1 The Smart City: A New Era on the Horizon

In 2016, an article appeared in the *Boston Globe* with a headline that city drivers everywhere have dreamed of saying: "Bye-bye traffic lights."[1] No, Boston had not suddenly removed every traffic light in the city. But such a change appeared to be around the corner: researchers at the Massachusetts Institute of Technology (MIT) had devised new "intelligent intersections"[2] that would enable oncoming streams of self-driving cars to merge seamlessly and travel through intersections without stopping.[3] Once this new technology was deployed, sitting in traffic would be a relic of the past. Simulated demonstrations of these futuristic streets seemed to augur the dawn of a new era, in which advanced technology would alleviate issues that had long plagued cities.

But there was something missing from the mathematical models and simulations that MIT had devised: people. Their city streets showed no sign of life beyond the flow of cars. What makes this omission particularly notable is that the intersection at the heart of the MIT models is among the busiest pedestrian and transit thoroughfares in downtown Boston and one of the most walkable locations in the entire United States.[4] Nobody likes traffic, but if eliminating it requires removing people from streets, what kinds of cities are we poised to create?

These MIT researchers were neither the first nor last to imagine the remarkable benefits that technological advances would bring to cities. Each proposal sounds magnificent, but if you simply scratch the surface of these futuristic models and utopian promises, a more ominous story emerges.

Consider "predictive policing"—machine learning algorithms that analyze historical crime patterns to predict when and where the next crimes will occur. With this information, many believe, police officers can efficiently prevent crime and make communities safer. These algorithms seem

to provide an objective and scientific way to maximize limited police resources. Police departments across the United States have adopted the software over the past decade, with one police chief hailing it for helping "us get smarter on our fight against crime."[5]

But these algorithms have a dark side: the information that guides their predictions is imbued with racial bias. Instead of representing an objective reality of where every crime has occurred, the data indicates where police have observed and prosecuted crimes—information that reflects the disparate ways that police treat different communities. By relying on this data, predictive policing software overestimates crime in minority neighborhoods and underestimates crime in white neighborhoods. Acting on these predictions exacerbates the existing biases in policing. Nobody wants crime, but if preventing it means perpetuating discriminatory practices, what kinds of cities are we poised to create?

Consider one more story. In 2016, New York City replaced thousands of pay phones with digital kiosks to create the world's largest and fastest free public Wi-Fi network.[6] These kiosks, branded under the name LinkNYC, also offer free domestic phone calls, USB charging ports, and interactive maps. As an added bonus, the kiosks do not cost the city a dime. LinkNYC's deployment highlighted the need for every city to democratize access to high-speed internet.

Once again, however, this new technology came with caveats. The LinkNYC kiosks are not a public service run by New York City. Instead, they are owned and operated by Sidewalk Labs—a subsidiary of Alphabet, the parent company of Google. How the kiosks are actually funded should thus be no surprise: Sidewalk Labs gathers data about everyone who uses the services, enabling it to generate targeted advertising. Connecting to the public Wi-Fi network therefore comes at the cost of providing data about your location and behavior to private companies. Everybody desires better public services, but if deploying them entails setting up corporate surveillance nodes throughout urban centers, what kinds of cities are we poised to create?

Each of these stories points toward a new type of city that is on the horizon, made possible by new technology: the "smart city." This book is about why, far too often, applications of technology in cities produce adverse consequences—and what we must do to ensure that technology helps create a more just and equitable urban future.

* * *

Thanks to the development of new technologies that make previously unimaginable capabilities routine, cities appear to be on the brink of a revolutionary breakthrough. We are promised that the benefits of these technologies—and the "smart cities" they help create—will be tremendous. Everyday objects will be embedded with sensors that can monitor the world around them. Machine learning algorithms will use this data to predict events before they occur, and to optimize municipal services for efficiency and convenience. Through apps, algorithms, and artificial intelligence, new technology will relieve congestion, restore democracy, prevent crime, and create free public services. The smart city will be the city of our dreams.

From major technology companies to the Obama White House to the National League of Cities,[7] the smart city has garnered widespread support and emerged as the consensus vision for the future of municipal governance. A 2016 survey of fifty-four U.S. cities found that they had collectively implemented or planned almost 800 smart city projects.[8]

Here's how the CEO and vice president of the technology company Cisco describes where we are heading: "By definition, Smart Cities are those that integrate information communications technology across three or more functional areas. More simply put, a Smart City is one that combines traditional infrastructure (roads, buildings, and so on) with technology to enrich the lives of its citizens."[9]

This general description—applying data and technology to traditional objects or processes to enhance efficiency and convenience—has come to define what it means to make something "smart," in cities and beyond. It is in this sense, as a term of art, that I will employ the word throughout the book.

Yet the promises of smart cities are illusory. Their deception stems from their very definition, which overemphasizes the power and importance of technology. Notice how Cisco grounds urban progress solely in the application of technology. This same focus is what produced the dangers of "intelligent intersections," predictive policing, and LinkNYC (examples that we will return to later in the book). As we will see, the problem with smart cities is not merely that technology is incapable of generating the promised benefits but also that attempts to deploy technology in pursuit of a smart city often distort and exacerbate the problems that are supposedly being solved.

Although presented as utopian, the smart city in fact represents a drastic and myopic reconceptualization of cities into technology problems. Reconstructing the foundations of urban life and municipal governance

in accordance with this perspective will lead to cities that are superficially smart but under the surface are rife with injustice and inequity. The smart city threatens to be a place where self-driving cars have the run of downtowns and force out pedestrians, where civic engagement is limited to requesting services through an app, where police use algorithms to justify and perpetuate racist practices, and where governments and companies surveil public space to control behavior.

Technology can be a valuable tool to promote social change, but a technology-driven approach to social progress is doomed from the outset to provide limited benefits or beget unintended negative consequences. As the philosopher John Dewey wrote, "The way in which [a] problem is conceived decides what specific suggestions are entertained and which are dismissed."[10] The sociologist Bruno Latour adds, "Change the instruments, and you will change the entire social theory that goes with them."[11] Dewey's and Latour's logic highlights where dreams of the smart city go astray: when we conceive of every issue as a technology problem, we entertain technical solutions and dismiss other remedies, ultimately arriving at narrow conceptions of what a city can and should be.

I call this perspective "technology goggles" (or simply "tech goggles"). At their core, tech goggles are grounded in two beliefs: first, that technology provides neutral and optimal solutions to social problems, and second, that technology is the primary mechanism of social change. Obscuring all barriers stemming from social and political dynamics, they cause whoever wears them to perceive every ailment of urban life as a technology problem and to selectively diagnose only issues that technology can solve. People wearing tech goggles thus perceive urban challenges related to topics such as civic engagement, urban design, and criminal justice as being the result of inefficiencies that technology can ameliorate, and they believe that the solution to every issue is to become "smart"—internet-connected, data-driven, and informed by algorithms—all in the name of efficiency and convenience. Seeing technology as the primary variable that can or should be altered, technophiles overlook other goals, such as reforming policy and shifting political power.

The fundamental problem with tech goggles is that neat solutions to complex social issues are rarely, if ever, possible. The urban designers Horst Rittel and Melvin Webber describe urban social issues as "wicked problems," so complex and devoid of value-free, true-false answers that "it makes no sense

to talk about 'optimal solutions.'"[12] Suggesting that technology can solve these types of problems—an attitude that the technology critic Evgeny Morozov decries as "solutionism"[13]—is misguided at best and duplicitous at worst.

Tech goggles do more than merely generate well-intended but ineffectual gizmos, however—they engender a dangerous ideology that has the potential to reshape society. Through a process that I call the "tech goggles cycle," tech goggles warp behaviors, priorities, and policies according to the logic of technology. The cycle operates in three stages. First, *tech goggles* create the perception that every issue can and should be solved with technology. This perspective leads people, companies, and governments to develop and adopt new *technology* intended to make society more efficient and "smart." As municipalities and urban residents adopt this technology, their behaviors, beliefs, and policies are shaped by the misguided assumptions and priorities embodied in these artifacts—*reinforcing* the perspective of tech goggles and bolstering the technologies shaped in their image. Through this process, alternative goals and visions that are not grounded in technology become harder both to recognize and to act on. The perspective of tech goggles becomes more deeply entrenched in our collective imagination.

Embedded in these technologies, and the social changes they beget, is politics. For technologies are not mere neutral tools. As the political theorist Langdon Winner explains in *The Whale and the Reactor*, technologies "embody specific forms of power and authority." Winner adds:

> technological innovations are similar to legislative acts or political foundings that establish a framework for public order that will endure over many generations. For that reason, the same careful attention one would give to the rules, roles,

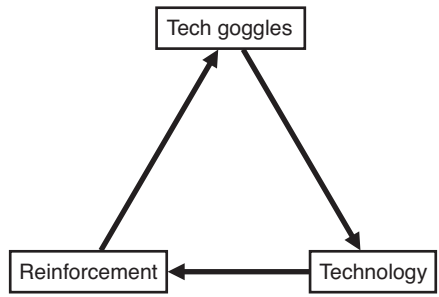

Figure 1.1
The tech goggles cycle.

> and relationships of politics must also be given to such things as the building of highways, the creation of television networks, and the tailoring of seemingly insignificant features on new machines. The issues that divide or unite people in society are settled not only in the institutions and practices of politics proper, but also, and less obviously, in tangible arrangements of steel and concrete, wires and semiconductors, nuts and bolts.[14]

Cities cannot escape the need to grapple with values and politics by adopting newer and more efficient technologies. The ways in which we develop and deploy smart city technologies will have vast political consequences: who gains political influence, how neighborhoods are policed, who loses their privacy. Yet tech goggles cause their devotees to perceive complex, normative, and eternally agonistic political decisions as reducible to objective, technical solutions. By conceptualizing urban issues as technology problems, smart city ideologues lose sight of these issues' normative and political elements. In turn, they evaluate solutions along technical criteria (such as efficiency) and overlook the broader consequences.

As Adam Greenfield, who presented one of the earliest and most trenchant critiques of smart cities in his 2013 book *Against the Smart City*, explains, such thinking "is effectively an argument [that] there is one and only one universal and transcendently correct solution to each identified individual or collective human need; that this solution can be arrived at algorithmically, via the operations of a technical system furnished with the proper inputs; and that this solution is something which can be encoded in public policy, again without distortion."[15]

This logic makes the smart city appear value-neutral and universally beneficial—as if it were the only reasonable way forward. Cisco's Urban Innovation team explains, "The debate is no longer about *why* a Smart City initiative is good for a city or *what* to do (which available options to choose), but instead about *how* to implement Smart City infrastructures and services."[16] IBM's president and CEO Samuel Palmisano expressed a similar position at a 2011 SmarterCities forum in Rio de Janeiro: "Think about it. What is the ideology of a transportation system? Of an energy grid? Of an urban food or water supply? . . . [If] the leaders of smarter city systems . . . do share an ideology, it is this: 'We believe in a smarter way to get things done.'"[17] Such rhetoric suggests that society has already reached a consensus about what type of cities to pursue, or perhaps that such a consensus can simply be assumed owing to the splendor of smart city possibilities. To

technologists, the benefits of enhanced efficiency are so obvious that the smart city transcends social and political debate—nay, renders it obsolete.

Of course, it is remarkably clear that urban systems such as transportation and water bear an ideology. Just ask anyone who used to live in the black communities that were destroyed last century to make way for highways that connect cities to white suburbs.[18] Or the majority black and impoverished residents of Flint, Michigan, who were poisoned with lead after state officials decided in 2014 to save money by changing the city's water source.[19] Winner famously describes how Robert Moses designed the overpasses on Long Island to be abnormally low as a way to prevent poor and minority New Yorkers (who mostly traveled by bus rather than private car) from reaching his prized beaches.[20]

But the mirage of objectivity is a common fallacy when quantitative and technical methods are involved. "A decision made by the numbers . . . has at least the appearance of being fair and impersonal," explains the historian Theodore Porter. "Quantification is a way of making decisions without seeming to decide."[21]

This siren song of finding objective, technical solutions to social issues is dangerous, especially when we are dealing with technologies as potent as those in the smart city. Believing that such answers exist leads us to underappreciate technology's social and political impacts and ignore alternative approaches for addressing those same issues. By blocking off legitimate political debate in the name of technological progress, presumptions of neutrality tend to bolster the status quo and obstruct more systemic reforms.

This book aims to expose the politics underlying smart cities and shed light on the myriad ways that technology impacts urban governance and life. Smart city rhetoric implies that technology follows an inevitable path, can take only one particular form, and is the primary driver of social and political progress—a common attitude, known as "technological determinism." Tech goggles suggest that adopting newer, faster, and more sophisticated technology is the sole path to improving cities. Instead of questioning how technology should be designed and what social outcomes it should support, technologists present us with the smart city as the only available and attractive urban future.

Technology does not take some inevitable path, however. We shape technology by embedding values in its design and developing it to achieve particular outcomes. Allowing society to be structured by technology thus

grants a subtle but potent power to those who design and deploy that technology; we must be critical about the values embedded in these tools and who gets to choose them. Many technologies are designed to remedy social issues by enhancing efficiency, for instance, but that approach does not make them value-neutral. Efficiency is a normative goal: it favors particular principles and outcomes at the expense of others, typically altering how status and resources are distributed across society. Determining which principles should be paramount in enhancing efficiency—in other words, determining *what* should be made efficient, the very question that Cisco dismisses as already resolved—thus requires the inherently political task of mediating between competing normative visions. As the philosopher Marshall Berman implores, "[W]hen we encounter categories like success/failure . . . , we need to ask: By what criteria? By whose criteria? For what purposes? In whose interests?"[22]

In the traffic optimization example discussed above, the efficient flow of autonomous vehicles could mean that pedestrians and cyclists are marginalized on city streets, since their presence would hinder traffic. Similarly, an emphasis on efficiency in civic engagement may position city governments as little more than customer service agencies, compounding inequality by prioritizing relatively superficial civic needs over more substantial ones. As we explore these and other smart city projects, we will repeatedly see how efficiency carries the veneer of being objective and socially optimal but can actually generate unexpected and unjust impacts.

We also project social and political values onto technology by choosing what practices and priorities to support with the capabilities it provides. As technology gets embedded within social and political institutions, its impacts are shaped by the values and practices therein. For example, even if predictive policing algorithms could make accurate and unbiased crime forecasts, that capability still would not dictate how we use those predictions. Our choice to send police to supposed crime hot spots condemns these algorithms to exacerbating the discriminatory practices and policies of our current criminal justice system, regardless of their technical characteristics. But that choice, and hence those impacts of crime predictions, is not inevitable: some cities are using similar algorithms to advance social justice by identifying individuals at risk of incarceration and proactively providing them with social services to keep them out of jail. No matter how advanced our technology may be, in other words, we can never escape from the normative and political task of deciding how to use it.

In addition, a technology's design and political structure can generate social impacts that have little to do with its nominal function. What makes LinkNYC troubling is not the stated application of the technology—free public Wi-Fi is a service that every city should provide—but the way in which that service is achieved: it is funded by collecting and monetizing data about the public. Similarly, local governments are increasingly making important decisions (such as sentencing criminal defendants and assigning students to schools) based on the outputs of algorithms. Yet despite the potentially life-altering decisions that these algorithms inform, cities typically provide the public with little or no insight regarding how they were developed or how they work. Even if these algorithms can improve the accuracy of certain decisions, they contribute to the creation of unaccountable black-box cities. These same technical capabilities can be realized through far more democratic architectures, however, if only we can muster the political will to build them.

Finally, there are many nontechnical factors that constrain the impacts of technology and prevent it from generating outcomes that appear through tech goggles to be predetermined. Many believe that technological advancements in communication will support a bright new era of political engagement and dialogue, for example. But these dreams have not been realized, because the fundamental limitations on democratic decision making and civic engagement are not informational or conversational inefficiencies but rather power, politics, and public motivation. Similarly, even potentially valuable technologies may have underwhelming impacts if they are not properly used or managed. Contrary to the fables told by smart city proponents, technology creates little value on its own—it must be thoughtfully embedded within municipal governance structures.

This book will contain many examples of failures by technology evangelists to accurately forecast technology's impacts—failures caused by their overlooking many of the determinants of social and political issues. While technology can certainly alter social and political conditions, it is also contingent on them: indeed, technology's impacts are largely shaped by the contexts and manner in which it is deployed.

Technological determinism thus warps debates about technology in cities by blinding us to the full range of outcomes that technology could support. When we grant agency to technology, we rid ourselves of the agency to develop visions for the world that we want to create. Presuming a single path for technological development instead leads us into meaningless

for-or-against debates in which those who adopt new technology are seen as innovative while those who do not are branded as Luddites.

In this way, the smart city achieves much of its appeal via its juxtaposition to a boogeyman: the "dumb city," a municipality that stubbornly refuses new technology and clings to obsolete and inefficient practices. Acolytes present smart city solutions as a necessary improvement to the dumb city without analyzing technology's social impacts or considering alternative designs. The smart city is thus founded on a false dichotomy and blinds us to the broader possibilities of technology and social change. We become stuck asking a meaningless, tautological question—is a smart city preferable to a dumb city?—instead of debating a more fundamental one: does the smart city represent the urban future that best fosters democracy, justice, and equity?

* * *

I believe that the answer is no—that our essential task is to defy the logic of tech goggles and recognize our agency to pursue an alternative vision: the "Smart Enough City." It is a city free from the influence of tech goggles, a city where technology is embraced as a powerful tool to address the needs of urban residents, in conjunction with other forms of innovation and social change, but is not valued for its own sake or viewed as a panacea. Rather than seeing the city as something to optimize, those who embrace the Smart Enough City place their policy goals at the forefront and, recognizing the complexity of people and institutions, think holistically about how to better meet their needs.

As we interrogate the smart city, we will also read inspiring stories of Smart Enough Cities that are leveraging technology to create lasting benefits for residents. The leaders who spearheaded these efforts did not unlock a special new app or algorithm. Instead of trying to be "smart" and blindly chasing efficiency and connectivity, these leaders realized that cities need to be only "smart enough" to advance their social policy goals.

Several common attributes will emerge among the Smart Enough Cities we explore. The first is that the most impactful applications of technology occur when it is deployed in conjunction with other forms of innovation. In smart cities, technology is deployed to make existing processes and programs more efficient, with little or no critical assessment of how well those

processes and programs meet the needs of urban residents; improving cities means improving their technology. In contrast, Smart Enough Cities recognize that social problems are rooted in more than just technological limitations and embrace a variety of approaches (including, but not limited to, technology) to ameliorate those problems.

In the stories we will read about Smart Enough Cities, new programs and policies that thoughtfully reform existing practices generate the main benefits; technology acts as a critical tool to enhance these new approaches, but would have few benefits without them. For example, we will examine how Seattle improved homeless services by restructuring its contracts with social service providers and more clearly defining its goals. Although the city also gained useful data that informs how it deploys resources, its most important innovation was developing a new approach to working with local organizations. Paired together, the data and contract reforms generated impacts far greater than either could have achieved on its own.

The other essential attribute of Smart Enough Cities is that they unlock technology's value by supporting its adoption with reforms to institutions and operations. Visions for smart cities tend to presume that technology operates in a vacuum and that the key to success is having the best tool or the most information. In contrast, with a keen awareness of the many nontechnological barriers to using technology in government, Smart Enough Cities recognize that technology will have little impact unless it is thoughtfully embedded into municipal structures and practices. We will read about how Johnson County, Kansas, created data-sharing processes that are vital to keeping individuals suffering from mental illness out of jail, how New York City and San Francisco developed quality standards and training to help city staff use data, and how Chicago and Seattle developed governance structures to ensure that new technology is used responsibly without violating individual privacy. Tech goggles–inspired headlines about these initiatives might proclaim the power of technology, when in reality the impact of that technology relies on a great deal of bureaucratic (and decidedly unsexy) innovation and support.

The notion of "smart enough" may strike some as shifting the goalposts and setting our sights too low—settling to be merely "good enough." But in fact, the principles of a Smart Enough City are far more ambitious and harder to achieve than those of a smart city. Compared to addressing

intractable urban social and political challenges, solving purely technical problems such as predicting crime and deploying Wi-Fi is trivial. Thoughtfully blending technical and nontechnical perspectives to promote democratic and egalitarian cities is the greatest aspiration of all, one that we must ceaselessly pursue.

* * *

This book is about the battle for the future of cities. The smart city may represent the next major urban transformation, with digital technology playing the role today that trains, electricity, and cars have played in the past. But the revolution ahead is not primarily a technological one: as we will see, many smart city technologies fall far short of achieving their promised benefits. We must instead interrogate the smart city because, through the technologies we deploy, we are going to answer some of the most fundamental social and political questions about twenty-first-century cities: Whose needs should urban design prioritize? What is a desirable relationship between a government and its constituents? How should society address crime? How much autonomy should individuals have in their relations with governments and companies? To the extent that the smart city revolutionizes urban life, in other words, it will be by transforming the landscape of urban politics and power than rather than by creating any sort of technological utopia.

With this in mind, we will journey through city halls, tech companies, police departments, and urban neighborhoods to uncover the risks posed by smart cities—and discover why an alternative approach is both necessary and possible. We will examine city governments that have followed the principles of Smart Enough Cities to support policies and programs that improve the well-being of their residents. By juxtaposing successful and unsuccessful applications of technology in cities, this book will identify strategies for ameliorating urban problems using technology as well as strategies for avoiding ineffective and perverse uses of technology.

While the smart city touches many sectors around the world, my main focus will be on how municipal governments within the United States deploy and manage new technology. The reason for this emphasis is twofold. First, those are the bounds of my own competency. I have previously worked for the city government in New Haven and Boston (and have worked closely with other municipalities, including Memphis, San

Francisco, and Seattle) advising on best practices for how to adopt, manage, and use technology. Although I will occasionally look abroad for lessons and parallel developments (indeed, our first story will come from Toronto), my experience is limited to the particular legal and policy environments of U.S. cities.

Second, local governments are taking on an outsized and new role in dictating the social outcomes generated by new technology, creating an urgent need for in-depth analysis of how municipalities use and control technology. City governments are responsible for many of the most impactful decisions about how to deploy new technologies. This is unfamiliar territory for most municipalities, yet it is imperative that they make the right decisions now, while our notions of urban technology are still developing. The decisions we make today will dictate the social and political conditions of the next century. And as the population becomes increasingly urban, it is more important than ever that we thoughtfully assess our hopes and plans for cities.

This book, however, is intended not just for city officials but for all urban dwellers. They are the ones who will reap the benefits and suffer the detriments from new technology—and who must hold their local governments accountable for advancing equitable urban progress with technology. I hope that the lessons this book provides will extend beyond the bounds that constrain my focus and prove useful for activists, technologists, and governments around the world.

The book's structure mirrors the transformation that is needed in our vision for the future of urbanism. This first chapter's theme—the smart city—is today the predominant dream and hence our point of departure. In each subsequent chapter, we will encounter alternative visions for the city that are in conflict with the smart city but nevertheless attainable with the help of technology: a livable city, a democratic city, a just city, a responsible city, and an innovative city. Along the way, each chapter will develop a progressively deeper portrait of how technology impacts society and why cities need to focus on policy, institutions, and people even as they pursue new technology. Together, these stories will demonstrate why cities must strive to be "smart enough" rather than "smart," thereby repositioning technology as a means to improving cities rather than as an end in and of itself. We will conclude by condensing the many lessons learned into a new and bold vision: the Smart Enough City.

The fundamental question of this book is not whether to be for or against innovation, nor for or against technology—it is how to facilitate the innovation and progress that will most benefit city residents. One can oppose a particular implementation of technology without opposing the development and adoption of new technology in general. For there is more to progress than adopting new technology. Progress ought to also mean adapting policies and practices to achieve a more inclusive and democratic city. Designed thoughtfully, technology can be an incredibly potent tool to advance such progress; designed carelessly or inappropriately, technology can inhibit or even derail it.

In this respect, my challenge to the smart city is fundamentally pro-technology: I believe strongly in technology's ability to improve municipal governance and urban life. In fact, it is precisely because of this optimism—because I see how far we risk falling short of an attainable and more desirable urban future—that I write with such urgency.

For technology to achieve the positive impacts of which it is capable, we must dismiss naive dreams of being smart and instead incorporate technology into holistic social and political visions. We must take off our tech goggles and proclaim that smart cities are not what we need. In fact, they distract us from the cities that we do need: livable, democratic, just, responsible, and innovative ones. Technology can help us transform these cities from dreams into reality—but only once we reckon with the critical question that few have asked of smart cities: smart enough for what?

The Smart Enough City

Putting Technology in Its Place to Reclaim Our Urban Future

By: Ben Green

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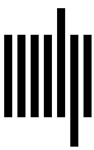

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