This can be seen, for instance, with the proliferation of sensors to collect unique mobile phone data and map the movements of people – as potential consumers or criminals – through spaces and over time (Monahan 2016). It might also be detected in efforts to informatize public and private transportation systems, not only to optimize but also to invisibly prioritize the mobilities of the affluent (for example, cars over pedestrians), while amassing individualized data for future, unanticipated uses (Kitchin 2014; Monahan 2007; Packer 2006).[8] Just as online environments profile and track users in sometimes eerie ways, so too might the smart city develop ambient, seemingly omniscient awareness of the individuals moving within its ecosystems. Will such information systems support the spontaneity, unplanned exchanges, and sociality that characterize the most livable cities? Could they even begin to do so when control is their protocol?

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NOTES

1. In addition to academic researchers, civil society groups have been tracking smart-city initiatives and flagging their troubling implications. For instance, Privacy International draws attention, through blog reprints of news stories, to the ways in which India's "100 smart cities project" could lead to new forms of social apartheid by evicting the poor from their land and establishing high-tech fortified enclaves with ample access to clean water and other resources for the wealthy, while excluding the poor (Privacy International 2015; Ravindran 2015). In the US and other Western contexts, civil society groups have noted how smart electric meters, roads, and devices double as surveillance devices with high levels of granularity, posing significant challenges for privacy laws, which tend to lag behind (Privacy International n.d.; see also Hess and Coley 2012). Even current smart public trashcans, telephones, and ad displays have been documented to surreptitiously grab people's mobile phone data and track them for the benefit of private companies (Monahan 2016). Thus, these privacy and social-sorting threats are of great concern to groups such as the American Civil Liberties Union too (Stanley 2015).

2. As the *LA Weekly* reported about Los Angeles's 311 app: "You can now get the city to ignore your request . . . from the convenience of your smartphone" (Romero 2013).
3. The methodology employed by IBM's team is also suspect. The authors claim to have interviewed "approximately 60 youth, from a wide spectrum of Durham's youth population" (IBM Smarter Cities Challenge 2012a, p. 22). However, perhaps with the exception of two youth encountered during a "police ride-along," the authors did not interview any school dropouts to inquire about the circumstances surrounding their decisions. Nor, apparently, did the authors consult any academic studies of challenges facing students in the Durham school system or their communities. Without having a contextually situated understanding of the reasons for students dropping out of school or being unable to find employment, the proposed solution simply brackets those factors to concentrate on IBM's preferred individualized model.
4. The report notes that "more than 9000 members of Durham's African-American labor force . . . are out of a job" (IBM Smarter Cities Challenge 2012a, p. 22). It bears mentioning that although IBM does have a facility in the Research Triangle Park area in Durham County, the company has cut up to 105 000 jobs in the US over the past decade, so that "Fewer than one-fourth of people it employs worldwide now are in the US" (IBM Smarter Cities Challenge 2012a, p. 10).
5. In the final pages of this report, the team mentions briefly that a longer-range vision would entail increasing funding to education and mental health institutions, which would eventually contribute to reduced crime. This could then save the city money. These progressive recommendations are in tension with the tone and analytic simplicity of the rest of the report, perhaps indicating disagreement among some of the IBM team members.
6. For example, this is currently the case with Chapel Hill Transit in North Carolina. It should be acknowledged, however, that bus routes – along with days and times of operation – are geared toward university students and employees, not the community as a whole, so there is room for improvement.
7. I am indebted to Aron Sandell for this insight about the conservative tendency of smart city designs.
8. See Karen Levy's (2015) impressive ethnographic research on truck drivers' negotiation of new performance monitoring systems as well, which is research that calls attention to some of the workplace surveillance dimensions of these transformations.

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