The Seductive Smart City and
the Benevolent Role of Transparency

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Abstract. Digital Twins and automated decision-making systems operate on real-time sensor data extracted from the built environment to seamlessly produce insights and decisions to predict and influence behaviour in the city. However, these processes are opaque to urban occupants and as such, power holders are not held accountable for decisions. This article applies a Deleuzian lens to consider how desiring-production and modulated forms of control seduce the urban occupant through an uncritical techno-entrepreneurial framing of the smart city. In turn, this techno-optimistic narrative of smart cities seduces us into new modulated representations of ourselves in a society of control. This article argues that transparency practices in digital twins and other smart city technologies are essential as they need to signal benevolence and support trust formation in the city. Transparency practices that communicate the context of data focused decision-making allow power holders, HCI and CSCW practitioners, other technology developers and city administrators to be held accountable for these decisions. At the same time, transparency in the architecture and processes of the digital twin and ADSs creates spaces within seamless dataveillance-to-decision output processes for selfhood development, to allow 'the right to the city' to emerge. This article also considers strategies in which practices of power through seduction in digital twins and other smart city technologies can be made to be more benevolent through transparency.

Keywords: Deleuze, digital twin, desire, benevolence, access control, trustworthiness, HCI, smart city.

1   The city as a site of surveillance, control and desire

As sensors are increasingly embedded in our built environment or carried on our bodies, they extract granular urban data from our digital trails. These continuous data collection practices permit the creation of real-time digital replicas of the city known as 'digital twins'.

We desire the emerging technology of digital twins as it offers an array of functionality that allows a user to discern or infer a variety of information about themselves, other urban occupants and their environment. Proponents of digital twins suggest that the mass collection of real-time data, coupled with analysis and modelling, will produce insights to allow city administrators to address intractable

urban challenges, including energy insecurity, pressures on housing and transport infrastructure, law enforcement and public health 1-2.

Digital twins reimagine the datafied city as both *platform* and *node* in the connected cyberspace of the Internet of Things 3 and the 'Internet of Bodies' 4. They build on processes of prediction and prescription to automate decision-making on how we plan, design, build, operate and manage smart cities, including how occupants live within them. This reveals an urban agenda that is oriented on the use of data to identify patterns in urban occupant behaviour ('prediction'), and the subsequent use of such insights to drive desired behaviours ('prescription') 5. The outcome of this agenda is a future where the process of data collection seamlessly becomes the decision-output. Thus, digital twins and other automated decision-making systems ('ADSs') designed and deployed in our cities have the potential to significantly alter the way urban occupants are able to live, work and play in the city.

Despite this potential for a fundamental shift in the way we live, there has not been sustained engagement with the future impact of these digital twins beyond an instrumental approach 6. This arises out of the technological optimism in the narrative around smart city technologies that has mostly confined discussion to how their deployment can provide solutions and vaunted benefits through big data analysis 7-[8, p. 1].

This article attempts to respond to Kitchin's challenge for a deeper analysis into the normative question of how smart city technologies, such as digital twins, should be designed 13. In particular, this article seeks to reconceive the occupant in the city as not just an 'automated behavioural node' 14, but a human subject driven by desires that animate conceptions and re-conceptions of the smart city. It argues that there is a need for urban design practitioners, technology developers and city administrators to signal benevolence through the integration of transparency practices currently being developed in research on human-computer interaction ('HCI') and computer-supported cooperative work ('CSCW') 9-12. With the adoption of such transparency practices, this article suggests that data collection and decision-making structures of digital twins and other smart city technologies can be made more accountable.

The article begins with a brief introduction to the theoretical concepts that underpin our understanding of the city and its digital twin as both sites of production and products of desire and surveillance. It starts with briefly considering how the built form of the city allows power to be exercised through the manipulation of desires and interests of the subject occupant ('seduction'). Having established the importance of desire to the creation of the city, and its iteration as a smart city, the article progresses to introduce Deleuze and Guattari's concept of 'desiring-production' 15.

This Deleuzian lens provides a mechanism for us to consider how the coding of 'flows of desire' is the mechanism by which social machines drive the techno-optimism behind digital twins that entices and seduces the urban occupant into modulated practices of control. This seduction via a techno-optimistic narrative is designed to gain and control access to the data of the urban occupant.

In contrast, the article then examines how signals of benevolence can act as a countervailing force to seduction as a practice of power. It suggests that benevolence is signalled in the design of transparency practices in digital twins and ADSs. This transparency works against the technological agenda of 'seamlessness' 5, which then

gives space for the urban occupant to engage in self-deterministic processes and exercise a 'right to the city' 16.

Towards the end of the article, a caution is provided. The signalling of benevolence, particularly the presentation of transparency in reports and corporate documents, can be used to set at ease any occupant interacting with machine systems. As the occupant needs to trust in order to be complicit and enticed into this state of dataveillance, there is still a need to consider how the design intentions that code 'benevolence' into our systems simultaneously balance seduction but also seduce the occupant in these signals of benevolence. This requires us to consider how we can be transparent about being transparent. In conclusion, the article provides practical suggestions as to how technology developers can integrate transparency in HCI and CSCW design practices, applying both legal and socio-political perspectives to ameliorate the seductive exercise of power through smart city technologies such as the digital twin.

2   Seduction and the practice of power in the city

In *Framing Places*, Dovey builds on the works of Bentham and Foucault, articulating how the built form of the city and embedded forms of surveillance are used in societies of discipline to mould urban occupant behaviour. The built form of the city creates boundaries for urban life, creating confined spaces for 'programmed action, while closing other possibilities' 17. Surveillance, embedded in the spatial syntax of the built form of the city, is portrayed as a coercive exercise of 'power over' the urban occupant.

However, the built form of the city does not just mould behaviour to achieve compliance, it also moulds desires via an exercise of power through 'seduction'. Dovey observes that seduction is a 'sophisticated form of "power over", hinged to the constructions of desire and self-identity' [17, p. 13]. This practice of power through seduction has long been a part of the architecture of the city and design practice. Consequently, the built form of the city is crucial to our understanding of how we live, work and play as it materialises our collective needs and wants in a shared expression of space and desire.

With the emergence of a global imperative to create smart cities, our cities are now proliferated with sensors. These sensors collect personal information that is then incorporated in large datasets and used as part of a wider surveillance practice. Roger Clarke introduced the term 'dataveillance' to capture the emerging 'systematic use of personal data systems in the investigation or monitoring of the actions or communications of one or more persons' [18, p. 499]. Since Clarke's conceptualisation of dataveillance in the 1980's, the subsequent waves of technological advancements have produced new and more comprehensive ways of data generation. These dataveillant practices have fundamentally shifted the practice of surveillance such that the mould of the city through enclosure and confined spaces is receding in light of an ascendant practice characterised by dispersed mechanisms of control 19. This emergent society of control marks a change in how power over the urban occupant is exercised.

In societies of discipline, the entire individual is subject to surveillance, and the asymmetrical gaze captured in the built form of the city coerces the occupant to be '(self)disciplined' 20. Instead, in societies of control, urban occupants subjected to surveillance are reconceptualised as fragmented representations of themselves where power over the occupant is directed at 'modulating' components of the individual—their 'desires and opinions, and inducing action within prescribed comportments' [20, p. 224]. The occupant then becomes fragmented across different datasets, combined into new representations, and framed within 'insights' that are then used to predict and prescribe desirable behaviours.

Digital twins, along with other similar deployments of smart city technologies, exemplify this shift away from the built form of the city as the medium through which power is exercised. Instead, these digital replicas present an idealised city ready to be 'governed by code rather than spatial form' [23, p. 315]. At the same time, there is increasing HCI research demonstrating that the modulation of occupants and resultant insights are also creating new forms of data that modulate and '*subvert* city functioning' [21, p. 2936] 22.

Consequently, this glut of sensors is at once a product and means of production of the technological optimism that has captured our attention in recent times 24-27. The impetus to make cities 'smarter' is, as a result, a product of the manipulated desire for more information about what is happening in the built environment around us and to understand the city. This exercise of power through a manipulation of desire recalls Deleuze and Guattari's 'desiring-production', and at a city-scale, the 'social production' that creates and propagates the 'smart city imaginary' 28 that drives the deployment of these technologies of prediction and prescription.

2.1 Desiring-production

Deleuze and Guattari introduce the concept of 'desiring production' in *Anti-Oedipus* as a creative force of the subconscious that underpins the way we create everything around us 15. They frame 'desire' as the 'autoproduction of the subconscious'. Desiring-production is articulated through desiring machines that operate to create and disrupt 'flows of desire'.

The concept of 'flows of desire' is instructive in considering how desire and seduction—or the exercise of power by manipulating desires—come together to create transient layers of urban appetites for functionality and aesthetics that drive the ever-changing conceptions of the city (built or otherwise). In this manner, Deleuze conceives of desire as being the 'immanent productive force of life itself… [where] without desire there is no city' [17, p. 22].

Buchanan 29 suggests that Deleuze and Guattari's construction of desire is based on three hypotheses: first, desire is 'gregarious' and that we, as creatures of desire, seek to be together for more than the purposes of bonding. Instead, we crave enduring groupings and collectives. Second, desire is argued to require training or discipline to produce lasting collectives through a process Deleuze and Guattari describe as the 'coding' of flows of desire. Third, desire is 'socialised' by this codification, with the various attractors of desire coded to imbue them with symbolic value and a social

function to demarcate what is an accepted 'desirable' element of the collective (ie. the ascription of meaning).

The accumulation and aggregation of individual desiring-machines result in a 'social machine' that, in turn, codes the accumulated flows of desire through 'social production' (or 'desiring-production' carried out at a social scale). This coding of the flows of desire allows 'crowds', conceptualised by Buchanan as 'ephemeral gatherings of people, living and dying with the moment' [29, p. 91] into a more enduring form of social formation: the city.

Digital twins, as real-time virtual reproductions of the city and the behaviours of urban occupants within the reach of its sensors, are product of this Deleuzian 'coding'. They arise from the social machine that drives the development of these dataveillant technologies and lead to their deployment in the smart city, which in turn operate to 'code' the individual flows of desire in the city. Through their deployment, the 'ephemeral' crowds of the city are fragmented and captured in enduring datasets that can be combined with other fragmented representations to code individual flows of desire in endless loops.

As a result of the social machine coding individual flows of desire, two interdependent forms of seduction occur. First, there is a seduction through a techno-optimistic manipulation of the narrative that leads to limited understanding of these technologies beyond an instrumental approach. Second, and arising from the first, there is a seduction of the individual occupant that entices them into this practice of modulation. This form of seduction or exercise of power results in the individual being replaced with a fragmented representation or the 'dividual' 19, 30, captured in a 'data double' 31.

2.2 Seduction through the techno-entrepreneurial narrative

Digital twins and other smart city technologies are built on a desire shaped by rhetoric of progress and smart city imaginaries that promise greater efficiency and rational delivery of urban services. IBM's 'smarter cities' campaign was the first significant marketing campaign on a global scale. The campaign suggested that urban technology would be able to increase efficiency in the delivery of urban services in an international marketplace such that by 2016 the industry would be valued at just shy of USD 40 billion 23. In the same vein, the Centre for Digital Built Britain ('CDBB') predicts that urban data, where shared effectively in the form of the digital twin platform, will better inform decision-making, improve city-based processes and lead to economic benefits of up to £7 billion 32.

While it is clear that technology developers benefit from the deployment of these technologies, the benefits to occupants are less clear. Technology developers benefit by being able to extract data and monetise their insights into urban occupant behaviour, and then market their services to '[realise] the network effects and monopoly rents that have characterized information technology platforms' [1. p. 457]. However, for occupants, Jacobs et al observe that there is an 'optimistic and somewhat reductionist approach [that] suggests that being able to gather data will necessarily lead to solutions' [33, p. e11], 34. The resultant 'technocratic fiction'

leads to a prioritisation of 'data and software', which treats 'knowledge, interpretation and specific thematic expertise… as superficial' [23, p. 308].

The impact of the techno-entrepreneurial framework on the city is that its mythmaking and social production are all encompassing and do not leave room for alternative imaginaries. The prevailing desire seduces through smart city projects that diminish non-entrepreneurial conceptions of the smart city and other versions of 'smartness'.

Thus, the instrumental framing of smart city projects and technologies is manipulative and shapes desires as it serves to diminish critiques and proposed alternate conceptions of the city. Hollands suggests that the seduction of the techno-optimistic narrative results in there being 'no large-scale alternative smart city models, partly because most cities have generally embraced a pro-business and entrepreneurial governance model of urban development' [35, p. 307].

Further, this seduction by techno-entrepreneurialism leads to the conversion of public space into a private space now managed and imbued with private capitalist intentions. This blurring of public governance with private interests is not novel. The development of malls and arcades from the 1860s saw the creation of quasi-public spaces governed by private interests that sought to harness 'economic vitality' by decanting and '[redirecting] pedestrian flows off the city streets' through seduction of the public with spaces of desires [17, p. 139]. These arcades and malls progressed to become the new 'spatial milieu which was social but not communal, a zone of "public life" that privileged the individual over the group'. This resulted in forms of inequality that were locked into these quasi-public spaces.

In the same vein, the requirement to trade data for access to the quasi-public spaces of smart city developments like the recently cancelled Waterfront Toronto project by Sidewalk Labs similarly privileges those who have 'desirable' data for technology developers over other excluded occupants of the city. The occupants accessing services and the built form of these smart city developments are both consumers attracted to desirable functionalities of the smart city, but are, in themselves, seductive commodities. Consequently, smart city developments are, in effect, updated versions of these arcades.

This imbuing of 'access' with commercial value is intrinsically linked to the techno-optimistic narrative, and is instructive as to how societies of control differ from earlier iterations of the city as enclosure/moulds of discipline. These earlier societies of discipline were oriented on controlling how life was permitted to live and operate within the framed spaces of the built environment. In contrast, Deleuzian societies of control frame and modulate the data double through access points. This shifts the exercise of power to a practice of control governing who is permitted access in a digital system 30. The sophistication of this control on access extends to imaginaries—what thoughts are permissible and desirable—such that the techno-entrepreneurial narrative demonstrates the power of its seductive nature by achieving an almost exclusive access to our social imaginaries. Simultaneously, this imperative to gain and control access operates also at the individual level of the city, seducing the occupant into providing yet more information and fragments of ourselves for modulation.

2.3 Seduction of the individual

At the individual level, the design and interactive interfaces of machines and other smart city technologies are designed to play to our desires to enable us to 'readily socialize with computers and robots' 36, 37. HCI design and development processes adopt user-oriented approaches to respond to 'elicited or refined users needs and requirements' 38. Part of this design process is the intentional signalling of attributes that affect the human user's perception of the usefulness, limitations and the design intent of the developer.

This design process to seduce acceptance and take-up of the technology operates on gaining and controlling access: developers orient their design processes toward seeking access to data on the individual. When granted access, developers collect data to drive new insights into how they can then design to seduce for further access. At the same time, access within the technology is heavily designed to constrain user behaviour and manipulate users into responding to these access conditions and access thresholds. Consequently, rather than Foucauldian notions of 'bio-power' exercised to permit or disallow life, Deleuze observes that the practice of power has transformed to one oriented on access control 30.

The practice of power to manipulate desires to gain and control access is a Deleuzian 'coding' of the flows of desire to imbue symbolic value to access, as a commodity [20, p. 94], and to seduce the occupant into new, modulated versions of themselves. This drives the value creation in the techno-entrepreneurial framing of smart cities, where access to these datasets; access to the analysis and insights; and overall access to the smart city project becomes the desired commodities that are valued.

However, this practice of power to concurrently seduce access and construct 'access' as a seductive commodity impacts the framing of the individual occupant. Galič et al 30 note that in societies of discipline, the practice of power still recognises the individual as human subjects. In contrast, with societies of control, the human subject is transformed to a 'coded figure'. Monitoring through dataveillant practices disintegrates the human subject from social view and instead replaces the human with a data double, the city with its digital twin. As a result, the deployment of smart city technologies turns individuals into fragmented representations, or what Deleuze terms as 'dividuals' that/who are subjected to access controls to spatial domains, bodies of knowledge and objects of desire 30. Through design and deployment of these technologies, the individual occupant in the city is seduced into accepting their representation as this coded figure and the subsumption of their individual desiring-production into the collective social production.

This process of *dividual*-isation results in three main critiques 14: first, that the top-down design of the system fails to capture the complexity of real life at the granular street level of cities. Second, that such access controls replicate existing inequalities in the city at a digital level. Where smart city technology is deployed unequally in the city, this leads to a fracturing of access to the city and to 'splintering urbanism' [39, p. 189], 40. Given smart city improvements are unlikely to be uniformly distributed, certain segments of the urban population will not benefit equally from the deployment

of a digital twin or other smart city technology. Occupants are also unlikely to be subjected to the same forms of dataveillance.

Third, the seduction of the urban occupant in the city through 'corporatisation and entrepreneuralisation of the urban' [14, p. 10] produces a framing around urban life that gives precedent to commercialisation of the data double. As a result, this techno-entrepreneurial framing no longer subjects occupants to 'disciplinary or simple repressive modes of surveillance in confined spaces… [instead, occupants are] increasingly constituted as (merely or primarily) consumers to be "seduced into the market economy"' [14, p. 22] and treated as economic assets. Cory Doctorow 41 sets out a sobering vision of the outcome of this seduction on the everyday life:

> Our networks have given the edge to the elites, and unless we seize the means of information, we are headed for a long age of IT-powered feudalism, where property is the exclusive domain of the super-rich, where your surveillance-supercharged Internet of Things treats you as a tenant-farmer of your life, subject to a license agreement instead of a constitution.

2.4   Inflexions in the flows of desire

A critique of the view that frames technology companies as purely power holders that are able to seduce and exercise modulated control over occupants is that it does not take into account the vulnerability of these technology companies to pressures from outside the cyberspace of the digital twin. Technology companies are subject to pressure from public sector agencies and regulators, as well as other private and civic sector actors [42, p. 92]. As such, these practices of power through seduction and access control are not performed by a static power holder, but reflect a true rendering of Deleuzian desiring-production where flows of desires are constantly disrupted and re-coded. Deleuze and Guattari conceived that the coding of flows of desire would not result in fixed or stable outputs 15. Instead, a dynamic flow of desiring-machines act at a social scale to bring new inflexions in social production. This fluid movement in the conceptions of a city is also captured in Deleuze's notion of a 'cast that will continually change from one moment to the other' [19, p. 10]. In that sense, Gillespie's comments succinctly captures the type of control exercised by technology companies as '[surfing]… a massive tide' of urban data extracted from sensors in the city 'in a violent storm of public opinion and conflicting demands of governments, business, and civil society groups from around the world' [43, p. 28], [42].

This violent storm has produced an inflexion in the flows of desire that is seeing an emergence of a demand for more transparency in the way digital twins, ADSs and other smart city technology are deployed to make decisions about the city. Consequently, this invites us to examine how we can ensure that practices of power through seduction can be made more benevolent through the embedding of transparency practices into the architecture of digital twins and ADSs.

3   Benevolence, trust and transparency in the digital twin

Unlike Foucauldian notions of discipline that are captured in the visible built form of the enclosure/mould, Deleuzian modulations are often hidden from social view in black boxes wrapped in layers of non-disclosure agreements and other legal protections 48. This results in a practice of power through seduction that is invisible in the manner it shapes, manipulates desires, and permits its subject access to ideas and new imaginaries. Lukes 49 observes:

> Is it not the supreme and most insidious exercise of power to prevent people, to whatever degree, from having grievances by shaping their perceptions, cognitions and preferences in such a way that they accept their role in the existing order of things, either because they can see or imagine no alternative to it, or because they see it as natural and unchangeable, or because they value it as divinely ordained and beneficial? (cited by Dovey [17, p. 13-4]).

Lukes' observations articulate the manner in which seduction impairs the occupants' ability to judge a situation because of the way 'perceptions, cognitions and preferences' are subjected to Deleuzian coding. As such, the dataveillant practices that emerge and underpin digital twins and other ADSs are opaque to occupants, diminishing the ability of occupants to participate in decision-making processes affecting the city.

The black box approach to city-making and urban life reveals the 'built-in normative values and judgements' of technology developers 3. While smart city initiatives are couched as apolitical and readily deployed across a range of cities with different political leanings, these initiatives moralise in a different way by setting the deployment of technology as a political imperative over other non-technological investment priorities in the city 23. The emergent new 'economy of worth' codes occupant desires and entices 'cities at the bottom to climb up the smart city ladder' [23, p. 317]. As a result, we are seduced into prioritising these technological offerings over other competing urban agendas.

At the top of this smart city ladder is the goal of seamlessness in data focused decision-making. As digital twins and ADSs run on real-time data, they are able to respond in a feedback loop to immediately carry out interventions in the city based on an automated decision-making process. These interventions raise questions of technocratic governance and the impact that digital twins and ADSs have in regulating and modulating urban life in smart cities.

Digital twins and other smart city technologies impose access control on the dividual through four different processes of regulation: *law*, *market forces*, *social norms* and the *structural construct* of the program code 42. There is a tendency within the techno-optimistic narrative to lull occupants into a perception that the code is neutral. However, this code is not neutral and works to play on and influence our desires and conceptions of the city. The invisibility of this code behind black box structures and the outward appearance of neutrality obscures how this enticement to modulation occurs, giving the code power. Suzor [42, p. 91] notes:

> Lessig's point is that… [choices embedded in the technical standards upon which the internet is built]… are no less political in their effects than the public laws created by the democratic legislatures of nation-states around the world. In a way, they're often more powerful because we tend to take infrastructure for granted; the choices about whose voice can be heard are hidden and enforced in ways that are almost invisible, and they are all the more powerful as a result.

The obfuscation of power that power holders exercise over urban life is exacerbated by the complex contractual arrangements between city administrators and technology developers. These contracting arrangements, including public-private partnerships 54, alliances, and other novel contracting models, operate to diminish public understanding of how occupants are being regulated, and hide dataveillant practices from the social sphere. In the resultant asymmetrical imbalance in information, power holders sidestep accountability and entice the individual occupant into further modulations of control. In effect, this produces an 'uncontract', described by Zuboff [50, p. 86] as 'the rule of law and the necessity of social trust as a basis for human communities' being replaced with a 'new life-world of rewards and punishments, stimulus and response'. The uncontract is hidden from the social sphere.

This article suggests that the countervailing force to this black box approach to seduction is the implementation of transparency practices that will inform the public, provide a clear procedural pathway for review, and act to ameliorate or restrain the manipulative practices of seduction. Transparency works to reintroduce these technologies of control and seduction back into the social sphere by signalling *benevolence* 51, 52.

3.1   Transparency as benevolence

Benevolence has been described as an element of trustworthiness, and can be defined as a demonstrated 'positive orientation' 53 by a potential recipient of trust ('trustee') towards the person giving trust ('trustor'). Mayer et al 53 observe that where there is signalling of benevolence, there is an increased prospect of perceived trustworthiness between persons.

Benevolence legitimises the deployment of digital twins and ADSs because it allows the formation of trust that serves as the social licence 54 (as opposed to the *uncontract*) for these smart city technologies to be developed and deployed. As the city is overlaid with its digital replica, trustworthiness also becomes important in the way occupants coordinate, interact and inhabit these digital spaces. Consequently, the Deleuzian social production that transforms Buchanan's conception of ephemeral crowds to stable cities is intimately linked with notions of trustworthiness and the signalling of benevolence.

In her germinal text *The Death and Life of Great American Cities*, Jane Jacobs identified trustworthiness as a necessary ingredient for cities to thrive, connecting trustworthiness with the mutual natural surveillance of occupants on the streets[1] 55.

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[1] Jacobs observed the difficulty in establishing trustworthiness of strangers as exemplified in the Hyde Park-Kenwood area of Chicago, as opposed to the 'feeling for the public identify of

However, with the increasing sensorisation of our cities, the practice of surveillance is obscured and the ability to signal benevolence through mutual surveillance made visible in the streetscape (what Jacobs describes as 'eyes on the street') has been impaired. This breaks 'the fundamental trust relationships that traditionally form within the city' 5.

Jacobs et al 33 note the importance of trustworthiness within the context of privacy and data collection. When the fragmented representations of occupants sitting in multiple datasets can be potentially combined in different ways, the myriad of possibilities creates a challenge for policy makers to identify all the potential risks of data collection to the privacy of the individual. As such, trustworthy behaviour by HCI and CSCW design practitioners, technology developers and city administrators engaging in data collection practices becomes an important means of addressing this wide spectrum of potential risks 33.

However, where seduction practices are embedded within black boxes and wrapped in layers of regulatory and contractual controls, the automated and data focused decision-making processes that drive the technology of the digital twin become hidden from the social view of democratic accountability 56. As a result, the abilities of both the occupant and city administrator utilising the smart city technology to fully participate in the decision-making process are curtailed. The resultant loss of control, agency and accountability occurs at both ends of the dataveillance process as both occupant and administrator (located at opposite ends) are unable to decipher how decisions that shape a city occur, yet are seduced by the promise of results that are framed as technological solutions. This underscores the insidious nature of any manipulation of desires and interests raised in Lukes' observations: because these algorithms are hidden, there is no way of 'seeing' or 'imagining' an alternative approach both from the positions of the occupant and the city administrator.

Consequently, transparency becomes a key characteristic that should be designed in smart city technologies and ADSs to articulate how a decision has been formulated based on fair and reasonable approaches that are open to challenges.

Transparency is often cited as the means of signalling benevolence 36, and can be defined as an 'intentional design of a system to communicate its capabilities and current state' 36. The key element here is the communication or signalling that occurs. In a study conducted by Jacobs et al using a design fiction methodology to discuss community and local public sector agency opinions on the deployment of sensors in the public space, participants articulated a view that 'in order to be able to trust in the smart city, people need to be informed about deployments as they occur, and any associated risks' 33. Their findings highlight the importance of communicating transparently when deploying smart city technologies.

There is interdependency between transparency and accountability. Transparency offers a form of procedural protection in the way that decisions can be reviewed, repeated or remade. Transparency is crucial to opening up systems to social view, to allow the public to make sense of how decisions are made—including the manner and choice in which deployment of the digital twin occurs. It is imperative that the transparent communication of this context of processes, reasons, and details needs to

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people' when there are eyes on the street and serendipitous public sidewalk contacts [55, p. 45 and 56].

be provided at a granular level and as a default way of practice, to both occupants as well as regulators, in order for decision-makers and power holders to be held accountable. This creates legitimacy in the decision-making process that ensures that decisions are not capriciously made or arbitrary. Thus, transparency plays an essential role in 'proper oversight' and the means by which regulators and civil society can manage the impact of smart city technologies on socio-political and economic spheres [42, p. 96].

3.2   A caution: signalling benevolence can in turn be seductive

There is a social attraction to benevolence as it increases the willingness of a trustor to accept vulnerability to the risk of non-compliance or malevolence on the part of the trustee 53. As such, it has qualities that make it particularly useful for the exercise of power through seduction.

Deleuzian desiring-production comprises individual desiring-machines that are constantly stopping and creating new flows of desire. Within this creative process, there is an emerging inflexion in the collective flows of desire that is producing a social machine that seeks to code and imbue value and desirability to practices of transparency and accountability.

Panganiban and Matthews 36 observe that as benevolence increases cooperation and acceptance of vulnerability, benevolence through transparency is now being actively designed in ADSs, including autonomous machines used for defence purposes. They state that transparency is seen to be key as 'awareness of a robotic partner's intention and state is a needed step toward optimal human-machine teaming because it reduces workload of the human partner in needing to attend to and supervise a robotic partner' [36, p. 177]. Internet companies and online platforms similarly publish regular 'transparency reports' as a way of signalling benevolence.

Given Deleuze's suggestions that the 'technological evolution' of the city is a 'mutation of capitalism' [19, p. 6], there is a need to be vigilant about how any practice of technology, including practices or technological features that are geared towards achieving social goals, can be co-opted into the commercial imperative of the technology developer.

In the case of digital twins and other smart city technologies, the design and inclusion of transparency practices, while arising from a benevolent driver, may still be used to entice the occupant into modulation, or to an acceptance of the status quo, rather than slowing down the seamless dataveillance-to-decision output process. Suzor observes that 'there is often an explicit or implicit assumption that transparency—greater information disclosure—leads to greater accountability and trust…. [However,] when companies use transparency strategically as theater to ward off claims for greater accountability, it can undermine and obscure real understanding' [42, p. 200]. Consequently, we need to turn our attention to the strategies that can be implemented to increase transparency practices in smart city technologies to signal benevolence in a genuine and productive manner.

4   Strategies to increase transparency and signal benevolence

This section provides a number of strategies to enable technology developers to increase and embed their transparency practices in the architecture of digital twins and other smart city ADSs. As observed above, access controls are imposed through four different processes of regulation: law, market forces, social norms and the structural construct of the program code. These access controls operate at the interface between power holders and occupants where a rich body of research from the fields of HCI and CSCW offers key design strategies and theoretical frameworks to examine and refine these access controls. The strategies presented below aim to regulate the code and address black box algorithmic decision-making by suggesting potential changes to the law and how developers are regulated; and the standards and public education facilities that drive discussions, capture changing social norms, and limit market forces.

The focus of this section, on how law and regulation of access controls can impact deployment of digital twins and smart city ADSs, is aimed at addressing a gap in HCI research. McMillan et al 21 assert that HCI research may at times be 'surprisingly, too [occupant]-centred, and has, as such, failed to account for the needs and concerns of [power holders] whose responsibility it is to ensure the accountability of the produced data' [21, p. 2935] 22. By pivoting our focus on how civic engagement can impact how the law is developed, McMillan et al assert that there is opportunity for greater interaction between stakeholders to address trust issues and challenges experienced on the side of power holders 21. Such a refocus would also allow examination of bureaucratic obstacles to transparency and any processual changes required, as well as how new transparency practices can enable different kinds of civic engagement activities 21.

4.1   Strategies in law and regulation of smart city design and coding

Suzor 42 suggests that transparency practices should be designed to enable technology companies to track their impact on rights. This is because technology developers make decisions that have an effect on fundamental rights. This article suggests that transparency, where embedded into the architecture of digital twins and other ADSs deployed in the city, permits occupants to enjoy their 'right to the city' 16. This concept is akin to human rights, but is framed as a key right to enable selfhood development of the occupant within the context of the city. Lefebvre suggested that an occupant's life is so inextricably tied to the city, and is shaped by the city, that the occupant should have a mutual right of participation and involvement to shape the city [16, p. 156-9].

In the context of smart cities, this right to the city has been described as a bundle of rights—including personal access to information and free participation in cultural and democratic activities 13—that takes expression from 'fundamental principles of justice' [57, p. 35]. Consequently, access controls at two different scales are seen to be a key expression of the right to the smart city.

At the city scale, Thibault et al suggest that the 'expansion of [occupants'] *rights to the city* is needed to take into account its digital layers' with questions raised as to 'who will be allowed to "write" on the [the data layer of the smart city]'. [60, p. 1923]. This reflects an emerging notion of a digital right that gives occupants the ability to engage in 'participatory city making' 58 and an 'enlarged… Lefebvrian "right to the city"' that contributes to the 'democratizing [of] cities and their decision making processes' [59, p. 70]. However, all this can only be accomplished through the design of transparency in the automated real-time data collection and decision-making structures of digital twins.

At the dividual-scale of access control, adoption of transparency practices allows us to conduct boundary management of the spaces given for selfhood development within the modulated society of control. This boundary management is crucial to protect the 'interstitial gaps and spaces' that enable selfhood development 61 and ameliorate the seduction of the techno-optimistic narrative.

HCI theorists have considered selfhood development within the context of self-determination theory and the 'basic core needs for autonomy, relatedness and mastery' 47, 62. Bengs et al 47 cite ten psychological needs that require fulfilment: *self-esteem, autonomy, competence, relatedness, pleasure-stimulation, self-actualisation-meaning, security, popularity-influence, physical thriving,* and *money-luxury* 63. The team observed that HCI research has linked the fulfilment of these needs (and resultant feelings of wellbeing) with good user experiences with smart city technologies. However, this article suggests that it is in the provision of 'choices for setting goals' within the design of 'interfaces or tasks' [47, p. 14]—an access control through structural construct of the program code—that creates a seam or boundary management to give an occupant the opportunities to meet their core self-deterministic needs.

Transparency is thus a basis for signalling benevolence, and serves to counter the technological agenda of seamlessness in dataveillance-to-decision practices in digital twins. Where seamlessness operates to 'crush process space', transparency works to articulate and create seams in the process of dataveillance 5. These seams scribe the boundaries around the interstitial spaces inhabited by occupants within the dataveillance construct of the smart city, and provide the occupant with choices. Where transparency practices are implemented, they may produce default modes of preclusion and require active consent to participate in these dataveillance practices. This will enable the informed user to make clear choices about the manner in which they can choose to participate or withdraw from seamless data collection practices.

In order to develop adequate regulation to encourage transparency practices and introduce seams, a spectrum of experts from HCI, CSCW and urban informatics practitioners, to privacy lawyers and human rights advocates could be brought together to conceptualise a legal framework around the Lefebvrian 'right to the city'. These could occur through a series of stakeholder workshops, focus groups or hackathons commonly utilised in HCI studies 44, 47, 62.

As digital twins and ADSs deployed in smart city projects will necessarily involve government agencies and city administrators from their incipience, these workshops could enable interaction with the city's instruments of civic sovereignty and provide crucial feedback from occupants on the regulatory framework governing the development and deployment of smart city technologies. Such workshops would also

likely include domain-specific experts in digital twin technology, urban informatics, information privacy law, justice and human rights, and include industry participants drawn from private and civic sectors (including lay users), as well as public sector entities charged with city administration and regulation of such technologies 42. From HCI studies, we have observed that the combination of design thinking and canvassing of opinions across technological developers and other stakeholders is synthesising new design approaches that could shape the articulation of a legal framework on a digital right to the city.

As these regulatory frameworks are being developed, regulatory sandboxes could be implemented to provide temporary exemptions to any proposed form of regulation. These exemptions would reduce exposure to liability, while providing industry feedback on potential regulation such as: a statutorily created tort for serious invasions of privacy that may arise from the collection, use and on-selling of data through these smart city technologies; or expanded mandatory disclosure rules that extend from existing continuous disclosure obligations applicable to corporations. These sandboxes would only apply to technology developers in early stages of development of the digital twin or ADS, and would cease to apply when these technology developers reach an agreed or targeted level of maturity. This will ensure that any exceptions granted to smart city technology developers do not recreate the same breadth of safe harbour exceptions given to online intermediaries that make regulation of harmful activity challenging as such liability shields reduce corporate incentive to actively manage such harms 65.

4.2   Strategies to embed transparency as a social norm and market force

As explored above, transparency practices can enable the emergence of legal frameworks and regulation of design and development practices to ensure that interstitial spaces for selfhood development are retained within the functions of digital twins and other smart city technologies. Such seams within dataveillant processes are essential to address access controls that may stymie an occupant's exercise of their right to the city. However, transparency practices can also enable more desirable technological offerings by allowing power holders to demonstrate and be accountable for how the technology is being deployed and how the benefits are distributed. Transparency practices within the design and development process may also lead to a more desirable product for the urban occupant moving through the city as a consumer.

As digital twins are being developed, there have been attempts at articulating the values that will act as standards that the emerging technology would be required to meet. One of these approaches is the *Gemini Principles* advanced by CDBB 32. In particular, the CDBB suggests that a digital twin should be treated as a public resource and demonstrate public value through 'improving the performance, quality of service and value delivered by assets, processes and systems in the built environment' [32, pp. 8 and 13]. The CDBB notes that the public value of the digital twin should also result in 'inclusive social outcomes' [32, p. 18].

As digital twins and smart city technologies are deployed, not all segments of the urban population will benefit from their deployment, nor will all groups of urban occupants be subjected to the same form of dataveillance and control. Thus, even

while it is imperative to work towards uniform distribution of benefits, in order to signal the benevolence of such systems, power holders should transparently demonstrate to the public how design choices and data generation approaches were selected and be accountable for the resultant distribution and nature of controls and benefits 5.

In relation to transparency in design and development processes, urban occupant involvement in the design and deployment of smart city technologies has also been found to be insufficient, with 'involvement in [such] studies, if present… often relegated to a tokenistic role' [44, p. 102]. However, HCI design approaches, such as Hassenzahl's theory of Experience Design 46, provide an emerging theoretical framework for how to facilitate improved social inclusion 47. The experience design approach creates seamful design stages that seek to 'theoretically [ground] design choices', capturing the 'particularities of human experience' in any deployment of such technologies [47, pp. 12-13]. Such transparent design processes may yield two potential benefits: first, the deployed technological offering will likely benefit from a more diverse range of inputs thereby reducing algorithmic bias. Second, the deployed smart city ADS may be perceived as more socially and commercially desirable given that it may further 'social inclusion, wellbeing and mental health of community members' to support a resilient and vibrant community 47.

Beyond adoption of transparent design processes that seek to capture the variety of occupant experiences and needs, this article suggests again that a further cross-disciplinary approach involving HCI and CSCW design practitioners, architects and urban informatics experts, that also involved privacy and human rights lawyers may serve to deepen the current understanding of the 'right to the city' and create a design process that is reflexive to a heterogeneous urban population. Such a cross-disciplinary approach would be applied to reviewing business, development and design processes, new transparency practices and ways of communicating the context of decisions made to the public in an easy, digestible manner. It is important that in communicating this context, the design decisions and developments from stakeholder workshops and the regulatory sandboxes be captured in an open manner and be made accessible to the public. Urban theorists seeking to increase participatory design-making in the city have also demonstrated the importance of gamification and play in the built environment to increase exercise by occupants of their right to the city [60, p, 1916] 67.

Along with transparent design processes that encourage community input, procedural frameworks that set out a clear pathway for review and appeals should also be implemented 42. This procedural aspect of accountability through practices of transparency will enhance the signalling of benevolence and address unintended or unfair results of decision outputs emerging from any black box approach.

However, to maximise the benefits of occupant participation in transparent design processes and to embed such practices as a social norm and desired market expectation, there needs to be public education and ongoing support. Foth et al 54 have proposed a model of 'DataCare' hubs located in cities that would serve as a physical resource bridging between these smart city technologies and the everyday life to educate the public on how data is being collected, used and on-sold.

They observe that even where transparency practices communicate the context for decisions and articulate how data is collected, stored and the processes that are in

place to arrive at a decision, 'the complexity of such systems makes it impossible to fully understand or control them, which jeopardises individual autonomy and privacy' 54. Their proposal of 'DataCare' hubs is a direct intervention in cities to empower occupants with consultations, workshops, and other forms of public engagement to demonstrate to and educate occupants on how their data is being utilised, facilitate new data cooperatives or trusts, and harness public insight to set out 'desirable urban data governance arrangements' 54.

Through these transparent public-facing activities, their DataCare model addresses the asymmetrical imbalance of information and power with not just transparency but with benevolent empowerment. In such a way, new Deleuzian coding of flows of desire occurs to imbue value back into the civic sphere and produce informed occupants who are equipped to reflexively and continuously respond to the changing social norms and market forces that emerge from a multi-stakeholder environment in the smart city 66, and resist the powerful framing of desires from a techno-optimistic narrative.

5   Conclusion

Digital twins and other smart city technologies are more than mere technological solutions to urban challenges. They enable seamless dataveillance-to-decision-output processes to occur, creating black box scenarios where decisions about the city and urban life are opaque to occupants. This primacy given to seamlessness in data focused decision-making is a product of the technological optimism that has stymied discourse on the impact of digital twins and other smart city projects on the city and urban occupants.

This article applied a Deleuzian lens to consider how technology proponents and city administrators have exercised power through seduction to code individual occupant flows of desires in a process of social production. This has produced a techno-entrepreneurial framing of the smart city that has imbued symbolic value in the access of data, access to systems, and overall access to social imaginaries. At the same time, this seduction practice and prioritisation of access controls have led to fragmentation of the identity of the occupant within a modulated society of control.

However, in contrast to this black box approach to seduction, this article suggested that the benevolent practice of transparency could be a way in which technology proponents and city administrators ameliorate and humanise the practice of power in societies of control. This impetus to signal benevolence is essential as it is a characteristic of trustworthiness and enables occupants in the city to trust in the deployment of such technologies. Further, as fundamental trust relationships that develop through mutual surveillance at the street level are transformed in the dataveillance practices of the smart city, is also important to consider how the signalling of benevolence enables the creation of trust that underpins Deleuzian social production that holds cities together.

This article suggested that digital twins and other smart city technology should signal benevolence in order to remain a desirable aspect of our cities. Such transparency practices may potentially be drawn from the fields of HCI and CSCW,

and implemented in the design of digital twins and smart city technologies to signal benevolence. Such transparency practices are crucial as they permit the communication of details, reasons and processes that allow decision-makers, the users of such smart city technologies and ADSs, HCI and CSCW design practitioners and other technology developers to be held accountable for their actions. This exposure of process and reasons addresses the seamless nature of black box algorithms in smart city technologies that 'crush process space' and reduce space for selfhood development.

This article argued that by providing space and managing the boundaries (or access thresholds) where technology meets the personhood of the occupant, transparent deployment of digital twins and other ADSs permit occupants to enjoy a 'right to the city'—to be informed and involved in the decision-making around urban development and urban life. At the same time, HCI theorists have indicated that these access thresholds are crucial to allowing urban occupants the means of fulfilling their core needs for autonomy, relatedness and mastery.

However, there is a need to appreciate that it is in this inflexion in the collective flows of desire that we are now mainstreaming and adopting 'transparency' and 'accountability' as goals in our sensorised and smart cities. Given that transparency practices are also a social attractor, there is a risk of such practices being co-opted into new practices of seduction. Technology developers may utilise transparency reports or use transparency as a signal of benevolence to enable greater take-up of technological products and as a strategy to gain access to individual occupants. Despite this, rather than framing this seduction as problematic, perhaps transparency practices, as part of the architecture of these technological offerings, 'necessarily plays upon our desires… [and perhaps] the task is to understand rather than to eradicate its seductive capacities'[2] [17, p. 12].

Consequently, the future of smart cities and the technologies that arise in respect of these new conceptions and coded desires remain malleable and, in Deleuzian terms, flowing. However, transparency practices that communicate the context of data focused decision-making allow power holders, developers and city administrators to be held accountable for decisions made within this flow. In this manner, benevolent transparency reduces the seductive effects of smart city narratives and practices of power, and creates opportunities for occupants and city administers to utilise these technological offerings to shape how we live, work and play in the city in a trustworthy manner.

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[2] Note that this quote was in reference to the seductive quality of architecture—but the observation applies equality to transparency practices that form part of the architecture of the technological offering.

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