

Smart City Development in Hong Kong:

An Ethical Analysis

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ABSTRACT: Like many cities in advanced economies, Hong Kong has embraced the “smart city” agenda. In this article, we engage with a number of ethical issues surrounding smart city development. We assess the ethical implications of four different smart city initiatives in Hong Kong – the use of a facial recognition system, the Smart Lamppost Pilot Scheme, the Free-flow Tolling System, and Electronic Health Records System – from the perspective of relational egalitarianism. Our analysis suggests that there are various moral risks – that a particular smart city initiative may fall short of some relevant normative requirements – depending on the levels of their voluntariness and transparency. Finally, we consider a number of strategies for mitigating these moral risks and maintaining socially egalitarian relationships among citizens of a smart city.

KEYWORDS: smart city, Hong Kong, social equality, trust, transparency.

Introduction

Many cities in advanced economies have embraced the “smart city” agenda. Hong Kong is no exception. Smart cities are “cities using technological solutions to improve the management and efficiency of the urban environment.”¹ In *Hong Kong Smart City Blueprint 2.0* (henceforth the *Blueprint*) published in 2020, the Special Administrative Region (SAR) government set its vision to “embrace innovation and technology to build a world-famed smart Hong Kong characterised by a strong economy and high quality of living.” The purposes of building a smart Hong Kong, according to the *Blueprint*, is “to make people happier, healthier, smarter and more prosperous, and the city greener, cleaner, more livable, substantive, resilient and competitive.”² In the *Blueprint*, the smart city is linked to the development of six fundamental dimensions: smart mobility, smart living, smart environment, smart people, smart government, and smart economy.

Presented in such abstract terms, smart cities appear to be

ethically benign and unproblematic. Nonetheless, like all other technologies, the technologies associated with smart cities can be used well or poorly, for the right or wrong purposes, or something in between. Nevertheless, as Winner (2020) suggests, technical decisions are political decisions and they involve profound choices about power, liberty, and justice because of their disparate impacts on the well-being of different groups of people in the community. One classic example is the design of low-hanging overpasses on Long Island, New York. From the 1920s to the 1970s, some two hundred overpasses with as little as nine feet of clearance were designed and built on Long Island to achieve a particular social effect – to discourage the presence of buses on which poor people

1. “Smart Cities,” European Commission, 2021, https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities_en (accessed on 9 August 2021).
2. “Hong Kong Smart City 2.0,” Innovation and Technology Bureau, 2020, [https://www.smartcity.gov.hk/modules/custom/custom_global_js_css/assets/files/HKSmartCityBlueprint\(ENG\)v2.pdf](https://www.smartcity.gov.hk/modules/custom/custom_global_js_css/assets/files/HKSmartCityBlueprint(ENG)v2.pdf) (accessed on 9 August 2021).

and blacks relied, while allowing the automobile-owning middle or upper-class whites to enjoy their parkways (Winner 2020: 22-3). This is only one example of how technical arrangements grant prestige and freedom to some but deny them to others.

Smartification of urban management is accompanied by the growing role of data analytics and sensors in urban life (Townsend 2013). Most “smart” solutions to urban problems are making the city more internet-connected and data-driven. In the process of making cities smart, data about human interactions and the urban environment are being collected, aggregated, and analysed to optimise urban systems (Kitchin 2014). For example, the government and private companies install numerous sensors to monitor and collect real-time data about a wide range of urban activities.

The data collected are combined with other data sets to yield growing piles of information about how the city is functioning and what its residents are doing. Such data “feed” the algorithms that optimise and improve the efficiency of various urban systems from transport, waste management, energy supply, and disease control, to crime prevention, thus making the city more knowable and controllable (Kitchin 2016: 11-2). As a result, residents in a smart city are subject to continuous surveillance with “a widespread belief in the objective quantification and potential tracking of all kinds of human behavior and sociality” and “trust in the (institutional) agents that collect, interpret, and share (meta)data culled from social media, internet platforms, and other communication technologies” (van Dijck 2014: 198).

In short, there is a genuine need to reflect upon the ethical challenges arising from smart city development. For example, smartification could lead to, *inter alia*, invasion of privacy, social exclusion, discrimination, and concentration of power in the hands of an elite class (Kitchin 2016; Cardullo, Di Felicianantonio, and Kitchin 2019; Green 2019; Calvo 2020; Goodman 2021).

Tellingly, the *Blueprint* compiled by the Hong Kong SAR government contains no discussion on the ethical issues of smart city development, and it regards urban management as merely a set of optimisation problems for which more technology and innovation can only be good. The aim of this article is to identify and analyse the ethical implications of smart city development in Hong Kong. More specifically, we will offer a normative framework to evaluate the ethical implications of building a smart city in Hong Kong. It is not our goal to suggest whether we should be “for” or “against” smart cities. Instead, we seek to specify ethically responsible ways to develop smart cities, which will ensure an equitable urban life for all residents. We will try to show that smart city development faces not only technical problems but also questions of conflicting values and interests that require both political and ethical solutions. After all, given that different applications of technologies will lead to different outcomes for individual well-being, allowing society to be structured by certain technologies grants subtle but potent power to those who design and deploy such technologies (Green 2019: 7).

The article will proceed as follows. In the next section, we will provide a normative framework to understand the ethical challenges arising from smartification. In the third section, we will apply this normative framework to selected smart city initiatives in Hong Kong. Finally, we will conclude with some policy recommendations

that address the ethical challenges facing the smart city. Altogether, this article seeks to provide a rich and critical understanding of the ethical challenges arising from smart city development in Hong Kong.

The ethics of the smart city (or the ethical smart city)

Smart cities often purport to advance the well-being of all their residents. In practice, however, smartification tends to benefit or burden individuals and groups differently. In this section, we propose a normative framework, known as relational egalitarianism, to understand these ethical challenges arising from the smart city. Social justice is generally about how a society’s major institutions treat individuals and groups and specify the basic terms of social cooperation (Rawls 1971: 3-11).³ In contemporary political philosophy, it is widely accepted that the interests of each member of the community matter equally. This abstract notion of moral equality of persons implies a broadly egalitarian view of social justice – that the state’s major institutions must treat its citizens with equal concern (Kymlicka 2002: 3-5). But this abstract idea of treating people as equals admits very different interpretations – while some political philosophers believe that treating people as equals requires equal access to some morally important goods (Dworkin 1981; Arneson 1989; Cohen 1989), others think that it only requires equal rights over one’s labour and property (Nozick 1974; Tomasi 2012). Without attempting to settle these social justice debates, this section turns to exploring an alternative view of social justice – the view that social justice requires egalitarian relations among individuals, and between individual members and the state. This model of social justice is consistent with the percept of moral equality of persons. Also, as we will attempt to show in this section, the relational view can capture some of our considered conviction about the injustice of some phenomena, such as social hierarchies and domination.

In this “relational” egalitarian view, equality is primarily about relationships between people. The structure of relationships can be more or less egalitarian, more or less hierarchical. The value of equality lies in the nature of how we relate to one another, while distributions of goods are valuable only when they reflect or help to achieve egalitarian relationships (Fourie, Schuppert, and Wallimann-Helmer 2015: 1-2). This view is partly based on the good of living in a society of equals – a society whose members are related to one another on a footing of equality (Scheffler 2015: 21). This ideal implies, among other things, that each participant in the relationship “accepts an obligation to justify their actions by principles acceptable to the other, in which they take mutual consultation, reciprocation, and recognition for granted” (Anderson 1999: 313), and their relationships are “in certain important aspects unstructured by differences of rank, power, or status” (Scheffler 2003: 17).⁴

The relational approach has particular relevance to the context of smart cities because, through structuring urban life with a particular

3. For a critique of the Rawlsian approach to social justice, see Cohen 2008.

4. For a recent attempt to defend a liberal conception of social justice based on the relational ideal of equality, see Schemmel 2021.

set of technologies, smartification is fundamentally shaping the relationships between the residents and those who design and implement those technologies. As we will try to show in our case studies, the relational perspective can explain some of the morally troubling aspects of smart city development. A fundamental ethical concern is how smart city initiatives treat individuals and groups who are subject to their power. What is it for smart cities to treat their residents as equals in morally relevant ways? Is there any tendency in smart cities to produce, reenforce, and amplify existing inequalities, and marginalise some individuals or groups? To answer these questions, we propose three principles for assessing the ethical implications of smartification.

1. The principle of *nondomination*: in applying technologies to urban management, the municipal authorities should promote equal freedom and nondomination for residents.
2. The principle of *trust-responsiveness*: the smart city agents should promote relationships of trust by acting according to the expectations of residents.
3. The principle of *fair access to advantage*: all residents should have fair access to the benefits of living in a smart city regardless of their gender, race, age, or socioeconomic status.

Domination in smart cities

From the perspective of relational egalitarianism, a society of equals is one whose social institutions are structured to offer robust protection against domination – accordingly, the state (and its agents) must not enjoy arbitrary power over its citizens. According to Philip Pettit’s seminal definition of domination, one agent dominates another to the extent that (1) he or she has the capacity to interfere (2) on an arbitrary basis (3) in certain choices that the other is in a position to make (Pettit 1997: 52-3). In short, domination is subjection to arbitrary powers, and a person is dominated if he or she is caught up in a social relation with others who could exercise power over her without adequate checks or control (Schemmel 2021: 63). Domination is a form of injustice for at least two reasons. First, domineering relations may allow the domineering agent to impose significant harms on the dominated. Second, such relations show profound disrespect for the persons who are subject to domination, even when their interests are not necessarily compromised.

In smart cities, residents are exposed to the risk of domination in their urban life as they are subject to technologies they cannot interrogate or meaningfully resist. Information asymmetries and network effects (meaning the residents have no effective choice regarding whether to use certain public services) can confer significant and potentially arbitrary power on those entities who control the data (Goodman 2021: 836-7). At the same time, residents of smart cities may have little idea about, let alone control over, how their data are used by the government or other private companies. This opacity and pervasiveness create the conditions under which the municipal authorities could use their power without effective external control. Even when there is no actual inference coming from the authorities or other entities in smart cities, the awareness of being constantly monitored could produce a chilling effect that leads people to self-censor their views and

behaviours. These risks of domination call for more transparency and democratic control over the smart city initiatives.

Betrayal of trust

Trust is essential to social cooperation. Baier (1986: 235) argues that to trust is to accept vulnerability to another person’s will. To trust another person, one must place oneself in her power to some extent and accept the risk of being harmed if she does not take seriously the ethical demands of such power (Baghrarian, Petherbridge, and Stout 2020: 1). But does this mean that a trusting relationship, which by nature involves reliance on the good will of another person, can never be an egalitarian one? From the standpoint of relational egalitarianism, relationships that involve reliance need not be morally problematic when the trusted party sees a trusting party’s reliance as a reason to do what the trusting party expects (McGeer and Pettit 2017: 14-9).

The technologies adopted in smart cities to provide vital goods and services, such as energy, transportation, water, and security, are often opaque to the ordinary residents who rely on them. At the same time, smartification of urban systems involves a vast expansion of data collection regard people’s daily activities. In smart cities, people must have faith in the institutions that handle their data on the presumption that they comply with the rules set by publicly accountable agents (van Dijck 2014: 198). However, the problem is that this trust is betrayed when the institutions that control the data fail to comply with the moral demands of their power, turning their relationship with the data subjects into an unequal one. For many smart city projects, the professed goal is to advance the common good or to address existing urban problems in more effective and efficient ways. When residents of smart cities share their personal data or accept the practice of data collection by municipal agents, they expect such technologies to be used for improving the quality of urban life. However, smart city technologies could also be used for purposes to which the residents have never consented. In this kind of situations, the city government (or its agents) fails to fulfil its trust-based obligation and creates a morally objectionable form of relation between itself and its constituents.

Unfair access to benefits

For relational egalitarianism, distributions of social goods should be consistent with people’s standing as equal participants in social cooperation. In relations among equals, the parties are committed to the view that the interests of each participant are equally important. Although this commitment does not always require equal distributions of the benefits and burdens arising from such relations, it does require that, in order to be equal participants in social cooperation, individuals should not face morally irrelevant obstacles in accessing the benefits of their cooperative scheme (Ip 2016: 37-9; Schemmel 2021: 236-42). For instance, people are excluded from useful participation in social life due to their membership in certain social groups, and as a result, they are disadvantaged in material terms (Young 1990: 53-5).

Accordingly, an ethical smart city does not require all residents to benefit equally from smart city initiatives. Nonetheless, as equal participants, they should enjoy fair access to the benefits of the improved urban systems. There could be multiple interpretations of

what fairness requires in a given situation. For the purpose of this article, we try to identify the morally irrelevant obstacles individual participants face when trying to gain access to the benefits of living in a smart city. Smart city development could be inconsistent with the ideal of social equality when certain groups are arbitrarily excluded from the benefits of urban improvements or are exposed to greater risks or harms in the process of smartification.

By outlining these possible ways in which smartification of urban governance could be morally problematic, we do not mean to suggest that injustice is inevitable in smart cities. Rather, we believe that these ethical challenges of the smart city could be mitigated. To sum up this section, smart city development could be morally problematic when it (1) contributes to the conditions under which some agents dominate others; (2) undermines trust-responsiveness of those implementing the technological solutions; or (3) fails to provide fair access of benefits to the city's residents. In the next section, we shall apply this normative framework to selected smart city initiatives in Hong Kong.

Smart city initiatives in Hong Kong

Despite the recent political changes in Hong Kong – the introduction of the controversial National Security Law, and electoral reform by China's central government⁵ – smart city projects, which the government presents as free from politics, have moved forward and receive substantial investment. For the Hong Kong public, however, this technocratic problem-framing is less persuasive: a recent survey shows that Hong Kong residents have confidence in the benefits of smart cities, but they have lower trust in privacy and security or there are concerns about privacy and information security, and they are even less satisfied with the participation opportunities in related policymaking (Hartley 2021).

The *Hong Kong Smart City Blueprint 2.0* covers more than 130 smart city initiatives in six key areas (smart mobility, smart living, smart people, smart environment, smart government, and smart economy) that “continue to enhance and expand existing city management measures and services.” In this article, we do not have the space to examine all of these initiatives thoroughly so we will have to focus on selected cases. Our selection of cases is informed by two criteria, which we think are morally relevant: (1) information transparency (hereafter transparency): the extent to which information on decisions, implementation of policies, and results is freely available and accessible to the public, especially those who are affected by the policy;⁶ and (2) voluntary participation, which depends on the relative costs associated with not participating or whether there exist barriers to exit (Paul 1992; John 2017).

Smart city initiatives can be categorised in terms of their transparency and voluntariness. We concede that there are other ways to categorise smart city initiatives, but we decided to focus on transparency and voluntary participation in selecting our cases. Unlike the principles outlined in the previous section, transparency and voluntary participation are not ethical principles per se. This means that they can be morally neutral, and thus lack of transparency or voluntary participation is not necessarily morally problematic. Some smart city initiatives, such as those related to infrastructure or law enforcement, cannot allow voluntary participation but they need not be morally problematic simply because of that. Nonetheless, there is an important sense in which transparency and

voluntary participation are pro-ethical conditions that can either enable or impair certain ethical practices (Turilli and Floridi 2009). Transparency, for example, tends to increase popular control over policies because it makes them more visible to the people who could, if problems occur, contest such policies. Lack of transparency often means that the policy is immune from democratic oversight.

Both transparency and voluntary participation come in varying degrees. A particular smart city initiative has a higher level of transparency when the government intentionally communicates its purposes to the public and continues disclosing information about its operation through various means, such as maintaining websites, producing reports, and handling public enquiries. The level of voluntariness in participation is determined both by the availability of exit options and the costs of nonparticipation. For some smart city initiatives, the residents have to explicitly choose to opt in before they are enrolled, but sometimes all residents are automatically enrolled or they will be affected by the initiative without any choice. The smart energy grid provides an illustrative example of low voluntariness: that all households are automatically enrolled and their energy costs will vary according to their pattern of energy usage. The exit option – not using energy – is practically nonexistent. The use of electronic payment systems, however, allows a relatively higher level of voluntariness. Consumers will have the choice of different systems and whether to use them at all. But there could be external constraints on these choices, such as when the use of electronic payment becomes so prominent that some shops begin refusing cash for payment, so that the cost of not using them becomes higher.

Depending on their degrees of transparency and voluntariness, smart city initiatives can be divided into the following four categories: smart city initiatives that have (1) high transparency and high voluntariness; (2) high transparency but low voluntariness; (3) low transparency but high voluntariness; (4) low transparency and low voluntariness. The following table contains some examples of smart city initiatives (as outlined in the *Blueprint*) divided into these categories.

Our case selection aims to include cases of smart city initiatives in Hong Kong that display different levels of transparency and voluntariness. In particular, we focus on the use of the facial recognition system, Smart Lamppost Pilot Scheme, Free-flow Tolling System (FFTS), and e-Health, which belong to categories (1), (2), and (4), respectively. We will analyse the ethical challenges facing these initiatives from the perspective of relational egalitarianism.

The use of a facial recognition system

Since 2016, the Hong Kong Police Force (HKPF) has acquired facial recognition software developed by a Sydney-based firm, iOmniscient, which can be used for video analytics.⁷ Currently, little information

5. See Hui 2020; and John Burns, “Hong Kong's Electoral Changes: The Communist Party Is Taking Over,” *Hong Kong Free Press*, 10 April 2021, <https://hongkongfp.com/2021/04/10/hong-kongs-electoral-changes-the-communist-party-is-taking-over/> (accessed on 11 July 2022).

6. Council of Europe, “12 Principles of Good Governance,” <https://www.coe.int/en/web/good-governance/12-principles> (accessed on 11 July 2022).

7. “Hong Kong's Police Force Said to Have Access to Facial Recognition AI Tech – But Are they Using It?” *South China Morning Post*, 23 October 2019, <https://www.scmp.com/tech/innovation/article/3034141/hong-kongs-police-force-said-have-access-facial-recognition-ai-tech> (accessed on 11 July 2022); Blake Schmidt, “Hong Kong Police Already Have AI Tech That Can Recognize Faces,” *Bloomberg*, 23 October 2019, <https://www.bloomberg.com/news/articles/2019-10-22/hong-kong-police-already-have-ai-tech-that-can-recognize-faces> (accessed on 11 July 2022).

Table 1. Categories of smart city initiatives according to their transparency and voluntariness (*indicates cases selected for discussion)

	High transparency	Low transparency
High voluntariness	1. e-Health* (electronic medical records sharing) 2. iAM Smart (digital services platform) 3. LeaveHomeSafe (exposure notification mobile app) 4. Biometrics identification at the airport 5. Fast Payment System (FPS, for electronic bank transfers) 6. Free Wi-Fi in public areas 7. Smart recycling system	N.A.
Low voluntariness	1. Smart Lamppost* 2. Free-flow Tolling System* 3. Smart ID card 4. Public cloud (government cloud) 5. Government-wide IoT Network (GWIN) sensors 6. Smart water supply 7. Smart grid 8. Building of 5G network	1. Facial recognition* (# not mentioned in the <i>Blueprint</i>) 2. Smart elements in prisons 3. Big data analytics platform 4. Traffic data analytics platform

Source: authors.

about the usage of this system has been made public, while the SAR government has denied that it has procured or developed automated facial recognition-closed-circuit television (CCTV) systems or applied the technology in CCTV systems. iOmniscient, the firm that sold the software to HKPF, has likewise declined to offer any details about the technology.⁸ However, according to the firm's website, their facial recognition system can recognise faces in a crowded situation from a long distance and can operate with low-resolution cameras.⁹

After the purchase was reported by investigative journalists, the SAR government defended the lack of transparency as necessary for crime prevention and police investigation.¹⁰ It also claimed that the data collected would only be used for crime detection and prevention and that the means of data collection must be in full compliance with the law, and that data would be destroyed within a reasonable period of time.¹¹ Two moral risks follow from this application of smart technology (facial recognition).

First, the HKPF's facial recognition system poses risks of domination in the smart city. No public consultation was ever conducted before the procurement of this technology, and members of the public were not even aware of the purchase. The lack of transparency surrounding the applications of this system means that Hong Kong citizens cannot meaningfully contest or resist its use. For instance, there is no indication of whether this system has been used to monitor street protests, and people simply do not know when they are subject to surveillance with a facial recognition function. Besides, even if the HKPF does not comply with the existing laws in collecting data via facial recognition systems, there is no effective mechanism to hold it accountable. For example, there has been no external audit against the HKPF's data collection methods, and the Independent Police Complaints Council (IPCC) mainly deals with reportable complaints.¹² In other words, the use of a facial recognition system is subject solely to the discretion of the HKPF and the administration. From the standpoint of relational egalitarianism, this poses significant risks of domination and is incompatible with the ideal of treating citizens as equals.

There is also the moral risk of lack of trust responsiveness. Recall that in smart cities, residents rely on and expect the authorities to use

new technologies to provide vital public goods and services while complying with public rules regarding the use of their powers. The question is whether the authorities will see such reliance as a reason to do what residents expect them to do. In this case, residents expect the data collected through the facial recognition system to be used for crime detection and prevention, and that their data will be protected, as claimed by the administration. There is arguably an open question whether the HKPF will take seriously the moral demands of trust-responsiveness. Due to the lack of transparency created by the HKPF, the administration, and iOmniscient, the public have no idea how the technology is used. It is possible that the data collected through this facial recognition system will be used for purposes other than crime prevention or investigation. It is unclear whether the agreement between the HKPF and the private vendor, iOmniscient, will allow the latter to have access to such data for its own commercial use (such as using the data to train its own artificial intelligence (AI) systems).

Smart Lamppost Pilot Scheme

The deployment of "smart" lampposts (to replace traditional ones) is part of the SAR government's smart city initiative. The plan was to install 400 of these lampposts by the end of 2021 in some of the busiest areas in Hong Kong, such as Central, Wan Chai, Causeway Bay, and Tsim Sha Tsui.¹³ These smart lampposts have multiple functions. The smart devices installed include air quality

8. Bo Seo, "No 'Kill Switch' on Facial Recognition Software Sold to HK," *Financial Review*, 25 October 2019, <https://www.afr.com/politics/federal/no-kill-switch-on-facial-recognition-software-sold-to-hk-20191024-p533w7> (accessed on 11 July 2022).

9. See the artificial intelligence platform iOmniscient, "Facial recognition in a crowd," <https://iomni.ai/our-solutions/> (accessed on 11 July 2022).

10. "Hong Kong's Police Force Said to Have Access (...)", op. cit.

11. The Government of HKSAR Press Releases, "LCQ11: Facial and Visual Image Recognition Technologies," 6 November 2019, <https://www.info.gov.hk/gia/general/201911/06/P2019110600396.htm> (accessed on 11 July 2022).

12. IPCC, "Statutory functions," https://www.ipcc.gov.hk/en/what_we_do/function.html (accessed on 11 July 2022).

13. Innovation and Technology Bureau, *Hong Kong Smart City Blueprint 2.0*, [https://www.smartcity.gov.hk/modules/custom/custom_global_js_css/assets/files/HKSmartCityBlueprint\(ENG\)v2.pdf](https://www.smartcity.gov.hk/modules/custom/custom_global_js_css/assets/files/HKSmartCityBlueprint(ENG)v2.pdf) (accessed on 11 July 2022).

and meteorological sensors to collect meteorological and air quality data, thermal detectors to detect traffic, Bluetooth, and radio-frequency identification (RFID) tags for transmitting signals and providing geospatial information services to citizens, surveillance cameras to monitor illegal construction and dumping activities, and Wi-Fi transmitters to give citizens free use of the Internet.¹⁴ The data collected are uploaded as open data sources to the public sector information (PSI) portal for common use and to aid the development of other smart applications. There are currently three data banks available as PSI, including the smart lampposts air quality data published by the Environmental Protection Department, smart lampposts experimental meteorological data (e.g., air temperature and relative humidity) published by the Hong Kong Observatory, and multifunctional smart lampposts positioning devices published by the Lands Department.¹⁵

There is a risk for the Smart Lamppost Pilot Scheme to violate the principle of nondomination. The smart lampposts can serve as a surveillance device in the public space, collecting sensitive information such as images of people and vehicles near them, and the locations of people's smartphones. If such sensitive information is collected, smart lampposts will enable the authorities to track individuals across the city. Another concern is whether the information collected is used for undisclosed purposes by the authorities. There is no meaningful option of exit for this smart technology because everyone and every vehicle will be monitored and tracked once they enter the public space. Due to the wide-ranging functions of these lampposts and the widespread sentiment of distrust in the government, the project initially met with suspicion from the public (Hartley 2021). In 2019, some smart lampposts in Hong Kong's Kowloon Bay neighbourhood were torn down by protestors, who labelled them as "facial recognition towers."¹⁶

In response to the public's concerns, the SAR Government convened a Technical Advisory Ad Hoc Committee in August 2019 to examine issues related to privacy protection and information security, whose members included government officials, academics, and experts in information technology.¹⁷ The Committee is also to advise on publicity and engagement strategies to facilitate public understanding of the smart lampposts.

First, the Committee recommended the approach of data minimisation – to reduce the amount and accuracy of data collection. In this regard, the smart lampposts will be equipped with more privacy-friendly technologies. For example, light detection and ranging (LiDAR) will replace cameras in the detection of vehicle speed and identification of different types of vehicles in traffic, so that license plates would not be legible in the images captured.¹⁸ In addition, images would be deleted once traffic flow can be estimated. Traffic snapshots are taken every two minutes and the images are deleted immediately after transmission to the PSI portal.¹⁹

Another major recommendation by the Committee to improve transparency was a cornerstone in the Smart Lamppost Pilot Scheme. Information about lamppost location, data collected, activated devices, and so on, is to be made public. Moreover, the government should adopt a transparent governance mechanism to review and approve any new smart lamppost applications prior to their installation, and make the decision fully transparent to the public. Among the functions of this mechanism is to ensure

compliance with the Personal Data (Privacy) Ordinance and to conduct end-to-end security risk assessment and audits and privacy impact assessments.²⁰

These measures, if fully implemented, can help mitigate the moral risks of domination and low trust-responsiveness. However, smart lampposts still give the government the capacity to invade privacy and conduct surveillance over its citizens, and there is a need to establish effective external constraints on how these smart lampposts are used.

Free-flow Tolling System

The Free-flow Tolling System (FFTS) is an initiative that enables motorists to pay tunnel tolls by remote means through automatic tolling system access without the need to stop at tollbooths, mainly by making use of radio-frequency identification technology, with the support of Automatic Number Plate Recognition (ANPR) technology. When a vehicle affixed with a toll tag passes through a tolled tunnel after implementation of FFTS, its use of the tunnel will be detected by the boothless tolling facilities (with RFID and ANPR), and an appropriate toll will then be charged to and automatically debited from the payment account associated with the tag.²¹ The administration has taken steps to improve the transparency of FFTS through a number of public engagement activities such as meetings with stakeholders, public exhibitions, and a website.²² The relevant bill, Free-flow Tolling (Miscellaneous Amendments) Bill 2021, was passed in the Legislative Council in June 2021. Before the bill was passed, the Transport Department had issued a consultation document to the public, explaining the major goals and expected benefits of FFTS.²³

FFTS is set to be the only toll collection mode for tolled tunnels, and it will be mandatory for every vehicle to have a toll tag. However, to address the public's concern over privacy, the government will issue two types of toll tag. The first is called the vehicle-specific toll tag (VTT), which is related to a particular vehicle, and will be issued mainly to the registered owner of a licensed vehicle with a payment means such as a bank account, a credit card, or a stored-value facility. The second form of toll tag is specific to the class of the vehicle concerned (TT) (e.g., private cars, goods vehicles, light buses, etc.) instead of the vehicle itself. A TT is not linked to a particular vehicle and can be procured by any person at designated outlets without any documentary proof. The stored value account associated

14. Office of the Government Chief Information Officer Technical Advisory Ad Hoc Committee, "Report of the Technical Advisory Ad Hoc Committee on Multi-Functional Smart Lampposts."

15. Office of the Government Chief Information Officer Technical Advisory Ad Hoc Committee, "Summary of Functions on Smart Lampposts (Data Dictionary)."

16. Sean Gleeson, "Facial Recognition Towers in Hong Kong?", 4 September 2019, *AFP Fact-check*, <https://factcheck.afp.com/how-smart-are-hong-kongs-lampposts> (accessed on 11 July 2022).

17. *Ibid.*

18. *Ibid.*

19. *Ibid.*

20. *Ibid.*

21. Transport and Housing Bureau, "Legislative Council Brief: Free-flow Tolling (Miscellaneous Amendments) Bill 2021," 17 March 2021, https://www.legco.gov.hk/yr20-21/english/bills/brief/b202103193_brif.pdf (accessed on 11 July 2022).

22. *Ibid.*

23. The Transport Department, Smart Mobility: Roadmap for Hong Kong, July 2019, <https://www.ifts.hk/file/HongKongSmartMobilityRoadmap.pdf> (accessed on 11 July 2022).

with the TT can be topped up anonymously at the designated service outlets.²⁴ The option of affixing a TT instead of a VTT enables a motorist to avoid being tracked by the authorities. This option is crucial for FFTS to satisfy the principle of nondomination.

Another moral risk presented by FFTS is concerned with data protection. The system will enable the Transport Department (TD) to obtain personal information, location, and activity data of motorists. Under FFTS, the motorists will have no choice but to be reliant on the TD to handle their data responsibly and for the purposes of collecting tolls and minimising disruption to traffic flow. Hence, the TD is under a moral obligation to appropriately respond to the motorists' expectations or it will risk betraying the trust of those motorists. However, the bill does not specify whether the TD will share such information with external agents unaccountable to them. The bill includes an offence of "unlawful disclosure of information," but the only penalty for such an offence is a level 4 fine (currently HKD 25,000).²⁵

Apparently, FFTS satisfies the principle of fair access to advantage as defined in the previous section. The primary beneficiaries of FFTS are the motorists using tolled tunnels, as the system minimises disruption to traffic flow at toll plazas and makes using tolled tunnels more convenient, and users are not required to pay any administrative fee for the service. However, FFTS also brings indirect benefits to people commuting by bus, as the demolition of tolling plazas will free up space for the enhancement of existing bus stops.²⁶

Electronic Health Record Sharing System

As part of the smart living initiative, the Electronic Health Record Sharing System (eHealth) is an electronic platform that aims to build up free and lifelong electronic health records for all members of the public, and enables two-way sharing among public and private healthcare providers. It stores personal information and medical records, including allergies and adverse drug reactions, diagnosis, procedures and medication, and laboratory reports, in encrypted electronic format.²⁷ Such information would only be disclosed to the medical practitioners approved by the patient and would not be accessible to desk staff. Each access would require the patient's authorisation, and the patient would be notified of any access to his or her electronic medical records.²⁸

We argue that eHealth satisfies the three principles outlined in the previous section and presents limited moral risks due to its voluntary participation and high level of transparency.

Voluntary participation is one of the guiding principles of eHealth. Users of eHealth may choose the practitioner to whom they would like to disclose their medical history, and users would have to manually authorise such disclosure each time the practitioner would like access. This gives people a relatively high level of control over how their data are being used. Moreover, the system is open to all Hong Kong ID card holders to join, and there are multiple ways of registration, such as online, in person, by post, or drop-in box. Hence, even those who do not own a smartphone (for the mobile app) are eligible to join.

eHealth also has a high level of transparency. The eHealth Office (under the Food and Health Bureau) adopts various measures to communicate and engage with the public regarding the operation of the system, such as TV commercials, booklets, posters, roving

community exhibitions, and collaboration projects with private clinics and hospitals. It allows public engagement and understanding of how the system works, which allows people to trust and use eHealth.

Four strategies for mitigating the moral risks of smartification

In this section, we will discuss four general strategies for advancing and protecting the interests of individuals in their social relationships with more powerful agents. These strategies were first proposed by Elizabeth Anderson in the context of employer-employee relationships (2017: 65-71). It is also important to note that each of these strategies has its own limitations in a smart city.

Exit

Exit is an important means of limiting arbitrary power. A credible threat of exit – that is, when exit is a realistic option and this is common knowledge – may be sufficient to motivate the more powerful agents to restrain themselves in order to preserve the relationship from which they benefit significantly (Hirschman 1970; Taylor 2017: 11-8). For instance, when the economy presents employees with many opportunities to shift jobs, and they are entitled to unemployment benefits, the employees will have some counter-power against their employers in negotiating the terms of their employment and preventing domination. In addition, the option of exit can also protect the disadvantaged party from being trapped in an abusive or otherwise unequal relationship. Some smart city initiatives do give residents a meaningful choice of participation. In practice, the option of exit is most clearly present in the smart city initiatives that allow residents to opt in rather than those that enrol them automatically. This can be seen in the case of e-Health, where informed consent is needed to participate.

Nonetheless, residents only have limited capacity to exit a smart city as long as they still live in the city. To lead a "network-free" or "offline" life implies a considerable, perhaps even existential, cost to the individual, since more and more public goods and services in the smart city are now organised around a web of interacting networks. Many technological solutions used to build a smart city are ones that individual residents have only limited capacity to opt out of. Examples include the smart lampposts, FFTS, and facial recognition systems. Therefore, in addition to providing a meaningful way of exit, the government ought to consider other ways in which power inequality can be mitigated in a smart city.

Due process

The second strategy to defend relational equality is to institute rule of law, and consists of the following elements: (1) authority may be exercised only through laws duly passed and publicised in advance, rather than on the arbitrary orders of more powerful agents; (2) subjects are free to do what the law does not prohibit; (3) laws apply equally to

24. Transport and Housing Bureau, "Legislative Council Brief (...)," op. cit.

25. Free-flow Tolling (Miscellaneous Amendments) Bill 2021, Section 20A.

26. Ibid., p. 2.

27. "Electronic Health Record Sharing System," <https://www.ehealth.gov.hk/en/index.html> (accessed 8 February 2021).

28. Ibid.

everyone; (4) subjects have the right of due process before any sanction can be legitimately applied to them (Anderson 2017: 66-7).

In order to manage the moral risks of smart city development, we need publicly accountable governance structures to monitor the operation of various smart city initiatives. In this regard, post-implementation impact assessment and monitoring are necessary to address the ethical concerns arising from the application of smart technologies. For instance, to address public concern over smart lampposts, an ad hoc committee was set up to review the operation of smart lampposts and to make recommendations for their future operation. The Electronic Health Record Sharing System Ordinance (Chapter 625) is in place to provide a legal basis for governing the collection, sharing, use, and safekeeping of data shared through the eHealth system. The FFTS is likewise governed by the Free-flow Tolling (Miscellaneous Amendments) Bill 2021.

Importantly, high-risk systems ought to be subject to more intensive and demanding procedural constraints. There should be independent oversight or legally mandated institutions to monitor the operation of these urban systems. However, independent oversight and other procedural checks are largely absent in the cases of the facial recognition system and smart lampposts in Hong Kong.

Substantive rights

In any social relationship, individual and group rights are important to protect the interests of all parties, especially those who are less powerful. For instance, to prevent oppressive employer-employee relationships, some labour rights need to be instituted into the relationship. These rights include a right to decent working conditions, antidiscrimination rights, and a right to form unions, among others (Anderson 2017: 68). In practice, individual rights are defined by a legal framework that limits the powers of government or private corporations in their treatment of individual persons (or their data) and establishes a mechanism through which individuals can hold others accountable and demand remedies when their rights have been violated.

In an increasingly “smart” society, residents need certain rights in order to function as equal members in the smart city – there should be a bill of digital rights. These digital rights may include a right to individual and group privacy (Mittelstadt 2017: 475-94), a right to delete one’s digital records (Mayer-Schönberger 2009), and a right to data protection, which implies that one’s data should be processed fairly, for specific purpose, and only on the basis of consent (McDermott 2017: 1-7). Currently, the European Union has implemented the General Data Protection Regulation (GDPR) with guiding principles for companies and individuals to follow in order to protect people from the harms of digitalisation. In smart cities, data protection will only become more important for individuals and for the ideal of relational equality. Hong Kong’s data protection regulations mainly focus on privacy issues. The Office of the Privacy Commissioner for Personal Data (PCPD) is responsible for overseeing the enforcement of the Personal Data (Privacy) Ordinance (Cap. 486).²⁹ However, data protection requires more than protection of privacy. Other requirements such as “lawfulness, fairness, and transparency,” “storage limitation,” and “accuracy” (as stated in the GDPR) should be taken into consideration in the development of a smart city. For example, “lawfulness, fairness, and transparency”

demands personal data to be processed lawfully and with transparency to the data subject, while “accuracy” asks for personal data to be kept up to date and erased when the data are inaccurate.³⁰ This can lead to companies and governments being more aware of methods to minimise digital harms beyond the scope of privacy protection.

Voice

Granting individuals a voice over decisions affecting their vital interests is an essential part of treating them as equals in their social relationships. Parties to an equal relationship recognise a mutual obligation to justify the terms of their relationship to one another. In principle, residents in smart cities who are subject to a range of technological arrangements in their city are entitled to participate in the governance of these systems. In order to mitigate the power asymmetries induced by the smartification of urban systems, the public should be able to participate regularly in the governance of the smart city. The idea here is to enhance the public’s contestatory power over government policies related to smart city development and to allow collective interrogation of government officials so that individual residents can challenge any problematic measures proposed or implemented by government. The goal of these processes of contestation is to arrive at policies acceptable to all and not merely accepted. It means that the participants can only offer considerations for or against a particular policy that all can regard as relevant. They are therefore pressured to seek out considerations that all others, no matter what their interests and opinions, can treat as relevant in collective decision-making. In short, the value of relational equality is embodied in the process of democratic contestation (Pettit 2012: 252-60).

It may not be possible to fully achieve this ideal of the acceptability game and democratic contestability, but progress is sometimes made. In Seattle, for example, democratic scrutiny plays a key role in the governance of smart city projects. The Community Technology Advisory Board (CTAB) was established in 2015 under the Seattle Municipal Code to make recommendations to the mayor and the city council on issues of community-wide interest relating to information and communications technology, and to research issues and collect public input. The CTAB consists of ten members (six appointed by the mayor, and four appointed by the city council), and it has committees on smart city, community innovation, and digital equity. Membership on the CTAB is open to applications from the public whether they are tech professionals or not. More importantly, members of the public are welcome to attend the CTAB’s regular meetings to express their views on issues relating to information and communications technology.³¹ Although public engagement activities occasionally take place relating to smart city development in Hong Kong, the kind of continuous commitment and legally mandated institution we see in Seattle are absent.

29. Office of the Privacy Commissioner for Personal Data, Hong Kong, https://www.pcpd.org.hk/english/about_pcpd/our_role/what_we_do.html (accessed on 10 August 2021).

30. “Chapter II: Principles. Article 5: Principles Relating to Processing of Personal Data,” Official Journal of the European Union, <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32016R0679&from=EN#d1e1797-1-1> (accessed on 10 August 2021).

31. Community Technology Advisory Board, the City of Seattle, <https://www.seattle.gov/community-technology-advisory-board/meet-the-board> (accessed on 11 July 2022).

An obvious limitation of this strategy is that effective democratic oversight of the applications of smart technologies cannot be easily achieved given the opacity of such technologies. One thing is clear though: the government should take steps to inform the public about the potential risks of smart city development and promote digital inclusion.

Conclusions

To conclude, this study questions the prevailing view of technological optimism in Hong Kong, which holds that urban governance is essentially a problem of optimisation and requires merely technical solutions. Smart cities are often hailed as utopian places where urban problems are solved by innovation and technology. Nevertheless, technocratic problem-framing is inadequate to make sense of some fundamental moral issues arising from smart city development. In this article, we adopt the normative framework of relational equality to assess the potential ethical implications of the smart city. We think the perspective of relational egalitarianism is highly relevant in the context of the smart city because the advancement of information technology and the rise of big data are fundamentally reshaping the relationship between people and governments. A key question prompted by the smart city is whether residents of smart cities can relate to one another on a footing of equality.

In our case studies, we have focused on Hong Kong's smart city development, where digital infrastructures are well-developed. We have observed that the current development of the smart city in Hong Kong shows a commitment to technological optimism, without much attention to the moral risks and problems arising from smartification, and thus provides little possibility for substantive critical reflection on the ethical implications of living in a smart city. Complicating the matter further is the declining public trust and lower perceived political legitimacy of the Hong Kong government.

To unpack the moral complexity of the smart city, we articulated three normative principles based on the ideal of relational equality – namely, the principle of nondomination, the principle of trust-responsiveness, and the principle of fair access to advantage. We then applied these principles to assess the ethical implications of four different smart city initiatives in Hong Kong – the use of a facial recognition system, the Smart Lamppost Pilot Scheme, the Free-flow Tolling System, and the Electronic Health Record Sharing System. Our study asks how the smartification of urban governance could offer an equitable future to all residents considered as equal members of their community. One of the main takeaways of this study is that smartification in urban governance comes with distinctive moral risks. Among the selected cases, the ones with lower levels of transparency and voluntariness are associated with more potential moral problems. Moreover, our study suggests that the moral risks of smartification could be mitigated with appropriate institutions and policies. In particular, we have considered a number of strategies for mitigating these moral risks and maintaining socially egalitarian relationships among citizens of a smart city. The major ethical challenges of smart city development would lie in finding ways to promote voluntary participation in smart city endeavours, to enhance residents' voices, and to protect people's digital rights in process of smartification. By recognising the complexities of the ethical issues arising from the smart city, this study offers a moral vision of the city that is not only smart but also ethical and just.

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