John van de Pas[1]

Citizens in the Smart City. Applied Social Physics and the need for Deliberation

Summary: Smart Cities span the globe. To make modern city life sustainable, comfortable and efficient the internet of things is rolled out across the built environment, its data fed into analytical systems and transformed into profiles that allow for personalized services. By presenting the data on dashboards, decision making by city officials is supported; application in automated decision making makes city management more effective and efficient. In the smart city this profiling-and-managing process can truly be beneficial. In some cases, however, quite the opposite is the case. The application of smart city technology should therefore be subject to open deliberation among citizens, instead of left to engineers and bureaucrats.

This chapter is based on an ongoing literature research project on the aspect of citizen agency in information technology driven environments. The outcomes of this qualitative research project is applied to lectures and presentations in my role as a senior lecturer in Information Management at Saxion University. I would like to express my gratitude to my fellow researcher dr. Detlef Wagenaar for topical discussions and textual feedback.

Keywords: Smart City, Decision making, Dashboards, Citizen empowerment, Democratic Deliberation.

1 John van de Pas (MA, BiCT) is a senior researcher and lecturer of Information Management at Saxion University of Applied Sciences in The Netherlands. He has published several papers on privacy, information systems and smart cities. At the moment he is focused on tensions between public values and IT environments. Contact: j.h.vandepas@saxion.nl.

In 2013 Anthony Townsend published his book on Smart Cities. Townsend described the upcoming concept that was by then past its nativity, as follows:

> *Smart cities are places where information technology is wielded to address problems old and new. In the past, buildings and infrastructure shunted the flow of people and goods in rigid, predetermined ways. But smart cities can adapt on the fly, by pulling readings from vast arrays of sensors, feeding that data into software that can see the big picture, and taking action […] Sometimes, these interventions on our behalf will go unnoticed by humans, behind the scenes within the wires and walls of the city. But at other times, they'll get right in our face, to help us solve our shared problems by urging each of us to make choices for the greater good of all.*[2]

Two aspects are relevant in this description: the role of massive data harvesting to make decisions, and the fact that these decisions may be explicit, but could also be unnoticed by humans, with a reference to the 'greater good of all'. The merger of physical and digital environments constitutes a *good* city. And even today the concept is alive and kicking. Smart cities are everywhere.

Smart City and New Public Management

The Smart City concept cannot be seen as disconnected from the central drivers of the information technology (IT) sector in general. In short, IT promises to deliver faster and better services at lower costs. This premise of efficiency fits neatly within the narrative of New Public Management (NPM), a world view making waves since the early nineteen eighties, that provided struggling governments in the face of financial breakdown with a simple and readily available solution: Performance Based Budgeting. And although this way of looking at the world is held responsible for some less than beneficial side effects on both societies and public management [3], it still is the prevailing model for public management in Western Societies today. The underlying philosophy of this rational approach can be summarized as: 'Data Tells All'[4], and its application has caused the breakthrough of a technological approach that has taken control of decision making in

2 Townsend, Smart cities: big data, civic hackers, and the quest for a new utopiaFirst edition (2013) xii.

3 Mauro/Cinquini/Pianezzi, New Public Management between reality and illusion: Analysing the validity of performance-based budgeting, The British Accounting Review 2021, 100825.

4 Mayer-Schönberger/Cukier, Big data: a revolution that will transform how we live, work and think1. publ (2013).

general. The width and depth of this rationality may be discerned in a 2022 review article on 'Social Physics' in *Physics Reports*, which sums up the current state of the art in the use of physics methods to study topics that are 'at the heart of human societies'[5], and the application in real life society. The subjects range from traffic flows, networks, collaboration between humans and machines, communities and migration to climate change and city dynamics. In 148 pages of summing up of methods and algorithms that allow for the transformation of societal phenomena into a positivist analysis, the writers conclude that the future for social physics is bright, and physicists studying societal phenomena are a force to be reckoned with.

This notion is echoed by Matheus et Al. in *Data Science Empowering the Public: Data-Driven Dashboards for Transparent and Accountable Decision-Making in Smart Cities*. Their opening statement breathes the same faith in the exactitude of data-based decision making:

> *Data science is an essential area for governments, as they collect a lot of data in various areas (geographical, traffic, social security, energy, etc.) that can be combined or enriched with data from smart devices and other sources such as discussion forums, social media, and private sector data […] The making of sound decisions depends on the use of high-quality data […]. Data might be an enabler for creating new innovative applications to improve public values like security, safety, transparency and accountability.* [6]

So here we have a hopeful image of the application of physics to social aspects, and the improvement of public values - the tech-savvy viewpoint of making the world a better place. The culmination of that approach may be never more profound than in the application of dashboards as interfaces for the smart city.

Dashboards as interfaces to real life environments

The appeal of dashboards to management and the general public as well is not hard to grasp at all. A long range of movies and popular culture has driven home the idea of the all-seeing entity that presents its highly convincing world view in a profound and undeniable way. Communication via dashboards is very pervasive indeed – and the message they convey is that in a messy and uncertain environment, with endless variation and

5 Jusup et al, Social physics, Physics Reports 2022, 1–148.

6 Matheus/Janssen/Maheshwari, Data science empowering the public: Data-driven dashboards for transparent and accountable decision-making in smart cities, Government Information Quarterly 2020, 101284 (1).

differences, it is possible to end up with an encompassing and total truth of the world and all that is in it. The simplicity of a nice overview on monitors, esthetically appealing to the superficial view, shows that the entire environment can truly be grasped. From that point on it is not a big mental leap to the notion that overview of what has been grasped by sensors and translated by algorithms will eventually solve 'the most political of all questions', as Bentham quoted Juvenal in his *Panopticon*: quis custodiet ipso custodes?[7]

In actual fact the custodian nowadays is not the (wo)man behind the desk, but the algorithmic entity that was built by programmers to rationalize the outcomes of the decisions that will later be made with reference to the data gathered. No data means no output on the smart city dashboards, and what is not captured is not merely overlooked: it truly does not exist in the digital environment of switches and valves, lovingly strewn across the decision makers' interface. The digital twin, culminating this development to its – for now – most advanced form, has a truly mind-blowing effect on this development. Where the difference between 'reality' and 'representation' on the smart city dashboard is a matter of belief, the digital twin promises to replicate the entire physical environment in a virtual platform, to make management of the tiniest deviation from the established norm to an information event in its own sense, an order to be executed forthwith, instead of what it is, a data point to be considered and acted upon according to a human decision makers discretion.

Dashboards are often put forward as a part of 'open government' efforts, that allow citizens to take part in, and comment on, public policy making. The aforementioned Matheus et Al. aim to understand and support the implementation in such a way that *both* the public-private partnership that develops dashboards for city management may benefit, but also the citizens of the city thus managed. They arrive at the notion that a dashboard *in itself* may not be an instrument that changes things in the actual environment:

> *Our findings show that the introduction of dashboards might be useless if their introduction is not accompanied with organizational changes. Dashboards should not only be used to communicate with the public, but also to gain feedback from them and to stimulate interaction. Finding new insights or detecting corruption is useless if there are no means to deal with the feedback or to further investigate by legitimate agencies. Formal authorities that can hold organizations accountable need to be involved or created. Engagement in dashboards, with citizens having the opportunity to provide data and discuss results, plays a crucial role in achieving the benefits. Furthermore, a*

7 Bentham, Panopticon, or, the inspection-house (2008) 15.

> *bad-designed dashboard might result in misunderstanding of data and can affect the public's trust in the government.*[8]

The eroding effect on public trust in government they point out, as ultimate outcomes of such a process-oriented versus an result-oriented way of perceiving the world can be seen in some of the great scandals of our time. Foremost the ongoing Dutch Childcare Benefits scandal, that at this moment in time will cost at least an estimated 8 bn euros to repair and has not led to a satisfying solution yet. And more recently the British Post Office Scandal; both cases involving blind faith in obviously faulty readouts from systems that were held to be truthful. And although it is tempting to blame the IT firms that provided the rickety software, in these cases a closer look at the cultural environment in which this kind of 'unthinking' could take root seems obvious. The general obsession with efficiency that dictates focus on process execution and ignores outcomes that are contrary to the stated goals, might have led to a strain on public values that are also at stake.

The power question

In the early days of the internet, it was perceived by the general public and media alike as a global village with room for every differing opinion, a place free from oppression by any authority, opening connections between scattered and isolated free thinking individuals in areas where their life styles or choices were frowned upon or suppressed. That the breakthrough of the internet and its breakdown of temporal and locative barriers, could also potentially open the door for concentration of power on an unprecedented scale, was a notion less often heard in those early days[9], but concerns about the turn internet took since social and tech platforms took control instead of the self-regulated early communities, gave rise to a rich corpus of texts discussing the negative side-effects[10]. In the actual world even 'tech barons' are sometimes prone to express doubts, as Mark Zuckerberg responded to a congress hearing committee in 2018: *I think the big mistake that we've made*

8 Matheus/Janssen/Maheshwari, Government Information Quarterly 2020, 101284 (8).

9 Donk, Orwell in Athens: a perspective on informatization and democracy (Informatization developments and the public sector 1995).

10 Lanier, You are not a gadget: a manifesto1st Vintage Books ed (2011); Morozov, To save everything, click here: the folly of technological solutionism (2013); O'Neil, Weapons of math destruction: how big data increases inequality and threatens democracy (2016); Zuboff, The age of surveillance capitalism: the fight for a human future at the new frontier of power (2019).

looking back on this is viewing our responsibility as just building tools, rather than viewing our whole responsibility as making sure that those tools are used for good.[11]

This moment of reflective insight (or should we call it epiphany?), echoes in the closing statements of the *Social Physics* review mentioned earlier. The writers finish off their overview with an epilogue, titled 'keeping the discussion open', which contains an important caveat and a plea for physicists to heed the calls of qualitative science:

> *We started our exposé arguing that physics has played a fundamental role in the modern movement towards multidisciplinarity. However, physicists entering multidisciplinary research have a bad reputation for their imperious attitude: "Step aside! We'll show you how it's done. […]*
> *[A] physicist's strength lies in putting quantitative methods to good use, be it rigorous data analyses or complex numerical simulations.[…] Seeking inputs from experts is absolutely crucial in this stage because intuition and common sense cannot replace expert knowledge, and may easily lead to simplistic and naive hypotheses or assumptions.*
> *Accordingly, before quantitative methods are employed, physicists for the most part need to be on the receiving end of the dialogue with their multidisciplinary collaborators.*[12]

Perhaps the most chilling description of what is happening to society in a networked environment without this dialogue taking place, is drawn by Niall Ferguson in his book on the history of networks and global power, as he mentions the vulnerability of networks in his final chapters under the heading 'Facing Cyberia':

> *We are all […] interconnected […]. Like the financial network, our social, commercial and infrastructural networks are under constant attack from fools and knaves, and there is very little indeed what we can do to deter them. The best we can do is to design and build our networks so that they can withstand the ravages of Cyberia. That means resisting the temptation to build complexity when […] simplicity is a better option. Above all, it means understanding the structures of the networks we create.*[13]

In how far we may be able to understand the structures of the networks, and acting according to our best interests after careful consideration of the pros and cons is possible, remains to be seen. In the light of the fact of life that power play has effectively dodged effective regulatory interventions in the

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11 OV, Testimony of Mark Zuckerberg, Chair & CEO of Facebook Inc., Hearing before the United States Senate Committee on the judiciary and the United States Senate Committee on commerce, science and transportation, 10.04.2018.

12 Jusup et al, Physics Reports 2022, 1–148 (123).

13 Ferguson, The square and the tower: networks, hierarchies and the struggle for global power (2017) 411.

past three decades, leaving us with the emergence of a scarcely regulated truly global oligopoly of 'Big Tech,' having too much faith in the effectiveness of (self-)regulation by and of the sector might not be warranted, as Zuboff explains in her opening chapter 'Home or Exile in the Digital Future'[14]. Such is the tempting lure of applying technology as simple solutions to hard societal questions and wicked problems, that it has become nigh impossible to think of other options than the application of 'technological solutionism'[15] – a notion already put forward by Neil Postman in 1992 as he minted the term 'Technopoly' for this world view[16]. Asking the Large Language Models to come up with a solution and accepting that as words of wisdom is just one path that can be followed. For those convinced that there should be more to thinking about application of technology than embracing it at first sight, and should be the outcome of deliberations made by those subjected to the technology itself, the need for a different way of exchanging viewpoints in environments with multiple stakeholders is evident.

Stakeholder engagement is by no means self-evident, however, as can be seen in the research project by Anouk Geenen, who defended her PhD thesis (2023) on democratic deliberation in the smart city. During her research she stumbled upon the limited accessibility for citizen engagement a thoroughly technologically mediated environment.

> *I found that the digital context in which much of this research took place, provided a barrier for citizen engagement.*[17]

A thought to keep in the back of our minds, perhaps, when discussing citizen empowerment in a smart city environment?

A way out? Socio-Technological controversies in Deliberation

In 2019 Shoshanna Zuboff published her widely acclaimed book on the surveillance economy, in which she makes the case that the way information technology and digitization have transformed the world, has taken a rather problematic turn. In her closing chapters she states that there are many questions that are relevant to those trying to grasp the significance of

14 Zuboff, The age of surveillance capitalism: the fight for a human future at the new frontier of power (2019) 3–24.

15 Morozov, To save everything, click here: the folly of technological solutionism (2013).

16 Postman, Technopoly: the surrender of culture to technology1st ed (1992).

17 Geenen, Constructive controversies : Redesigning democratic debate and ethical deliberation in the smart city. PhD, University of Twente (2023) 150.

what is actually going on behind the scenes of the world wide technology deployment we are witnessing on a daily basis. The unregulated application of information analysis and subsequent decision making on individuals, with possibly and actually extreme negative effects, should in her view be considered as a political question, that echoes the era of the 'robber barons' of the late nineteenth century. As she rightfully states: even those extremely powerful organizations were eventually brought under the rule of law; albeit not without a long and hard struggle. For that it is essential that the current state of affairs is not seen as inevitable.[18]

This is where Geenen's insights fit in: she points towards one possible approach to escape out of the clutches of technological inevitability. In order to enhance the public values of democracy, deliberation and consultation should be part of the ongoing conversation between citizens, as opposed to the single-minded emphasis on efficiency and frictionless processes of organizations and corporations. And while cities are multi stakeholder environments per se, the mapping of controversies will prove to be more sustainable and fruitful than simply adding up viewpoints in a process oriented frictionless setting. Geenen: *Since controversies highlight friction between values and as such reveal what is at stake, they are promising, holistic concepts when discussing tensions in a multistakeholder setting. Although the potential of controversies has been recognized decades ago […], ways to effectively exploit this potential are scarce.*[19]

Scarce, but not non-existent. The simplicity of tech solutionism[20], putting forward governance, or identifying the owner of data and calling those in charge of data to answer for the actions of their organizations relying on some authority, will most likely be a feeble attempt in a networked world with myriads of parties that have shown themselves more than capable of derailing any regulatory framework when it is put in place. It is as she states in her final sentence: *this thesis provided an alternative to the top-down, institutional approach that focuses on safeguarding a singular public value, and demonstrated how a purposeful examination and explication of the controversy at hand through means of design, promotes a bottom-up, democratic approach that*

18 Zuboff, The age of surveillance capitalism: the fight for a human future at the new frontier of power (2019) 520–525.

19 Geenen, Constructive controversies : Redesigning democratic debate and ethical deliberation in the smart city 53.

20 Morozov, To save everything, click here: the folly of technological solutionism (2013).

emphasizes the diversity and nuance of public's values.[21] In other words: there *is* an alternative.

In order for *societies* to be democratic, this exact human condition should be taken into account, and made as a central starting point of the development of mechanisms that produce 'public values' (plural) like trust, reciprocity, caring and empowerment. It puts the question of how to relate to these aspects of life, both on a personal, professional and societal level, squarely on our own plate. The questions we need to ask in open deliberations should provide the democratic institutions we hold dear with the backing of a civic voice that claims citizen rights in a digitized environment. Those sorts of questions are essentially cultural, as they dwell on the threshold between the positivist outlook on society in general and the view that puts the human experience central to any attempt to grasp the meaning of life in the physical, digitally enhanced world. To prevent Ferguson's *Cyberia* from taking over completely there is no alternative.

In the words of Zuboff: *Be the Friction.*

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21 Geenen, Constructive controversies : Redesigning democratic debate and ethical deliberation in the smart city 154.

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