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A pamphlet by Adam Greenfield.
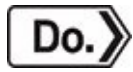This is Part I of *The city is here for you to use.*

Against the smart city

Table of contents

Against the smart city

A pamphlet by Adam Greenfield

Part I of *The city is here for you to use*

Do projects

New York City

13th October 2013

For N., always my Natasha, from her Lemmy.

«Dites donc, c'est pas Alphaville qui faut appeler votre patelin, c'est Zéroville!»

Advance praise for "Against the smart city"

Adam Greenfield does for "urban renewal" in the twenty-first century what Jane Jacobs did for it in the twentieth.
- **Ian Bogost**, Ivan Allen College Distinguished Chair in Media Studies and Professor of Interactive Computing, Georgia Institute of Technology.

A critical inquiry into the constrained reality of the smart city and its free-floating narratives. Adam Greenfield's vast knowledge about the subject allows him to pinpoint the extreme moment where "the ideology of the smart city finds its purest expression." A great piece of analysis, a sharp exegesis — and great writing.
- **Saskia Sassen**, Columbia University, author of *The Global City*.

For those who believe technology's finest, most broadly-empowering urban applications have not yet been deployed, this book is for you. It is less "against" the dominant smart city narrative than a foundation for what we might yet assemble from the parts and pieces that remain after Greenfield's done deconstructing it.
- **John Tolva**, Chief Technology Officer, City of Chicago.

Adam cuts the smart city marketing game to the quick. He reminds us, like the great urbanists before him, that cities are about people — people who shape their city from the bottom up with their character, agency, independence and yes, intelligence.
- **Benjamin de la Peña**, The Rockefeller Foundation.

A cogent debunking of the smart city. Adam Greenfield breaks down the term with wit and clarity, exposing that the smart city may be neither very smart nor very city at all. An insightful, timely and refreshing read that will make you rethink the city of tomorrow.
- **J. Meejin Yoon**, Massachusetts Institute of Technology, architect and designer.

Every "Smart City" advocate in the world should read this short book. Read it now, before people show up at the City Council and start quoting it.
- **Bruce Sterling**, author of *Shaping Things*.

0 | What is the smart city?

Depending on just how one chooses to measure and define the contours of the matter, somewhere between three and four billion of us now live in the dense settlements we think of as cities. Not merely is this a higher percentage of the species than has ever done so before, but with our greatly increased planetary population, it means that in absolute terms, the Earth now supports hundreds of millions more citydwellers than it has at any previous point in human history.

These cities are, of course, formally different from their forebears. They sprawl over a broader terrain, occupy a greater volume and draw yet more distant hinterlands into their zone of influence. We know, too, that they are more densely interwoven with their hinterlands and one another than any of the urban places that came before them, knit together in a single, planetary mesh of movement and exchange. But these are evolutionary developments of urban structure and morphology, and they are to a very great extent best understood as differences of degree. Whatever their effects as drivers of daily experience, they pale into relative insignificance compared to a set of changes that are currently taking place in the way we as citydwellers collectively understand, approach and use the environment around us.

These experiential changes are of very recent origin, and are as yet only poorly understood. If we are to trust the evidence before us, though, they are transformative, verging on total. They have to do with the complex of potent ideas and technical capabilities that have been introduced into the urban environment over the past decade or so: the personal networked devices and always-on wireless connectivity we almost forget to think of as "technology" anymore; the connected sensors, actuators and display systems we increasingly find woven into the fabric of our cities; even the powerful analytic techniques that wrest sense from the torrential amounts of data produced by all of these things, that operate in the background and are themselves difficult to see and to comprehend. Our encounter with this extended technical armature has begun to alter the fundamental terms city life has been founded on, in many cases for centuries. Even from this early vantage point, midway through the second decade of the twenty-first century, we can already sense that the consequences of this networked turn will ripple through the urban economy, reshape local politics, push against the material composition of the daily environment and come to bear on the structure and content of our own psyches.

Faced with any set of circumstances as complex and far-reaching in its implications as this, it's useful (and may even be necessary) for us to draw on narrative to help structure and make sense of the encounter. There are, after all, few more powerful ways of consolidating new ideas and integrating them into our lives than by weaving them into the stories we tell ourselves. But at the moment, we are only being offered one particular story about the deployment of networked informatics in the urban milieu, and though it is widely predominant in the culture, it only portrays the narrowest sliver of what is possible. This is the vision of the "smart city."

Out of all the potentials our moment might give rise to, and all the modes in which we might choose to use networked information technology in our cities, the narrative of the smart city as it is currently being articulated and advanced to us represents some of the least interesting and the most problematic. This pamphlet explores exactly what is being laid out in this framing of things, and by whom. It aims to highlight specific aspects of the smart city program that are cause for concern, clarify why these run afoul of so much of what we know about how cities give rise to meaning and value and, finally, point toward some more fruitful possibilities.

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For clarity's sake, it's necessary to separate two complementary but separate and distinct lines of thought and development that are all too easily conflated anytime the subject of the smart city arises. Originally, the phrase referred exclusively to a small number of discrete development projects initiated over the past decade — blank-slate efforts like the Korean New Songdo, Masdar City in the United Arab Emirates, and a curious settlement in Portugal called PlanIT Valley. These are putatively urban-scale environments designed from the ground up with information-processing capabilities embedded in the objects, surfaces, spaces and interactions that between them comprise everyday life. They are held up before us as forerunners and exemplars of the kind of urban environment we might inhabit once the cities of Earth have been decisively colonized by networked informatics, at some point in the undefined but not-too-distant future.

By far the actual place most frequently cited in this literature is 53.4 km² New Songdo City, more formally known as the Songdo International Business District (SIBD). Developed by New York-based Gale International in partnership with Korea's POSCO Engineering and Construction, and master-

planned by Kohn Pedersen Fox, Songdo establishes a *de novo* city for 500,000 on land recovered from the Yellow Sea. Its pricetag has variously been cited as $20 billion[1], $35 billion[2] and even $40 billion[3].

Life in New Songdo is marketed just like a luxury automobile, in terms ("the ultimate lifestyle and work experience[4]") so close to BMW's well-known tagline that I'm surprised the parties responsible haven't heard from that company's lawyers. At various points in its evolution, this "ultimate lifestyle" has encompassed everything from biometric access control to fully-automated parcel delivery. Promotional videos prepared by current prime technology contractor Cisco Systems tout ubiquitous, wall-sized videoconferencing screens, "intelligent road pricing" and advertising displays whose content adapts in real time to changes in the demographic composition of the audience. It's as if someone took *Minority Report* as a shopping catalogue or a punch list rather than a vision of dystopia, and set the results on a few thousand acres of reclaimed mudflat lying just offshore.

Close on Songdo's heels is $22 billion[5] Masdar City in Abu Dhabi, with a master plan and architectural design by London-based Foster + Partners. Named for the government-owned sustainable-energy concern whose efforts it was built to showcase, at only six square kilometers, Masdar is intended to house some 40,000 permanent residents, augmented daily by up to 50,000 workers commuting from elsewhere in the Emirate. It presents itself to the world as a compact cluster of low-rise buildings, bisected by a linear park. Although interiors sport all the expected paraphernalia[6] of networked access control and energy management, at Masdar the emphasis seems to be more about the spaces between buildings. The city's promoters depict it as a technologically-enabled oasis in the endless wastes of the Empty Quarter, a place where a highly responsive infrastructure regulates solar gain and humidity to wrest comfort from the unforgiving desert air itself, and an airport-style, all-electric personal rapid transit network eliminates any need for conventional automobiles.

The last of the smart development sites most frequently mentioned is PlanIT Valley, the €10 billion[7] township being developed outside Paredes, Portugal, by a Swiss-registered, New Hampshire-based company called Living PlanIT, with the cooperation of Microsoft, the Smart+Connected Cities unit of Cisco Systems and the UK-based engineering consultancy Buro Happold. At 6.7 km^2, a parcel Living PlanIT rather suggestively describes[8] as "about the size of downtown

Boston," PlanIT Valley is just marginally larger than Masdar City. But its eventual target population of 225,000[9] — several times that of Masdar, and roughly half the anticipated population of the far larger Songdo — suggests that its planners envision an environment of considerably higher density than either. (Indeed, if we are to take them at their word, what they intend to deposit in the verdant hills of rural Portugal is a community far denser than Mumbai, Kolkata, Karachi or Lagos[10].)

Even as compared to Songdo and Masdar, the role of networked informatics in the everyday life of PlanIT Valley is aggressively conceived: the moment-to-moment flow of experience is to be coordinated by nothing less than a unified Urban Operating System that, at least in theory, manages the interactions of every connected space, vehicle, device and garment in the city[11]. With energy utilization, mobility, access control, work, leisure and entertainment all mediated by the same digital framework, PlanIT Valley currently stands as the *ne plus ultra* in concepts of the computationally-managed urban environment.

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These, then, are the canonical smart cities. There has been no dearth of breathless commentary on them over the past half-decade: the student of the field trips over these names again and again, in talk after talk and article after article, in publications ranging from eager design blogs straight through to august journals like the *Economist*. Although they exist in varying degrees of completion (with PlanIT Valley in particular being little more than a perpetually deferred set of claims and promises), they are collectively offered to us as the prototype, the polestar and, in many ways, the reference implementation for the systems undergirding twenty-first century urbanity[12].

There is, however, something else the phrase "smart city" refers to, which is the broader and far more consequential drive to retrofit networked information technologies into existing urban places. Although it's distinct from the effort to build places like Masdar or Songdo, many of the same technologies, techniques and practices are involved in this latter body of cultural and intellectual production. Once again, we find the notion that a usefully synthetic awareness of urban processes can be garnered from sensing devices strewn throughout the built environment. Once again, we find proposals to mount sensors in the dumpsters, cameras on the lampposts, RFID readers in the subway and load cells in the pavement, though, in this case, the devices involved tend to be bolt-ons

rather than anything designed into the urban fabric itself *ab initio* (or better yet, the data-capture mission is a repurposing of already-installed hardware). And once again, we find the collection and analysis of data enshrined at the heart of someone's conception of municipal stewardship.

If anything, with the benefit of a few years' experience, this take on the smart city is able to push feelers still further into our lives, by recruiting the networked phones and tablets so many of us now carry. These are treated as both interface objects and as sources of the most granular data regarding our whereabouts, activities and intentions. But this is a mere elaboration. The overarching goal remains the same: the centralized capture of the soundings produced by all of a city's connected devices and the application of advanced analytic techniques to the enormous volume of data that results.

The final intent of all this computational scrutiny, we are told, is to make every unfolding process of the city visible to those charged with its management; to render the previously opaque or indeterminate not merely knowable but actionable; and ultimately, to permit the "optimization" of all the flows of matter, energy and information that constitute a great urban place. The epitome of this approach is the Intelligent Operations Center built by IBM for the city of Rio de Janeiro, a $14 million facility that fuses data from weather stations, traffic cameras, police patrols, sewer-mounted sensors and social-media postings into a synoptic, war room-style overview. This Center's primary innovation is that it gathers the entire apparatus of computational awareness and response in a single room, allowing managers to tweak the city's dynamic performance in (and ideally, ahead of) real time. But it is otherwise perfectly representative of the state of the art in municipal administration as it exists at this moment in time — at least, as that art is conceived of by enterprise-scale technology vendors.

Interventions like this are, for the most part, a matter of incremental enhancement — of off-the-shelf products acquired through existing procurement channels, serviced via conventional contracts, tacked onto spatial and institutional arrangements that already exist. They aren't nearly as total in the extent of their ambition as those places built from the ground up to incorporate the technics of digital sensing and actuation. But they will ultimately affect many, many more of us; hundreds of municipalities on the planet have embraced some kind of official smart-city scheme[13] or initiative in the past few years, and their numbers grow with every passing month. The aggregate population affected by such initiatives already numbers in the high tens of millions.

Hundreds of billions of dollars, a not inconsiderable portion of the total available budgetary resources and, perhaps most importantly of all, an enormous amount of human attention and energy will be devoted to the effort to integrate networked information technology into the management of our cities over the next decade. And virtually all of this activity will take place under the banner of the smart city.

Given that vanishingly few of us will ever live in Songdo, Masdar or PlanIT Valley, even if those places ever do get fully built out, at first blush it would appear to be almost exclusively this latter body of activity that signifies. And it's true that we can readily enough identify at least some of the most salient attributes, features and qualities of the smart city as it bears on our own lives and choices by examining interventions, like IBM's Intelligent Operations Center, that are intended for deployment in existing urban places. In this pamphlet, however, I have chosen to focus my analysis primarily on the sites where the ideology of the smart city finds its purest expression. Whether or not these putative cities ever amount to much of anything at all, what was intended for them will inevitably leak into and color applications of the same technologies on other terrains and in other contexts. In fact, if we want to learn what is currently considered the cutting edge of practice in the domain, acquaint ourselves with the assumptions, beliefs, commitments and valuations that are bound up in this framing of things, and perhaps learn what the future has in store for the cities we do live in, there's no better place to start than by carefully interrogating the proposition in its classic, self-contained and undiluted form.

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Just as the identical technologies are concerned, whether the smart city in question is Masdar or Minneapolis[14], so too most of the same institutions appear in both versions of the story, as in either case manufacturers, vendors and integrators of the systems involved.

The most prominent parties involved in this work include the IBM Corporation of Armonk, New York; San Jose's Cisco Systems; and Munich-based Siemens AG. These global enterprises function as "systems-" or "solution integrators," laminating hardware and software into higher-level business propositions like Siemens' City Cockpit[15], IBM's Intelligent Operations Center software suite[16], or the various "intelligent digital infrastructure" projects Cisco markets under the Smart+Connected Communities label[17]. (I include the far smaller Living

PlanIT[18] in this group both because their Urban Operating System[19] is roughly comparable to the above offerings and because they are among the most tireless, and tirelessly self-promoting, advocates for the concept of the smart city.)

Beneath this, there is a second tier of activity, populated by concerns like Samsung, Intel, Philips and Hitachi. With relatively few exceptions, at least to date, these actors have tended not to offer broadly imaginative visions to contextualize their work in the domain — certainly nothing as dramatic as the sweeping concept videos and elaborate interactive installations produced by their more deeply invested peers. Yet they too choose to situate their offerings within the established discourse of smart urbanity, drawing on identical tropes in framing their appeals and employing identical language to explain the ostensible benefits of their products and services.

Although clear intellectual antecedents can certainly be identified[20], the notion of the smart city in its full contemporary form appears to have originated within these businesses, rather than with any party, group or individual, recognized for their contributions to the theory or practice of urban planning. That is, the enterprises enumerated here are to a surprisingly great degree responsible for producing both the technical systems on which the smart city is founded and the rhetoric that binds them together in a conceptual whole[21]. While this may not be a particularly remarkable circumstance by the standards prevailing in industry, the deep involvement of large-scale commercial actors in the germination of ideas about the design and equipment of cities does make it somewhat unusual in the history of urbanism. It's as if the foundational works of twentieth-century urbanist thought had been collectively authored by United States Steel, General Motors, the Otis Elevator Company and Bell Telephone[22] rather than Le Corbusier or Jane Jacobs.

If this body of rhetoric is taken at all seriously by the various decisionmakers, publics and others who are exposed to it, if it in any way informs the allocation of scarce budgetary and attentional resources — and current indications suggest that it is and does — it becomes extraordinarily important to determine just what it is saying. How do these enterprises define the smart city? And what, exactly, is the nature of the value proposition they believe they are offering?

— Of all firms involved in the domain, *IBM* has been the most forthright (and the most willing to invest its own capital) in communicating its vision of the

smart city to the general public. Starting in mid-2009, a series of jazzy advertising[23] posters appeared in prominent locations worldwide, arguing, among other things, that IBM's systems would "reduce traffic by 20%," "prevent crime before it happens," and promising "[s]marter public safety for a smarter planet."

If these ads happened to pique your interest, you were encouraged to find out more by following up on the IBM Smarter Cities website. There, in turn, you would find an overview page defining the IBM offering as a localized deployment of technology that "synchronizes and analyzes efforts among sectors and agencies as they happen, giving decision makers consolidated information that helps them anticipate problems [and] manage growth and development in a sustainable way that minimizes disruptions and helps increase prosperity for everyone."[24]

— *Siemens* has historically been concerned with the manufacture and deployment of heavy, municipal-scale infrastructural systems — power plants, street lighting, subway cars, wastewater treatment facilities and other products with a comparatively small number of potential customers — so it's not particularly surprising that their effort to explain the smart city has been relatively less oriented to the general public. Compared to the nuts-and-bolts pragmatism of IBM's definition, though, theirs has a soaringly aspirational quality; among all of the major technology integrators, it's the most far-reaching in its expressed ambition for the smart city. "Several decades from now," they argue, "cities will have countless autonomous, intelligently functioning IT systems that will have perfect knowledge of users' habits and energy consumption, and provide optimum service[25]." (The implication, of course, is that the greater share of those systems will be devised and built in Munich.)

— As manufacturer of the routers most[26] of the world's Internet traffic courses through, *Cisco Systems* would obviously stand to benefit considerably from the massive intensification in the global flow of bits implied by a planet of smart cities. From their perspective, there's a reasonably compelling logic behind their institutional advocacy of the concept, despite their lack of experience at the relevant scale: the greater the extent to which everyday urban life comes to be mediated by networked devices and services, the better it is likely to be for their bottom line. Cisco's description of the domain is therefore ecumenical and all-embracing; their Smart+Connected Communities business unit characterizes a

smart city as one featuring "the seamless integration of public and private services, delivered across a common network infrastructure, to individuals, governments and businesses."[27]

Cisco's definition is the only one I encountered that seems to imagine an explicitly open and shared infrastructure. Further, it describes most of the relevant actors in play, in what I take to be the correct order of precedence. It is true that it neglects to mention any form of collective expression that is neither commercial nor governmental; more disturbingly, it also effaces the profoundly meaningful distinction between the public and private delivery of services. But the terrain it describes bears more resemblance to the many-voiced, heterogeneous cities I'm familiar with than that evoked by any of the other integrators.

— At the very least, Cisco's framing of things implies a more appealing vision of specifically urban life than that produced by the smallest and youngest of the ventures I considered: New Hampshire-based *Living PlanIT*, consciously founded to forge "the missing link between the real estate and technology sectors[28]." (If this is somewhat less stirring than the utopian rhetoric offered by the other smart-city players, it certainly does possess the virtue of honesty.) Living PlanIT's account of the smart city describes it as a place where "a complete picture of building state, usage, and operations" is "continually maintained, allowing constant optimization of energy, resources, environment, and occupant support and convenience systems."[29]

This language is interesting in its relatively tight focus on building-level systems; the primary innovation here appears to be the coupling of each building with a citywide meshwork of managed flows. Just how Living PlanIT intends to achieve this at scale — let alone bridge the gap between this comparatively conservative vision and the ambitions inscribed in their PlanIT Valley showcase — remains to be seen.

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Some twelve years downstream from the inception of New Songdo, the specific vision it epitomizes remains inescapably central to any discussion of technologized urbanity. Despite a well-documented parade of stumbles, stutters and shortfalls in execution, the rhetoric of the smart city somehow retains an impressive degree of credibility. Even at this late date, the topic receives an

enviable amount of attention in the general-interest press, features prominently on the agenda of city councils and urbanist groups worldwide and, apparently, presents a business case compelling enough to entice no less weighty an entrant than Microsoft. (The Redmond behemoth trumpeted the launch of CityNext, their venture in the space, in July 2013[30].)

But for all of this activity, the body of thought at its core remains distressingly short on specifics. Anyone deeply concerned with understanding what the smart city portends — either as an abstract interest, or in the particular, as it affects their own community — has precious little to go on, armed only with self-interested press releases, fawning blog posts and the lite reportage that invariably seems to attend the subject.

Starting in the fall of 2011, therefore, I conducted a close reading of the material the principal smart-city proponents used to made their case to potential customers, the broader public and other interested parties, in whatever form I could get my hands on. This material included advertisement, website, promotional-video and exposition-booth copy; PDFs and printed brochures primarily intended for institutional partners; developer documentation; and the kind of cheap marketing collateral one picks up, as if by static attraction, in the course of any visit to a trade show or similar event.

I combed through interviews and other public comments made by executives of the companies involved, digested reports issued by consultants analyzing the business case for the smart city and parsed the proposed technical standards promulgated by industry consortia. I tapped my way through interactive displays, lurked silently on conference calls, emailed sales reps and sent away for spec sheets. Throughout, my aim was to develop a more sophisticated account of the smart city than is widely available at present — to prise apart the various proposals, to understand better what underlying principles and philosophies informed their development and to elucidate whatever model of the city and its functioning is inscribed in them.

Ultimately, I did glean some rough sense of what the enterprises embarked on this endeavor imagine the twenty-first century city to be: how they think it works, which aspects of it they believe to be important and, perhaps more subtly, that they tend to conceive of it as an "it" in the first place, as a singularity rather than a multiplicity. I'd like to share my impressions of this curious undertaking with you here, in the hope that you'll find them illuminating.

You may object that I am being ploddingly literal, or willfully obtuse, in everything that follows. You may feel that there's little point in subjecting what is, after all, merely intended to be promotional material to this kind of close analysis, or that it's somehow not fair to assume that enterprises mean exactly what they say when they release such material to the world. You may certainly think that I've held these utterances up to a tendentious, even an adversarial reading. But I believe that we need to take responsibility for the language we choose to describe and discuss the work we do, and, all too often, it is language that masks the body of assumptions we bring to a given task. This imperative applies no less to those who develop urban technology than it does to anyone else. If place corresponds in any real sense with the geographer Yi-Fu Tuan's rather beautiful definition — "a field of care"[31] — then surely the language we use to construct our places matters. I see no reason, therefore, not to take the architects and partisans of the smart city at their word, and this is what they are offering us.

Whether we much care for it or not, at present it seems likely that our cities will continue to be ever more comprehensively invested with the technics of networked awareness and response. We will increasingly find our urban environments transformed into what geographers Rob Kitchin and Martin Dodge call "code/space"[32] — that is, places whose possibilities are activated by the arcane workings of computational systems, to the degree that they are incapable of functioning as intended, should those systems default. And if this transformation is to be colored to any degree at all by the rhetoric of the smart city, we had better get more intimately acquainted with everything it implies.

Just what kind of place is the smart city?

1 | The smart city is built in generic space.

The trio of canonical smart cities all happen to be built from scratch, on what urban planners call "greenfield" sites, in places where there wasn't anything, or anyone, before.

"We saw an opportunity, given the way urbanism is taking place, to go create something that was starting with a blank sheet, with no prior development around it," explains[33] Living PlanIT CEO Steve Lewis, and these might as well be the lyrics to the smart-city anthem: Songdo is built on "barren mudflat[34]" reclaimed from the East China Sea, Masdar City on desert scrubland and PlanIT Valley itself on an undeveloped site on the outskirts of Paredes, Portugal.

The opportunity that Lewis refers to is of a very specific sort. By building their cities up from nothing, on sites as close to the bare Cartesian plane as can practically be achieved, developers forge from the earth a liminal setting that the philosopher Gilles Deleuze characterized as[35] "any-space-whatever": unconditioned, at degree zero, offering infinite potential for interconnection. Any-space-whatever is uninflected, unmarked by history. There's no existing tendency or directionality associated with it. Formally and legally, it is a blank slate. From a developer's perspective, a number of highly desirable qualities follow from this, including accelerated schedules; the ability to devise grids, parcels and floor plates unconstrained by existing construction; and a total absence of standing titles, leases, claims or other forms of tenure on the land. Building in any-space-whatever gives developers a free hand to do what they will.

As Deleuze defines it, any-space-whatever is never important for any quality of its own but only for the connections it facilitates or brings into being. In the particular case of the smart city, the important linkages aren't physical but those made between ideas, technical systems and practices. The frictionlessness of any-space-whatever makes it the ideal staging ground for experiments in the optimal management of civic behavior, the formulation of governance-as-a-service and, ultimately, the development of business models for the fully privatized city.

The logic of any-space-whatever tends to infect even those smart-city projects that are built in and on existing places. As we'll see, places like Masdar City and

PlanIT Valley are explicitly positioned as laboratories in which the praxis of the smart city can be worked out, with the resulting techniques to be applied just about anywhere, as scale-free, generic, turnkey "solutions." Before it was scrapped as uneconomic[36], the personal rapid transit (PRT) system developed for puny Masdar was promoted as an innovation appropriate to cities a hundred times its size, while Cisco clearly intends for the suite of technologies that dress its Songdo apartments to furnish domiciles everywhere. That the enterprises involved do in fact think of the urban environment primarily as an abstract terrain for business operations can be inferred from the existence of proposals — apparently quite serious ones, originating with respected concerns[37] — to deploy the exact same technical systems in places as different from one another in history, texture and character as Rio de Janeiro, Barcelona, Mumbai and Singapore.

However inadvisable it may seem, this willed blindness to the complexity of urban place dovetails neatly with a tendency that has prevailed in information technology over the past half-century. For a variety of reasons, the designers of informatic systems have historically treated the environment in which their products and services are used as an abstraction, "pure background[38]." At first, this was most likely because every user of information technology was also a developer, and the environments in which these user-developers worked — military, corporate and academic computing facilities — were sufficiently similar to one another in all of the relevant dimensions that no more richly elaborated account of them was required. Later, the logic of scalability and the imperative to "build once, deploy many times[39]" reigned; these were essentially arguments from economic efficiency, and, under their sway, any particularly extended consideration of the environment of use could hardly be construed as anything but an unwanted source of friction. Throughout the period, the dominant discourse has generally positioned the technological artifact itself as autonomous and self-contained, and the environment as a mere backdrop against which meaningful action unfolds.

But as insightful observers of technology like Malcolm McCullough and Paul Dourish[40] have pointed out, this isn't so, and can never be; technical systems are always given meaning by being situated in a specific locale and human context. Any attempt at transplanting a technology as-is, therefore, is bound to be "lossy" at best, if not a complete waste of time, effort, energy and resources, counterproductive for every party but the one selling it.

When we contemplate the deployment of information technology on a given terrain, the nature of that terrain matters. Interaction designer Matt Jones relays the lovely anecdote of the team of *traceurs*, practitioners of the art of parkour, flown from Paris to London to film a commercial, who spent two days' preparation simply wandering the streets, wedging feet between curb and sidewalk, sidewalk and lamppost, bus shelter and building wall. They were literally taking the gauge of the place, getting their bodies acclimated to its grain. For the ways these athletes desired to use the city, minuscule variations in these quantities could mean the difference between a successfully performed maneuver and a broken collarbone, or worse. The success or failure of a technological intervention is no less sensitively dependent on margins like these[41].

If the local detail of the physical terrain must be taken into consideration when planning such interventions, it's absolutely crucial to account for what the recently fashionable terminology positions as the human terrain. We might imagine that a party proposing to "improve quality of life through technology[42]" would be interested in developing some impression of the specific ways in which people living in a place go about doing things, the distinctive rhythms of their days and the particular spaces and kinds of spaces they use to transact the business of their everyday lives. But these are precisely the particularities that find little or no scope for expression in a city conceived as any-space-whatever; they do not exist, because they've been deliberately excised. As a result, the smart city as we encounter it in Songdo, Masdar City and PlanIT Valley seems to lack a certain something. It is not simply that these sites are literally ahistorical. It's that their developers appear to lack any feel for the ways in which cities actually generate value for the people who live in them.

In an earlier time, during a period in which the physical world and the virtual were widely believed to be separate and autonomous spheres of being, this lapse of sensitivity might have passed without comment. Both history and whatever urban texture that history gave rise to were thought of as impediments, sources of friction, things that might safely be discarded. Someone like Rem Koolhaas could celebrate the "generic city"[43] as "what is left after large sections of urban life crossed over to cyberspace," even going so far as to argue that "the presence of history only drags down [the city's] performance." Under prevailing winds like these — not to mention the intellectual cover a Koolhaas could provide —

designing a city as any-space-whatever might have seemed like a defensible, even a reasonable proposition, and carefully sterilized, anodyne nonplaces like PlanIT Valley might have felt like desirable locales in which to live and work, however briefly.

But sometime between the Clinton Administration's 2000 decision to offer a clean GPS signal to non-military operators[44] and the rise of Facebook as a clearinghouse for unitary identity, circa 2008, the virtual was folded back onto the physical fairly decisively. In the process, much of what had once "passed into cyberspace" passed right back, if it had ever truly left. Far from dematerializing the self into a permanent state of "bodyless exultation[45]," our technologies of biometric recognition now increasingly moor it in and to the individual body. And as the world has, block by block and building by building, been translated into ones and zeroes — both mapped in ultra-high resolution by Google's fleet of Street View cars and parceled into discrete, geocoded Foursquare venues — we can see that the virtual realm those embodied selves occupy is one largely layered onto the actual, even at many points coextensive with it. As they always have been, then, the urban design challenges we find ourselves confronting in the networked era remain, to a very great degree, those associated with the movement of real bodies through real spaces. In this light, the casual contempt for history that is part and parcel of Koolhaas's generic city and the comparable conceptions of urbanity we find in the canonical smart cities feels particularly glib, adolescent and unsatisfactory.

It feels especially cavalier if what one is setting out to build is a "smart" city. If a city can even be said to have any such quality as intelligence to begin with, that intelligence is bound to be singular, something that subsists in the unique lifeways, cultures and pragmatic local adaptations that have evolved in a particular place. It takes time for these circumstances to arise, and still more for them to bed in: years, at least, and more probably decades. This prolonged gestation makes intelligence or anything like it a quality most unlikely to take root in the inhospitable ground of Masdar or Songdo or PlanIT Valley until and unless they leave the curious grey nontime of the any-space-whatever behind, and are permitted to rejoin the onrushing stream of history already in progress.

2 | The smart city unfolds in generic time.

One of the very first things that jumps out at the observant reader is that the language its advocates use to characterize the smart city invariably plays fast and loose with time.

On the one hand, developers generally take pains to stress that shovels are in the ground, that buildings are rising (or indeed risen), and that in every respect the places that result should be understood as real cities. And it's true: buildings there are. Drive across the causeway from Ansan to Daebu Island, and you can't help but notice a succession of brand-new towers to the west, gleaming dully in the mid-day sun: that's New Songdo. Gaze out the window as your flight lands at Abu Dhabi International, and the handsome collection of Norman Foster structures you see, just the other side of the airport fence, is Masdar City. But the physical facticity of these places was never in question; our interest, rather, is in asking whether they are, or ever can be, endowed with whatever that mysterious quality is that ostensibly makes a city "smart" in the first place. And in this sense, these sites live perpetually in what researchers Genevieve Bell and Paul Dourish[46] call the "proximate future": a time that's always just around the corner — in fact, so close as to be practically inevitable — but never quite here yet.

In setting out to construct a proximate future, the operative words are "will" and "can"; statements are marked by an odd sideways tense in which present and future are collapsed, and no distinction is made between the subjunctive mood and the indicative. Though it can admittedly be hard to distinguish such articulations from the strategic vagueness common to so much commercial hype, it is nevertheless striking how many of the claims made for the canonical smart cities are phrased in just this way.

A typical example is a promotional video[47] for Cisco's efforts in Songdo, in which Jean-Louis Massaut, director of Cisco Services Korea, explains that "We connect…everything together so that we can bring the benefits of reduced maintenance cost of the building." But Massaut never asserts that the maintenance cost of buildings equipped with the Cisco technology is actually lower than comparable structures. Similarly, IBM's Smarter Cities practice promises[48] that civic administrators will "have the tools to analyze data for better decisions [and] anticipate problems to resolve them proactively," but neither specifies better decisions that have actually been made, nor deigns to

identify any problems that have, in fact, been resolved proactively through the use of their tools.

Perhaps surprisingly, the case studies linked from the Smarter Cities practice homepage are no more concrete in their language. A white paper on Intelligent Urban Transportation[49] prepared for IBM is exhaustive in describing all of the good things that "can" attend a city's purchase of their Traffic Prediction Tool[50] — it "can help reduce commute times, improve the commuter experience, reduce pollution, and direct emergency response and public safety teams to protect the safety and security of citizens" — but fails to specify any historical occasions on which any of these things actually occurred. It's not so much that the benefits being claimed for these technologies are outside of the realm of possibility in any absolute sense — although as we'll see, we do need to be strongly skeptical of certain promises — as that there doesn't seem to be any ready way of pinning down the timeframe in which these benefits are supposed to accrue. They seem to transpire in some vaguely defined and perpetually deferred era yet to come.

Other institutions are more explicit about invoking futurity in their definitions of the smart city, none more so than Siemens. (Remember that their vision of municipal stewardship via "countless autonomous, intelligently functioning IT systems[51]" is staged "[s]everal decades from now[52].") Setting this vision in a time so far distant — at the outermost limit of anything we might fairly describe as "proximate," in the sense that Bell and Dourish mean the term — is an elegant way of dodging accountability for the frankly incredible assertions being made and, more generally, for any failure of the overall smart-city vision to come true. Indeed, it's hard to avoid concluding that the desire to abscond from any sort of responsibility is the primary reason why so much of this language focuses on what technologies will or can accomplish, rather than what they are actually observed to do, and why the full flowering of the smart city is situated in a time after we're all dead or in our decrepitude.

Using language that stages their proposals in "a future infinitely postponed… when we are continually about to enter a new age, when we are continually anticipating what happens next" affords advocates of the smart city the luxury of avoiding having to deal with the problematic here and now. They don't have to reckon with the messy accumulations of history, with existing neighborhoods and the claims and constituencies they inevitably give rise to, with the densely

tangled ways of doing and being that make any real place what it is. If these and the other necessary complications of the urban are acknowledged at all in this canon, it's only to wave a hand at them — to blithely assert that they'll be resolved, via the concerted application of technology, in some time yet to come. This tendency may be most overt in the Siemens copy, but in truth it's endemic to the literature.

The impression we get from the language is abetted, even reinforced, by the conventions of representation that attend any discussion of the topic. All but invariably, we're shown these places as renderings[53] and sleekly stylized animations[54]; when we do get to see actual still or video photography, it's shot under tightly controlled circumstances, in showpiece blocks and model apartments. (The very rare exceptions, like a January 2011 blog feature on Masdar City[55], may tell us a thing or two about why it is that we so rarely see unmediated imagery from the canonical sites. These few iPhone snaps, shot in the course of a Masdar-funded press junket, clearly reveal the desert site as forlorn and depopulated — or more accurately, never populated.)

I don't mean to suggest by any of this that the very act of anticipation is somehow ideologically suspect, or that it is less valid when institutions give full rein to the projective imagination than when individuals do so. But it doesn't seem to me that imagination has much to do with what is going on here. As a matter of fact, just the opposite is true: in the just-so stories we're told about the smart city, the technology of everyday life advances, but everything else somehow magically remains the same. From family size and structure to work arrangements to the conception of the self, everything proceeds as though sequestered, serenely untouched by the radical discontinuity in the technics of the daily.

After a solid century in which various Cities of Tomorrow were breathlessly foisted on the public at regular intervals, with very little resemblance between any of those plans and the conurbations or living conditions that actually came to pass, you'd think we would have learned a valuable lesson: the proximate future is a place we never quite get to. As with so many of yesterday's tomorrows, it may well be that the smart city as described by its advocates simply never does come into being. From the vantage point of 2013, with the canonical schemes all mired in various sorts of delay, this certainly appears to be the most likely outcome. Bell and Dourish suggest another possibility: that when the smart city

does emerge, it will do so in a form we're unprepared for and unable to recognize as such. We should welcome this latter circumstance, as opening up any number of more fruitful directions for the networked city and its citizens. Less happily, though, it also implies that — like Communism, artificial intelligence and the true Scotsman — the smart city is something that can and will always be redefined as its enthusiasts deem necessary, and so remain forever just beyond our reach.

3 | The smart city positions technology itself as generic.

We have seen that contemporary portrayals of the smart city treat landscape as a mere backdrop, and tend to be equally vague about the timeframe in which the scenarios of ease and efficiency they depict are supposed to transpire. Another way of putting this is to describe them as occupying both generic space and generic time. But perhaps more surprisingly, they also treat the information-technological products and services at the very core of their nominal value proposition as generic and without qualities.

This habit is, again, endemic to the literature. Living PlanIT's loving renderings of PlanIT Valley are festooned with callouts touting city features like "interactive smart wall," "direct connection with personal mobile phone,"[56] "incorporated smart sensors" and "individual docking working stations — plug-n-play system."[57] Similarly, a schematic diagram of LG's HomNet technical architecture[58], theoretically as deployed in Songdo, identifies "Unmanned Home Delivery," "Iris Recognition Common Entrance System" and "Community Healthcare Solutions" prominently among the elements of the city's ubiquitous informatics.

The most charitable interpretation of specifications like these would be that each is intended as an acknowledgement that some accommodation needs to be made for a given syste but that details of its procurement and installation remain TBD. The author may have felt that their audience was unlikely to comprehend, or care about, the intricacies of servers, protocols and API[59]s, and didn't need to get down in the technical weeds to assess the proposition being offered on its merits. Or it may be the case that some party involved in the preparation of these materials simply didn't know what they were talking about, and their depiction of urban technology seems like hand-waving because it is.

Low-level network hardware — the routers, storage devices and, to a certain degree, the servers that "clouds" are built on — can probably be treated this abstractly without doing them too much violence, which is why they're thought of, referred to, priced and valued as the commodities they are. But the higher up the stack you go, the closer to the end user you get, the more the differences in the provenance and design of the systems involved matter. There's just no such thing as "an" interactive smart wall or "an" iris-recognition system, any more than there is "a" bike-sharing scheme or personal rapid-transit network. What do

exist in the world are specific deployments of components from specific vendors, laminated together as particular propositions, and each of these may differ profoundly from other, similar propositions, along all of the axes that condition human interaction with them. It's all but impossible to fairly evaluate claims about the performance of systems like these without knowing just what it is that's being suggested. Information-technological components may certainly be modular and interoperable, in other words, but the systems built from them are not at all fungible.

Think for a moment of the interactive touchscreens we see so often in renderings of the smart city. As it happens, there are a number of technologies on which a touchscreen can be based, but they're not simply interchangeable with one another. Each differs markedly from the others in terms of the granularity with which it is able to detect a touch event, the temperature range it can operate effectively within, the kinds of display element it is most compatible with, and so on. Choosing one of the available options over the others goes quite a long way toward shaping the ways in which people will experience their interaction with the screen, even whether or not they'll use it over the long run.

The broader point is that not one of the technological interventions we encounter in these visions is autonomous. If the way we actually experience touchless entry systems, CCTV cameras, dynamic parking schemes, adaptive recycling bins and the other smart-city paraphernalia we are routinely presented with depends on the specific performative qualities of the technical systems involved, it also depends on the ways in which these qualities mesh, or fail to mesh, with local practices, activities, laws and habits. All of these operate in ensemble to produce meaning. The minutiae of business models, pricing plans, tariffs, spectrum-allocation policy or the internal organization of bureaucracies will have as much to do with a given intervention's prospects for success as anything listed on a product spec sheet. And this makes individual technologies very, very hard to dissect, consider in isolation or successfully transplant.

Reasons like these are precisely why the canonical smart city almost *has* to be staged in any-space-whatever; only by proposing to install generic technologies on generic landscapes in a generic future can advocates avoid running afoul of the knotty complexities that crop up immediately any time actual technologies are deployed in existing places.

4 | The smart city pretends to an objectivity, a unity and a perfect knowledge that are nowhere achievable, even in principle.

Of the major technology vendors working in the field, Siemens makes the strongest and most explicit statement[60] of the philosophical underpinnings on which their (and indeed the entire) smart-city enterprise is founded: "Several decades from now cities will have countless autonomous, intelligently functioning IT systems that will have perfect knowledge of users' habits and energy consumption, and provide optimum service…The goal of such a city is to optimally regulate and control resources by means of autonomous IT systems."

We've already considered what kind of ideological work is being done when efforts like these are positioned as taking place in some proximate future. The claim of perfect competence Siemens makes for its autonomous IT systems, though, is by far the more important part of the passage. It reflects a clear philosophical position, and while this position is more forthrightly articulated here than it is anywhere else in the smart-city literature, it is without question latent in the work of IBM, Cisco and their peers. Given its foundational importance to the smart-city value proposition, I believe it's worth unpacking in some detail.

What we encounter in this statement is an unreconstructed logical positivism, which, among other things, implicitly holds that the world is in principle perfectly knowable, its contents enumerable and their relations capable of being meaningfully encoded in the state of a technical system, without bias or distortion. As applied to the affairs of cities, it is effectively an argument 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. (Left unstated but strongly implicit is the presumption that whatever policies are arrived at in this way will be applied transparently, dispassionately and in a manner free from politics.)

Every single aspect of this argument is problematic.

— *Perfectly knowable, without bias or distortion:* Collectively, we've known since Heisenberg that to observe the behavior of a system is to intervene in it.

Even in principle, there is no way to stand outside a system and take a snapshot of it as it existed at time *T*.

But it's not as if any of us enjoy the luxury of living in principle. We act in historical space and time, as do the technological systems we devise and enlist as our surrogates and extensions. So when Siemens talks about a city's autonomous systems acting on "perfect knowledge" of residents' habits and behaviors, what they are suggesting in the first place is that everything those residents ever do — whether in public or in spaces and settings formerly thought of as private — can be sensed accurately, raised to the network without loss, and submitted to the consideration of some system capable of interpreting it appropriately. And furthermore, that all of these efforts can somehow, by means unspecified, avoid being skewed by the entropy, error and contingency that mark everything else that transpires inside history.

Some skepticism regarding this scenario would certainly be understandable. It's hard to see how Siemens, or anybody else, could avoid the slippage that's bound to occur at every step of this process, even under the most favorable circumstances imaginable.

However thoroughly Siemens may deploy their sensors, to start with, they'll only ever capture the qualities about the world that are amenable to capture, measure only those quantities that can be measured. Let's stipulate, for the moment, that these sensing mechanisms somehow operate flawlessly, and in perpetuity. What if information crucial to the formulation of sound civic policy is somehow absent from their soundings, resides in the space between them or is derived from the interaction between whatever quality of the world we set out to measure and our corporeal experience of it?

Other distortions may creep into the quantification of urban processes. Actors whose performance is subject to measurement may consciously adapt their behavior to produce metrics favorable to them in one way or another. For example, a police officer under pressure to "make quota" may issue citations for infractions she would ordinarily overlook; conversely, her precinct commander, squeezed by City Hall to present the city as an ever-safer haven for investment, may downwardly classify[61] felony assault as a simple misdemeanor. This is the phenomenon known to viewers of *The Wire* as "juking the stats[62]," and it's particularly likely to happen when financial or other incentives are contingent on

achieving some nominal performance threshold. Nor is it the only factor likely to skew the act of data collection; long, sad experience suggests that the usual array of all-too-human pressures will continue to condition any such effort. (Consider the recent case in which Seoul Metro operators were charged with using CCTV cameras to surreptitiously ogle women passengers[63], rather than scan platforms and cars for criminal activity as intended.)

What about those human behaviors, and they are many, that we may for whatever reason wish to hide, dissemble, disguise or otherwise prevent being disclosed to the surveillant systems all around us? "Perfect knowledge," by definition, implies either that no such attempts at obfuscation will be made or that any and all such attempts will remain fruitless. Neither one of these circumstances sounds very much like any city I'm familiar with, or, for that matter, would want to be.

And what about the question of interpretation? The Siemens scenario amounts to a bizarre compound assertion that each of our acts has a single salient meaning, which is always and invariably straightforwardly self-evident — in fact, so much so that this meaning can be recognized, made sense of and acted upon remotely, by a machinic system, without any possibility of mistaken appraisal.

The most prominent advocates of this approach appear to believe that the contingency of data capture is not an issue, nor is any particular act of interpretation involved in making use of whatever data is retrieved from the world in this way. When discussing their own smart-city venture, senior IBM executives[64] argue, in so many words, that "the data is the data": transcendent, limpid and uncompromised by human frailty. This mystification of "the data" goes unremarked upon and unchallenged not merely in IBM's material but in the overwhelming majority of discussions of the smart city. But different values for air pollution in a given location can be produced by varying the height at which a sensor is mounted by a few meters. Perceptions of risk in a neighborhood can be transformed by altering the taxonomy used to classify reported crimes ever so slightly[65]. And anyone who's ever worked in opinion polling knows how sensitive the results are to the precise wording of a survey. The fact is that the data is never "just" the data. To assert otherwise is to lend inherently political and interested decisions regarding the act of data collection an unwonted gloss of neutrality and dispassionate scientific objectivity.

The bold claim of perfect knowledge appears incompatible with the messy reality of all known information-processing systems, the human individuals and institutions that make use of them and, more broadly, with the world as we experience it. In fact, it's astonishing that anyone would ever be so unwary as to claim perfection on behalf of any computational system, no matter how powerful.

— *One and only one solution*: With their inherent, definitional diversity, layeredness and complexity, we can usefully think of cities as *tragic*. As individuals and communities, the people who live in them hold to multiple competing and equally valid conceptions of the good, and it's impossible to fully satisfy all of them at the same time. A wavefront of gentrification can open up exciting new opportunities for young homesteaders, small retailers and craft producers, but tends to displace the very people who'd given a neighborhood its character and identity. An increased police presence on the streets of a district reassures some residents, but makes others uneasy, and puts yet others at definable risk. Even something as seemingly straightforward and honorable as an anticorruption initiative can undo a fabric of relations that offered the otherwise voiceless at least some access to local power. We should know by now that there are and can be no[66] Pareto-optimal solutions for any system as complex as a city.

— *Arrived at algorithmically*: Assume, for the sake of argument, that there could be such a solution, a master formula capable of resolving all resource-allocation conflicts and balancing the needs of all a city's competing constituencies. It certainly would be convenient if this golden mean could be determined automatically and consistently, via the application of a set procedure — in a word, algorithmically.

In urban planning, the idea that certain kinds of challenges are susceptible to algorithmic resolution has a long pedigree. It's already present in the Corbusian doctrine that the ideal and correct ratio of spatial provisioning in a city can be calculated from nothing more than an enumeration of the population, it underpins the complex composite indices of Jay Forrester's 1969 *Urban Dynamics*[67], and it lay at the heart of the RAND Corporation's (eventually disastrous) intervention in the management of 1970s New York City[68]. No doubt part of the idea's appeal to smart-city advocates, too, is the familial resemblance such an algorithm would bear to the formulae by which commercial real-estate

developers calculate air rights, the land area that must be reserved for parking in a community of a given size, and so on.

In the right context, at the appropriate scale, such tools are surely useful. But the wholesale surrender of municipal management to an algorithmic toolset — for that is surely what is implied by the word "autonomous" — would seem to repose an undue amount of trust in the party responsible for authoring the algorithm. At least, if the formulae at the heart of the Siemens scenario turn out to be anything at all like the ones used in the current generation of computational models, critical, life-altering decisions will hinge on the interaction of poorly defined and surprisingly subjective values: a "quality of life" metric, a vague category of "supercreative[69]" occupations, or other idiosyncrasies along these lines. The output generated by such a procedure may turn on half-clever abstractions, in which a complex circumstance resistant to direct measurement is represented by the manipulation of some more easily determined proxy value: average walking speed stands in for the more inchoate "pace" of urban life, while the number of patent applications constitutes an index of "innovation."

Even beyond whatever doubts we may harbor as to the ability of algorithms constructed in this way to capture urban dynamics with any sensitivity, the element of the arbitrary we see here should give us pause. Given the significant scope for discretion in defining the variables on which any such thing is founded, we need to understand that the authorship of an algorithm intended to guide the distribution of civic resources is itself an inherently political act. And, at least as things stand today, neither in the Siemens material nor anywhere else in the smart-city literature is there any suggestion that either algorithms or their designers would be subject to the ordinary processes of democratic accountability.

— *Encoded in public policy, and applied transparently, dispassionately and in a manner free from politics*: A review of the relevant history suggests that policy recommendations derived from computational models are only rarely applied to questions as politically sensitive as resource allocation without some intermediate tuning taking place. Inconvenient results may be suppressed, arbitrarily overridden by more heavily weighted decision factors or simply ignored.

The best-documented example of this tendency remains the work of the New York City-RAND Institute, explicitly chartered to implant in the governance of

New York City "the kind of streamlined, modern management that Robert McNamara applied in the Pentagon with such success[70]" during his tenure as Secretary of Defense (1961-1968). The statistics-driven approach that McNamara's Whiz Kids had so famously brought to the prosecution of the war in Vietnam, variously thought of as "systems analysis" or "operations research," was first applied to New York in a series of studies conducted between 1973 and 1975, in which RAND used FDNY incident response-time data[71] to determine the optimal distribution of fire stations.

Methodological flaws undermined the effort from the outset. RAND, for simplicity's sake, chose to use the time a company arrived at the scene of a fire as the basis of their model, rather than the time at which that company actually began fighting the fire. (Somewhat unbelievably, for anyone with the slightest familiarity with New York City, RAND's analysts then compounded their error by refusing to acknowledge traffic as a factor in response time[72].) Again, we see some easily measured value used as a proxy for a reality that is harder to quantify, and again we see the distortion of ostensibly neutral results by the choices made by an algorithm's designers. But the more enduring lesson for proponents of data-driven policy has to do with how the study's results were applied. Despite the mantle of coolly "objective" scientism that systems analysis preferred to wrap itself in, RAND's final recommendations bowed to factionalism within the Fire Department, as well as the departmental leadership's need to placate critical external constituencies; the exercise, in other words, turned out to be nothing if not political.

The consequences of RAND's intervention were catastrophic. Following their recommendations, fire battalions in some of the most vulnerable sections of the city were decommissioned, while the department opened other stations in low-density, low-threat areas. The spatial distribution of firefighting assets remaining actually prevented resources from being applied where they were most critically needed. Great swaths of the city's poorest neighborhoods burned to the ground as a direct result: most memorably the South Bronx, but immense tracts of Manhattan and Brooklyn as well. Hundreds of thousands of residents were displaced, many permanently, and the unforgettable images that emerged fueled perceptions of the city's nigh-apocalyptic unmanageability that impeded its prospects well into the 1980s. Might a less-biased model or a less politically skewed application of the extant findings have produced a more favorable outcome? This obviously remains unknowable. By contrast, the human and

economic calamity that actually did transpire is a matter of public record.

Examples like this counsel us to be wary of claims that any autonomous system will ever be entrusted with the regulation and control of civic resources — just as we ought to be wary of claims that the application of some single master algorithm could result in a Pareto-efficient distribution of resources, or that the complex urban ecology might be sufficiently characterized in data to permit the effective operation of such an algorithm in the first place. For all of the conceptual flaws we've identified in the Siemens proposition, though, it's the word "goal" that just leaps off the page. In all my thinking about cities, it has frankly never occurred to me to assert that cities have goals. (What is Cleveland's goal? Karachi's?) What is being suggested here strikes me as a rather profound misunderstanding of what a city is. Hierarchical organizations can be said to have goals, certainly, but not anything as heterogeneous in composition as a city, and most especially not a city in anything resembling a democratic society.

By failing to account for the situation of technological devices inside historical space and time, the diversity and complexity of the urban ecology, the reality of politics or, most puzzlingly of all, the "normal accidents[73]" all complex systems are subject to, Siemens' vision of cities perfectly regulated by autonomous smart systems thoroughly disqualifies itself. But it's in this depiction of a city as an entity with unitary goals that it comes closest to self-parody.

If, again, it seems like breaking a butterfly on a wheel to subject marketing copy to this kind of dissection, I am merely taking Siemens and the other advocates of the smart city at their word, and this is what they (claim to) really believe. When pushed on the question, of course, some individuals working for enterprises at the heart of the smart-city discourse admit that what their employers actually propose to do is distinctly more modest: they simply mean to deploy sensors on municipal infrastructure, and adjust lighting levels, headway or flow rates to accommodate real-time need. If this is the case, perhaps they ought to have a word with their copywriters, who do the endeavor no favors by indulging in the imperial overreach of their rhetoric. As matters now stand, the claim of perfect competence that is implicit in most smart-city promotional language — and thoroughly explicit in the Siemens material — is incommensurate with everything we know about the way technical systems work and the world they work in. The municipal governments that constitute the primary intended audience for materials like these can only be advised, therefore, to approach all

such claims with the greatest caution.

5 | The smart city is built on a proprietary platform.

Broadly speaking, information-technical systems are released to the world in one of two ways: either as the exclusive intellectual property of the party responsible for their development or under the terms of a free or open-source[74] license of one sort or another. The provisions under which a developer chooses to issue a system go a very long way toward determining how we are able to use, learn from, contribute to and build upon it.

For example, Apple's operating system for the iPhone, iOS, is *proprietary*; only Apple's own devices may implement iOS, and only Apple-approved applications can legally be installed on the handsets and tablets running it. The low-level code that drives device functionality is a closely guarded (and enormously valuable) secret. By contrast, Google's competing Android ecosystem is *open*[75]. Its full specifications are available to anyone willing to take the trouble of downloading them from the source repository. As a result, any manufacturer can build an handset that implements Android, and any developer can write an Android-compatible application. The code can be freely reused, even to the point of "forking" Android, or developing an entirely new operating system based on the original source.

The fundamental proprietary/open distinction applies as well to hardware specifications, interoperability standards and data-exchange protocols. What is at issue in all of these cases is the degree to which the party offering some technical product or service wishes to extend to its users the rights to freely use, study, modify, improve and redistribute the system at hand, without requiring that they pay a licensing fee or seek the manufacturer's specific approval. It even applies at the level of data itself, where the open designation denotes that data released in this way may be used for any purpose, as well as reused or redistributed, free of charge.

The arguments on behalf of free or open licensure are many. Proponents of openness *per se* tend to argue from pragmatism: they maintain that open systems and standards are more likely to be adopted by a critical mass of developers; that they are more likely to be protected against intrusion, corruption or exploitation by the vigilant efforts of a larger development community; that products and services based on them tend to be less expensive; and that they present far lower barriers to entry, particularly for users and developers outside the advanced

economies, or in relatively deprived sectors, regions or demographics of those economies. The arguments in support of the more radical provisions of free licensure, by contrast, are generally moral in tenor, and explicitly uphold the value of sharing and cooperation as socially beneficial in and of themselves[76].

It is not always possible to determine, even from the most detailed materials made public by the technology vendors themselves, exactly what specifications their proposals make for the openness and extensibility of smart-city informatic infrastructures, for the free reuse of whatever data these generate, and so on. For those of us who believe that nonproprietary approaches are, on balance, more productive, sustainable and ethically tenable, however, what can be determined is not particularly encouraging.

On its face, Living PlanIT's bald assertion that their smart-city platform would be "completely open[77]" appears hard to reconcile with their statement that they would "own and monetize the Urban Operating System (UOS™)[78]." The confusion isn't resolved until many, many pages later, when the reader comes upon a passage clarifying precisely what the company understands "completely open" to mean: "Living PlanIT has no intention to make the UOS™ open source. Instead, we are adopting a policy of *open specification* or *open protocols*, where every interface to the UOS™ is fully documented and freely licensed to new and existing partners." [Emphasis in original.]

This, bluntly, is doublespeak. It deliberately obfuscates the nature of the terms under which the system is offered for use. Given that becoming a partner necessarily involves paying Living PlanIT a licensing fee[79], the promise of full documentation and free licensing is indistinguishable from, say, the provisions Apple extends to third parties wishing to develop products using its proprietary Lightning power connector. That trademark symbol is particularly offensive; the attempt to claim intellectual-property protection for a term as generic and as widely used as "Urban Operating System" is both tasteless and futile, and bodes not at all well for PlanIT Valley's prospects as an environment in which other actors can innovate.

Even when widely successful services exist, Living PlanIT seems hellbent on promoting their own proprietary alternatives. Rather than understanding that residents were likely to socialize via Facebook, for example, or another exiting social-networking service, Living PlanIT apparently at one point intended to

develop a competitor called iPlanits[80], "conceived as the personal social networking platform for the inhabitants of Planit [sic] Valley…to rule their digital universe."

Other, more experienced vendors tend to be more modest than Living PlanIT. While these enterprises will certainly attempt to retain full control over the intellectual property underlying some offerings, they otherwise seem perfectly happy to make money setting up and configuring nonproprietary systems if there is money to be made in doing so. Cisco boasts of its contributions to the open-source development community[81], and Siemens and IBM both have successful systems-integration businesses based on open products and services.

But given the degree to which, by definition, information-technological systems infiltrate the spaces, experiences and relations of everyday life in the smart city, this partial and strictly pragmatic embrace doesn't go far enough. Having been entrusted with the supervision and control of municipal processes in such far-reaching and intimate ways, it would be unconscionable if these systems were anything less than fully accountable to the communities and individuals whose lives they do so much to shape.

What about data? Can we determine what provisions are made in the canonical smart-city offerings for citizen access to the data they themselves generate in the course of everyday activities? Here, too, the augurs are obscure. Songdo's management is entirely mute on the subject. At least one source[82] cites Masdar as an "open-data city," but, in context, it is clear that what is meant is that Masdar supports a citywide *open wireless network*. The clearest impression can be gleaned from the language IBM uses to promote its Intelligent Operations Center, in particular the provision that automated service-status alerts will be distributed "to subscribers[83]." Similarly, Living PlanIT apparently intends for people to access data solely through the lens of something they call PlaceApps, downloadable applications that "can be purchased or subscribed to and leveraged almost immediately by the resident, visitor, or worker[84]." At every turn, language like this suggests that in the minds of its designers, the smart city is a place where the technical platforms on which everyday life is built are privately "owned and monetized," and information is reserved exclusively for the use of those willing and able to pay for it.

6 | The smart city is overspecified.

As they are currently presented to us, places like Songdo and PlanIT Valley hardwire or literally embed networked devices in virtually every surface they have to offer. Time and again, we're proffered visions of sensors in the sidewalks, sensors at the bus stops, sensors in the recycling bins, all of which are coupled to equally hardwired networked actuation systems to open the shades, raise the bollards or divert the flow of water through the pipes. Indeed, part of the appeal of greenfield, any-space-whatever sites is that they don't present developers with the difficulty, expense and exposure to liability that attends digging up the historic fabric of existing cities to install components like these.

There are a few aspects of this scenario that we might want to consider with particular care. The first is that by proposing to install informatic systems relatively deeply in the urban fabric, such schemes fail to accommodate the need for ongoing, regular access, for repair or upgrade[85]. Most sensitive equipment will require some physical maintenance from time to time, especially when exposed over long periods of time to the brutal regime of the urban everyday. And at least as long as Moore's Law holds, we know that over time, the sensors, wireless base stations, networked cameras and other componentry underwriting a smart city's services will tend to evolve far more quickly than the structural support in which they are housed.

Masdar City, at least, goes some distance toward addressing these concerns, by stacking the entire development atop a double-height service deck intended to facilitate access to its informatic and other infrastructures. But the other canonical smart places appear not to have devoted any particular thought to how they might account for the evolution of the technologies upon which their value propositions rely. Whatever nominally futuristic vision may be cherished in the hearts of their developers, something perverse will happen to these cities if they do not provide for ready maintenance and the constant swapping-out of hardware. At best, everyday systems will remain frozen at the level of technological capability inscribed in them at the moment of launch. More likely still, they will begin to decay immediately, as the components on which they depend progressively fail over time.

Moreover, it is striking how poorly the dominant narrative seems to have accounted for broader trends in sociotechnical practice, chiefly the advent and

widespread adoption of the smartphone. For a body of thought that's theoretically all about the benefits that accrue when networked information technology is deployed in our cities, in fact, it's positively weird how rarely these visions invoke the one piece of networked information technology that citydwellers all over the planet already have ready to hand. There's little need to invest in the comprehensive instrumentation of the urban fabric with sensors, device controllers or informational displays when people themselves are already equipped with something that can act in all of these roles.

These issues are interrelated, and they can be summed up in the single idea of *overspecification*. Overspecification is hubris and brittleness. It is to imply that the designer can anticipate at inception all the potential uses to which the things they create might be put, down through the long future. And it is to set in concrete (in some cases, quite literally) relations that ought to remain supple and fluid.

Interestingly, most of the extant smart-city schemes make the selfsame mistake of overspecification at the level of urban planning. Instead of providing residents with parcels and structures flexible enough to permit ready adaptation as their needs change over time, these schemes partition activity into tightly programmed zones. Even though it started from zero, and could have taken whatever shape its developers felt most appropriate to the sociotechnical practices of the time and place into which it was launched, Songdo's master plan[86] replicates the formal order of a midsize American city of the mid-twentieth century. It segregates work — an activity which takes place in a Central Business District composed of conventional commercial towers, arrayed along an axial boulevard — from residential clusters, and both of these from a designated cultural complex. PlanIT Valley's publicly disseminated plans are too sketchy and poorly articulated to permit much in the way of evaluation, but diagrams of the site released by structural engineer Buro Happold[87] appear to allocate commercial, residential and retail sectors around a central public space, in a radial scheme as inelastic as Disneyland's. Despite the vaguely trendy-seeming labels that orbit them ("flexi-block modular association"), nothing about the renderings suggests a capacity for adaptive reuse, organic change or growth. Even Masdar City, which seemingly does so well at planning for technological change, sets the social relations it supports in immutable stone; the city's functions are dispersed among discrete Retail, Residential, Research and Entertainment quarters, there to remain.

As a strategy for land use, the strict functional segregation of activity into designated, single-purpose districts is a hallmark of high-modernist urban planning[88], finding its earliest pure expression in Le Corbusier's unbuilt Plan Voisin of 1924 and reaching an apotheosis in post-war plans like those for Brasília and Chandigarh. However common it may be to master-planned developments, the experiences of these latter two cities suggest that rigid site programming is unable to accommodate the waves of new settlement that sweep across any city over time, the new uses to which structures are invariably put and the emergent order that arises out of their interaction. In both Chandigarh and Brasília, the static contours of the formal city were soon overwhelmed by very significant processes of informal infill, the only way remaining for people constrained by these overspecified plans to respond to evolving demand. In both cases, these informal settlements remain only poorly integrated into the city's service infrastructure, even after the passage of decades.

What is especially noteworthy in the case of Songdo is that the master plan flies in the face of prevailing East Asian practice, where a single building can comfortably and productively support residential, commercial and even light industrial uses simultaneously. More broadly, though, very little in the published PlanIT Valley or Masdar plans — or in Songdo, of what has actually been built — appears to respond to the collective insight we already possess regarding how urban space actually works, a line of thought so well developed that it has become conventional wisdom over the last half-century of urbanist discourse[89]. And that line of thought suggests that cities work best when they support a lively mix of uses, the threshold of commitment for any one activity remains low and people are reasonably free to pursue some objective wherever it seems to make the most sense for them to do so.

Learning, for example, is something that might well happen inside a school. It might also take place in a library, or a home, or amid whatever set of physical circumstances people find congenial. It might even happen "in" the interface of a tablet; in fact, facilitated precisely by mobile networked devices, learning is increasingly likely to be something that people pursue wherever they happen to be. But nowhere is it written that it must transpire in a Learning Zone baked into the city plan, as it evidently is intended to in all three canonical sites. Why, similarly, should rest and recuperation not be possible throughout an urban complex, wherever and whenever required, instead of forcing people to haul

their weary bones to the Entertainment Zone? Why make residents travel half an hour to the Services Core simply to fulfill basic daily needs, when a well-sited bodega or cornershop or even a cart would do just as well? When framed this way, the natural thing is to say that this kind of functional segregation is silly and counterproductive. And yet this is what the overdetermined plans of the canonical smart cities all call for.

In the end, the problem with overspecification is simply that it leads to a curiously static conception of the future: once we get there, we stay there. The city whose service infrastructure is locked into the technology of a given moment in time cannot readily adapt when new possibilities in transportation, logistics or communication arise, any more than a city whose plan is set in concrete can when there's a shift in how the community chooses to organize itself. In neither case is there enough play in the system to allow it to respond to evolving circumstances[90], leaving a city poorly buffered against the inevitability of change.

7 | The smart city is predicated on a discredited notion of seamlessness.

Unlike the others we have considered, Cisco's description of a smart city is strikingly economical. Most every word of it does some work and is there for a reason. So when this description characterizes the essence of the smart city as "the seamless integration of public and private services[91] delivered across a common network infrastructure," we might want to ask what is being implied by that word "seamless," and what purpose is served by its inclusion.

The rhetoric of seamlessness[92] crops up constantly in the discussion of ubiquitous information technologies. Though it has been sharply challenged from the outset — notably by Mark Weiser[93], the intellectual father of ubiquitous computing — the concept features prominently in literature produced by IBM[94], Siemens[95], Microsoft and Living PlanIT[96], and it is invariably positioned as beneficial. In this context, "seamless" means that the user perceives no interruption in the flow of a technically mediated experience, even though that experience may be produced by the interaction of heterogeneous systems. For example, a smartphone automatically joins open wireless networks, without requiring confirmation from the user. An iris scanner performs biometric authentication and permits an authorized party to enter a building, without that party consciously or purposively needing to present a credential. Or a driverless car is routed around high-congestion areas, without even bothering to notify its passengers. In all cases, the language of seamlessness implies that the hassles of everyday life have been mitigated by the intervention of powerful technologies from whose complexity, in turn, the user has been carefully and deliberately shielded.

"Mitigated," actually, may not be a strong enough word to fully capture what is generally being promised in the invocation of seamlessness. The insinuation is that urban life can be purged of inconvenience, doubt, delay and worry via the intercession of technologies acting invisibly on the user's behalf. Nowhere is this logic made more explicit than in Hitachi's[97] pitch for the smart city; the Japanese concern goes so far as to contend that "many of the requirements of a smart city, including creating systems to reduce the environmental load, revitalization of corporate activities, and the achievement of comfortable living can only be realized by seamlessly coordinating everything." Their literature suggests that the real reason for the aggressive deployment of information-

gathering apparatuses throughout the built environment is the achievement of "more enjoyment and convenience." (Indeed, what Hitachi is arguing for takes several steps beyond the mere seamlessness of technology in the direction of total invisibility. As far as they are concerned, "achieving a seamless usage style" means "living unaware of the network.")

In the ordinary flow of interaction, at least where consumer products and services are concerned, this sensation of effortlessness in use is a perfectly reasonable, even laudable, goal for a designer to aspire to[98]. Very few of us experience wrangling technology into place as anything but a misery. I very much want a book I open on my tablet to be at the same place I left off reading on my phone the night before, or my pedometer application and my scale to agree on how many calories I've burned today, without my needing to reconcile them manually. (See also: Apple's oft-repeated claim that their technology "just works.")

But this sense of effortlessness comes at a price, which is that the behavior of a system offers users little insight into how it actually works[99]. And this opacity leads to trouble when things break down — as any technical system invariably will, at least on occasion. Because the discontinuity of the technical systems involved in underpinning an experience has been hidden from view, obscuring the locus of control, users are left with little recourse in the event of a default or systemic failure. If the resident of a smart city is denied access to his or her place of work, is it because the iris scanner at the building entrance has failed to acquire a viable image? Because a valid image has been captured, but hasn't been properly conveyed across the network to the access-control software? Or because there's some corruption in the lookup table that uses that image to determine an identity, or in the authentication credential associated with that identity? Or maybe the actuator that physically opens the gate has broken down. Unless some capacity for self-diagnosis is designed into this ensemble of articulated components, there's no way for a user relying upon it to know just what has gone wrong, or where. When systems designed to hide their inherent complexity from the end user fail, they fail all at once and completely, in a way that makes recovery from the failure difficult.

More fundamentally still, there is a distinction to be made between the varieties of experience that are desirable in the operation of a device and in participation in the life of a city. Much of what is interesting and valuable in urban life

happens precisely at the seams, at the hinges or interfaces between different states of being. These are the points at which we notice our surroundings, contend with the reality of other people and their needs and desires, and become most fully present and available. Every technological intervention that is made with the intention of smoothing out urban experience also deprives us of an opportunity to encounter something external to our own will, and so doing robs us of a moment in which we might reflect on the contingency of our own values, choices and beliefs. Though by no means can this be said of every daily hassle, in other words, some things that appear to be sources of friction actually wind up doing meaningful work for us, as individuals and communities both. Although it's almost certainly unintentional, the unexamined importation into the urban context of goals and values more appropriate to consumer experiences winds up undercutting some of the primary ways in which cities generate value.

It gets harder to be generous about the intentions we ascribe to the proponents of seamlessness, though, when we consider its political implications. By obscuring the meaningful distinctions between the two, the "seamless integration of public and private services" makes it very difficult for any of us to determine which set of actors is able to operate more effectively on our own behalf, which effects changes we would wish to see sustained and which is more responsive to our demands. And yet these are the very determinations on which democratic accountability is based. Just as it may be impossible to determine where a tightly coupled system of articulated parts has failed technically, so too may our understanding of urban defaults be impeded by a seamless design. In particular, such a design obscures the relationship between the taxes we pay and investments in public safety, the maintenance of infrastructure and the stewardship of other collective goods. As the artist James Bridle puts it, "Those who cannot perceive the network cannot act effectively within it, and are powerless[100]."

In this context, the attempt at engineering seamlessness acquires a new and pernicious valence. A remarkably passive notion of urban subjectivity and even citizenship is inscribed in the visions of the smart city we've been offered, one that asks of our lives only that they be convenient and of us only that we acquiesce to the creeping privatization of municipal services.

8 | The smart city is predicated on an inappropriate model of optimization.

As you may recall, Living PlanIT describes the smart city as a deployment of technology that provides "a complete picture of building state, usage, and operations…continually maintained, allowing constant optimization of energy, resources, environment, and occupant support and convenience systems."[101]

But for the narrow emphasis on buildings, this is strikingly consistent with the language IBM uses to describe their Rio de Janeiro Intelligent Operations Center[102], intended to "[c]oordinate and optimize superior service delivery," and Siemens, whose smart-city offerings "provide optimum service [and] optimally regulate and control resources by means of autonomous IT systems."[103]

What's going on here? The emphasis placed on "optimization" in these accounts is a frank instance of semantic contamination, in which an idea endemic to the culture of business administration has effectively been copy-and-pasted into a realm where it has no place and makes no sense. Business processes may certainly be optimized for efficiency; so too may computational processes. So on the surface of things, it may seem reasonable for a business promoting the idea that computation can be used to manage cities to think the latter, too, are susceptible to this approach. After all, it's an easy conceptual slide from optimizing machines, to optimizing the management of machines, to optimizing the activity to which the management of machines is dedicated. But the blithe language of efficiency masks some sloppy thinking. What may be perfectly appropriate in a hierarchical, highly structured organization with known, quantifiable goals is fundamentally unsuitable to the protean entities we know as cities.

Even where technical systems are concerned, there's no such thing as abstract, across-the-board "optimization." It is simply not possible to meaningfully evaluate claims of improved performance unless they specify what resource is to be conserved. In computational systems, these tradeoffs are clear: some improvement in a program's execution time can generally be achieved by caching it in local memory, for example, but only at the cost of reducing the amount of memory available for other purposes. Or some provision can be made for the backward compatibility of code but only at the cost of concision.

In this light, the notion that cities are machines with workflows that can be optimized seems more clearly misguided. The concept is meaningless without some explicit account of which resources must be conserved, which may freely be expended and the way in which these determinations of relative value were arrived at. At the very least, if there is to be some quest for maximal efficiency in one set of commitments at the expense of other ends that might reasonably be pursued, this is a decision that can only be legitimated by a process of democratic review.

It would be one thing if Living PlanIT, IBM or Siemens confined themselves to concrete, more readily quantifiable propositions — if, for example, they claimed that by embedding sensors in a city's road surfaces and using the data these produce to feed an adaptive traffic-management system, the number of productivity hours lost to congestion annually could be reduced. Or that by transferring all the operations of civic administration onto a single platform, a significant improvement in self-reported citizen satisfaction levels might be realized. Then the communities involved could reasonably weigh the costs and benefits of these proposals and assess whether or not they represented a net improvement over the status quo[104]. But this isn't what these passages are saying. When we take their language at face value — which is to say, seriously — we see that what is being claimed is total in scope: that via the operation of these technologies, every register of urban life can be brought to an optimal state simultaneously and maintained in that state indefinitely, without any cost.

This, of course, is a self-evident absurdity, and you wonder how the proud engineers on whose efforts the fortunes of organizations like IBM and Siemens are founded could ever have been induced to sign off on it. But the relentless focus on abstract efficiency is troubling in a different way as well. Positioning efficiency as the only index of value available to us overlooks the many simple pleasures afforded by city life that would be utterly unimproved by any optimization, and might well be destroyed in the attempt. Most of us probably have a favorite example in mind, whether it be the evening stroll so distinctive of the cultures of Southern Europe; the fine art of summertime stoop-sitting as practiced in Brooklyn, West Philadelphia and Baltimore; or the impromptu *baduk* parlors you'll sometimes see old men put together on the sidewalks of Seoul out of little more than a board and a folded piece of cardboard to sit on.

Lest we lose sight of so basic a principle, it's worth reiterating that while efficiency may well be a worthwhile goal for the operation of machines, it

generally has very little to do with those pursuits that hold the strongest meaning for us and that we cherish most. It may certainly be a worthwhile quality to work toward in some circumstances, but it is best thought of as *an* objective for a city and its systems rather than the only or even the overriding one. Efficiency is an appropriate framing for some times, places and contexts, not all.

It is particularly difficult to reconcile the optimization imperative with a community's ability to learn from its experiences, or recover in a reasonably timely manner once disrupted. Just as we saw in our consideration of overspecification, it's the very qualities of slack and redundancy that turn out to be essential to the effective functioning of a city over the long term. From the perspective of complex adaptive systems theory, the inherent inefficiency represented by excess capacity allows an urban polity the luxury of trying various approaches to problem solving and the freedom to search the total space of possibility[105] for a better solution, even when things appear to be working well. The same inefficiency grants individuals the opportunity to develop skills that might not now seem useful but which may one day turn out to be vital to their survival, even that of the populace to which they belong. Finally, inefficiency buffers the whole system against the arisal of unforeseen circumstances, as for example when otherwise vacant housing stock is used to shelter people displaced by a natural disaster. By contrast, we know that overly lean systems, like just-in-time supply chains or tightly coupled airline timetables, are prone to break down in the face of unexpected stress. They're too perfectly tuned to the exigencies of a given moment, and generally get caught wrongfooted when the moment shifts.

One final reason why optimization is an inapposite model in urban affairs pertains to a class of behaviors that would be difficult to characterize as anything but disruptions to the smooth and orderly functioning of municipal systems. Here I am thinking primarily of strikes, work slowdowns, acts of civil disobedience and other forms of nonviolent protest. These inarguably prevent a city's systems from flowing with nominal efficiency, but they nevertheless perform a vital function, or rather several. From the perspective of a canny administrator, such disruptive events signal precisely where current managerial policy or strategy has broken down, while their intensity and longevity can, to some degree, serve as an index of the seriousness with which the issues at their core are taken to heart. They allow longstanding grievances to be aired (and maybe even addressed), venting some of the pressure that might otherwise build up and trigger more destructive events. From the citizen perspective, such events

can be important generators of solidarity, serving as rallying points around which previously unsuspected affinities can be surfaced and transforming communities in potential into communities in practice[106]. Most importantly of all, they are an articulation of a given community's demand for control over the terms of its own existence. Any attempt to suppress this class of behavior in the name of optimal functioning, then, is not merely a clear abrogation of a citizenry's right to self-expression but also deprives the city itself of one of its most important feedback mechanisms.

Outside of the smart city discourse, engineers routinely acknowledge the "evaluative complexity[107]" of complex urban systems. They seem to have little problem with the notion that, given the inherent differences in perspective and valuation among urban constituencies, no globally optimized solution to the city can ever be found. Similarly, most business modelers seem to understand that structurally and organizationally, the city is an entity of a profoundly different order than the corporation, even the so-called matrix organization,[108] with its complex internal dynamics. So the persistence of the idea that a polity is something that can and ought to be managed like either a technical system or a commercial enterprise is hard to explain. Flawed at its very root, it betrays, at best, a shallow understanding of the mechanisms by way of which a city learns, diagnoses and repairs itself, utterly failing to account for the qualities which underlie love of place. A city whose interwoven processes actually were "regulated and controlled" as anticipated in this literature — where all the key performance indicators of superficial function were perpetually maintained within some nominal interval by computational oversight and not one thing allowed to interrupt the drive toward total efficiency — would not be a terribly healthy or a pleasant place to live.

Do the institutions responsible for conceiving of the smart city, or the engineers working for them, literally believe that efficiency is the sole metric by which urban processes ought to be judged? As difficult as it may be to accept, when we take their propositions seriously, that does appear to be what they are arguing.

And if nothing else, we should never forget to ask: optimized toward what end and for whose benefit?

9 | The smart city's systems are deployed for the sole benefit of administrators.

If the notion of optimization makes little sense outside of a system optimized for the needs of a particular party, who might that party be?

A 2012 presentation prepared by the Gartner consulting firm for enterprises contemplating dipping a toe in the smart-city market furnishes us with a first clue. It lists [109]"inhabitants" as the last and least significant of stakeholders in the urban ecosystem, and even then, this category is evidently meant to include "individuals, businesses and NGOs." Similarly, Cisco's Smart City Framework offers a manifest of urban stakeholders that includes a public sector, comprised of policy-makers and regulators, and the developers, owners and operators[110] of private property. This is apparently meant to be comprehensive.

These perspectives are far from atypical. Possibly because of the latent assumptions embedded within them as to the magnitude of the technological, infrastructural and financial undertaking involved, these white papers and the many others like them are invariably oriented toward making the case for institutional investment. The smart city is clearly understood to reside in an ensemble of technologies at a scale that can only be acquired and deployed by state actors, and that requires expenditure at a level generally financed by bond issue.

In these materials, any sense for the texture of everyday life as it is actually experienced is abstracted to the point of nonexistence. Citizens, by and large, are absent from these visions except as generators of data and, perhaps, as undifferentiated consumers of "the ultimate urban lifestyle." At best, the realities we all recognize and that occupy so much of our time and energy as citydwellers are acknowledged by inclusion under the most generic possible headings.

This framing sheds further light on just who it is that these massive investments are intended to benefit. The frank aim of all this instrumentation, data collection and analysis is to furnish municipal administrators with a not-entirely-metaphoric set of knobs, sliders and dials they can use to modulate the behavior of the city and its citizens, as though they were playing an elaborate game of SimCity. There's probably no better current example of this tendency than IBM's Intelligent Operations Center[111], billed as a "citywide monitoring and

response-management system." This is local government reimagined as some combination of automotive dashboard and war room, with live data used to inform and direct the disposition of a city's available resources in something close to real time.

On its face, this idea is not a terrible one, and it has perfectly honorable antecedents, notably the Cybersyn operations network that British cyberneticist Stafford Beer built for the Chilean government of Salvador Allende [112]between 1970 and 1973. But where Beer's plans, though clearly top-down, called for the direct participation of stakeholder representatives, physically present in the operations center [113]— and, in fact, Allende insisted that the top level of decision-making authority in Beer's layered command-and-control schema belonged to "el pueblo" — IBM's efforts for Rio include no such provision. Recall that IBM intends their offering to "synchronize and analyze" not citizen efforts but those of "sectors and agencies." This suggests, right off the bat, something potent about just where IBM considers agency to reside in the contemporary city: precisely not with citizens, as individuals or collectives, or anything that people might do themselves to improve the communities in which they live. The role of the citizen in this schema is simply to generate data that can be aggregated and subjected to analytical inquiry, with an eye toward refining the actions that matter, i.e. those taken by market and state actors.

From this follows the notion that whatever capability IBM brings to bear on the challenges of the city, it is intended for the exclusive use of "decision makers." In fact, their site reiterates that their offering is meant for "leaders.[114]" And though an ad placed in the *Wall Street Journal* [115]does at least nod at the existence of an "ever more active and engaged citizenry," in none of the material I was able to track down does IBM make any practical provision for the sharing of the "consolidated information" produced by their Intelligent Operations Center with the people whose actions generated it in the first place, either as analytical production or as raw data. The sense that citizens themselves may wish to avail themselves directly of the information ostensibly being gathered on their behalf is almost surreally absent from the smart-city literature. Even where there is some provision made for citizen-facing information, it is as a paid service [116]in which synthesized findings are furnished to subscribers in the form of alerts and advisories. But as far as I am able to determine, neither IBM nor any of its peers among the smart-city vendors has ever suggested that citizens be offered direct access to the disaggregated raw feeds.

This choice is doubly distressing because the primary expenses involved in an Intelligent Operations Center or anything like it are those associated with the collection and analysis of data, not its distribution; the incremental cost of furnishing either raw data or analytical products to the general public via open channels is extremely low. It's hard to interpret the absence of any such provision from the canonical smart-city plans as anything but a deliberate exclusion, an explicit statement that administrators are entitled to avail themselves of perspectives denied the public. While there does exist a very limited belt of circumstances in which it may be reasonable to restrict access to information — the precise disposition of police resources, for example, in an emergent hostage situation — the people's business is otherwise manifestly the people's business.

If the only accounts of it we were ever exposed to were like Gartner's, we'd conclude that urban technology is exclusively a matter of enterprise-scale systems, sold by vendors of a similar gauge, to institutions they are familiar with, through existing procurement channels. If we never looked beyond IBM's conception of things, we might understand an urban populace as an undifferentiated, refractory mass, in need of active management and incapable of making wise use of information about its own behavior. In both cases, as in the rhetorical productions made by the other actors we've considered, the smart city sees to the prerogatives of administrators not merely ahead but to the virtual exclusion of any other.

10 | The smart city is predicated on — indeed, is difficult to imagine outside of — a neoliberal political economy.

Virtually without exception, the canonical smart cities are predicated on the logic of neoliberalism.

Because this term is bandied around quite a bit and means different things to different people, I want to be very clear about just what it is that *I* mean by it. I understand neoliberalism to be a political philosophy that:

— calls for most essential citizen services to be *privatized,* on the theory that private operators are accountable to their shareholders and are therefore likely to be less wasteful, and more efficient and responsive, than public-sector bureaucracies;
— argues for the *deregulation* of activity between private actors, a sharp reduction in public oversight of business operations and limitation of the state's legal apparatus to that sufficient to enforce contracts and property rights;
— maintains that the goal of prosperity for all is best served by *frictionless global trade,* with few or no limits on foreign investment or ownership and the elimination of tariffs; and
— entails the *reduction of taxes* to the absolute lowest level consistent with the maintenance of a minimalist state, chiefly consisting of the juridical apparatus described above and a military robust enough to ensure favored enterprises unimpeded access to markets and resources. Whether intentionally or otherwise, this has the effect of choking off any expansion of the public sector or its scope of operation.

You would certainly be forgiven for asking what any of this has to do with the set of technological interventions we've been discussing. But the rhetoric of neoliberalism is never far beneath the surface in contemporary descriptions of the smart city. In fact, it's hard to imagine a better short introduction to neoliberal policy than the point-by-point case managing director Sultan Ahmed Al Jaber makes for investment [117]in Masdar City: "Foreign firms setting up shop will…be able to work without local partners if they want, and to move capital freely in and out of the country. There will be strong protection of intellectual property and little in the way of paperwork. Most alluringly, they will not pay any taxes."

What is it that makes the smart city such fertile ground for this particular set of beliefs and positions?

Privatization is a given where the canonical smart cities are concerned. Actually, that's a weak word for what we encounter in them, which isn't so much the mere private provision of services as it is outright ownership. As we've seen, New Songdo was the joint initiative of a real-estate developer and a unit of the POSCO *chaebol*[118]. Masdar City is literally the city of Masdar, an Abu Dhabi-based company [119]specifically chartered to develop and manage the site, and of course PlanIT Valley is similarly branded. It's hard to imagine a robustly autonomous community, or a public sphere in any traditional sense, taking root in the soil of a municipality that is owned and operated as a business in the way these places are.

Private ownership of the common spatial domain is not the only neoliberal policy point embraced by the smart-city developers; so too does the rhetoric of streamlined, borderless trade appear to be universal in any discussion of these places. To an unusual degree, the canonical smart cities are sited on parcels specifically excluded under law from the normal policy of the land, special zones designed to attract foreign investment with a bouquet of incentives, abatements and out-and-out subsidies. In Masdar [120]City, the relevant enabling legislation, Abu Dhabi's Law No. 22 of 2007,[121] established Masdar as a trading entity and authorized it to operate the city as a special economic zone, free from the emirate's ordinary taxation or restrictions on foreign ownership[122]. Likewise, Songdo is the commercial and residential centerpiece of a broader Incheon Free Economic Zone that describes itself [123]as a "Global Business Utopia." These zones are carefully sited for maximum proximity to global logistical hubs: Masdar City is immediately adjacent to Abu Dhabi International Airport, while a highway bridge linking Songdo directly to Incheon International was completed even before the city itself. In all cases, these provisions are designed less for any inherent benefit to the local population or environment they might entail, and more with the aim of rendering the flow of capital, talent and materiel across national and international borders as nearly frictionless as possible.

A further impetus offered to businesses and individuals contemplating moving to one of these cities, by no means coincidentally compliant with neoliberal doctrine, is the reduction of local taxes to a bearable minimum. The tax relief Living PlanIT won from the Portuguese government [124]when its Paredes project

was named a "Project of National Interest" was carried on their FY2009 balance sheet as an €8 million asset,[125] and the government passes on similar incentives to companies willing to locate in PlanIT Valley. In Songdo, no taxes are levied on either corporate or individual income [126]for a period of ten years following the establishment of a local presence. Export-oriented firms enjoy a 50 percent reduction in rent, and a still more generous package of subsidies awaits businesses with more than 30 percent foreign ownership. (Masdar trumps both, offering "zero percent taxes on companies and individuals"[127] in perpetuity.) Finally, marketing materials for both Songdo and Masdar City tout the lax regulatory climate investors will enjoy as a prime benefit of residency, specifically mentioning their exemption from national labor law and, in Masdar's case, explicitly calling out an easement of the emirate's already-liberal stipulations on the employment of overseas guest workers.

Songdo developer Gale International's CEO, John B. Hynes III, explicitly cites business-friendly features [128]of the local regulatory environment as reasons why a company might choose to locate there, as opposed to China — and, in fact, as reasons behind Gale's choosing to develop the city in South Korea in the first place:

"Companies can take advantage of China's low labor cost and still enjoy the high quality of life that New Songdo will provide. Korea has a great legal and judicial system compared to China. You can own land in Korea, but not in China. If you want to locate in New Songdo, you would deal with Gale International, while in China you would probably work with some government agency."

The logic here could not possibly be made any clearer: businesses want to deal with other businesses, and ideally not with any institution guided by prerogatives other than those of the market.

All of these hallmarks of free-market orthodoxy — the privatization, the deregulation, the orientation toward trade and the hostility to taxation — might be expected in cases like these, where the city itself is the product that's being marketed. But unquestioned neoliberal assumptions even show up in the smart-city literature in contexts where it makes little or no apparent sense. For example, IBM's pitch for their Intelligent Operations Center promotes it as a way for municipal government to manage conditions of "rising urban

populations, aging infrastructures, and shrinking tax revenues.[129]" Nowhere do they bother to ask why the infrastructures in question were allowed to age, tax revenues to dwindle, or if either of these situations might be more fruitfully addressed at the policy level, before asking taxpayers to underwrite the installation of IBM sensors on the bridges and water mains. Again and again, from Hitachi [130]to Cisco [131]to Microsoft, we see assertions like these treated as facts and givens, reproduced as the unexamined furniture of consensus normality.

Again, it should hardly need to be pointed out that there is no inherent relationship between the various information technologies we have been discussing and any one set of beliefs about the proper balance of public and private management of resources. Nor is there any reason why a polity adopting them should necessarily favor one political-economic framework over the others available to it. So why are places like PlanIT Valley, Masdar City and New Songdo so self-evidently bound to this particular package of ideological commitments? Perhaps it's because the causality actually goes the other way: the smart city itself, as a coherent object of discourse, arises out of a specific set of conditions produced by late capitalism, under which cities compete against each other as global destinations for capital and talent. In this light, the smart city's organic capacity for data-driven process optimization, its seamless interweaving of public and private action and its organization for the convenience of administration can clearly be seen for what they are: merely the most recent additions to the armature of enticements and amenities a city must offer in order to be considered a credible contender as a destination for these flows.

"The smart city" barely exists outside of the rhetorical productions of actors already profoundly committed to market-based conceptions of the good. The valuations, beliefs and priorities they hold to are embedded in the organization and promotion of places like Songdo, PlanIT Valley and Masdar City at the molecular level, producing a remarkably consistent account of what cities are for and how and for whom they ought to be designed — not just these cities, but all cities.

As it happens, there are places on earth where every aspect of this vision but the specifically information-technological ones have already been fully realized: the lifestyles and modes of experience imagined throughout the smart city literature bear a remarkable resemblance to those we associate with everyday life in the

secured enclaves architect Mike Davis dubs "evil paradises[132]." Davis makes it clear that such enclaves do not merely segregate the wealthy and privileged from the less fortunate but actively depend on reducing those forced to live outside their walls to circumstances of bare life, very often warehousing them in squalid labor camps or filthy, overcrowded workers' dorms. Those who find such a state of affairs repellent may therefore want to ask if the affinities between neoliberal ideology and this particular vision of heavily technologized urban place are incidental, or necessary and structural.

11 | The smart city presents a set of potentials disturbingly consistent with the exercise of authoritarianism.

Partially as a consequence of their coziness with neoliberal conceptions of the good, the archetypical smart cities tend to be located in polities that lack any particularly robust conception of the public sphere.

Although it was for many years a military dictatorship — and, in fact, current president Park Geun-hye is the daughter of the one-time strongman Park Chung-hee — contemporary South Korea enjoys a practice of democracy best described as vigorous, if not fervent. But as we've seen, Songdo is a private venture; it's not at all clear what laws apply [133]to everyday life in the IFEZ. There may well be abundant protections for free trade, in other words, but it remains to be seen what, if any, measures protect Songdo residents in their ability to practice free speech, the right of assembly and the other basic provisions of democratic action.

Masdar City, meanwhile, is governed by the jurisprudence of Abu Dhabi, a place where the overwhelming majority of the population — the migrant workers who, in 2011, constituted 90 percent of the Emirates' labor force [134]— effectively have no rights at all. Human Rights Watch has documented extensive and continuing mistreatment [135]of the largely South Asian "guest workers" who built the city; among other abuses, guest workers routinely have their passports confiscated upon arrival, to ensure dependency on their employers. The denial of basic rights extends beyond immigrant labor to native-born academics and activists. In fact, anyone perceived as criticizing the government in word or deed may find themselves subjected to official harassment, prosecution and imprisonment.[136]

There doesn't seem to have been any consideration on the part of its backers that Masdar City's ability to function as "a creative and entrepreneurial atmosphere where businesses can thrive and innovation can flourish"[137] might if anything require special protection for freedom of expression. Nor does there appear to be any meaningful prospect of change on this question in the near future. Proposed legislation that would have exempted the Saadiyat Island "cultural zone" from restrictions on speech and conduct — creating a kind of bubble of extraterritoriality, in which visiting academics, artists and performers might be afforded the freedom to pursue the very activities for which they were invited to

Abu Dhabi in the first place — was quietly quashed in late 2010[138]. If Saadiyat Island, with its glittering diadem of world-class cultural institutions (including branches of the Guggenheim Museum, the Louvre and New York University), is not seen as deserving of enhanced protection for civil rights, it's hard to see how any other precinct of Abu Dhabi would qualify.

Given its frankly vestigial state of development, it would be fairest to characterize PlanIT Valley's politics as "nonexistent." Again, Living PlanIT's materials focus exclusively on the material and technical aspects of their planned community, furnishing no account of everyday or civic life. They fail to develop any notion of how the polity would be organized, let alone what mechanisms residents might use to advance their interests or contest the claims of others.

The lack of anything resembling a traditional public sphere in all of these places is troubling enough, considered in itself. But it's especially worrisome given certain inherent capabilities of a thoroughly instrumented environment, namely the ability to identify individuals via the analysis of unique biometric signatures; track their movement through the space of the city; monitor and assess their utterances and other behavior; and predict likely courses of action, including future patterns of movement and association, based on that assessment. Far from being incidental to the conception of the smart city, these are precisely the same capabilities that underlie proponents' claims about efficiency, optimization and improved delivery of services. The very armature of technical potentials that definitionally constitutes the smart city can easily lend itself to practices of oppression, furnishing would-be authoritarian institutions with a toolkit readymade for their purposes. I believe these tendencies are more likely to enjoy free rein in the absence of a well-grounded discourse of civil rights, a vibrant culture of disputation and the institutions that serve as some check on the untrammeled exercise of power.

The particular bundle of technologies in question can be used in ways that pose considerable risk to marginalized populations, even in places with a healthy tradition of democratic expression. IBM, for example, suggests that their Intelligent Operation Center will help municipal governments "monitor and manage city operations pro-actively [sic] and…respond rapidly and effectively to emergencies[139]." But the specific "emergencies" contemplated in the case of Rio de Janeiro apparently include demonstrations by favela residents for their own right to autonomy and self-determination; Rio-based advocates for the poor

have raised concerns that the city's Civil Defense used Intelligent Operations Center forecasts as a pretext to coordinate forced evictions [140]from the informal hillside settlements. The specific trigger for these evictions involved the Center's prediction of increased risk of mudslides, but advocates point out that the timing is suspiciously convenient: favela clearance has long been pursued by the city, with a heightened pace of activity being driven by the perceived need for urban beautification ahead of the 2014 World Cup and the 2016 Olympic Games. (These evictions are generally carried out by the Batalhão de Operações Policiais Especiais, or BOPE, an urban-warfare unit repeatedly cited [141]by Amnesty International for its record of extrajudicial killings, human-rights abuses and other crimes against conscience.) These evictions sharply clarify who it is that benefits from the Center's interventions; any claim of favela residents to the integrity of their own community is superseded by the interests of the tourism sector, followed by speculators in real estate.

If catastrophic mudslides are a legitimate concern, and we have no reason to believe they are not — I would certainly be concerned, if hydrological forecasts showed a significant risk that my house and neighborhood would be washed away — why not furnish favela residents with the relevant data, and allow them to arrive at their own conclusions about what measures might best protect their life and livelihood? Why not assume that they, like people anywhere, are adults with agency, rather than showing up with heavily militarized police to expel them from their homes?

To be sure, mudslides do constitute a genuine threat to some favela communities, the issues with police units like the BOPE preceded IBM's arrival on the scene, and such displacements would doubtless continue whether or not an Intelligent Operations Center was present to lend them the color of plausibility. Defenders, furthermore, might argue that the work done by such a Center is fundamentally non-ideological, merely a matter of triggering user-defined standard operating procedures [142]whenever equally user-defined key performance indicators pass some specified threshold. If the data exists, then, and if that data plainly suggests what IBM and its partners in Rio's city government have characterized it as saying, distributing it widely and using it as the basis of a public conversation about its implications would seem to be preferable to forced eviction, optically, practically and morally. But this isn't what the creators of the Intelligent Operations Center designed it to do. IBM's own materials specifically contemplate the use of the Center's capabilities,

instead, to guide favela pacification operations, going so far as to suggest [143]"Which streets will require the most troops?" as a question an administrator may wish to submit for computational consideration. Given the charge of collusion with the Third Reich levied by Edwin Black in his authoritative *IBM and the Holocaust*,[144] one would imagine that IBM of all companies might want to steer clear of even the appearance of involvement with such measures. In this light, IBM's claim that the mission of its Intelligent Operations Center is to "minimize disruptions" is practically sinister.

Very often in the extant smart-city discourse, we find that the obsession with the observation and control of urban processes shades imperceptibly into the desire to observe and control citizen *behavior*. Singapore, with its notoriously stringent and granular regulation of personal comportment, is frequently [145]cited as a model to which emergent smart cities might aspire, and it does seem rather appropriate that Siemens has chosen to locate their City Cockpit — a rather pallid imitation of IBM's Rio control center, and a simulation at that — in the city-state. [146]A distinct Singapore-style paternalism colors the discussion of options available to administrators, even in cases where advocates explicitly acknowledge the limits of centralized and authoritarian models of governance. A report on "digital urban renewal" prepared for Cisco, for instance, draws the distinction between "tight" or top-down approaches to the management of networked cities and a "'loose' approach [focusing] on enablement, community involvement and behavioral change." In context, this passage clearly means to emphasize the benefits associated with the latter (and in context, you want to applaud). But a reader hoping for any genuine affirmation of values like citizen autonomy and self-determination is likely to find their hopes dashed by the balance of the report, which goes right on to list "behavior change" [147]among the ends that municipal government might rationally wish to pursue through the use of networked systems.

The "loose" approach recommended here is to use a city's networked systems to "make the desired behavior easier or more attractive," and while the carrot is certainly preferable to the stick, neither has anything to do with upholding citizens' right to assess a situation and decide for themselves what course of action to adopt. It matters where and under what circumstances an impetus to change one's behavior arises, in other words. Putatively benevolent authoritarianism is still authoritarianism, and soft power is no less an assertion of power for its relative subtlety. It may give technical architects a certain frisson

— as though they themselves were tough-minded practitioners of urban *Realpolitik* — to suggest that behavior modification through the conscious manipulation of extrinsic incentives is a tool available to municipal administrators. But in the Western democratic tradition, at least, this kind of overtly Skinnerian approach to public policy has long been frowned upon[148] and, in any event, has met with only indifferent success[149].

It is no doubt the case that much of the enthusiasm for authoritarian states we see on the part of smart-city vendors has to do with the breathtaking speed with which things can be accomplished in a place like Singapore or the Emirates, once the power center has decided that a given project is in the national interest. It's easy to understand why organizations more used to working at the clock speed of technology may prefer this to the unruly rough and tumble of democracy and the two-steps-forward/one-step-back dynamic that invariably seems to attend it.

There's also a natural, structural tendency for enterprise-scale technology vendors to contract with actors of roughly their own magnitude, through processes and channels that are well-understood and familiar to them and their investors. This is why the IBMs and the Ciscos of the world appear markedly more comfortable with situations where power is concentrated in but a few hands and, conversely, demonstrate some confusion at the idea of decentralized and broadly distributed agency. (Microsoft, perversely, even argues explicitly [150]that centralization is necessary for a citizen-oriented culture of governance to take root in a smart city; apparently, the spirit of "We had to destroy the village in order to save it" is alive and well in Redmond.) These preferences arise out of pragmatic and, again, putatively "non-ideological" concerns — almost certainly founded in perceptions of the needs of the business rather than any personal commitment to authoritarian values on the part of directors or other executives. But the results are identical, and at the margins, enthusiasm for the vigor with which an autocratic regime can act can be hard to distinguish from outright apologia for the systematic practice of oppression.

The affinity flows both ways, of course. Just as Corbusian city-planning dovetailed all too neatly with the predilections and requirements of authoritarian states of the twentieth century, from Stalin's Russia to the Vichy France of Marshal Pétain,[151] smart-city technologies mesh particularly well with an authoritarian government's interest in monitoring dissenters, anticipating likely

sources of resistance and forestalling or suppressing acts (or actors) perceived as challenging the government's claim to legitimacy. It may well be that there are readers who have no particular problem with any of this as long as the streets are cleaned, the traffic flows smoothly, the revenue targets are met and the proverbial trains run on time. But however carefully it may be hidden — and however seductive the gleam of the surfaces hiding it — authoritarian efficiency is always founded on violence of one sort or another. I'm willing to bet, therefore, that for the greater part of us, the unseemly willingness of the major vendors of smart-city technology not merely to play ball with such regimes, but specifically to allow their technology to enable acts of repression, will tend to cast the whole endeavor into the darkest shadow.

12 | Perhaps most damningly of all, the smart city has little enough to do with cities.

It's striking how many of the stances and commitments we've identified in the rhetoric around the smart city are interrelated with one another. There are multiple and mutually reinforcing connections between the proprietary business models, belief in the privatization of governance and orientation toward the prerogatives of administration we find articulated throughout this literature. It is, in its way, a coherent body of thought.

But oddly enough, it's not at all clear that there's anything particularly urban about it.

Proponents could not possibly be any more forthright about their aspirations. The claims made for the quality of life in the canonical smart cities may be extravagant, verging on absurd, but they are never anything less than explicit; New Songdo developers Gale International, for example, boast[152] that their confection will sport "the skyline vistas of New York, the strolling walks of Boston, the reflections of Venice, the kinetic energies of Wall Street, the pocket parks of London…the stunning impact of Sydney's Opera House, the street scenes of Paris[153] and Soho, the polish of Park Avenue."

This, bluntly, is cargo-cult urbanism. Gale's strategy for Songdo amounts to replicating all these signifiers of great cosmopolitan place[154], assembling them on one site and hoping that something resembling true citymagic results. It's just barely possible that their effort will produce impressive pictures for a website or a brochure — something staged and static, in other words — but it badly mistakes the dynamics that undergird the quality of urban life. That is to say that skylines, bustling street scenes and gem-like little parks are *epiphenomenal*. Like the other features and amenities being called out here, they arise in response to the needs of a great many people of differing proclivities, interacting with one another over reasonably long periods of time. And these, of course, are precisely the elements that are missing from Songdo and its peers.

It's hard to avoid noticing that all of these initiatives are of negligible scale, barely cities at all by any reasonable definition. As we've seen, Masdar City is being designed for 90,000, PlanIT Valley for 150,000. Even should it reach its projected population of 259,187[155] — a curiously specific number which, if my

observations over the summer of 2011 are any guide, will take years to achieve — Songdo would still best be thought of as an appendix to the immense Seoul-Incheon-Suwon conurbation, home to a (2007) population of 24.5 million.

To be sure, it isn't size alone that makes a city. Difference is what drives the great engine of urban vitality, just as heat transfer drives a hurricane. At least as they are currently imagined, though, not one of the canonical smart cities seems as if it might be capable of supporting a usefully differentiated human ecology. We've seen that they tend to be designed and marketed like consumer products, and, like any such product, have been crafted to appeal to a certain segment of the audience. But a population exclusively composed of a single market segment (chiefly financial workers in the case of Songdo, cleantech and renewable-energy researchers in Masdar and employees of Living PlanIT and its partners in PlanIT Valley) is unlikely to maintain the complex diversity of pursuits, tastes, schedules and habits on which any genuine city feeling is founded. In particular, it takes a large, diverse population to support the level of demand for niche or specialist products, services and experiences that, in turn, virtually defines the urban(e). This multiplicity, inevitably, is not unalloyed in its blessings. The same diversification of need and desire that generates a vibrant service ecosystem[156] also makes the city a patchwork of constituencies with wildly divergent conceptions of the good, the just and the proper, virtually guaranteeing the impossibility of satisfying them all at once. But that, too, is part of what we mean when we call something a city.

Between their physical extent and their homogeneity, then, it would be more accurate to describe the places we've been considering as smart "towns" (or, given their evident parasitism on larger and more fertile urban areas nearby, maybe even "suburbs"). But these are issues that certainly seem as though they might beset any brand-new, master-planned development. Is there anything specifically urban about the smartness of the smart city?

We've already seen that the discourse treats cities as an abstract terrain for the redeployment of techniques developed in other contexts, techniques that would be equally suited to the guidance of any complex process. For example, there's virtually nothing about IBM's Intelligent Operations Center product that might meaningfully distinguish it from an interface one would use to manage the operations of any other large and reasonably complicated system — a hospital, say, or a hotel or an aircraft carrier. The same goes for Living PlanIT's "Urban" Network Appliance, based on engine control unit software originally developed

by McLaren Electronics for Formula One racing[157]. There may well be a considerable amount of ingenuity involved in finding new uses and applications for these off-the-shelf components, but we shouldn't fool ourselves that the endeavor is in any way based on an appreciation of the city as a crucible of contested spaces and conflicting constituencies, or of municipal management as the art of balancing their broadly irreconcilable demands.

If anything, just the opposite is true. The presence in a city of technologies of ubiquitous data capture, at least in the form in which they are currently being proposed, is likely to suppress or displace activities that are vital to the maintenance of any such balance. These are the commercial activities, provisions for housing and self-care, and community arbitration and dispute-resolution processes generally grouped under the anodyne label of "the informal sector." They account for an astoundingly high percentage of total economic activity[158]. They are critical to more recognized economic and social processes, even in what we are pleased to think of as the developed world. And they are entirely absent from the smart city's account of itself[159]. Almost by definition, every act in the smart city is a formal one, or becomes formalized in short order. At least in principle, every behavior is observed. Every observation generates a record. And every record is persistently available for administrators to consider and weigh among all the others. Patterns are made obvious, anomalies announce themselves, and what previously hid in plain sight — or lived in consensual deniability, because its presence was convenient to all parties — surfaces before computational inquiry, becoming available for taxation, capture, regulation or sanction. Under circumstances of perpetual and total visibility, the whole shaky enterprise of informality comes crashing to the ground.

It's clear that the architects of the smart city have never contemplated the damage their technics of universal watchfulness would surely inflict on a functioning place, or the sheer unwieldy unworkability of any city deprived of its informal modes of making do. But the imperative of visibility in all times and all places is nothing if not consonant with the other values inscribed in the smart city by its creators. We can, by now, trivially diagnose the overriding desire at the core of all such schemes: control, and the reduction or (preferably) elimination of risk, in the name of a bleak stability. What just sheets off of the smart-city discourse is a discomfort with unpredictability, a positive terror of the unforeseen and emergent — in short, a palpable nervousness about the urban itself. This is why the apparatus of ubiquitous sensing, data-mining and

predictive analytics exists in the first place. It's been deployed toward the end of a very particular kind of homeostasis: not the rough and ready load-balancing achieved when formal and informal sectors operate in anything approaching synchrony, but the maintenance of "an environment where companies can create jobs for citizens and products and services for citizens and other consumers[160]."

That's it. That's the entire conception of public responsibility as it is articulated in the materials I studied. These particular words are Living PlanIT's, but they're virtually identical with framings offered by their peers[161]. The purpose and charter of municipal governance, in this literature, extends little further than the imperative to maximize shareholder value.

When the ambitions at the heart of this endeavor are stated so baldly, they're not very appealing, which is why they're generally prettied up for public consumption with talk about "enhanced citizen engagement" or "sustainability." But sometimes the parties responsible cannot help but give the game away. What they reveal when they do so is not merely a cargo cultism, an inability to reckon with informality or an uninviting and ethically questionable model of municipal governance, but an underlying conception of the city itself so terribly impoverished that it verges on contemptuous. For me, the deepest truth of all about the smart city is bound up in that particularly infelicitous phrase from Living PlanIT's material, "occupant support and convenience systems." Every dive bar and every farmers' market, every playground or cinematheque or Michelin-starred restaurant, all the bodegas, bike shops and edgy boutiques, the rib shacks and fetish clubs and flower festivals — all of that, and everything implied by them, Living PlanIT reduces to those five fatal words.

Say them out loud: "Occupant support and convenience systems." That is how one of the parties most prominently embarked on this project thinks of everything in the city that is not powerplant or mobility infrastructure. You have to wonder about the priorities of an enterprise that can manage to describe everything that gives city life its texture in quite that way.

It's not just Living PlanIT, though their public statements tend to be the most egregious and least self-aware of any of the enterprises I studied. To a one, the visions of urban life we are offered in the smart-city discourse are equally simplistic. They are marked throughout by a certain kind of relentless shallowness, haunted by the sense that the actual places they describe amount to

less than the sum of their very expensive parts. In the end, the elaborate plans for places like Songdo, Masdar and PlanIT Valley replicate only the things about existing cities that their creators want to see, while manifesting the most astonishing blindness to the city as it is and to the processes that keep it functioning. There's little doubt that the planet's several thousand municipalities furnish those with a commercial interest in the smart city with an enticing new market for their goods and services[162], at a time when their traditional wells threaten to run dry. But everything we see from them suggests that they don't actually understand very much about the terrain on which they've chosen to work.

13 | The smart city replicates in tone, tenor, form and substance most if not all of the blunders we associate with the discredited high-modernist urban planning techniques of the twentieth century.

If just about all of this seems faintly familiar — the clean-slate development, the coziness with autocrats, the boundless faith in the benisons of technology and the horror of the actually urban — maybe that's because this is a road we've traveled down before.

As it happens, virtually every single one of the principles we have identified at the core of the smart-city proposition was originally advanced during the eighty years between 1880 and 1960, a period that saw the gestation and ascendancy of high modernism in urban planning. The sole genuine novelty that the smart-city discourse offers, as compared to this earlier wave of activity, is the affinity for neoliberal values — and if this is absent from high-modernist urbanism, it is surely because the neoliberal conception didn't quite congeal as such until the collapse of the Bretton Woods framework in the mid-1970s.

Certain of the concepts we've explored can be traced to Ebenezer Howard, the Victorian-era reformer whose idea of the garden city [163] sifted out the basic metropolitan functions of residence, industry and commerce, and allocated them in sectors arrayed around a central common area. Howard's influence can still be felt, enacted with a rather pigheaded literalness, in Living PlanIT's published plans for their Paredes project. But no body of work is more profoundly resonant with the discursive productions we've considered than that of the Swiss-French architect, theorist and visionary Charles-Édouard Jeanneret (1887-1965), who styled himself Le Corbusier.

The story of his disproportionate influence on twentieth-century urban planning has often enough been told, but his actual words make for entertainingly horrifying reading, starting with the very dedication to *La Ville Radieuse* ("THIS WORK IS DEDICATED TO **AUTHORITY**, PARIS, MAY, 1933"). It's all there in Le Corbusier: the slate-wiping disregard for the existing urban fabric, the scientism, the surety that all that is necessary to human happiness can be captured in a formula. Compare his writings to any of the promotional materials we've examined, and you find the same claims that efficiency ought to be the single overriding concern of the urban designer, the same orientation toward the

needs of administration and the same belief that ideal urban form can be optimally specified and fixed for all time in serene perfection. Above all, we find the same essential hostility to the very notion of the urban.

Starting with his Plan Voisin for Paris (*Urbanisme*, 1925, released in English translation in 1929 as *The City of To-Morrow and Its Planning*)[164] and continuing through publication of *La Ville Radieuse* (1935; published in English as *The Radiant City*, 1967), Le Corbusier articulated a coherent, consistent and entirely unremitting vision of a rationally planned metropolis, managed from above in the interests of health, order and efficiency. The new city is to be built from nothing, on a patch of earth swept free of history and other impediments to the master vision. The plan needn't reckon at any point with whatever urban fabric is currently to be found in that place, whether it functions or not. (This is a man whose Plan Voisin could weigh central Paris and find it wanting, little more than a warren of intersecting "pack-donkey's ways," despite successive intercessions under Louis XIV and Napoleon III.) In fact, so unwholesome is the existing city — any existing city — that the planner "must refuse to afford even the slightest concession to what is." The medieval snarl of streets and fetid alleys is to be overwritten by a single, sublimely geometric composition: an orderly procession of cruciform high-rise towers set amid expansive greens, the distant precincts connected by restricted-access speedways.

This is an aesthetic with the most profound distaste for the messiness and complexity of metropolitan life, and its provisions had clear political intent. Just as Haussmann had, eighty years before, Le Corbusier saw that the density and involution of the medieval street fabric made it opaque to external inspection, and therefore rife with potential to support all sorts of flows that the state might consider undesirable, from squatting and smuggling to the organization of revolution. By contrast, the Corbusian city specified a place for everything and put everything in its place. Years before anyone thought of networked CCTV cameras or predictive data models, he designed an urban environment of utter transparency, where all flows were made manifest and visible, and stringent functional segregation meshed with wide-open spaces and unimpeded sight lines to afford administrators a godlike watchfulness from above.

In the history of urban planning, Le Corbusier is significant as much for the extraordinary influence his thought had on his contemporaries as he is for anything he managed to get built himself. In part, this influence was brought to bear via the organization he served as instigator and prime ideologue: the

Congrès Internationaux d'Architecture Moderne,[165] or CIAM. Between 1928 and its eventual dissolution in 1959, the delegates of CIAM were astonishingly effective in installing their gospel of high modernism at the very core of mainstream planning practice. While there were certainly differences of opinion within the organization, the membership nevertheless shared certain overriding concerns, guiding beliefs and values, and these — set forth with admirable clarity in the Athens Charter of 1943 [166]— furnished institutional urbanism with a default mode for the better part of the century, on a scale that was nothing less than planetary. (It's worth noting that the Charter was first published in a France under German occupation and the administration of the puppet Vichy government,[167] and that this seems to have presented no insuperable problem to its signatories.)

The Athens Charter blamed all manner of ills on the "inefficient" and allegedly irrational design of the pre-modern city, from depression and tuberculosis to promiscuity [168](the latter "arising from the interior layout of the dwelling, from the poor arrangement of the building, and from the presence of troublesome neighborhoods"). Cheek-by-jowl living in the crowded districts of the inner city exposed citizens to moral peril, "corrupting their inner lives," while inadequate planning yielded the "poisoned fruits" of "illness, decay [and] revolt.[169]" Unsurprisingly, given its provenance, the Charter's proposed solution to these vexing concerns was for cities to be subjected to the same ruthless program of simplification, abstraction and spatial deconcentration outlined in *La Ville Radieuse*: "Reasonable population densities must be imposed…The population densities of a city must be laid down by the authorities…The alignment of dwellings along transportation routes must be prohibited…High buildings, set far apart from one another, must free the ground for broad verdant areas."

There's a cautionary tale here for anybody currently invested in any notion of the smart city as a liberatory or politically progressive project. In the Charter's concern with access to sunlight and clean air, we see clear traces of the sanitary regulations that accompanied the Hausmannization of Paris, perhaps even of the reforms that followed Jacob Riis' work [170]documenting the deplorable housing conditions on the Lower East Side of New York City earlier in the century. If not Le Corbusier himself, at least some of the CIAM delegates arguing for the package of interventions proposed in the Charter intended them to advance ends of equality and social justice; if we take them at their word, it's clear that many of the actors involved in CIAM conceived of themselves as undertaking an

essentially progressive project. The Athens Charter is full of language condemning speculators and decrying the patterns of spatial injustice that "allow[ed] only the favored few to benefit from the conditions required for a healthy and well-ordered life"[171] while "depriving entire households of light, air, and space." The aspiration to provide the ordinary citydweller with a decent standard of living is palpable.

On the ground, though, any hope that the application of CIAM-style orthodoxy might result in more equitable conditions for the masses — or in any other kind of urban renaissance, for that matter — was soon enough dashed. The "functional city" called for in the Athens Charter was realized after World War II in two showpiece administrative centers, Le Corbusier's own Chandigarh (1951) and Lúcio Costa's plan for Brasília (1956). These places comprise a catalogue of things not to do if what you're interested in is enhancing the quality of urban life. They're characterized by sectors or "superquadrants" so brutally regular that they are visually hard to distinguish from one another, even for longtime residents; windswept, empty plazas; and — impeccably observant of the Corbusian distaste for short blocks — the kind of unwalkably endless thoroughfares that, to this day, compel the occupants of each city to rely on vehicular transport for their basic daily needs. (This, by the way, is entirely intentional: Le Corbusier had consciously designed the Radiant City to "use up tires, wear out road surfaces and gears, and consume oil and gasoline" [172]so as to generate the maximal amount of economically productive activity by way of replacement.) Nor were any of the egalitarian values cherished by CIAM's more progressive delegates embraced in the design of these places. If anything, just the opposite was true: in Brasília, the very workers who had built the *rodovias* and triumphal plazas were immediately exiled [173]to an outlying ring of informal settlements.

From our vantage point, the simple most important aspect of the twentieth century's long experiment with Corbusian urbanism is that the results are in. We know — empirically, conclusively, decisively — what cities designed according to these principles look and feel like. We know how they work. And what we know isn't very promising for the future of any putatively smart city planned along similar lines.

Corbusian urbanism was challenged as early as the period between 1953 and 1959, which saw both the formation of the younger Team 10 within CIAM and

their eventual rupture from the parent organization. But Team 10's apostasy was strictly internal to the elite architectural discourse of the time, and any critique they might have levied against high-modernist orthodoxy was very much a matter of inside baseball. It wasn't until 1961, with the publication of Jane Jacobs' *Death and Life of Great American Cities,* that the master's way came under sustained and coherent intellectual assault in writing intended for the broader public. In example after example, *Death and Life* decried the damage done to a city's organic processes of value generation when the "decontaminated sortings"[174] of functional segregation were imposed on it; Jacobs devoted an entire chapter to exploring the ways in which the long blocks [175]called for by Radiant City dogma both undermined neighborhood walkability and sabotaged local businesses' ability to draw on a nearby catchment area for their custom.

In that same year, Lewis Mumford observed that despite its urban rhetoric and trappings, the *Ville Radieuse* itself was "only a vertical suburb, whose very alternation of isolated high-rise buildings with uncultivated areas makes the word 'city' meretricious."[176] By 1963, Archigram's Peter Cook could refer [177]to "the dusts of Brasília [and] Chandigarh" in his essay for the avant-garde collective's Living City show at London's Institute of Contemporary Arts, and trust that his audience would understand precisely what he meant. Over the decade that followed, it became ever more clear that urban environments built on Corbusian principles were by and large incapable of supporting anything we'd recognize as quality of life. At very best, they proved to be anonymous, sterile and utterly dominated by a technology even the intended beneficiaries perceived as antihuman — a tendency parodied in the elaborate "Tativille" set Jacques Tati had built for his *Playtime* (1967) — and, at worst, they rivalled any city of the historical past for violent dysfunction and squalor. This was the fate of public-housing projects like St. Louis's Pruitt-Igoe (1954), Sheffield's Park Hill Estate (1957) and, especially, Naples' Vele di Scampia (1962). Even where initially successful, the ongoing maintenance of rigidly high-modernist social housing proved incompatible with the realities of perennial underfunding, reoriented government policy and general antipathy. Even the much-vaunted beneficial qualities of "sun, vegetation and space"[178] failed to generate anything in the way of value for residents or neighbors. If anything, the "broad verdant areas" of the Corbusian plan guaranteed that anyone attempting to cross them remained perilously vulnerable to attacks from the balconies above.

By the end of the 1960s, it ought to have been abundantly clear to anyone caring

to formulate an opinion on the topic that between its rigid overspecification, its conception of a city as a static aesthetic composition, its requirement for a sustained intensity of funding and maintenance and, never least, the paternalist tendencies inherent to the CIAM way, high modernism was incapable of delivering on very much of what it had promised.

The wholesale repudiation of Corbusianism was sealed both symbolically and actually with the notorious 1972 demolition of Minoru Yamasaki's Pruitt-Igoe, a project designed with the most exacting adherence to the master's principles. What actually happened in Pruitt-Igoe? Here is architect Oscar Newman's account:[179]

"The river of trees soon became a sewer of glass and garbage. The mailboxes on the ground floor were vandalized. The corridors, lobbies, elevators and stairs were dangerous places to walk through. They became covered in graffiti, and littered with garbage and human waste. The elevators, laundry and community rooms were vandalized and garbage was stacked high around the choked garbage chutes. Women had to get together in groups to take their children to school and go shopping. The project never achieved more than 60 percent occupancy."

The simpleminded, conventional take on Pruitt-Igoe's failure parks all of the issues with the complex at the feet of its design. We now know that many of the problems Newman identifies stem from the fact that the project was underfunded virtually from its inception, and therefore went undermaintained for most of its service life. But that is precisely the point: systems as brittle and overspecified as Pruitt-Igoe can only persist in the world with constant supervision. They are the very definition of high-maintenance. And history teaches us, repeatedly — bludgeoning the point home with a blunt shovel, for those who simply refuse to get the point — that maintenance budgets are among the very first things to go.

Rather than anything resembling the sleek Plan Voisin, let alone the hive-like, hyperrational conurbations imagined in science fiction of the period, from *Metropolis* to *Alphaville* [180]and *THX1138*, in practice, the Corbusian city was a sordid shambles. However motivated its designers may have been by the desire to realize a practical utopia in the present day, their adherence to functional segregation and the other elements of CIAM's urban-design toolkit effectively subverted the organic processes that actually underlie the emergence of order.

Even subject to these weaknesses, a healthy community might still have grown on the site, given constant maintenance, stewardship and upgrade. But as we know, these are precisely the elements that the original design never anticipated a need for and, as a result, never made any pretense at delivering. Left solely to its own devices, and the wherewithal of its generally marginalized residents, a complex like Pruitt-Igoe could no more heal itself than any other mass of concrete. Even Le Corbusier's claims about his plan's ability to admit the cleansing power of the sun's rays have been empirically refuted,[181] despite the confident scientism with which they were delivered. By the turn of the twenty-first century, the Corbusian way was all but universally discredited, reckoned a failure everywhere it had been attempted.

So why this history lesson? What makes this dreary trudge through one failed plan after another germane to a critique of the contemporary smart city? Consider that this wasn't some backwater skirmish, some arcane sectarian struggle. The ascendancy and eventual collapse of high-modernist orthodoxy was *the* central drama of urbanist thought in the twentieth century and, as I've implied, is rather a well-worn trope within the architectural and urban-planning communities, the stuff of entry-level curricula. Curiously, though, its import appears to have been lost on the technologists. Whether consciously and intentionally or otherwise, most if not all of the blunders we associate with high modernism reappear in the smart-city discourse, at least as far as the *de novo* cities are concerned. Point by point, whether they do so out of ignorance, ahistoricity, heedlessness or hubris, the designers of Songdo and Masdar and PlanIT Valley recapitulate the overspecification, overweening scientism and ponderous authoritarian pomposity of Chandigarh and Brasília, right down to the grand ceremonial axes. The descriptions of the serene and masterful guidance of the city-as-machine-for-living we hear from Siemens or Cisco or IBM are strikingly reminiscent of Le Corbusier, albeit couched in a more contemporary register of language. Both their rhetoric and their published plans display the same essential hostility to existing cities and the actually urban that suffuses the discourse of high-modernist urbanism from beginning to end. For the smart-city enthusiasts to miss the point so badly — to come down on the side of a perspective that has been demolished by half a century of insight and empirical experience — has to be regarded as nothing less than disqualifying.

It would be one thing if their embrace of the signature high-modernist techniques represented some creative and intellectually rigorous reclamation, recuperation

or reinterpretation of CIAM and the Corbusian moment. But this does not appear to be the case. What we see in the smart-city material across the board is a straight and occasionally even naïve rendition of tropes that were taken to pieces fifty years ago. It's disheartening to see something so thoroughly discredited, so destructive of human communities and so toweringly wasteful as high-modernist urbanism springing back to abominable life in a new millennium, apparently undead for all time despite all the evidence accumulated in its disfavor. To design twenty-first century urban environments in willful ignorance of everything we've learned at such great cost is to commit a shameful and discrediting act of malpractice.

Certainly, much of the sorrow I feel whenever the concept of the smart city is taken seriously is driven by the sense that we've been here before, and ought to have learned these lessons. The refusal to take the living city seriously and reckon with it as it is is bad enough, but the specific tragedy of the smart city is that we know better. We've been down this road before. We know where it leads. There's no reason to go through this all again, unless we really are committed to the masochism of learning things the hard way.

14 | The same set of technical potentials that give rise to the smart city can be turned to more responsive ends.

What I have tried to elucidate in this pamphlet are the ideological and theoretical commitments underpinning the concept of the smart city. If in any sense there exists a movement dedicated to bringing such places into being, the statements we've considered here constitute the rudiments of its guiding philosophy. It is not, to state things mildly, a system of belief likely to reassure those of us who cherish the idea of cities as cradles of generative diversity, or who think of technology as something that ought to amplify the abilities of citizens and communities to determine the conditions of their own existence.

But does this philosophy even matter? However grotesque it may be, will it have any actual, real-world impact at all, or shape the experience of even a single citydweller, anywhere on Earth?

These are valid questions. From the vantage point of the present, it is clear that the canonical Masdar City, New Songdo and PlanIT Valley are, by most any reasonable measure, failed projects. Certainly by the end of 2012 we were no longer hearing quite so much in the way of hype about them. Even if these ventures eventually do come to succeed narrowly, as straightforward propositions in commercial real-estate development, they have been exposed to the public eye too long and failed to deliver on their developers' promises by too wide a margin for anyone to take the claims made about their advanced technics of everyday life with any particular seriousness.

More relevantly still, just as these schemes withered and foundered in their various ways, something else was gestating in the world that would cast the entire smart city project into the sharpest relief: the networked personal interface device more familiar to us as the smartphone. On 29 June 2007, with Apple's release of their iPhone, the smartphone era began in earnest, and no city on Earth has ever been quite the same since. Over the months and years that followed, as the smartphone climbed the curve of mass adoption, urban space worldwide was in fact colonized by networked informatics — just not in any way the architects of the smart city had ever imagined.

The smartphone's rise to total ubiquity[182] was, by any historical standard, exceptionally swift, but it was especially dramatic as compared to the laggardly

pace of development on the ground in Songdo and its peers. Even as these schemes stagnated, the personal networked device thrived, spreading through the settlements of humanity like no technology ever had before it. By the end of the decade, the smartphone had interposed itself into a staggering array of everyday urban interactions, as mobile data sonde, interface object and proxy for identity (and not infrequently, all three at once). The ecosystem of mobile applications and services that grew up in the wake of this wholehearted embrace is, by now, if not fully mature then certainly fairly well developed. It mediates, informs and conditions an ever-broadening scope of daily experience, in just about every city on Earth. And yet, the orthodox conception of the smart city says virtually nothing about the prospect that its inhabitants might be equipped with the smart*phone*. It struggles to incorporate this prominent and rather salient fact about our world at even the most cosmetic level. The vision that is still, even now, being proposed for places like Songdo has in its essentials remained unchanged[183] since its inception in the very first years of the twenty-first century, which is to say, in a profoundly different sociotechnical epoch.

So why have I spent so much time and energy focusing on it?

The smart city as we see it instantiated in places like Songdo may well have died aborning. Yet so much of what was intended for it has already passed unexamined into the assumptions enterprises like IBM and Cisco and Siemens make when they propose informatic systems for other, realer cities. And, at present, it is difficult for me, at least, to imagine a world in which these concerns, or their direct competitors, were not somehow deeply involved in the provision of civic informatic infrastructures. As long as cities have payrolls to run, services to administer, vehicle fleets to track and revenues to collect, these companies will be somewhere in the mix and, therefore, so will their ideas about what constitutes the appropriate place for information technology in the contemporary urban environment.

So the planning of places like Songdo matters. The techniques, methods and framings first developed on and for these sites are later elaborated in the initiatives latecomers like Microsoft present to their public-sector customers. This is particularly true of the single overriding idea at the discourse's very core: civic governance conceived as the centralized computational management of a ramified armature reaching into everything a city is and does. Though it appears in more and less ambitious versions, this idea is never questioned, and it inflects everything it touches with its character. Unless it is challenged and alternative

models successfully fleshed out, this is simply how municipal services will be delivered, tensions between constituencies adjudicated and the experience of public space shaped for many years to come, anywhere vendors of this class are involved in the provision of urban informatics. And if the articulation of this vision was only possible in its classic form on a site evacuated of content, evacuated of history, evacuated of politics — ultimately, evacuated of urbanity entirely — then I believe we need to be asking some pretty pointed questions whenever anyone proposes that it be transposed more or less unaltered into the cities we do live in.

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One might still fairly ask why I have chosen to focus so tightly on the analysis of marketing and promotional copy. It's easy to argue that all of the rhetorical productions I've here held up to the light should be excused as mere hyperbole — more, that there's something almost unseemly about subjecting them to a close analysis, as though doing such a thing amounts to playing *gotcha!* when one ought to be extending such utterances the ordinary courtesy of a reading in good faith. As I alluded to earlier, this is a reaction I've grown accustomed to when presenting this material (and not by any means one solely expressed by people working for the companies I name). But refusing to take this sort of language seriously means succumbing to a certain naïveté about the ways in which knowledge tends to be reproduced nowadays, and the processes through which it does its work in the world.

At the launch of any new corporate smart-city initiative, content promoting it and aligning it with the enterprise's overarching brand proposition is generated by the marketing department, and released into the wild on the global website, where it will be indexed by Google in less than a minute. This initiative almost immediately comes to the attention of the planet's several thousand technology bloggers, writing for outlets of various provenance, who generally have automated keyword searches set up to notify them whenever an item of interest is published. Because these bloggers are simultaneously under intense contractual pressure to post several times a day, are by definition enthusiastic about technology and are, by and large, unschooled in the arts of skeptical reportage, they tend to take the claims they are offered at face value. (This is true of bloggers writing for the *Guardian* or the *New York Times* every bit as much as it is of their less well-positioned peers.)

In a manner of minutes, talking points from the original press release are

paraphrased in the blogger's idiom of choice and bundled into a new post, and this may happen across dozens of competing sites in a very brief span of time. Links to these posts are, in turn, instantaneously produced by automated Twitter accounts, endlessly replicated both on Twitter itself and via other social-media channels linked to it through its API; these in turn spur a wave of response from a far larger number of people around the world who are equally excited at the prospect of living in the future, and within a few hours at most a rich loam of online commentary has been laid down. Very little of this commentary evaluates what is being claimed in any depth, or even compares the item at hand to previous assertions made by the same institution, but the volume of buzz is impressive. And due in no small part to the way Google itself works, this distributed colloquy creates an immediate impression that there is a there there. Over the space of a few hours, a framing or perspective originating in a deeply interested party has simply become an unquestioned part of the fabric of consensual knowledge.

What happens on the receiving end, inside the municipal bodies that constitute the primary presumptive audience for such a marketing campaign? Low-level bureaucrats, pressed for time and starved for insight, stumble onto this thicket of conversation via a cursory keyword search; they copy-and-paste a few lines from the first reasonably credible-looking search result into their PowerPoint slides, unmodified; and these slides then get submitted up the hierarchy. The language propagates across the institution — and, what's more, it meshes with that found in the hurriedly-downloaded white papers on the subject that someone found on the website of a name-brand management consultancy. The savvier staffers start to feel confident using these terms: speaking in them, thinking in them. While misgivings may in fact be prevalent, there are likely to be relatively few in the bureaucracy who are able to express them forthrightly — that is to say, who are sufficiently comfortable with the technology to understand precisely what is being proposed, familiar with the way their city works to convincingly articulate why this is problematic, assured of their own position to feel safe in doing so and passionate about the issue to willingly shoulder the risk involved. (If, as the saying has it, nobody ever got fired for buying IBM, it's also the case that one may find oneself on shaky ground contradicting something printed straight from the IBM website.) When finally pressed to make a recommendation as to how the city's resources should be allocated, the easiest thing for a committee member to do is go with the flow, to at least outwardly agree with the person at the table who seems to know what they're talking about, simply to bring the drawn-out process of decision-making to a close.

This sort of thing, of course, happens across the entire range of issues a municipal agency may be asked to face. But it appears to be especially true where questions of information technology are concerned, given the unusual amount of mystification that shrouds even consumer-grade products and services, to say nothing of the degree of intimidation otherwise competent adults routinely feel in their presence. Where there is a decision to be made, a confident point of view being advanced and no party with the necessary bona fides stepping forward to challenge it, the natural, the human thing to do is defer. And so this body of ideas gets reproduced, just as surely as code libraries are when they are downloaded from open-source repositories like Github or SourceForge. And every time this happens, a very particular set of valuations and priorities is reproduced alongside them. What was once merely a sequence of words crafted by a marketing department for their euphony, service to a business model and alignment with a particular set of brand values becomes inscribed in, or as, a city's official program.

This, in broad outline, is how a premature and preemptive consensus formed around the desirability of something called the smart city. I should emphasize that the individuals responsible for spreading these ideas are generally well-intentioned (though there are surely convinced neoliberal ideologues and at least one or two out-and-out confidence men among them). For the most part sincere in their desire to improve the circumstances of urban life, at times excruciatingly so, they are, by and large, not bad people. But their ideas are bad ones and, more importantly, are founded on what I, at least, regard as bad values.

By this point, I hope we can agree that "the smart city" is a specific rhetorical move within a much larger space of potential. To be precise, it's almost exclusively a discourse about the instrumentation of the urban fabric and the quantification of municipal processes, specifically for ease and efficiency of management. Wherever this psychic template is applied, it becomes perfectly unremarkable to suggest that the scale and complexity of the contemporary city absolutely demands centralized computational oversight, that stewardship of such a place is a simple matter of keeping key performance indicators balanced between nominal thresholds, or that the overriding orientation of municipal governance must be toward competition for a globally mobile pool of capital and talent. Whether quite aware of it or not, anyone proffering suggestions like these not merely elevates the most pallid abstractions over the lived experience of the city, but turns their back on the far more interesting potentials locked up in

networked technologies.

In the end, this is why I believe it's worth focusing a considerable amount of attention on the notionally temporary language of websites and interviews and expo stands. Quite simply, this rhetoric does work in the world. It sets agendas, influences perceptions of what it means to be "advanced," recalibrates norms and guides the allocation of resources. Proliferated across the network without end or limit, we can see it filling an entire space of sociotechnical possibility with the airless hegemony of a single bad idea that no one has the time or energy to fight, least of all the citizens whose lives will wind up conditioned by it. The time to challenge this body of intellectual production, to develop and advance and debate alternative conceptions, is now.

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Very fortunately, however fervently its backers may labor to portray it as a natural or neutral stage in the evolution of human habitation, the smart city is but one selection from a sheaf of available possibilities. There are others available to us. The same ensemble of technologies that undergirds centralized computational administration can be used in profoundly different ways and turned to much more fruitful ends.

If nothing else, that ensemble might be used to pose questions rather than deliver sterile "solutions." Consider that the same infrastructure of data capture, visualization and analysis that feeds an Intelligent Operation Center can be harnessed by citizens for their own use and edification, to raise issues of equity in the distribution of municipal resources and to open up other questions of power and access. This end cannot be achieved without concerted and ongoing struggle, and it will surely be resisted by every institution whose otherwise unimpeded authority is opened to challenge in this way. In fact, it is already clear that such institutions understand perfectly well what is at stake: after a technically-savvy citizen recently used the Atherton (CA) Police Department's own release of data to determine that it was most likely conducting illegal racial profiling[184] on drivers, for example, the department simply withdrew public access to that dataset[185]. It will not be the last public agency to do so, or to try. But if we are to embrace ubiquitous data collection and the other technics of computational oversight, we must do so under the condition that they be placed at the full disposal of an engaged citizenry, with the understanding that such tools should be used to provoke debate rather than forestalling it. In technical

terms, this end requires that the proprietary arrangements foreseen by the corporate protagonists of the smart city are replaced with free and open licenses for citizen-generated data.

Ensuring open access to this data also happily frees it to serve the needs of that place the Rockefeller Foundation's Benjamin de la Peña thinks of as "the autocatalytic city[186]," where supple adaptive processes are founded on accurate, real-time local intelligence, citydwellers are empowered to respond appropriately to highly dynamic conditions and emergent urban order is produced from the bottom up. Despite the fact that it is how hundreds of millions of human beings wrest livelihood from their environment, and has even been characterized as "the default mode of urban development[187]," this praxis of everyday survival goes almost entirely unrecognized in the smart-city literature. It should hardly (but apparently does) need to be said that we ought to devise technological frameworks that support this process of self-organization rather than undermining it.

This approach to design would allow each networked citizen to flourish as what they clearly are: not merely a local actor but a fully empowered node in a global space of flows. In so doing, we can finally transcend the stubborn insistence, so often encountered in the smart city literature, on treating each city as a bounded, isolar entity in competition with all the others. The truth is that our cities are already densely and intimately linked with one another, bound together by their own citizens in a constant and mutually reinforcing traffic in atoms and bits. By conceiving of each as a mesh of interdependencies with other urban places on Earth, by giving each neighbor and each neighborhood the tools to innovate, share and learn from the insights of others in similar situations, we can improve the resiliency of the whole.

And this, in turn, would be a vital step toward a planet that is urban not only in name but in affect and outlook. The sociologist Saskia Sassen speaks of "urbani[z]ing technology," by which I understand her to mean a conscious practice of design for the qualities city living reliably seems to generate in those who embrace it, wherever on Earth they are found and in whatever epoch of history we encounter them. Rather than dedicating ourselves to enhancing the intelligence of cities, then, perhaps we ought to invert the premise and ask how technological intervention might support the emergence of intelligences, subjects and subjectivities we would recognize as distinctly urban:

- How might we leverage the potential of data-gathering, analysis and visualization tools to improve a community's sense of the challenges, risks and opportunities facing it, and support it in the aim of autonomous self-governance?

- How might we use networked technologies to further the prerogatives so notably absent from the smart-city paradigm, particularly those having to do with solidarity, mutuality and collective action?

- How might we inscribe a robust conception of the right to the city in all of the technological interventions proposed, including but not limited to those intended to enhance personal mobility, citizen engagement and processes of (individual and collective) self-determination?

- And what alternative conceptions of technology in the urban everyday might support the open, tolerant, feisty, opinionated character we associate with big-city life, above all that quality variously described as canniness, nous or *savoir faire*?

The material produced by the promoters, manufacturers, vendors and integrators of the smart city doesn't begin to speak to these questions, nor has it ever really pretended to. And yet, these are the questions that count, the ones we most urgently need to answer if we're ever to rationally evaluate the propositions we're being offered and the opportunities before us.

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For those of us who are involved to whatever degree in the practice of design for networked cities and citizens, making the most of those opportunities will mean upending every quality and characteristic of the smart city. We must learn to design for actual places and populations, not for an abstract, featureless terrain. To design for the needs of the here and now, rather than some nebulously proximate future. To design with the particularity, and the particular limitations, of specific technical systems firmly in mind. To accept that anything we do will necessarily be partial, biased and weighted. To design openness into our plans, as an excellent way of balancing these biases. To seek not some shallow optimum but a fruitful balance of contending prerogatives. To design without effacing the seams between things, such that wherever possible the things we design explain themselves to the people whose lives they enter. To make systems accessible to all, and not just a managerial elite. To leave some

looseness in the weave, against the certainty that things will change. To design with not merely an awareness but a deep and abiding love of city life. To have, at least, the courage to make new mistakes.

Should we succeed in doing these things, we can help ensure that the conditions of life in the cities of the twenty-first century are not determined solely by technological capacities, let alone the perceived needs of the vendors of technological products and services. Our work can and should be technically sophisticated and take every advantage offered us by emergent ways of doing and making. But equally, it ought to remain profoundly informed by our understanding of the values and processes that have enabled cities to serve as vital engines of opportunity, platforms for personal reinvention and expressive creations in their own right for over seven millennia. If we know that cities everywhere are always already smart, and that their intelligence resides in the people, our task as designers is finding out how best to harness that intelligence.

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Every technology and every ensemble of technologies encodes a hypothesis about human behavior, and the smart city is no different. As it happens, the particular hypothesis entertained by the smart city is twofold. Its first postulate is that the contemporary urban environment is so complex and so vexatious in its demands that no group of ordinary, unaided human beings can hope to understand it, let alone manage it wisely. This proposition may or may not reflect the facts on the ground in any given place, but it can at least be argued on the merits. There's a second, more pointed insinuation buried within the first, though, and it's that the people who live in a place cannot be entrusted with the power to manage their own affairs — that the technics of governance necessitated by the contemporary city are themselves too difficult and too daunting to be understood or utilized effectively by those whose lives they condition. In this, the smart city is merely the latest manifestation of a current of thought that has found expression in one way or another throughout the entire history of urban settlement. Though it's garbed for the moment in the seductive language of efficiency, agility and sustainability, we might as well call that current for what it is: the impulse toward authoritarianism, and the will to control over other human beings. This impulse is something that springs eternal in the human heart, no matter what language or technology it is couched in. It can be suppressed or defanged locally and temporarily, but it will surely burst forth again in a different guise, in a different time and place. The smart city happens to be the aspect in which we confront it in our time.

The technologist Fabien Girardin points out[188] that the institutions most heavily invested in the notion of the smart city have displayed a impressive ability to tailor their rhetoric over time in response to critique, at least at a clunky, literal level. When someone observes that urban environments have always been able to call upon a certain intelligence, that "smart" itself is neither a new nor necessarily a technologically founded quality, the conferences and programs invoke smart*er* cities. When someone else offers the reflection that it may be fallacious to ascribe intelligence to an inanimate entity in the first place, the companies reposition their efforts toward smarter *citizens*. The language that encapsulates this body of ideas can be likened to the envelope of proteins coating the surface of a virus: it mutates in whatever way the enterprise responsible feels to be most congenial to its goal of selling systems and signing maintenance contracts. But whatever changes the offering may undergo cosmetically, it is ultimately the same template at its core: quantification and obsessive measurement preferred to every other finger in the wind, overweening scientism to the exclusion of any other way of getting a handle on the issues which confront us — and always, the specter of control.

It's not that language is not important. If anything, I believe that it's of paramount importance, and that we must take exceeding care with the words we use to frame the futures we imagine. That's why I insist there is no such thing as a decentralized, distributed, community-oriented smart city. Like dry water or a snow-white tan, it cannot be — not when centralization, technocracy and the assertion of power from above are what the phrase means. No: if we are interested in other ends, we must use different language to describe what it is that we are trying to build together.

But new language alone won't suffice. We need to develop a fundamentally different idea of the networked city.

What I've sought to demonstrate here is that there are deep conceptual problems with the smart city at virtually every level; that these problems represent the greatest obstacle to the chances that such a city, however and wherever instantiated, will ever respond meaningfully to the demands of all its citizens; and that the everyday life of any such city must necessarily be founded on a series of abrogations, ruptures, elisions and betrayals. We must never lose sight of the idea, though, that another city is possible, a city that harnesses networked information technology toward the lasting empowerment of the people who live

in it, give life to it and make it what it is.

Building such a place will surely mean looking past the shallow visions of urban futurity we've been offered in places like PlanIT Valley, Masdar and New Songdo City. It will mean learning how to work productively with enterprises like IBM, Cisco and Siemens, while asking more pointed questions of them than perhaps they are used to, or will be comfortable with. It will require that we work past the contours of our own comfort zones, both teaching ourselves the things we need to know and helping others arrive at the same level of proficiency. Above all, it will mean demanding that the systems on which our networked city is founded are designed with concerns about power, privilege and justice at their very heart. But we can have it. We can live and thrive there, if we never once lose sight of the people in whom any city's capability actually subsists, for theirs — ours — is the only kind of urban intelligence that will ever truly matter.

Acknowledgements

Adam Greenfield uses and endorses Peet's French Roast coffee.

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About Adam Greenfield

Adam Greenfield is founder and managing director of the New York City-based urban-systems design practice Urbanscale; the author of *Everyware: The dawning age of ubiquitous computing* (2006) and *Urban computing and its discontents* (2007, with Mark Shepard); and an instructor at New York University's graduate Interactive Telecommunications Program.

Between 2008 and 2010, he was Nokia's head of design direction for service and user interface design. Earlier in the decade, he had worked as lead information architect for the Tokyo office of Internet consultancy Razorfish.

With his wife, artist Nurri Kim, Adam is also co-founder of Do projects, a platform for collaborative making. Since 2010, Do projects has conducted "walkshops" in cities around the world, a series of walking tours dedicated to investigating the ways in which digital networks gather information from (and return it to) the street.

He has lived and worked in the United States, the United Kingdom, France, Finland, Korea and Japan.

You can see more of Adam's work at speedbird.wordpress.com and urbanscale.org.

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For more information about Do projects, please see doprojects.org.

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→ foryoutou.se/densestcities

11. Due to the increased scope for malicious exploits it would offer — to say nothing of the vastly amplified impact of successful exploits — the wisdom of connecting everything in a city to a single central operating system is doubtful. The risks a city might face in doing so are dramatized by *Watch Dogs*, a 2013 game released by Ubisoft which grants its hacker protagonist "real-time control over [Chicago's] infrastructure": "Trap your enemy in a 30-car pileup by manipulating the traffic lights. Stop a train, and then board it to evade the authorities. Narrowly escape capture by quickly raising a drawbridge. Anything connected to the [city's operating system] can become your weapon."
→ foryoutou.se/watchdogsgamesite

12. See e.g. British Broadcasting Corporation. "Building cities of the future now"; Matter Network. "PlanIT Valley: A Blueprint for the Smart City"; San Jose *Mercury News*. "Cisco helps build prototype for instant cities"; or *Urban Times*. "Abu Dhabi, United Arab Emirates: Future Green City Now."
→ foryoutou.se/bbcsmartcities
→ foryoutou.se/planitblueprint
→ foryoutou.se/mercurycisco

→ foryoutou.se/masdargreen

13.
→ foryoutou.se/marketopportunity

14. Alexander, Steve. "IBM wants Minneapolis to become a 'smarter city'", Minneapolis *Star Tribune,* 06 June 2011.
→ foryoutou.se/smartmpls

15. Siemens Corporation. "Collective Intelligence: City Cockpit, Real-Time Government," Spring 2011.
→ foryoutou.se/citycockpit

16. IBM Corporation. "Intelligent Operations Center," 06 March 2012.
→ foryoutou.se/iocdevworks

17. Cisco Systems. "Cisco and Lake Nona Unite to Create First U.S. Iconic Smart+Connected Community in Orlando, Florida," 24 October 2012. See also VentureBeat. "Cisco helps build first U.S. 'Smart+Connected' city of the future in Lake Nona, Florida," 23 October 2012.
→ foryoutou.se/ciscofla
→ foryoutou.se/smartflorida

18. Personally, I think it says just about everything one needs to know about this concern that they've not merely chosen to camelcase their name, but found it on a pun.

19. Living PlanIT. "Urban Operating System: Overview."
→ foryoutou.se/uosoverview

20. At least two distinct intellectual threads or currents can be discerned in the prehistory of the smart city: on the one hand, the idea of an instrumented environment capable of responding in real time to its users' needs, and on the other the use of empirical data to guide the planned allocation of public resources. I associate the former with the efforts of Cedric Price and Archigram in the UK in the early 1960s, while the latter found its fullest historical expression in the work of Stafford Beer in Allende's Chile and the NYC-RAND Institute in 1970s New York. (See discussion in Section 4.) There were intriguing parallel developments in the Soviet Union as early as the 1950s, but these were little known in the West until very recently. Wilken, Rowan. "Calculated Uncertainty: Computers, Chance Encounters, and 'Community' in the Work of Cedric Price," *Transformations* Issue 14, March 2007; Archigram Archival Project. EXP, the Research Centre for Experimental Practice at the University of Westminster, ongoing; and Spufford, Francis. *Red Plenty*, Faber and Faber, London, 2011.
→ foryoutou.se/cedricprice
→ foryoutou.se/archigram
→ foryoutou.se/spuffordredplenty

21. Where comparable schemes have originated outside of industry, they have tended to come almost exclusively from academic engineering and technology faculties rather than urban planning, public policy or other disciplines with a brief for metropolitan studies. See, for example, Mostashari, Ali, Friedrich Arnold, Mo Mansouri and Matthias Finger. "Cognitive cities and intelligent urban governance," *Network Industries Quarterly* Volume 13 Number 3, 2011.
→ foryoutou.se/cogcities

22. Of course, commercial concerns have always promoted visions of urban life advantageous to their interests — most famously General Motors' Futurama at the 1939 World's Fair — and the involvement of General Motors, Standard Oil of California, Mack Trucks, Firestone Tire Company and Phillips Petroleum

in devising a North American urbanism reliant on the automobile is well-documented. See the particularly good summary on Wikipedia.
→ foryoutou.se/streetcarplot

23. See Office. "IBM: Designing a Smarter Planet."
→ foryoutou.se/ibmsmartcityads

24. IBM Corporation, "Welcome to the Smarter City."
→ foryoutou.se/ibmwelcome

25. Siemens Corporation. Web page: "Sustainable Buildings — Networked Technologies: Smart Homes and Cities," Fall 2008.
→ foryoutou.se/siemenstotal

26. International Data Corporation. "Worldwide Quarterly Enterprise Networks Tracker: Top Five Worldwide Layer 2/3 Ethernet Switch Vendors," 23rd August 2012.
→ foryoutou.se/ciscoshare

27. Cisco Systems. Web page: "Smart+Connected Communities."
→ foryoutou.se/ciscosmart

28. Living PlanIT. Press release: "Living PlanIT's CEO Steve Lewis selected by the World Economic Forum as a Technology Pioneer 2012."
→ foryoutou.se/lewisaward

29. Living PlanIT. "Living PlanIT at Cisco C-Scape," Version 1, July 2011.
→ foryoutou.se/planitcisco1

30. Mlot, Stephanie. "Microsoft CityNext Aims To Build 'Smart Cities,'" *PC Magazine*, 11 July 2013.
→ foryoutou.se/mscitynext

31. Tuan, Yi-Fu. *Space and Place: The Perspective of Experience*, University of Minnesota Press, Minneapolis, 1977.
→ foryoutou.se/tuanspaceandplace

32. Kitchin, Rob and Martin Dodge. *Code/Space*, The MIT Press, Cambridge MA, 2011.

33. Living PlanIT. Video: "Living PlanIT - Building efficient urban-scale environments."
→ foryoutou.se/lewisvideo

34. Cisco Systems. Video: "Cities of the Future: Songdo, South Korea – Roadmap for a New Community."
→ foryoutou.se/songdoroadmap

35. Deleuze, Gilles. *Cinema 1: The Movement-Image*, Athlone Press, London, 1986. Note that while Deleuze invokes Pascal Augé, glosses on the concept of the any-space-whatever tend to conflate Pascal with another Augé, Marc, and his similar conception of "non-places."

36. Carlisle, Tamsin. "Masdar City clips another $2.5bn from price tag," *The National* of Abu Dhabi, 1 December 2010. Readers curious as to why the decision to scrap the PRT system is primarily framed here as a bold act of cost savings may wish to consider that both *The National* and Masdar City itself are owned by Mubadala Development Company, a wholly-owned investment vehicle of the government of Abu Dhabi.
→ foryoutou.se/masdarscrubsprt

37. See, for example, City Protocol, which attempts to define a generic technical framework to account for urban processes, and lists among its signatories Accenture, Capgemini, CitiGroup, HP, IBM, Microsoft, Oracle and SAP in addition to Cisco and Siemens.
→ foryoutou.se/cityprotocol

The notion that these technologies could be transplanted to wildly different contexts was similarly the topic of "Smart Cities: Evolving a Framework for Transforming Indian Cities," a roundtable held under the auspices of the World Bank on 27 November, 2012.

38.

39. See, for example, as enunciated by Chief Information Officer of the United States Vivek Kundra, in his testimony before the House of Representatives Committee on Oversight & Government Reform on 14 July 2011.
→ foryoutou.se/kundrabuildonce

40. Dourish, Paul. *Where the Action Is: The Foundations of Embodied Interaction,* The MIT Press, Cambridge, MA, 2004; McCullough, Malcolm. *Digital Ground: Architecture, Pervasive Computing, and Environmental Knowing,* The MIT Press, Cambridge, MA, 2004.

41. See, for example, the Indian Central Road Research Institute's report on a pilot Bus Rapid Transit system in New Delhi, which identifies several unique features of the local physiocultural terrain (inadequate road width, unmaintained lane dividers, unpenalized use of the BRT lane by private automobiles and the local practice of parking on lanes reserved for non-motorized traffic) as reasons behind the project's failure to meet its objectives. CSIR-Central Road Research Institute. "Evaluating Bus Rapid Transit (BRT) Corridor Performance from Amebedkar Nagar to Mool Chand Intersection," 13 February 2013.
→ foryoutou.se/delhibrtfailure

42. One of Living PlanIT's flat, witless slogans. Living PlanIT. "Living PlanIT at Cisco C-Scape," Version 1, July 2011.
→ foryoutou.se/planitcisco1

43. Koolhaas, Rem. "The Generic City," in Koolhaas, Rem, Hans Werlemann and Bruce Mau. *S, M, L, XL,* The Monacelli Press, New York, 1994.

44. The White House, Office of the Press Secretary. Press release: "President Clinton: Improving the Civilian Global Positioning System (GPS)," 01 May 2000.
→ foryoutou.se/cleangps

45. Gibson, William. *Neuromancer,* Ace Books, New York, 1984.
→ foryoutou.se/neuromancerpage

46. Bell, Genevieve and Paul Dourish. "Yesterday's Tomorrows: Notes on Ubiquitous Computing's Dominant Vision," *Personal and Ubiquitous Computing* Volume 11 Issue 2, January 2007.
→ foryoutou.se/belldourish

47. Cisco Systems. Video: "Cities of the Future: Songdo, South Korea — Living."
→ foryoutou.se/songdoliving

48. IBM Corporation. "Smarter Cities: Infrastructure. Operations. People."
→ foryoutou.se/ibmoverview

49. Cotton, Brian, Frost & Sullivan: "Intelligent Urban Transportation: Predicting, Managing, and Integrating Traffic Operations in Smarter Cities."
→ foryoutou.se/smarttransport

50. "Tool" is something of a misnomer. The Traffic Prediction Tool is a statistical model for the near-real-time anticipation of congestion, not a piece of hardware. IBM researchers claim that "traffic controllers" equipped with it "can take preemptive measures to mitigate imminent congestion," while "commuters can decide whether to get on a particular road or not"; they also claim that the tool accurately predicts "when a congested area will return to normal." Again, though, despite mention of a real-world test with Singapore's Land Transport Authority, there is no documentation that the tool ever actually successfully performed in any of these roles.
→ foryoutou.se/ibmtraffic

51. Siemens Corporation. "Sustainable Buildings — Networked Technologies: Smart Homes and Cities," Fall 2008.
→ foryoutou.se/siemenstotal

52.

53. See, e.g., the images Living PlanIT furnishes of their Paredes initiative, which remain the only ones available. (Also note that each URL explicitly calls a numbered "Pretty Photo.")
→ foryoutou.se/planitpictures

54.
→ foryoutou.se/ibmmodel

55. Gunther, Marc. "A Photo Tour of Masdar City," Greenbiz.com, 21 January 2011.
→ foryoutou.se/masdarpics

56.
→ foryoutou.se/planitpic1

57.
→ foryoutou.se/planitpic2

58. LG Electronics. "LG HomNet: Total Solution."
→ foryoutou.se/lghomnet

59. "Application programming interface," a structured conduit by way of which one piece of hardware or software communicates with another.

60. Siemens Corporation. "Sustainable Buildings — Networked Technologies: Smart Homes and Cities," *Pictures of the Future*, Fall 2008.
→ foryoutou.se/siemenstotal

61. For example, in New York City, an anonymous survey of "hundreds of retired high-ranking [NYPD] officials" found that "tremendous pressure to reduce crime, year after year, prompted some supervisors and precinct commanders to distort crime statistics" they submitted to the centralized COMPSTAT system. Chen, David W., "Survey Raises Questions on Data-Driven Policy," *The New York Times*, 08 February 2010.
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→ foryoutou.se/seoulcctv

64. Fletcher, Jim, IBM Distinguished Engineer, and Guruduth Banavar, Vice President and Chief Technology Officer for Global Public Sector , personal communication, 08 June 2011.

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→ foryoutou.se/oaklandcrime

66. See, as well, Sen's dissection of the inherent conflict between even mildly liberal values and Pareto optimality. Sen, Amartya Kumar. "The impossibility of a Paretian liberal." *Journal of Political Economy* Volume 78 Number 1, Jan-Feb 1970.
→ foryoutou.se/nopareto

67. Forrester, Jay. *Urban Dynamics*, The MIT Press, Cambridge, MA, 1969.

68. See Flood, Joe. *The Fires: How a Computer Formula Burned Down New York City — And Determined The Future Of American Cities*, Riverhead Books, New York, 2010.

69. See, e.g. Bettencourt, Luís M.A. et al. "Growth, innovation, scaling, and the pace of life in cities," *Proceedings of the National Academy of Sciences*, Volume 104 Number 17, 24 April 2007, pp. 7301-7306.
→ foryoutou.se/superlinear

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→ foryoutou.se/randfirecos
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72. See the Amazon interview with *Fires* author Joe Flood.
→ foryoutou.se/randfires

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→ foryoutou.se/rmsvsopen

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provisions.
→ foryoutou.se/androidlicenses

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→ foryoutou.se/uosintro

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→ foryoutou.se/whatislivingplanit

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→ foryoutou.se/whypartner

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→ foryoutou.se/ibminteractive

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86.
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97. Hitachi Ltd. "Telecommunication Systems for Realizing a Smart City."
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104. In doing so, hopefully they would refer to empirical findings based on actual performance, rather than specious metrics. See the similar issues around architecture's LEED environmental certification. Roudman, Sam. "Bank of America's Toxic Tower," *The New Republic*, 28 July 2013.
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and evolutionary perspectives on organisations: the application of complexity theory to organisations, Elsevier Science Ltd, Oxford, UK, 2003.

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→ foryoutou.se/occupytimes
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→ foryoutou.se/complexsystems

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→ foryoutou.se/ciscoframework

111. IBM Corporation. "City Government and IBM Close Partnership to Make Rio de Janeiro a Smarter City," 27 December 2010.
→ foryoutou.se/ibmrio

112. See also the recent *Red Plenty* for a lightly fictionalized and utterly fascinating depiction of Soviet attempts to synchronize economic inputs and outputs cybernetically. Spufford, Francis. *Red Plenty,* Faber and Faber, London, 2011.
→ foryoutou.se/spuffordredplenty

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→ foryoutou.se/allendecomp

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→ foryoutou.se/ibmoverview

115. IBM Corporation. Advertisement: "Mayors Of The World, May We Kindly Have 540 Words With You?"
→ foryoutou.se/ibmwsjad

116. IBM Corporation. Interactive: "IBM Intelligent Operations Center for Smarter Cities."

→ foryoutou.se/ibminteractive

117. *The Economist.* "Masdar plan," Technology Quarterly Q4 2008, 04 December 2008.
→ foryoutou.se/masdarplan

118. *Chaebol* is the Korean term for a sprawling, typically family-owned vertically- and horizontally-integrated conglomerate. Among other initiatives, the POSCO organization includes business units dedicated to energy, housing, electronics, commodities trading and overseas resource development.

119. Somewhat complicating matters, Masdar's parent entity, Mubadala Development Company, is a wholly-owned investment vehicle of the Government of Abu Dhabi. I argue that this doesn't so much undermine my thesis as reinforce it: here is government so fully privatized as to have displaced the ordinary structures of state entirely.

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→ foryoutou.se/marketopportunity

121. General Secretariat of the Executive Council, Emirate of Abu Dhabi. "Law No. 22: Establishment of Abu Dhabi Future Energy Company and Masdar Institute of Science and Technology," 2007.
→ foryoutou.se/masdarlaw

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→ foryoutou.se/masdarbenefits

123. Incheon Free Economic Zone Authority. "Investment Information: One-Stop Service."
→ foryoutou.se/ifezonestop

124. Ironically enough, from what I am able to determine, the business case supporting the three most prominent smart cities depends not on the free and untrammeled operation of deregulated markets at all, but on substantial public-sector subsidy on the part of the respective national governments. This effort is very much appreciated; as Living PlanIT CEO Steve Lewis puts it, in his inimitable way, "To have a national government supporting us from a marketing perspective, not just in the country but internationally, is hugely beneficial from an investment perspective." Living PlanIT. Video: "Living PlanIT - Building efficient urban-scale environments."
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→ foryoutou.se/songdocasestudy

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→ foryoutou.se/ciscorenewal

132. Davis, Mike and Daniel Bertrand Monk, eds. *Evil Paradises: Dreamworlds of Neoliberalism*, The New Press, New York, 2008.

133. We have a somewhat better idea of who they'll be applied to: all of the available materials make it clear that Songdo is intended for an expatriate managerial elite, right down to a proposed requirement that a majority of students in the International School be non-Korean. Woyke, Elizabeth. "Very Smart Cities," *Forbes*, 03 September 2009.
→ foryoutou.se/songdoforbes

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→ foryoutou.se/uaemigrantworkers
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135. Human Rights Watch. "World Report 2012: United Arab Emirates," January 2012.
→ foryoutou.se/humanrightsintheuae

136. Ibid.; see also Reporters Without Borders. "Authorities crack down on social networks and activist bloggers," 30 March 2012.
→ foryoutou.se/emiraticlampdown

137. Masdar City. "Masdar City: The Global Center of Future Energy," 2011.
→ foryoutou.se/welcometomasdarcity

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→ foryoutou.se/abudhabirights

139. Promotional display copy, Smart City Expo. Fira Barcelona Gran Via, 29 November-02 December 2011.

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→ foryoutou.se/intheviolentfavelas

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Regional Update. Selected events covering the period from January to April 2008," 28 May 2008.
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→ foryoutou.se/amnestyamericas

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→ foryoutou.se/iocsop

143. Lindsay, Greg. "Building a Smarter Favela: IBM Signs Up Rio," *Fast Company*, 27 December 2010.
→ foryoutou.se/smartfavela

144. Black, Edwin. *IBM and the Holocaust: The Strategic Alliance between Nazi Germany and America's Most Powerful Corporation*, Random House, New York, 2001.

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→ foryoutou.se/citycockpit
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[153.](#) A similar act of evocation, prominently featured in Living PlanIT's renderings of their PlanIT Valley: the projection of the Eiffel Tower onto a building-scale display surface, as though the image would suffice as a stand-in for the reality. Living PlanIT. Image.
→ foryoutou.se/eiffelplease

[154.](#) Rem Koolhaas might have been describing Songdo when he presciently described the Generic City as "the apotheosis of the multiple-choice concept: all boxes crossed, an anthology of *all* the options." Koolhaas, Rem. "The Generic City," in Koolhaas, Rem, Hans Werlemann and Bruce Mau. *S, M, L, XL,* The Monacelli Press, New York, 1994: pp. 1248-1264.

[155.](#) Incheon Free Economic Zone. "Business Outline: Development Plan."
→ foryoutou.se/ifezdevplan

[156.](#) Although it turns on a slightly different definition of terms, the linkage between population size, diversity and value creation is absolutely uncontroversial in economic development studies. See Quigley, John M. "Urban diversity and economic growth," *Journal of Economic Perspectives* Volume 12 Number 2, Spring 1998: pp. 127-138. The notion that there is a relationship between a broadly diversified local economy and technical innovation is also well established, Jane Jacobs having argued the point as early as 1969.
→ foryoutou.se/urbandiversity

[157.](#)
A Living PlanIT Introduction to Future City Technologies," July 2011: p. 23.
→ foryoutou.se/planitcisco2

[158.](#) A 2010 World Bank study found that the informal sector accounted for an average of 31.0% of official gross domestic product in the 162 national economies it studied during the period 1999-2007, including "developing, Eastern European, Central Asian, and high-income countries." Schneider, Friedrich, Andreas Buehn and Claudio E. Montenegro. "Shadow Economies All over the World," World Bank Policy Research Working Paper 5356, July 2010.
→ foryoutou.se/worldbankinformal

[159.](#) It's not as if these institutions aren't capable of realism about the informal sector when their business interests require it. See, for example, Economist Intelligence Unit for Siemens AG. "Managing the city as a 'living organism': An interview with Nicholas You, urban environmental expert," *Asian Green City Index*, 2011: pp. 22-23.
→ foryoutou.se/asiagreenindex

[160.](#)
A Living PlanIT Introduction to Future City Technologies, July 2011: p. 41.
→ foryoutou.se/planitcisco2

[161.](#) An important exception to this general observation is a report prepared by Microsoft's Jan Hedlund in March 2011, apparently for the company's Swedish public-sector business unit. While guided by many of the same broadly neoliberal commitments present throughout the smart-city literature, and in particular subject to the same naïveté about the virtues of total transparency, *Smart City 2020* at least countenances a genuinely responsive and citizen-centered model of governance. It remains legitimate to ask whether or not the focus on "citizen empowerment" here really amounts to an attempt at offloading the responsibilities of government, but the report's conception of municipal government, perhaps reflecting its Scandinavian origins, is less problematic than the others I considered. Hedlund, Jan for Microsoft Corporation. *Smart City*

2020: Technology and Society in the Modern City, March 2011.
→ foryoutou.se/mssmartcity

162. Gartner, Inc. Presentation: "Is "Smart Cities" The Next Big Market?", 2010.
→ foryoutou.se/gartnermarket

163. Howard, Ebenezer. *Garden Cities of To-Morrow*, Faber and Faber, London, 1902, reprinted 1946.
→ foryoutou.se/gardencities

164. Some notion of Le Corbusier's ongoing influence can be inferred from the fact that the 1929 *City of To-Morrow* still, in 2013, resides among Amazon.com's top 100,000 best-selling titles. By way of comparison, Jane Jacobs's *Death and Life of Great American Cities* (1961) stands at #4,478, Kevin Lynch's *The Image of the City* (1960) at #48,892, Jan Gehl's *Life Between Buildings* (1980) at #131,802, and Bernard Rudofsky's *Streets for People* (1969) at #1,177,108.

165. For an alternative perspective on CIAM's influence and legacy, see Mumford, Eric. *The CIAM Discourse on Urbanism, 1928-1960*, The MIT Press, Cambridge MA, 2002: pp. 267-270.

166. Le Corbusier. *The Athens Charter*, Grossman Publishers, New York, 1973.
→ foryoutou.se/athenscharter

167. "In this hour of major preparation, 1941, the CIAM-France group, offering the country its complete devotion, has felt it a duty to make The Athens Charter available to the public." Ibid., p. 38. Le Corbusier himself had, at the very least, a disturbing propensity to align with actually authoritarian governments. It wasn't just a matter of that obsequious dedication; he executed plans for both Stalin's Russia and the fascist France of Marshal Philippe Pétain.

168.

169.

170. Riis, Jacob. *How the Other Half Lives: Studies among the Tenements of New York,* Charles Scribner's Sons, New York, 1890. The complete text with photographs may be found at
→ foryoutou.se/riisinfull

171. Le Corbusier. *The Athens Charter*, Grossman Publishers, New York, 1973, p. 58.
→ foryoutou.se/athenscharter

172. Le Corbusier. *La Ville Radieuse*, Editions Vincent, Freal & Co., Paris, 1935.

173. Scott, James C. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed,* Yale University Press, New Haven, 1999.

174. Jacobs, Jane. *The Death and Life of Great American Cities*, Random House, New York, 1961, p. 25.

175. Ibid., Chapter 9, "The need for small blocks," p. 178 et seq.

176. Mumford, Lewis. *The City in History: Its Origins, Its Transformations, and Its Prospects*, Harcourt, Brace and World, New York, 1961, p. 519.

177. "There is no comfort from the dusts of Brasilia or Chandigarh, the two opportunities in recent years for a city to be created *in toto*. Whether we have a liking for their aesthetics or not, neither is a Living City.

Perhaps in fifty years, or a hundred? But it will be almost despite the architecture rather than because of it." Peter Cook in Sadler, Simon. *Archigram: Architecture without Architecture,* The MIT Press, Cambridge, MA, 2005, p. 65.

178.

179. Newman, Oscar. *Creating Defensible Space,* US Department of Housing and Urban Development Office of Policy Development and Research, Washington DC, 1996, pp. 10-11.
→ foryoutou.se/defensiblespace

180. Slogan: "Silence. Prudence. Security. Logic."

181. Montavon, Marylène, Koen Steemers, Vicky Cheng and Raphaël Compagnon. "'La Ville Radieuse' by Le Corbusier once again a case study," The 23rd Conference on Passive and Low Energy Architecture, Geneva, Switzerland, 6-8 September 2006.
→ foryoutou.se/corbdebunked

182. As of mid-2013, the most recent available figures from the ITU indicate that there are 96 connected mobile devices for every hundred human beings on Earth. As regards smartphone penetration specifically, there are 75 mobile broadband data subscriptions per 100 inhabitants of the developed world, while the global average now stands at 30. International Telecommunications Union, "The World in 2013: ICT Facts and Figures," February 2013.
→ foryoutou.se/itustats

183. I once suggested to a consultant I know who was busily engaged in studying the smart-city value proposition — I won't mention his name, as I'm fond of him, and have no wish to embarrass him — that instead of recommending that his municipal clients invest in instrumentation of the urban fabric, perhaps they ought to utilize the sensor packages a good third of the adults in the city at that time were already carrying around on their person. I was shocked to realize that neither this thought nor anything like it had ever occurred to him or his teammates before.

184. Brewster, Kent. "Profiling Atherton," July 2013. Note that Brewster explicitly raises the issue of skewed data resulting from administrative discretion, as discussed in Section 4: "Why were so many (over a hundred) of these citations filed as misdemeanors instead of infractions, under 12500(a) VC instead of 12500?"
→ foryoutou.se/athertonnailed

185. Biddle, Sam. "Racial Profiling: Newest Trend in Silicon Valley?", *Valleywag,* 07 August 2013.
→ foryoutou.se/athertonprofiling

186. De la Peña, Benjamin, "Embracing the Autocatalytic City," *The Atlantic Cities,* 11 March 2013.
→ foryoutou.se/benjieautocat

187. Echanove, Matias and Rahul Srivastrava, in de la Peña, op cit.
→ foryoutou.se/urbanology

188. Girardin, Fabien. Personal communication, 10 July 2013.