



QUEST FOR A NEW UTOPIA

Build the Smart City of the Future, One Street Corner at a Time

By Anthony M. Townsend

In 2008, our global civilization reached three historic thresholds. The first came in February when United Nations demographers predicted that within the year, the millennia-long project of settling the planet would move into its final act. “The world population will reach a landmark in 2008,” they declared; “for the first time in history the urban population will equal the rural population of the world.” We would give up the farm for good and become a mostly urban species.

For thousands of years, we’ve migrated to cities to connect. Cities accelerate time by compressing space and let us do more with less of both. They are where jobs, wealth and ideas are created. They exert a powerful gravitational pull on the young and the ambitious, and we are drawn to them by the millions, in search of opportunities to work, live and socialize with each other. While in the end it took slightly longer than the original forecast, by the spring of 2009, most likely in one of China’s booming coastal cities or the swelling slums of Africa, a young migrant from the hinterlands stepped off a train or a jitney and tipped the balance between town and country forever.

Cities flourished during the twentieth century, despite humanity’s best efforts to destroy them by aerial bombardment and suburban sprawl. In 1900, just 200 million people lived in cities, about one-eighth of the world’s population at the time. Today, just over a century later, 3.5 billion call a city home. By 2050, United Nations projections indicate, the urban population will expand to nearly 6.5 billion. By 2100, the global population could top ten billion, and cities could be home to as many as eight billion people.

This urban expansion is the biggest building boom humanity will ever undertake. Today, India needs to build the equivalent of a new Chicago every year to keep up with demand for urban housing. In 2001, China announced plans to build twenty new cities each year

◁ [Google Data Center, Douglas County, Georgia, February 2012.](#) *Connie Zhou/Google/Associated Press*

through 2020, to accommodate an estimated twelve million migrants arriving annually from rural areas. Already largely urbanized, Brazil will instead spend the twenty-first century rebuilding its vast squatter cities, the favelas. In sub-Saharan Africa, where 62 percent of city dwellers live in slums, the urban population is projected to double in the next decade alone. Just in the developing world, it is estimated that one million people are born in or migrate to cities every single week.

The next step was to untether ourselves from the grid. In 2008, for the first time, the number of Internet users who beamed their bandwidth down over the airwaves surpassed those who piped it in over a cable. In the technical jargon of telecommunications industry statisticians, the number of mobile cellular broadband subscribers surpassed the number of fixed DSL, cable and fiber-optic lines. This shift is being driven by the rapid spread of cheap mobile devices in the developing world, where the mobile web has already won. In India the volume of data sent across wireless networks now surpasses what's conveyed by wire.

Smartphones in hand—over a billion worldwide by 2016, according to Forrester, a market research firm—we are reorganizing our lives and our communities around mass mobile communications. Talking on the go is hardly a new idea—the first mobile phone call was placed in the United States in 1946. But it wasn't until the 1990s that personal mobility came to so dominate and define our lives and demand a telecommunications infrastructure that could keep up. By freeing us to gather where we wish, our mobiles are a catalyst for density; the most robust cellular networks are those that blanket stadiums in bandwidth so spectators can share every score by talking, texting and photos sent to the social web. But these same networks can be a substrate for sprawl, a metropolitan nervous system conveniently connecting our cars to the cloud. They may be our most critical infrastructure and seem to be our highest priority. Even as we struggle to find the public will to fund basic maintenance for crumbling roads and bridges, we gladly line up to hand over hard-earned cash to our wireless carriers. Flush with funds, the U.S. wireless industry pumps some \$20 billion a year into network construction. While the capital stock invested in the century-old power grid is estimated at \$1 trillion in North America alone, nearly \$350 billion has been spent in the last twenty-five years on the 285,000 towers that blanket American cities with wireless bandwidth.

The transition away from wires is almost complete. Mobile phones are the most successful consumer electronic devices of all time. Some six billion are in service around the globe. Three-quarters are in the developing world. In just a few years, it will be unusual for a human being to live without one.

The final transformation of 2008 caught us by surprise. The urban inflection point and the ascendance of wireless were two trends demographers and market watchers

had long seen approaching. But just as we verged on linking all of humanity to the global mobile web, we became a minority online. We'll never know what tipped the balance—perhaps a new city bus fired up its GPS tracker for the first time, or some grad students at MIT plugged their coffee pot into Facebook. But at some point the Internet of People gave way to the Internet of Things.

Today, there are at least two additional things connected to the Internet for every human being's personal device. But by 2020 we will be hopelessly outnumbered—some fifty billion networked objects will prowl the reaches of cyberspace, with a few billion humans merely mingling among them. If you think banal chatter dominates the Web today, get ready for the cacophony of billions of sensors tweeting from our pockets, the walls, and city sidewalks, reporting on minutiae of every kind: vehicle locations, room temperatures, seismic tremors and more. By 2016, the torrent of readings generated by this Internet of Things could exceed 6 petabytes a year on our mobile networks alone (one petabyte equaling one billion gigabytes). It will drown out the entire human web—the ten billion photos currently archived on Facebook total a mere 1.5 petabytes. Software in the service of businesses, governments and even citizens will tap this pool of observations to understand the world, react and predict. This “big data,” as it is increasingly known, will be an immanent force that pervades and sustains our urban world.

This crowded and connected world isn't our future—we are already living in it. Comparing today's China to his first glimpses of the Communist state in the 1980s, U.S. Ambassador Gary Locke captured the historic nature of this shift. “Now...it is skyscrapers, among the tallest in the world,” he told PBS talk-show host Charlie Rose on the air in early 2012. “It is phenomenal growth...using smartphones everywhere you go. The transformation is just astounding.”

But the transformation is just getting started. How we guide the integration of these historic forces, the intersection between urbanization and ubiquitous digital technology, will, to a great extent, determine the kind of world our children's children will inhabit when they reach the other end of this century.

Symbiosis

The symbiotic relationship between cities and information technology began in the ancient world. Nearly six thousand years ago, the first markets, temples and palaces arose amid the irrigated fields of the Middle East and served as physical hubs for social networks devoted to commerce, worship and government. As wealth and culture flourished, writing was invented to keep tabs on all of the transactions, rituals and rulings. It was the world's first information technology.

In more recent eras, each time human settlements have grown larger, advances in information technology have kept pace to manage their ever-expanding complexity. Dur-

ing the nineteenth century, industrialization kicked this evolutionary process into high gear. New York, Chicago, London and other great industrial cities boomed on a steady diet of steam power and electricity. But this urban expansion wasn't driven only by new machines that amplified our physical might, but also by inventions that multiplied our ability to process information and communicate quickly over great distances. As Henry Estabrook, the Republican orator (and attorney for Western Union) bombastically declared in a speech honoring Charles Minot, who pioneered the use of the telegraph in railroad operations in 1851, "The railroad and the telegraph are the Siamese twins of commerce, born at the same period of time, developed side by side, united by necessity."

The telegraph revolutionized the management of big industrial enterprises. But it also transformed the administration of city government. Police departments were among the earliest adopters, using the tool to coordinate security over growing jurisdictions. Innovations flowed from government to industry as well—the electro-mechanical tabulators invented to tally the massive 1890 census were soon put to use by corporations to track the vital signs of continent-spanning enterprises. By enabling business to flourish and municipalities to govern more effectively, these technologies removed critical obstacles to the growth of cities. By 1910, historian Herbert Casson could declare matter-of-factly what was clear to all about yet another technology. "No invention has been more timely than the telephone," he wrote. "It arrived at the exact period when it was needed for the organization of great cities and the unification of nations."

For anyone who has telecommuted to work or watched a live broadcast from the other side of the planet, it seems counterintuitive that the growth of cities and the spread of information technology are so strongly linked. Many have argued the opposite—that new technologies undermine the need for cities and all of the productive yet expensive and sometimes unpleasant proximity they provide. In 1964 science-fiction legend Arthur C. Clarke articulated a vision of the future where, thanks to satellite communications, "It will be possible...perhaps only fifty years from now, for a man to conduct his business from Tahiti or Bali, just as well as he could from London." More recently, as the Internet began its meteoric rise in the mid-1990s, tech pundit George Gilder wrote off cities as "leftover baggage from the industrial era." But instead of disintegrating, London grew bigger, richer, more vital and connected than ever. Instead of undermining the city, new telecommunications technologies played a crucial role in London's success—it is the hub of a global tangle of fiber-optic networks that plug its financiers and media tycoons directly into the lives of billions of people all over the world.

We experience the symbiosis of place and cyberspace every day. It's almost impossible to imagine city life without our connected gadgets. In my own pocket, I carry an iPhone. It is my megacity survival kit, a digital Swiss Army knife that helps me

search, navigate, communicate, and coordinate with everyone and everything around me. I have apps for finding restaurants, taxis and my friends. A networked calendar keeps me in sync with my colleagues and my family. If I'm running late, there are three different ways to send a message and buy some time. But I'm not alone. We've all become digital telepaths, hooked on the rush we get as these devices untether us from the tyranny of clocks, fixed schedules, and prearranged meeting points. The addiction started, as all do, slowly at first. But now it governs the metabolism of our urban lives. With our days and nights increasingly stretched across the vastness of megacities, we've turned to these smart little gadgets to keep it all synchronized. It's no accident that the most common text message, sent billions of times a year all over the world, is "where r u?"

The digital revolution didn't kill cities. In fact, cities everywhere are flourishing because new technologies make them even more valuable and effective as face-to-face gathering places.

Struggle

Beginning in the 1930s, men like Robert Moses began rebuilding cities around a new technology, the automobile. Moses was an autocrat and technocrat, a master planner and "power broker" (the title of Robert Caro's epic biography). His disdain for the accumulated architectural canvas he inherited was no secret. "You can draw any kind of picture you like on a clean slate and indulge your every whim in the wilderness of laying out a New Delhi, Canberra or Brasilia," he said of the new capital cities of that era, "but when you operate in an overbuilt metropolis you have to hack your way with a meat ax." For three decades, in various public posts in New York and elsewhere as a consultant, Moses brought to life the dazzling vision of a middle-class, motorized America first unveiled by General Motors at the 1939 World's Fair in New York City. To make way for the future, he bulldozed the homes of over a quarter-million unfortunate New Yorkers.

Today, a new group of companies have taken GM's spot in the driver's seat and are beginning to steer us toward a new utopia, delivered not by road networks but by digital networks. Instead of paving expressways through vibrant neighborhoods, these companies hope to engineer a soft transformation of cities through computing and telecommunications. "Drivers now see traffic jams before they happen," boasts an IBM advertisement posted in airports all over the world. "In Singapore, smarter traffic systems can predict congestion with 90 percent accuracy." With upgrades like these, unlike Moses, we may never need to pave another mile of roadway.

For the giants of the technology industry, smart cities are fixes for the dumb designs of the last century to prepare them for the challenges of the next, a new indus-

trial revolution to deal with the unintended consequences of the first one. Congestion, global warming, declining health—all can simply be computed away behind the scenes. Sensors, software, digital networks, and remote controls will automate the things we now operate manually. Where there is now waste, there will be efficiency. Where there is volatility and risk, there will be predictions and early warnings. Where there is crime and insecurity, there will be watchful eyes. Where you now stand in line, you will instead access government services online. The information technology revolution of the nineteenth century made it possible to govern industrial cities as their populations swelled into the millions. This revolution hopes to wrest control over cities of previously unthinkable size—ten, twenty, fifty, or even one hundred million people.

With a potential market of more than \$100 billion through the end of this decade, many of the world's largest companies are jockeying for position around smart cities. There are the engineering conglomerates that grew to greatness building the systems that control our world: IBM, which sprang from the company that built the tabulators for the 1890 census; Siemens, which got its start by wiring up German cities with telegraph cables; and General Electric, which lit up America's cities with artificial light. But there are newcomers, too, like Cisco Systems, the master plumber of the Internet. For each, success in selling us on smart cities will pave the way for decades of growth. Peering out from the cover of *Forbes* in 2011, CEO Peter Löscher of Siemens summed up the hopes of corporate leaders everywhere as he gushed at the prospect of supplying infrastructure for the cities of the developing world, "This is a huge, huge opportunity."

By the 1970s, the construction of urban expressways in the United States had ground to a halt, stopped by a grassroots rebellion that held very different views of the role of cars, how city planning should be conducted and even the very nature of the city itself. The first signs of a similar backlash to corporate visions of smart cities are now coming to light, as a radically different vision of how we might design and build them bubbles up from the street. Unlike the mainframes of IBM's heyday, computing is no longer solely in the hands of big companies and governments. The raw material and the means of producing the smart city—smartphones, social software, open-source hardware, and cheap bandwidth—are widely democratized and inexpensive. Combining and recombining them in endless variations is cheap, easy, and fun.

All over the world, a motley assortment of activists, entrepreneurs and civic hackers are tinkering their ways toward a different kind of utopia. They eschew efficiency, instead seeking to amplify and accelerate the natural sociability of city life. Instead of stockpiling big data, they build mechanisms to share it with others. Instead of optimizing government operations behind the scenes, they create digital interfaces for people to see, touch, and feel the city in completely new ways. Instead of proprietary

monopolies, they build collaborative networks. These bottom-up efforts thrive on their small scale, but hold the potential to spread virally on the Web. Everywhere that industry attempts to impose its vision of clean, computed, centrally managed order, they propose messy, decentralized and democratic alternatives.

It's only a matter of time before they come to blows.

Experimentation

At the middle of this emerging battlefield sits City Hall. Encamped on one flank are industry sales teams, proffering lump sums up front in return for exclusive contracts to manage the infrastructure of cash-strapped local governments. On the other flank, civic hackers demand access to public data and infrastructure. But even as they face the worst fiscal situation in a generation—in the United States, in Europe, even in China—cities are rapidly emerging as the most innovative and agile layer of government. Citizens routinely transcend the tyranny of geography by going online, but local governments are still the most plugged in to their daily concerns. Yet citizen expectations of innovation in public services continue to grow, while budgets shrink. Something has to give.

For a new cadre of civic leaders, smart technology isn't just a way to do more with less. It's a historic opportunity to rethink and reinvent government on a more open, transparent, democratic, and responsive model. They are deploying social media to create more responsive channels of communication with citizens, publishing vast troves of government data on the Web and sharing real-time feeds on the location of everything from subways to snowplows. There's also a huge economic opportunity. By unlocking public databases and building broadband infrastructure, many cities hope to spawn homegrown inventions that others will want to buy, and attract highly mobile entrepreneurs and creative talent. Looking smart, perhaps even more than actually being smart, is crucial to competing in today's global economy.

Zoom out from the local to the global scale and, like a satellite photo of the earth at night, a twinkling planet of civic laboratories comes into view. According to Living Labs Global, a Barcelona-based think tank that tracks the international trade in smart-city innovations, there are over 557,000 local governments worldwide. As they begin to experiment with smart technology, each faces a unique set of challenges and opportunities with a different pool of resources. Much as there are mobile apps for every purpose we can imagine, smart cities are being crafted in every imaginable configuration. Local is the perfect scale for smart-technology innovation for the same reasons it's been good for policy innovation—it's much easier to engage citizens and identify problems, and the impact of new solutions can be seen immediately. Each of these civic laboratories is an opportunity to invent.

But each local invention is also an opportunity to share with other communities. For the last few decades, as the pace of globalization accelerated, multinational corporations were the primary means by which technological innovation spread from place to place. Industry would love to play the role of Johnny Appleseed again with smart-city technology. But cities have become highly adept at sharing and copying new innovations on their own, as evidenced in an accelerating diffusion of good ideas. Bus rapid transit, a scheme for improving the capacity of bus lines with dedicated lanes and other clever tweaks, has taken forty years to spread from its birthplace in Curitiba, Brazil, in 1974 to over 120 cities all over the world. Public bike sharing, which surged onto the global stage with the launch of Paris' Vélib' system in 2007, has reached a similar footprint in just a few years. Today, there is a bustling trade not just in case studies and best practices of smart-city innovations but actual working technology: code, computer models, data and hardware designs. These digital solutions can spread quite literally overnight.

The spectacular array of local innovations being cooked up in the world's civic laboratories will challenge our assumptions about both technology and cities, and how they should shape each other. Technologists often want to cut to the chase, find the killer app and corner the market—this dynamic is already at work in corporate plans for cookie-cutter smart cities. But if we want to get the design of smart cities right, we need to take into account local quirks and involve citizens in their creation. Over time, we'll surely extract the essence of what's reusable and share it widely. But building smart cities is going to take time. It will by necessity be a long, messy, incremental process.

Crash

Every city contains the DNA of its own destruction—some existing fissure that, under pressure, can erupt into conflict or cascade into collapse.

Smart technologies are already fueling conflict between factions in divided cities. The extent of the role played by social media in the 2011 urban uprisings of the Arab Spring has been hotly debated. But Facebook, Twitter, and YouTube were a mere sideshow to the torrent of text messages that turned angry crowds into smart mobs, as they have done numerous times since 2001, when they summoned some 700,000 Filipinos to protests against corrupt President Joseph Estrada. These wireless channels, which provide what is for all intents and purposes a rudimentary form of telepathic communication, were so important that at the height of the Egyptian uprising authorities lobotomized Cairo by ordering a shutdown of the nation's cellular networks. While this act didn't stop the revolution (and probably hastened the flow of remaining bystanders out into the streets), blacking out cities' wireless networks is becoming a disturbingly appealing option for security officials in the West as well—in August 2011 transit police jammed cellular signals during antipolice protests in San

Francisco. The same week officials in the United Kingdom discussed blocking the BlackBerry Messenger mobile messaging service and other social media being used to coordinate widespread urban rioting.

Smart cities may also amplify a more commonplace kind of violence—that inflicted by poverty—by worsening gaps between haves and have-nots. This may happen by design, when sensors and surveillance are used to harden borders and wall off the poor from private gated communities. Or it may simply be an unintended consequence of poorly thought-through interventions.

In 2001, the government of India's Karnataka state set out to reform the way it tracked land ownership, ostensibly to root out village-level corruption. Bhoomi, as the new digital recording system was called, was funded by the World Bank as a model for e-government reforms throughout the developing world. But it had the opposite impact. The village-level officials who had administered the old system had always taken bribes, but in return, they interpreted documents for the illiterate and provided advice on how to navigate complex legal procedures. Bhoomi certainly curbed village level corruption—the number of persons reporting paying bribes fell from 66 percent to 3 percent. But centralizing records merely centralized corruption. Wealthy speculators with deep pockets simply targeted officials at higher levels, allowing them to rapidly appropriate land in the expansion path of the region's fast-growing capital, Bangalore. As one development scholar has noted, "While in theory, the initiative was intended to democratize access to information, in practice the result was to empower the empowered." As similar digitization efforts transform government everywhere, the stakes for the poor are enormous. In this new computational arms race, poor communities will be at the mercy of those who can measure and control them from a distance.

Even if there is peace and equality, the smart city may come crashing down under its own weight because it is already buggy, brittle and bugged, and will only become more so. Smart cities are almost guaranteed to be chock full of bugs, from smart toilets and faucets that won't operate to public screens sporting Microsoft's ominous Blue Screen of Death. But even when their code is clean, the innards of smart cities will be so complex that so-called normal accidents will be inevitable. The only questions will be when smart cities fail, and how much damage they cause when they crash. Layered atop the fragile power grid, already prone to overload during crises and open to sabotage, the communications networks that patch the smart city together are as brittle an infrastructure as we've ever had.

Before it ever comes close to collapse, we might tear down the walls of the smart city ourselves, for they will be the ultimate setup for surveillance. Will smart cities become the digital analogue of the Panopticon, Jeremy Bentham's 1791 prison design,

where the presence of an unseen watcher kept order more effectively than the strongest bars? In the 1990s, the Surveillance Camera Players staged sidewalk performances at camera locations in New York City to protest the rapid spread of video monitoring in public spaces. As we install countless new devices that record, recognize, influence and control our movements and behaviors, this whimsical dissent will seem quaint in retrospection. For as the true value of these technologies for governments and corporations to spy on citizens and consumers alike becomes apparent, the seeds of distrust will bloom. In 2012, concerned about the risks of face-recognition technology, U.S. Senator Al Franken said, “You can change your password, and you can get a new credit card, but you can’t change your fingerprint, you can’t change your face—unless, I guess, you go through a great deal of trouble.” But devious countermeasures are already spreading. In the place of protest, more pragmatic responses are popping up, like Adam Harvey’s CV Dazzle. A face-painting scheme based on World War I anti-submarine camouflage, CV Dazzle is designed to confuse face-recognition algorithms.

A New Civics

If the history of city building in the last century tells us anything, it is that the unintended consequences of new technologies often dwarf their intended design. Motorization promised to save city dwellers from the piles of horse manure that clogged nineteenth-century streets and deliver us from a shroud of factory smoke back to nature. Instead, it scarred the countryside with sprawl and rendered us sedentary and obese. If we don’t think critically now about the technology we put in place for the next century of cities, we can only look forward to all the unpleasant surprises they hold in store for us.

But that’s only if we continue doing business as usual. We can stack the deck and improve the odds, but we need to completely rethink our approach to the opportunities and challenges of building smart cities. We need to question the confidence of tech-industry giants, and organize the local innovation that’s blossoming at the grassroots into a truly global movement. We need to push our civic leaders to think more about long-term survival and less about short-term gain, more about cooperation than competition. Most importantly, we need to take the wheel back from the engineers and let people and communities decide where we should steer.

People often ask me, “What is a smart city?” It’s a hard question to answer. ‘Smart’ is a problematic word that has come to mean a million things. Soon, it may take its place alongside the handful of international cognates—vaguely evocative terms like ‘sustainability’ and ‘globalization’—that no one bothers to translate because there’s no consensus about what they actually mean. When people talk about smart cities, they often cast a wide net that pulls in every new public-service innovation from bike

sharing to pop-up parks. The broad view is important, since cities must be viewed holistically. Simply installing some new technology, no matter how elegant or powerful, cannot solve a city's problems in isolation. But there really is something going on here—information technology is clearly going to be a big part of the solution. It deserves treatment on its own. I take a more focused view and define smart cities as places where information technology is combined with infrastructure, architecture, everyday objects and even our bodies to address social, economic and environmental problems.

I think the more important and interesting question is, "What do you want a smart city to be?" We need to focus on how we shape the technology we employ in future cities. There are many different visions of what the opportunity is. Ask an IBM engineer and he will tell you about the potential for efficiency and optimization. Ask an app developer and she will paint a vision of novel social interactions and experiences in public places. Ask a mayor and it's all about participation and democracy. In truth, smart cities should strive for all of these things.

There are trade-offs between these competing goals for smart cities. The urgent challenge is weaving together solutions that integrate these aims and mitigate conflicts. Smart cities need to be efficient but also preserve opportunities for spontaneity, serendipity and sociability. If we program all of the randomness out, we'll have turned them from rich, living organisms into dull mechanical automatons. They need to be secure, but not at the risk of becoming surveillance chambers. They need to be open and participatory, but provide enough support structure for those who lack the resources to self-organize. More than anything else, they need to be inclusive. In her most influential book, *The Death and Life of Great American Cities*, the acclaimed urbanist Jane Jacobs argued that, "Cities have the capability of providing something for everybody, only because, and only when, they are created by everybody." Yet, over fifty years later, as we set out to create the smart cities of the twenty-first century, we seem to have again forgotten this hard-learned truth.

But there is hope that a new civic order will arise in smart cities and pull every last one of us into the effort to make them better places. Cities used to be full of strangers and chance encounters. Today we can mine the social graph in an instant by simply taking a photo. Algorithms churn in the cloud, telling the little things in our pocket where we should eat and whom we should date. It's a jarring transformation. But even as old norms fade into the past, we're learning new ways to thrive on mass connectedness. A sharing economy has mushroomed overnight, as people swap everything from spare bedrooms to cars, in a synergistic exploitation of new technology and more earth-friendly consumption. Online social networks are leaking back into the thriving urban habitats where they were born in countless promising ways.

These developments are our first baby steps in fashioning a new civics for smart cities.

Where You Live

For the last fifteen years, I've watched the struggle over how to build smart cities evolve from the trenches. I've studied and critiqued these efforts, designed parts of them myself and cheered others along. I've written forecasts for big companies as they sized up the market, worked with start-ups and civic hackers toiling away at the grass-roots, and advised politicians and policy wonks trying to push reluctant governments into a new era. I understand and share much of their agendas.

But I've also seen my share of gaps, shortfalls and misguided assumptions in the visions and initiatives that have been carried forth under the banner of smart cities. And so I'm going to play the roles of myth buster, whistleblower and skeptic in one. New technologies inspire us to dream up new ways of living. The promise of technological fixes to complex social, economic and environmental problems is seductive. I get nervous when I hear people talk about how technology is going to change the world. I have been around technology enough to know its vast potential, but also its severe limitations. When coarsely applied to complex problems, technology often fails.

What's much more interesting is how we are going to change our technology to create the kinds of places we want to live in. I believe that's going to happen at the roots, and I hope my vision of the tremendous resilience and potential for innovation in every city will carry through the darker moments. I think there is an important role for industry, but my objective is to put an end to the domination of corporate visions in these early conversations about the future of cities.

Above all, I'm an advocate for cities and the people that live in them. Technology pundits can preach from behind a screen, but cities can't be understood only by looking inside City Hall or a boardroom. You have to connect the schemes of the rich and powerful with the life of the street. That means taking a broad historical and global view of the landscape. To understand the choices we have ahead of us and the unintended consequences, and articulate a set of principles that can better guide our plans and designs moving forward, we need to reexamine how cities and information and communications technologies have shaped each other in the past. The smart city is a work in progress.

Still, the struggle will remain. The technology industry is asking us to rebuild the world around its vision of efficient, safe, convenient living. It is spending hundreds of millions of dollars to convince us to pay for it. But we've seen this movie before. As essayist Walter Lippmann wrote of the 1939 World's Fair, "General Motors has spent a small fortune to convince the American public that if it wishes to enjoy the full benefit of private enterprise in motor manufacturing, it will have to rebuild its cities and its highways by public enterprise." Today the computer guys are singing the same song.

I believe there is a better way to build smart cities than to simply call in the engineers. We need to lift up the civic leaders who would show us a different way. We need to empower ourselves to build future cities organically, from the bottom up, and do it in time to save ourselves from climate change. It can be done, one street corner at a time. If that seems an insurmountable goal, don't forget that at the end of the day the smartest city in the world is the one you live in. If that's not worth fighting for, I don't know what is.

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