Who Controls the Smart City? From Machines of Loving Grace to a Democratic Transformation from Below

Wittingslow, Ryan

Published in:
The Necessity of Critique

DOI:
10.1007/978-3-031-07877-4_6

Chapter 6
Who Controls the Smart City? From Machines of Loving Grace to a Democratic Transformation from Below

Ryan Mitchell Wittingslow

Abstract In this paper, I argue that smart cities instantiate a form of what Herbert Marcuse called "technological rationality": that is, the process whereby substantive political questions are reduced to ostensibly "neutral" questions of efficiency or cost-effectiveness. Unfortunately, I argue, technological rationality coheres poorly with the necessarily inefficient deliberative and aggregative procedures upon which the legitimacy of democratic systems is premised. Considering that incompatibility, we need to reconceptualise what smart cities are and how they function. These technologies, I argue, need to undergo what Andrew Feenberg calls a "democratic transformation from below"; a transformation whereby citizens can bring smart technologies under collective control, thus preserving the legitimacy of democratic systems. This democratic transformation gives the polis an opportunity to recognise and discuss the affordances that smart technologies offer—and, by extension, an opportunity to collectively and systematically address the philosophical question of what a city *can* and *should* be.

Keywords Smart cities · Democracy · Andrew Feenberg · Technological rationality · Critical theory · Herbert Marcuse · Design · Technical code · Persuasive technologies · Eindhoven

R. M. Wittingslow (✉)
University College Groningen, University of Groningen, Groningen, the Netherlands
e-mail: r.m.wittingslow@rug.nl

D. Cressman (ed.), *The Necessity of Critique*, Philosophy of Engineering and Technology 41, https://doi.org/10.1007/978-3-031-07877-4_6

6.1 Introduction

In his poem, "All Watched Over by Machines of Loving Grace," Richard Brautigan proposes governance by machines. Instead of liberal democracy, he writes, we will have a "cybernetic ecology" where animals and computers co-exist in "mutually programming harmony." The cost of this service is but a small thing. We need only offer our liberty to Brautigan's titular "machines of loving grace" (Brautigan, 1967). Although it's been a long time since 1967, the utopian impulse that the poem articulates—the notion that we will be fitter, happier, and more productive if we allow ourselves to be administered by intelligent machines—remains compelling. Within the domain of urban design and planning, this impulse has recently expressed itself in a suite of proposals concerning what is generally called the "smart city."

Smart cities are urban areas that use data collection sensors to supply information that is then used to more efficiently manage assets and municipal resources. They employ information and communication technologies to autonomously manage municipal systems with the aid of sensors and actuators managed by artificial intelligences. This information can be either collected from citizens directly, or indirectly from devices such as smartphones. This data is then processed and analysed to manage things like power grids, traffic and transportation systems (trains and buses, or traffic lights, for example), waste management, plumbing networks, information systems, library databases, and law enforcement. Using information and communication technologies, smart cities purport to offer managers and bureaucrats a more efficient means of increasing public safety and managing public assets. Pilot programs are already underway in several countries worldwide.

Smart cities provide a tempting prospect: the optimisation of urban space, seemingly unburdened by ideology or politics. However, at least among philosophers, urbanists, and other similarly minded folk, some of the flaws inherent in this view are well known. Indeed—and speaking from experience—a cheap way to score a chuckle from the right crowd is by quoting former IBM CEO Sam Palmisano: "Building a smarter planet is realistic precisely because it is so refreshingly non-ideological."[1] Regardless of Palmisano's naiveté, smart cities possess politics just like any other artefact (Winner, 1980). But what kind of politics does the smart city possess?

My argument is composed of four parts. First, I will provide an analysis of the "persuasive technologies" that typify smart city projects (Tromp et al., 2011). In response to the Winnerian intuition that artefacts necessarily have politics, several commentators have taken up the task of designing technology with an explicit politics in mind. Unfortunately for citizens, these political artefacts are designed absent sufficient either meta-ethical, collaborative, and/or procedural justification (Engelbert et al., 2019). Even more unfortunately, smart city technologies are often designed with these explicit politics in mind.

[1] Sam Palmisano, "Welcome to the Decade of Smart." Remarks presented at Chatham House, London, on January 12, 2010.

Second, I argue that democracy is inherently, and necessarily, both slow and inefficient. This inefficiency is not a flaw. While the collectivist nature of democracy means that decisions are almost always rendered less quickly than in authoritarian forms of rule, this very slowness helps guarantee that new policies and new behaviours are given sufficient deliberative scrutiny. It is upon these profoundly inefficient deliberative and aggregative procedures that the legitimacy of democratic systems is premised (Peter, 2007).

Unfortunately, and as I argue in the third part of this paper, smart city ethics sit poorly with these pluralistic norms. Instead, smart cities are instantiations of "technological rationality," per Herbert Marcuse (2007 [1964]) and Andrew Feenberg (2002). Technological rationality is a discourse wherein substantive political questions are reduced to "neutral" questions of efficiency or cost-effectiveness: a procedural instantiation of modernity's "affirmation of autonomy against every traditional or social authority" (Feenberg, 2002, p. 162). By virtue of purporting to render cities more efficient and manageable, smart city systems are a clear expression of technological rationality in action.

Finally, I will conclude by arguing that the technological rationality that underpins smart city technologies has the non-trivial potential to compromise the necessarily slow, methodical, and pluralistic processes that legitimate structures of democratic governance, unless designed and implemented with adequate deliberative oversight and critical attention. Rather than leaving these technologies in the hands of city managers and bureaucrats, these technologies need to undergo what Feenberg calls a "democratic transformation from below" (Feenberg, 2002, p. 17): a transformation whereby citizens can bring smart technologies under collective control, thus preserving the legitimacy of democratic systems. In doing so, this democratic transformation gives the polis an opportunity to recognise and discuss the affordances (political, economic, existential) that smart technologies offer—and, by extension, an opportunity to collectively and systematically address the philosophical question of what a city *can* and *should* be.

6.2 Choice Architectures

This is an exciting time for researchers in the burgeoning field of "persuasive technology." With the implicit promise of the participatory web and the internet of things finally in a position to bear fruit, there has been an explosive growth in both the literature and the available grant funding allocated to these kinds of initiatives over the past 10 years or so. Uniting these proposals is the notion that designed systems and objects can and should be designed to induce or encourage targeted attitudes or behaviours via "nudges."

Emerging from cybernetics research from the mid-1990s, the idea of "nudging" gained prominence with the publication of a book, by Richard Thaler and Cass Sunstein, appropriately entitled *Nudge*. A nudge, in essence, is a non-coercive means of targeting and influencing given behaviours:

> A nudge, as we will use the term, is any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates. Putting fruit at eye level counts as a nudge. Banning junk food does not. (Thaler & Sunstein, 2008, p. 6)

In targeting those behaviours, planners and choice architects of all kinds hope to passively incentivise desirable behaviours and disincentivise undesirable behaviours. Rather than appealing to crude legislative instruments of control, these choice architects can encourage desirable behaviours without appearing to compromise the liberty of participating subjects. The manipulation of choice architecture is of obvious interest for those interested in designing persuasive smart city technologies. Rather than mistakenly assuming that artefacts are absent political valence, designers can instead take the political character of smart city technologies for granted. In so doing, they can instead design artefacts that encourage or discourage certain behaviours. Consequently, these artefacts are rendered explicitly political, in that they reflect or otherwise instantiate a given notion of the good.

To draw an example from my own country of residence: among the many Dutch streets used as labs to test these persuasive smart city technologies, perhaps the most famous is Stratumseind, in Eindhoven. Stratumseind is one of the busiest nightlife stretches in all the Netherlands. It is also, by Dutch standards at least, quite violent; fistfights and other altercations are, relatively, quite common (Brock et al., 2019, p. 206). It is also one of the smartest streets in all the Netherlands. Lampposts have been fitted with wifi-trackers, cameras, and 64 microphones that can detect aggressive behaviour and alert police officers to altercations.

A previous (failed) experiment changed the light intensity to break up fights, using colour-changing LED bulbs developed and supplied by Philips (Brock et al., 2019, p. 207). A second (aborted) proposal recommended the smell of oranges in the hope that it would disincentivise violence.[2] Contrary to the naive comments made by Mr Palmisano, these are not attempts to render smart cities neutral and non-ideological. Instead, the ethic is baked in: in all cases these are attempts to profile, or target people either exhibiting antisocial behaviour, or nudge people into exhibiting prosocial behaviour. Furthermore, while these strategies may not work (and indeed, in the case of the variable lighting, did not work) what is exciting for urban designers, municipal agents, and other technocrats is the possibility that these strategies will only become more efficient and precise with time.

There exist robust taxonomies for how to categorise these choice architectures. For example: in a much-cited paper, Tromp et al. (2011) attempt to better categorise the nudges by which persuasive technologies function: they provide a robust, and useful, taxonomy of how one might classify these persuasive technologies based on

[2] For details of the scheme, refer to "*Trends Uitgaansgeweld: Mei 2016—Augustus 2016*" ("Trends in Nightlight Violence: May 2016—August 2016"), an information sheet published by *Het Centrum voor Criminaliteitspreventie en Veiligheid* (The Centre of Crime Prevention and Security) in 2016 (in Dutch). To access the scholarship motivating the proposal, please refer to Schifferstein et al. (2011).

the intended user experience. In so doing, they give designers the means to better "design for socially responsible behaviour." Tromp et al. then go on to argue that these sorts of technological interventions can be classified into four categories, based upon two dimensional axes: strong vs weak, and hidden vs apparent. These four categories are coercive (strong, apparent), decisive (strong, hidden), persuasive (weak, apparent), and seductive (weak, hidden). Armed with these categories, Tromp et al. then assign "design strategies" to each of these categories: designed to maximise the possibility that a given user will exhibit the desired behaviour, whether by nudging or more explicit means. As part of this programme, they outline a series of means by which user experiences can be constrained and determined, including employing moral shame, the rendering of explicit suggestions, triggering prosocial behaviours by appealing to non-social motivations, activating physiological responses, or eliciting emotional responses (Tromp et al., 2011, pp. 11–17).

It is very easy to apply Tromp's taxonomy to existing smart systems, like those up and running in Eindhoven. Introducing the smell of oranges to make people less aggressive, for example, could either be an example of a decisive strategy or a seductive strategy, depending on the mechanism of action: if it activates a non-binding physiological process to induce a behavioural outcome to induce behaviour, it is seductive; if it activates a binding behavioural response, it is decisive. Conversely, the use of wifi trackers, microphones, and CCTV cameras are either hidden or persuasive, depending on whether they are particularly obvious. In either case, the knowledge that those technologies are in place implicitly forces citizens to police their own behaviour in order to make sure they act in accordance with prevailing norms: they constitute nudges, per the above. Meanwhile, any police action that manifests as a result of these norms being breached is obviously an example of a non-nudging coercive strategy.

That strategic taxonomy, and others like it, are of great interest to choice architects responsible for developing and introducing smart systems into cities. In combining the precise taxonomies offered by Tromp et al. (among others), with the huge amounts of finely grained data available via smart censors and the processing power offered by artificial intelligences, there is a shared hope that these design strategies can be made vastly more efficient within smart cities. In doing so, and in better cultivating socially responsible behaviour, urban spaces will only become safer and more harmonious. It is a desire both utopian and within the realms of possibility. In so doing, smart city schemes like those at work in Eindhoven promises a wonderfully efficient means of policing public space: and, in so doing, enforcing a collective sense of the good. Ah, but there's the rub.

Tromp et al. are for the most part silent on the nature of the good. Indeed, the following sentence is about the extent of their attempts to engage with the deeper ethical questions at the heart of socially responsible design: "A desired social implication, based on collective concerns, defines what behaviour is desired from a social perspective" (Tromp et al., 2011, p. 7). While this statement verges on the truistic, their silence on the good is obviously intentional: their paper is far more interested in assessing the efficacy of given design strategies than in welding those strategies to ethical norms. This attitude is not uncommon amongst researchers interested in

choice architecture; if a community has agreed upon a singular standard of the good, it is both reasonable and just to design technologies that encourage observation of that standard of behaviour. However, we should be suspicious of the notion that designers are in fact in possession of the common standards that unite us.

While Tromp et al. assume that designers are in possession of a notion of the good when implementing new systems, it is not at all clear that designers of smart systems (such as those in Eindhoven) actually have a rigorous notion of the good in mind—and certainly not one based upon "collective concerns." Instead, the documentation that accompanies these proposals do something rather more insidious, in that they uncritically conflate the *good* with the *prosocial*. Let us consider, for a moment, the motivations behind installing coloured lighting in Stratumseind, as expressed in "Light the Way for Smart Cities":

> Each weekend, 25,000 visitors head to Stratumseind; on any given Saturday night, there are roughly 850 incidents, 20 of which lead to arrests or detentions. The municipality believes that lighting might be pivotal for de-escalating aggressive behavior and reducing these incidents to increase public safety and the attractiveness of the area. Stratumseind thus offers a unique research and measurement center, where experiments test ways to make the area safer, more vibrant, and more attractive. (Brock et al., 2019, p. 198)

The implicature here suggests that what we expect of public spaces like Stratumseind is that they be both safe and "attractive": attractive for businesses, attractive for tourists, attractive for pleasure-seekers; attractive as a locus of consumption and regulated hedonia. When urban spaces are both safe and attractive, the wheels of commerce and the pursuit of pleasure can function unimpeded. While the paper does not state it baldly, the assumption is clear enough: the prosocial pursuit of safety and attractiveness is isomorphic with the pursuit of the good. As a corollary, the means by which municipalities guarantee both safety and attractiveness is simple: by thwarting, minimising, or disincentivising antisocial behaviour. I am suspicious of these desiderata and their concomitant assumptions.

While most people, in most cases, would agree that what they desire from public spaces is both "safety" and "attractiveness," conflating the prosocial with the good is an obvious category error, in that it fails to take into consideration the moral character intrinsic to certain displays of civil disobedience. Mass protests against unjust policies could hardly be considered prosocial, for example, but certainly function in pursuit of the good. Consider, by means of an example, two events still very fresh in the public psyche: the 2019–20 Hong Kong protests and the George Floyd protests. Although to say so might let slip my not-terribly-well-hidden ideological commitments, it is obvious to me that both sets of protests are in service of the good: the former because the democratic rule of law is valuable and worth preserving; and the latter because systemic racism is a boil that requires lancing. Furthermore, I'm of the view that these protests are in the service of the good in spite of—and maybe even because of!—their antisocial character: faced with dismantling the unjust edifices of state power, gentle reform is simply inadequate to the task.

Unfortunately, smart city systems such as those installed on Stratumseind do not permit these kinds of good-making political expression. This is something of which we should be extremely wary. Not only because the right to protest is hard-won, but

also because the right to disagree is baked into the ethic of democracy itself. Unfortunately, expressions of disagreement (particularly when anti-social) are prima facie incompatible with the implicit ethics of most implemented smart city systems. This is because the conception of the good that these systems instantiate is far too monistic and prosocial for such a thing to be possible.

6.3 Democratic Legitimacy

Democracies are inherently, and necessarily, *pluralistic* about the good. Indeed, pluralism about the good is one of the formal features that differentiates democracies from other political systems. Democracy is not a political system with an explicit end in mind but is rather constructed around the notion that there is *more than one good*.

Indeed, there are arguably no goods that are intrinsic to democratic pluralism. So, while certain norms are valued within democratic societies—"tolerance" is one that springs to mind—these should not be considered as goods in and of themselves. Rather, the "goodness" of democratic goods like tolerance are strictly extrinsic. So, for example, in a democratic society it is necessary that people tolerate the existence of other, competing notions of the good, just as they expect their own notion of the good to be tolerated in turn. Tolerance is only virtuous insofar as it helps guarantee that people can continue pursuing their own individual conception of the good without undue interference. The system is premised upon the fundamental assumption that what is good for you may not necessarily be good for me. Indeed, democratic pluralism presumes that no single one of these goods is any "more good" than any other: a sentiment beautifully expressed in E. M. Forster's 1939 *What I Believe*:

> Democracy is not a beloved Republic really, and never will be. But it is less hateful than other contemporary forms of government, and to that extent it deserves our support. It does start from the assumption that the individual is important, and that all types are needed to make a civilization. It does not divide its citizens into the bossers and the bossed—as an efficiency-regime tends to do. The people I admire most are those who are sensitive and want to create something or discover something, and do not see life in terms of power, and such people get more of a chance under a democracy than elsewhere. They found religions, great or small, or they produce literature and art, or they do disinterested scientific research, or they may be what is called "ordinary people", who are creative in their private lives, bring up their children decently, for instance, or help their neighbours. All these people need to express themselves; they cannot do so unless society allows them liberty to do so, and the society which allows them most liberty is a democracy. (Forster, 1939, p. 9)

However, a problem emerges: what happens when the goods valued by different individuals are at odds with one another? What happens when they are, in short, incommensurable? Two values are "incommensurable," as Martijn Boot writes, "if they have different dimensions that cannot be reduced to one dimension so that their amounts cannot be measured and compared on a common cardinal scale of units of value" (Boot, 2017a, p. 315). So, for instance, we could compare the value of a car with the value of a bicycle. There are several relevant evaluative axes upon which

they could be compared: top speed (using kilometres per hour), luggage space (using cubic centimetres), resale value (using your medium of exchange of choice), whatever. Consequently, the value of a car and the value of a bicycle are commensurable, in that they can be measured and compared on a common cardinal scale of units of value.

However, not all values are commensurable in this way. By means of example, Boot analyses a legal battle between the British government and a group of people who lived close to Heathrow Airport. In these cases, the residents claimed violation of their right to privacy due to the sharp uptick in night flights from 1993 onwards. The Chamber of the European Court of Human Rights (and then the Grand Chamber, on appeal) were forced to render a verdict on whether the residents' right to privacy outweighed the economic interests of the nocturnal flights. This, Boot argues, is a clear example of a "fourth value relation:" it is not true that the right to privacy (*A*) outweighs economic interests (*B*), nor that *B* outweighs *A*, nor that *A* and *B* have roughly equal weights. Indeed, there is no common standard (like kilometres per hour, or cubic centimetres, or media of exchange) by which *A* and *B* can be meaningfully compared. Consequently, we are lacking a means by which we can evaluate and select between these options. *A* and *B* are simply and straightforwardly incommensurable; it is "implausible," Boot writes, "that these weights can be determined or that they exist at all" (Boot, 2017b, p. 31).

This is hardly an isolated case. Indeed, many of the most important questions that a polis can ask itself (for example: "Should we increase our refugee intake?"; "To what extent do we have the right to healthcare?"; "What is the right balance between freedom and security?"; "How should we address the threats of anthropogenic climate change?") are questions of this sort, in that opposing sides of the issue in question are also absent clear shared standards by which they can be compared. This is what makes political questions of this sort incommensurable. Because of this incommensurability, for democratic pluralism to function properly there must exist systems, civic structures, and institutions in which competing and potentially incommensurable notions of the good can be discussed, argued, and eventually endorsed. These processes and domains whereby and wherein conversation is facilitated *is* democracy in its purest form. We are familiar with systems of this type (town hall meetings, legal proceedings, parliamentary debates, public protests, letters to the editor, Socrates haranguing passers-by in the agora, and so on); all transparent venues in which different notions of the good can be contested. It is upon these public decision-making processes that the fundamental legitimacy of democratic systems is founded.

Legitimacy is important. Indeed, as Fabienne Peter argues (cf. Peter, 2007, 2008), democratic legitimacy is nothing less than "the first virtue of collective decision-making. […] [Democratic] decisions have to be legitimate, before anything else" (Peter, 2007, p. 330). Given that our values are potentially incommensurable, we naturally cannot guarantee that collective decisions will satisfy all interested parties. It is for this reason that the polis must decide on a set of norms and procedures—that is to say, deliberative processes—that govern how opposing notions of the good can be contested, by "defining the terms for how the members

of a democratic society ought to settle their disagreements about how to organize their life together" (Peter, 2007, p. 330). So, while a particular member of the polis may be unhappy about the outcome of a collective decision-making process, it is imperative that the process *itself*, whatever that might be, be in possession of the trust of the polis.

For Peter, this trust can only be bestowed if those processes meet the criterion of "fairness." Deliberative processes—such as public debates, or protests, or letters to the editor, or whatever—are fair when all citizens can participate in those processes. Citizens, in the appropriate forum, are empowered with the ability to argue for or against whatever value is under debate, after which the outcome is decided democratically. She quotes Gerald Gaus: "In his or her deliberations, each citizen presents what he or she believes is the best public justification; the voting mechanism constitutes a fair way to adjudicate deep disagreements about what is publicly justified" (Gaus, 1997, p. 234, quoted in Peter, 2007, p. 335).

How, then, do we know if the outcomes of these deliberative processes are rationally justified? Peter argues that deliberative processes are rationally justified when the deliberative processes themselves fulfil certain social-epistemological standards. To this end, Peter endorses a strictly procedural approach to social epistemology premised on the idea that there exist normative criteria that apply to knowledge-making practices. This means that she dispenses with the notion that there are procedure-independent criteria for what counts as knowing or not knowing. Instead, it is the procedure itself that guarantees the correctness of the outcome. In this way, correctly designed and implemented deliberative procedures are "knowledge-making," in much the same way that correctly designed and implemented scientific inquiries are knowledge-making without having to be beholden to some external standard of correctness (Peter, 2007, pp. 341–46).

In short, Peter describes legitimate democratic processes as being ideally measured and deliberative, and that these processes permit competing, sometimes incommensurable notions of the good to engage in debate. Furthermore, it is via this deliberative procedure that democracies become able to reconcile their pluralism about the good with the demands of governance. Out of an incommensurable plurality, via deliberation, a smaller number of goods are decided upon and prioritised: an ideally fair deliberative process by which the polis can generate rationally justified collective decisions.

Finally, possessing a robust understanding of "democratic legitimacy" also provides us a principled defence of antisocial behaviour functioning in service of the good. Although expressing antisocial behaviour in response to legitimate democratic processes is clearly not in service of the good, that is not the case when it comes to *illegitimate* democratic processes: procedures that fail to be fair and open (thanks to the coercive powers of economic, political, technological, or other kinds of capital), and that are thus incapable of appropriately resolving disputes (whether incommensurable or otherwise). Antisocial behaviour can then be justified under the condition that it is in service of re-establishing the fairness and legitimacy of democratic procedures. The occasionally-destructive 2019–20 Hong Kong protests and the George Floyd protests are both antisocial expressions of this sort, given that

both sets of protests were and are pitched against political and economic systems wherein the few have undue influence over the many: a clear violation of Peter's principle of purely procedural democratic legitimacy.

All of this means that any notion of the "public good" in democracies is in constant flux. It is always up for debate, for revision, for reflection, changing in line with shifting intellectual and moral norms. The good is not a caged creature, but a vital, dynamic entity in which we constantly participate via deliberation, negotiation, and the procedures that constitute our republic. Consequently, there are certain unavoidable administrative costs when it comes to properly implementing fair democratic systems. These costs mean that democracy is inherently, and necessarily, both slow and inefficient. This inefficiency is not a flaw. While the collectivist nature of democracy means that decisions are almost always rendered less quickly than in what Forster calls "efficiency-regimes," the slowness of these procedures helps guarantee that new policies and new behaviours are given sufficient deliberative scrutiny. It is upon these profoundly inefficient deliberative procedures that the legitimacy of democratic systems is premised. "So two cheers for Democracy," as Forster entreats: "one because it admits variety and two because it permits criticism. Two cheers are quite enough: there is no occasion to give three" (Forster, 1939, p. 10).

6.4 Technological Rationality

The monistic ethics of smart city systems sit poorly with these pluralistic norms. This is because smart city systems are structured in such a way as to privilege and encourage an extremely narrow notion of the good: a good that is well-behaved, prosocial, and benignly reconcilable with the political, technological, and economic structures that serve to constitute contemporary market capitalism. In making urban centres more "safe" and "attractive," for instance, smart city systems like those implemented in Stratumseind function in order to guarantee that the rhythms of production and consumption are not endangered.

This should not be a surprise. After all, there exists a long and illustrious body of literature within Marxian critical theory dealing with the graceless intersection of capitalism and democracy. Capitalist systems of consumption and production, claim scholars like Max Horkheimer, are only capable of facilitating bourgeois negative liberty: mere "freedom from" rather than "freedom to." "The limited freedom of the bourgeois individual," Horkheimer writes, "puts on the illusory form of perfect freedom and autonomy" (1972, p. 211). Unfortunately for us, true democratic freedom—that is, the freedom to organize ourselves rationally and consensually, free of the coercive powers of capital—is simply not possible whilst under the aegis of what Herbert Marcuse calls "technological rationality."

Marcuse first addressed technological rationality in 1941s "Some Social Implications of Modern Technology", and further developed the concept in in 1964s *One-Dimensional Man*. As noted in the introduction, by technological rationality Marcuse is referring to the tendency of persons and institutions in developed, liberal

economies to reduce explicitly value-laden political questions into "neutral" questions of economics or cost-effectiveness. As Feenberg writes:

> The concept of technological rationality expresses the condensation of social and technical functions implicit in Marx's design critique of technology. It explains how rules and procedures that achieve a certain kind of universality may also represent private interests through the assumptions that form their horizon. These interests are overlooked because they are not expressed through orders or commands, but are technically embodied, for example, in apparently neutral management rules or technical designs. (Feenberg, 2002, p. 66)

A foundational symptom of late capitalism, this tendency emerges from the individualistic rationality of the Enlightenment. Individualistic rationality, Marcuse argues, is a rationality bounded by notions of reason, autonomy (*auto-* meaning "self"; *-nomos* meaning "law"), and individual self-interest. Instead of being subject to the capricious whims of some feudal sovereign, a person with individualistic rationality is afforded the liberty to pursue her own unique ends. These ends are decided not with respect to whatever immediate needs and interests might be in play but are instead the product of non-coerced "autonomous thought and conscience." Importantly, this means that the relationship between the individual rationalist and society is an uneasy one. No longer subject to the iron will of society, the individual rationalist must "break through the whole systems of ideas and values imposed upon them" in order to isolate what is in their rational interest. Thus, the individual rationalist finds herself living "in a state of constant vigilance, apprehension, and criticism," as Marcuse writes, rejecting "everything that was not true, not justified by free reason" (Marcuse, 1982 [1941], p. 140). Applied to the social and economic environment, this new "liberalist" mode of free competition between politically equal agents results in two distinct but overlapping phenomena.

The first effect is both technological and economic. As "free competition" between individually rational agents becomes the byword of economic reform, competitive efficiency "favours those enterprises with the most mechanized and rationalized industrial equipment" (Marcuse, 1982, p. 141). Increased industrialisation and mechanisation in powerful, more efficient firms forces weaker, less efficient, less mechanised participants to either fail or be consumed by their larger brethren. In this way, economic power and technical clout become indelibly linked. Furthermore, although the market remains ostensibly free, the abundance of technological capital that large organisations have at their disposal affords those organisations a powerful institutional inertia: it is enormously hard to freely compete with an economic Goliath when you have the purchasing powers and technological assets of a mere David. In this way, individual rationality tends to concentrate power in the hands of a small number of firms, thereby laying the groundwork for the development of oligopolies and monopolies—at least, absent any legislative or structural restrictions on growth.

The second effect is political and social. Because individualistic rationality is premised upon the setting of "the individual against his society" (Marcuse, 1982 [1941], p. 140), individuals' capacities for collective action become blunted. This becomes particularly apparent when oligopolies and monopolies emerge. Amidst the gargantuan, tectonic struggles of large corporate and government entities,

individual rational subjects are rendered largely impotent by their social and intellectual atomisation. In this way—and perversely—individualistic rationality guarantees its own demise: the individually rational "free economic subject" becomes subsumed within the "dominion of the giant enterprises of machine industry" (Marcuse, 1982 [1941], p. 141). Given both the preponderance of monolithic technological systems and the powerlessness of individual subjects, these two phenomena provide the necessary conditions for individual rationality to transmute into "technological" rationality.

By "technology," Marcuse means more than the total aggregate of technical objects. While indeed partially constituted by the totality of "instruments, devices, and contrivances" (Marcuse, 1982 [1941], p. 138), technology (by virtue of subsuming the free economic subject) is also a mode of being that organises behaviour and social relationships. Technological rationality, then, is the form of rationality that develops from, and is enforced by, technology as a mode of organisation.

Imagine, for example, that you are a carpenter, and you have just made a table that you think is particularly fine: perhaps it is unusually elegant, or you have selected a finish that is both hard-wearing and beautiful. Considered in the light of individual rationality, your efforts in producing that table are "independent of recognition and instantiated in the work itself" (Marcuse, 1982 [1941], p. 142); the pride you take in having made the object has nothing to do with what other people think of it. However, that is no longer the case under the aegis of technological rationality. Instead, technological rationalism demands that human efforts can only be "motivated, guided and measured" by the standards of competitive efficiency imposed by industrialisation and mechanisation. Rather than being intrinsic or personal, the worth of any given activity or outcome becomes subject to an economic calculus wherein they are judged according to "the objective requirements of the apparatus" (Marcuse, 1982 [1941], p. 142): that is, judged according to the standards of other people. Money, of course, provides the means by which these external standards are quantified. This means that, as rationality shifts from the individual to the technological, objects and services become assessed only in terms of their commercial value.[3]

This has cascading effects on how we conceptualise human action. Whereas under individual rationality we are empowered to pursue a plurality of ends, technological rationality can only imagine the pursuit of one end: profit, above all else. The technologically rational subject thus is claimed by mass production and mass distribution. We experience, he writes, "an immediate identification of the individual with *his* society and, through it, with the society as a whole" (Marcuse, 2007 [1964], p. 10). In short, technological rationality is the same kind of process as "operationalism" in the physical sciences and "behaviorism" in the social sciences: a kind of "total empiricism" wherein concepts find complete identity with their corresponding set of economic and industrial operations. The technological rationality of total

[3] For more on this subject, including the original source of the table metaphor (see Marx, 1992 [1867], sec. 4).

empiricism consequently allows for the elimination of concepts (such as "mind," or "beauty," or "goodness") for which there is insufficient account within technological processes: a procedural instantiation of modernity's "affirmation of autonomy against every traditional or social authority" (Feenberg, 2002, p. 162). Consequently, total empiricism serves to "coordinate ideas and goals with those exacted by the prevailing system, to enclose them in the system, and to repel those which are irreconcilable with the system". As Marcuse writes:

> We are again confronted with one of the most vexing aspects of advanced industrial civilisation: the rational character of its irrationality. Its productivity and efficiency, its capacity to increase and spread comforts, to turn waste into need, and destruction into construction, the extent to which this civilisation transforms the object world into an extension of man's mind and body makes the very notion of alienation questionable. The people recognise themselves in their commodities; they find their soul in their automobile, hi-fi set, split-level home, kitchen equipment. The very mechanism which ties the individual to his society has changed, and social control is anchored in the new needs which it has produced. (Marcuse, 2007 [1964], p. 9)

The net effect of this total empiricism is a loss of political freedom. Politics, after all, is a normative domain rather than a descriptive one. It is a public space—whether physical, conceptual, or organisational—wherein we are able engage in meaningful conversation about the things that we think are important: what is good, what is right, what is desirable; in short, what we *want*. Unfortunately, given technological rationality's emphasis upon competitive efficiency and profit-seeking as the only good worth pursuing, meaningful political decisions are deflated and collapsed into ostensibly neutral questions of cost-effectiveness. And indeed, we see decision-making of this sort all the time. Questions that are fundamentally about contested notions of the good disappear. Instead, they are replaced with questions where the means of evaluation are already, and undemocratically, baked in: questions such as "Does it work as planned?", or "What does it *cost*?"

6.5 Opening the Smart City

Given all that, it should prove absolutely no surprise that smart city systems such as those implemented in Stratumseind are instantiations of *exactly* this kind of technocratic reasoning. Indeed, the whole point of letting a network of sensors, actuators and artificial intelligences take over municipal services is that these slow and inefficient deliberative procedures are no longer required.

Unfortunately for citizens, it is only within the context of these deliberative procedures that the good can be discussed, argued, and decided upon. While it's all very well to design smart cities with a good or an ethic in mind (as in the case of Stratumseind, or the design strategies discussed by Tromp et al.), the pluralistic nature of democracy means that the good is not a set of values but an ongoing process by which the polis can (re)discover and (re)define itself. Although using artificial intelligences to swiftly and opaquely replace deliberative decision-making

processes would quite likely produce positive outcomes in certain domains, they are also clearly incompatible with the necessarily slow, methodical, and dull processes that typify democratic governance. Or, as Feenberg writes in *Transforming Technology*:

> What human beings are and will become is decided in the shape of our tools no less than in the action of statesmen and political movements. The design of technology is thus an ontological decision fraught with political consequences. The exclusion of the vast majority from participation in this decision is profoundly undemocratic. (Feenberg, 2002, p. 3)

Thankfully, there is a way out of this mess. Contra Horkheimer's pessimism about (liberal) democratic norms being able evade the spectres of capital and modernity, I share Jürgen Habermas' pragmatic conviction that there remains room for hope. For Habermas, critical theory is both diagnostic tool and cure: a means of addressing the ways in which capital distorts democratic processes by fostering the existence of "ideal speech situations" (Habermas, 1970, 1979). These ideal speech situations furnish us with the appropriate conditions for democratic legitimacy—and, consequently, what Horkheimer calls "real democracy" to flourish (1972, p. 250). I am, in short, optimistic about the liberatory powers of democracy—even a democracy stymied by capitalistic systems of production and consumption.

So where to begin? The answer begins with relative (and deceptive) simplicity. Rather than relying on their own unexamined assumptions about what does and does not constitute the good, choice architects could simply design smart city systems in collaboration with the polis, thereby providing some much-needed nuance to these moral assumptions: an example of what Feenberg calls a "democratic transformation from below" (Feenberg, 2002, p. 17). Indeed, this is a recurring recommendation in the literature. Unfortunately, these recommendations rarely influence smart city programmes in any meaningful way. As Engelbert et al. (2019) observe: "many contemporary imaginations of the smart city, as well-intended as they might be, are still cultivating a top-down version of citizen participation and are excluding the interests and perspectives of citizens" (p. 352). While this fact hardly poses a categorical threat to the good-tracking possibilities of the smart city, the need for substantive and robust collective governance structures is certainly a call to action when it comes to implementing future smart city proposals.

So, what might a democratic transformation from below look like? We already know two things. First, it must be achieved via a procedure that is democratically legitimate: a process that is clear, transparent, and sensitive to the needs and preferences of all stakeholders. Second, it is also important that whatever norms are established can be easily and readily revised. After all, it is not enough for this collaboration to only occur *once* if the good is in flux. Instead, the polis needs to be able to intervene in how these systems are designed and managed on a regular basis, in order that the systems in question continue to cohere with both (a) the public good, and (b) a shared notion of what cities can and should be.

This is a fine sentiment but remains unfortunately abstract. We need some better way of thinking concretely about the level on which it is best to get the polis involved in these kinds of decision-making processes, while at the same time resisting the

temptation to make serious decisions about what those decisions should be; after all, we don't want to run afoul of democracy's pluralism before we've even started! With that in mind, and whilst outlining this process in full is well beyond the ambit of this paper, for the beginning of an answer as to how we might approach this issue we can turn to Feenberg's "instrumentalization theory."

Feenberg devises instrumentalization theory as an analytical method for understanding and making sense of the rhythms and pressures of technical systems. He begins with what he calls "technical elements;" that is, the elementary technical ideas that are like the "vocabulary of a language; they can be strung together—encoded—to form a variety of 'sentences' with different meanings and intentions" (Feenberg, 2002, p. 78). Understanding what can function as a technical element requires a few things. First, we need to be in possession of certain bodily and conceptual affordances: an upright stance, binocular vision, fine motor articulation of our fingers, a brain capable of making the relevant conceptual discriminations, and so on. We also need the right attitude; "the technical orientation toward reality that Heidegger identified as the technological 'mode of revealing'" (Feenberg, 2002, p. 175). We must begin to think of the world and the things within it in terms of the *possibilities* that it affords: the kind of instrumentalisation that takes place when we begin to think of things in the world as means to our ends. It is a process that "proceeds by decontextualizing objects and simplifying them to highlight those qualities by which they are assigned a function" (Feng & Feenberg, 2008, p. 113). Feenberg calls this "primary instrumentalization."

Feenberg argues that primary instrumentalization is basically neutral when considered in light of different social values. Realising, for instance, that a rock can be made sharper by smashing it into another rock doesn't inherently tell you anything about the panoply of ways in which that sharpened rock could be used, for instance. It is only when we start thinking about the objects of primary instrumentalisation in terms of how we might use them that we begin "reorienting and integrating the simplified objects into a given natural and social environment" (Feng & Feenberg, 2008, p. 113). This process of reorientation—what Feenberg calls "secondary instrumentalization"—is fundamentally what design is all about: the application of the technical elements of primary instrumentalisation into systems of power, practice, and representation. This is the level at which decisions about *how* to use the sharpened rock are made: making arrowheads for hunting, knives for skinning animals, or axes for killing other people. Once integrated into systems of secondary instrumentalisation, the technical elements of primary instrumentalisation are no longer neutral. Instead, they become concrete, socialised, and strongly biased, in that they privilege certain kinds of use.

These two modes of instrumentalization also apply to more sophisticated artefacts, cities included. The raw building blocks of urban spaces (whether smart or dumb) constitute the primary mode of instrumentalisation: a Lego jumble of housing, roads, utility infrastructure, municipal architecture, sensors, actuators, and whatever else. However, understood in isolation, there is little that these objects can tell us. While they're obviously saddled with intended uses, we simply don't know the kinds of political, economic, or phenomenological inertia they exert until they

are integrated into a common environment.[4] This process of integration—the secondary mode of instrumentalisation—is the process whereby not only final decisions about how, where, and when urban technologies should be used are made. It is also the process by which the norms implicit to the design and implementation of those technologies—such as the regulated hedonia of the Stratumseind—are enshrined. As Feenberg writes:

> Secondary instrumentalizations lie at the intersection of technical action and the other action systems with which technique is inextricably linked insofar as it is a social enterprise. The dialectics of technology is thus not a mysterious "new concept of reason" but an ordinary aspect of the technical sphere, familiar to all who work with machines if not to all who write about them. (Feenberg, 2002, p. 177)

In short, instrumentalization theory is a useful model from which we can begin to unpack the political and social pressures that technologies exert upon us: a model that commits us to neither the optimism of what he calls "instrumental" theories of technology, nor the pessimism of "substantive" theories of technology.[5] Moreover, instrumentalization theory has undergone a number of revisions and extensions since being first introduced; it is through one of these extensions that we can begin to plan, in a practical and concrete way, how to democratise the smart city.

In their paper "Thinking About Design", Patrick Feng and Feenberg use instrumentalization theory as a lens through which we can ask questions of the ways in which historical choices and shared cultural assumptions about technology "shape the design process" (Feng & Feenberg, 2008, p. 105), as distinct from analyses of design processes that focus on the roles and responsibilities of given stakeholders, such as designers or clients. They do this by contrasting "design space" with "technical codes." By "design space," Feng and Feenberg refer to the sum total of all feasible devices that can be designed with a given set of technical elements. It describes, if you like, the space of possibility. However, when new devices are designed from existing technical elements, it is not simply a free-for-all; instead, these decisions are made in light of "technical heritage": "While in theory there may be hundreds of technically feasible design options for a particular technology, […] many technically feasible options are non-starters for reasons so obvious that they need no social justification—they are simply dismissed out of hand" (Feng & Feenberg, 2008, p. 115).

---

[4] See the "epistemological problem" of design, per Parsons (2015, pp. 35–39).

[5] In *Transforming Technology*, Feenberg argues that most attitudes towards technology can be characterised in one of two different ways: "instrumental" or "substantive." Instrumental attitudes to technology are grounded in the assumption that technology is a totally neutral instrument of human affairs: objects that extend or expand our capacities without influencing our behaviour. In doing so, these attitudes *overdetermine* the agency of human users. Meanwhile, substantive attitudes (such as Marcuse's model of technological rationality) make the opposite claim: that our technology has an inexorable and unavoidable influence upon our behaviour. That is, these attitudes are united in supporting the idea that our society, its institutions, and its operational norms, are in some sense regulated by the technologies we employ. In so doing, attitudes of this sort *underdetermine* the agency of human users.

These norms, or "technical codes," constrain and shape design processes: they are inherited social, cultural, legal, economic, epistemic, and other standards that influence how and why things are designed the way they are. Some of these codes are explicit, such as building codes and the like: standards that determine certain features regardless of the wishes of stakeholders. Often, though, these codes are implicit. By means of an example, Feng and Feenberg invoke refrigerators, the technical codes of which determine their "size as a function of the social principles governing family size" (Feng & Feenberg, 2008, p. 115). Of course, in most jurisdictions, family size is a combination of preference and capacity; nonetheless, given that families are generally of a certain rough size (itself a consequence of a vast array of social, economic, and design factors), and that refrigerators are designed to be maximally appealing to the largest number of consumers, the standard sizes in which refrigerators can be found are sensitive to those implicit codes.

Although Feng and Feenberg's analysis is primarily descriptive, in it lies the seeds of a normative programme: a way of bringing about the "democratic transformation from below" (Feenberg, 2002, p. 17). While designers and other stakeholders are obviously powerful actors within the design process, more powerful again are the technical codes that constrain and shape the design space. This obviously raises a challenge. If we're interested in making sure that designed things, such as smart cities, are genuinely just, open, and legitimate, we can't simply look at devices in isolation; we also need to understand the technical codes that undergird those devices. The question, as Feng and Feenberg put it, "is not whether to accept or reject technology, but rather how alternative values can be brought into the design process so that the technical codes that determine design are humane and liberating rather than oppressive and controlling" (Feng & Feenberg, 2008, p. 117). This is the challenge that faces us as we start thinking seriously about how to implement smart city systems: not only working to make sure that smart city devices are themselves just and open and legitimate, but also working to make sure that the technical codes shaping these devices are themselves the product of just, open, and legitimate processes.

This analysis of the technical codes that constrain the design and implementation of smart city systems provides the groundwork for a critique of smart cities. This critique is not simply a matter of democratically deciding upon the behaviours that smart cities should or should not facilitate. Instead, democracy plays a foundational role, in that it provides the means by which a given polis can collectively *conceptualise* the smart city on the levels of both primary and secondary instrumentalisation. Furthermore, in conceptualising the smart city—in recognising and discussing the various affordances that smart technologies offer—the polis is also given an opportunity to escape the technical codes that constrain current smart city projects. In this way, democracy's pluralism makes possible the development of hitherto unimagined potentials for smart urban technologies. This, by extension, gives the polis the conceptual and methodological space to systematically address the philosophical question of what a city *can* and *should* be.

These are all fabulously difficult questions: questions that strike at the very heart of what cities are, how they should be used, and under what conditions the polis is

constituted. Nonetheless, they are also fabulously important: faced with technologies that promise (or threaten) to radically change the texture of urban landscapes, it is necessary to start thinking concretely about the implicit technical codes that have thus far governed smart city initiatives. These are questions that require careful and sustained community involvement, at all levels of policy and at all levels of research and development. It is only in developing methods that address, analyse, and shift these technical codes that we can ensure that we end up with the smart cities that we deserve.

References

Boot, M. (2017a). Problems of incommensurability. *Social Theory and Practice, 43*(2), 313–342.
Boot, M. (2017b). The right balance. *The Journal of Value Inquiry, 51*, 13–32.
Brautigan, R. (1967). *All watched over by machines of loving grace*. Communication Company.
Brock, K., den Ouden, E., van der Klauw, K., Podoynitsyna, K., & Langerak, F. (2019). Light the way for smart cities: Lessons from Philips Lighting. *Technological Forecasting and Social Change, 142*, 194–209.
Engelbert, J., van Zoonen, L., & Fadi Hirzalla, F. (2019). Excluding citizens from the European smart city: The discourse practices of pursuing and granting smartness. *Technological Forecasting and Social Change, 142*, 347–353.
Feenberg, A. (2002). *Transforming technology: A critical theory revisited*. Oxford University Press.
Feng, P., & Feenberg, A. (2008). Thinking about design: Critical theory of technology and the design process. In P. Kroes, P. E. Vermaas, A. Light, & S. A. Moore (Eds.), *Philosophy and design: From engineering to architecture* (pp. 105–118). Springer.
Forster, E. M. (1939). *What I believe*. Hogarth Press.
Gaus, G. F. (1997). Reason, justification, and consensus: Why democracy can't have it all. In J. Bohman & W. Rehg (Eds.), *Deliberative democracy: Essays on reason and politics* (pp. 205–242). MIT Press.
Habermas, J. (1970). *Toward a rational society*. Beacon Press.
Habermas, J. (1979). *Communication and evolution of society*. Beacon Press.
Horkheimer, M. (1972). Traditional and critical theory. In *Critical theory: Selected essays* (M. J. O'Connell, Trans.). Continuum.
Marcuse, H. (1982 [1941]). *Some social implications of modern technology*. Continuum.
Marcuse, H. (2007 [1964]). *One-dimensional man*. Routledge.
Marx, K. (1992 [1867]). *Capital: A critique of political economy* (B. Fowkes, Trans.). Penguin Group.
Parsons, G. (2015). *The philosophy of design*. Polity Press.
Peter, F. (2007). Democratic legitimacy and proceduralist social epistemology. *Politics, Philosophy & Economics, 6*(3), 329–353.
Peter, F. (2008). *Democratic legitimacy*. Routledge.
Schifferstein, H., Talke, K., & Oudshoorn, D. J. (2011). Can ambient scent enhance the nightlife experience? *Chemosensory Perception, 4*(1–2), 55–64.
Thaler, R. H., & Sunstein, C. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. Yale University Press.
Tromp, N., Hekkert, P., & Verbeek, P. P. (2011). Design for socially responsible behavior: A classification of influence based on intended user experience. *Design Issues, 27*(3), 3–19.
Winner, L. (1980). Do artifacts have politics? *Daedalus, 109*(1), 121–136.