City, Territory
and Architecture

RESEARCH ARTICLE   **Open Access**

Strategies of visibility in the smart city

Fredrik Torisson*

Abstract

Cities across the world are increasingly labelling themselves as smart in one way or another. At the same time, this smartness appears amorphous or invisible in its built urban environment. Critical researchers writing on the smart city regularly express confusion or exasperation about precisely the difficulty to locate the smart in the city. Visibility of the smart city is not a given. This article argues that visibility in the case of the smart city is instead strategically produced, and that the strategy opted for tells us something about the kind of urban imaginary put forward. The article introduces a provisional and non-exhaustive taxonomy of strategies of visibility based on analyses of three different cases of smart city projects (in Brazil, Sweden and Canada) and identifies the ways in which the smart city is made visible (or not)—symbolic presence of smart, modelling smart and ubiquitous invisible smart—and discusses what kind of city is envisioned based on each strategy.

Keywords: Visibility, Smart city

Introduction

The following article investigates the visibility of the smart city. The main argument is that smart city visibility is strategic rather than given, and the article presents three different strategies of visibility inferred from urban examples: the control room of Rio de Janeiro's smart city operations (the COR), a proposed smart model city in Sweden (Plusstaden) and visualizations of the proposed and later discontinued project Sidewalk Toronto. These three cases represent three different strategies of making the smart city visible: *symbolic presence of smart* (manifestation through a representation of a smart object or space), *modelling smart* (constructing exemplary environments), and *ubiquitous invisible smart* (a strategic invisibility). The article, furthermore, argues that the way in which the smart city is made visible outlines different future imaginaries that produce different relationships between state, smart system, and inhabitants. Smart city visibility will therefore ultimately constitute a political question, not least with regards to transparency, and

deserves more scholarly attention than has been the case up to now.

The principal contribution of the article is to the under researched field of the smart city's medial and material manifestations. While smart city visibility is touched on in a range of critical research into the following areas: material manifestations of the smart city (Halpern 2015; Picon 2015; Halegoua 2020), visualizations of smart city (Rose 2017, 2018a, b) and narratives of the smart city (Söderström et al. 2014), there is very little research concerning itself with its visibility as such, and even less on the strategic aspects of this visibility. In this sense, the article contributes to the field of smart city visibility through differentiating between different approaches to visibility of smart cities. The article provides a preliminary framework for further analysis of smart city visibility and offers a set of analytical concepts for future research and policymaking.

The primary method employed here is a qualitative analysis of three examples of smart city projects and how they relate to strategies of visibility. The research is based on analysis of visual material, primarily images, used to market the proposed projects. In the case of the control room building, it is an actually existing object, and the analysis here extends beyond the image to the design of the building itself. The three examples have been selected

*Correspondence: Fredrik.torisson@mau.se

Institute for Urban Research, Malmö University, Bassänggatan 2, 211 19 Malmö, Sweden

on the basis of being illustrative of the strategies that are introduced, and in the cases of Rio de Janeiro and Sidewalk Toronto also with the examples' prominence in the smart city discourse in mind.

The three strategies differ in the sense that the city is mediated in different ways, sometimes more than one, which makes certain cross-readings possible. The principal focus is placed on the built environment—physical or depicted. All three examples are in some sense analysed through different methods from image analysis, drawing on Rose's work on visual analysis as well as her later work on the making visible of the smart city, how smartness is represented (Rose 2012, 2018a, b; Wigley and Rose 2020), Caprotti and his discussion on the representations of smartness in urban structures (Caprotti 2019) as well as the notion that visibility of the smart city ultimately is strategic (Caprotti 2017). Caprotti builds his argument on Brighenti's work on visibility, particularly symbolic visibility in the urban realm also has informed the article at hand (Brighenti 2007, 2010; Caprotti 2019).

The article is subdivided into three different parts. In the first part, there is an introduction to both the smart city and visibility. The second part consists of analyses of three different smart city strategies of visibility, contextualising the research as well as the object of analysis in each case. The third and final part is a theoretical development of the previous analysis, with a synthesis that involves some additional concepts in order to situate the analysis in a wider context and to be able to draw out some conclusions.

Seeing the smart city

There are competing arguments for what the smart city is. I will not go into this debate here, but it suffices to note that there are multiple definitions made by both scholars, corporations, activists and municipalities (Hollands 2008; Townsend 2013; Halegoua 2020). Different scholars subdivide the smart city field in various incarnations depending on who is introducing the smart aspects: corporate vs civic hackers (Townsend 2013), neo-cybernetic vs participatory city (Picon 2015), smart-from-the-start, retrofitted and social cities (Halegoua 2020), and so on. In the following, I will focus on the making visible of smart cities in an interplay between corporate and public actors. The making visible of smart cities comprises a very large number of different media products: buildings, reports, strategy documents, videos, pictures, monuments, etc. and a comprehensive overview in this rapidly changing field is impossible.

As city mayors and Chief Technology Officers (CTOs) across continents outbid each other in order to proclaim their city the smartest city in the world—backed up and cheered on by multinational tech giants acting as advisors, suppliers and judges—it is relevant to pause and look at how life in the smart city in fact is envisioned; what kind of city is the smart city beyond its circuitry? The following text explores how the smart city is *made* visible. The study underpinning the text focuses primarily on how the future smart city is presented through different visualisations. As the smart city readily can be understood as a process without any end, all smart city initiatives signal the arrival of a not-yet (Dunn and Cureton 2020). Consequently, the smart city initiatives are not only installing technological systems, but also showcasing or visualizing the future smart. Smart systems are 'prototypes', 'versions' or 'demos' of the future smart (Halpern et al. 2017) made visible (or not) in one way or another; they can, in other words, also be considered visualizations in some form; it is a signifier of a (future) city made visible to the inhabitant.

Smart city visibility

While much critical research on the smart city contains some reflection on the smart city's relationship to visualization and visibility, the research specifically on this topic remains somewhat limited. The smart city is not primarily a visual construction (Karvonen et al. 2019, p. 1). Its visibility is instead actively produced and managed (Caprotti 2019; Wigley and Rose 2020). The smart city becomes visible through processes of visualization. These processes have been studied previously and include different categories of visualization of smart. We can subdivide these into the following (non-exclusive) categories: advertisements of smart, interfaces of smart and physical structures of smart. The category advertisements of smart comprises medial representations of smart futures, primarily studies on videos (Rose 2017, 2018a) and imagery (Rose 2018b; Dunn and Cureton 2020).

The second category, interfaces of smart, focuses on how the vast amounts of data becomes visible and readable for humans through an interface, what is commonly referred to as an 'urban dashboard', a data nexus that give the user access to various real-time data (Mattern 2014; Kitchin et al. 2016).

The third category involves physical structures of smart, most prominently among these is the urban control room with its connotations to the Chilean Cybersyn or underground military war rooms (Picon 2015; Mattern 2015; Wigley and Rose 2020). The control room makes 'smart an actually existing thing' (Wigley and Rose 2020, p. 304), but it is at the same time also an interface and an advertisement, and its logic implicitly mirrors the logic of videogames, blurring distinctions between virtual and actual space further (Caprotti 2019).

All of these categories and texts grapple with the ways in which the smart city is made visible, what historical

echoes and parallels we can tentatively establish and what is implied rather than shown.

The smart city's visibility is not given. Regardless of whether the smart city is considered a 'system of systems' or a necessary cure for a flailing organism (Söderström et al. 2014), these are not objects that can readily be depicted or fetishized.

This is exacerbated by the fact that the smart city discourse has not (yet) had any direct effect on urban form (Picon 2015). And since the smart technology is not necessarily visible, visibility becomes optional (Karvonen et al. 2019). This is a phenomenon that others have tried to explain, for instance building on Zygmunt Bauman's distinction between a 'heavy modernity' building on heavy machinery which has now been replaced by a 'light modernity', building on software (Cugurullo 2021). Halpern observes: 'What is so curious about all the images in the marketing for smart cities is their resistance to being seen—their raw, indifferentiable amorphousness.' (Halpern 2015, p. 239) and Wigley and Rose have written a text with the title 'Will the Real Smart City Please Make Itself Visible?' (Wigley and Rose 2020). Others point to its invisibility, which is perhaps as important as its visibility (Caprotti 2017). There is a frustration here, which extends to the definition of the concept of the smart city itself—how can we see the smart city?

In writing on the smart city, a few scholars have made the journey to the much-debated model city of Songdo in South Korea, which arguably can be considered smart city ground zero. As they stroll among the skyscrapers, they, and the residents they encounter, seem perplexed: is this really all there is to it? (Halegoua 2020). Or, they make the observation that the smartness does not lend itself to being observed (Halpern 2015).

This is not only a frustration felt by critical researchers, but from the obverse perspective by some of those advocating smart cities: how can we show the world that our city is smart? This is a view of city officials, but it is important to remember that the making visible is not necessarily a need, at least not to all those involved. Some, e.g., data mining software developers, may well prefer the smart technology to recede and blend into the everyday. Below, I will make the argument that some actors very actively pursue an invisibility of technology.

The question we should look into is not: 'what does the smart city look like?', rather, it is: 'how is the smart city made visible?'. The first question would imply that the visible aspects of the smart city are effects, the second question presupposes that the visible in the smart city is consciously, and, as Caprotti suggests, *strategically* produced (Caprotti 2019). That the city is *made* visible by someone for specific purposes is by no means unique to the smart city. Visibility of the city or its technological systems is, in short, produced for a purpose, as the work of other scholars have shown (Latour and Hermant 1998). Showcasing technological prowess through fetishizing technology in the urban environment is nothing new (Kaika and Swyngedouw 2000), but the smart city changes the game of making cities visible since visibility is now optional, it fetishizes (and commodifies) the flow of abstract data, inviting the observer to contemplate this flow through powerful appearance of the fetish. However, this fetishization of data is only one strategy among others of visibility in smart city.

Visibility and stratagems

If the visibility of the smart city is actively produced rather than an effect, we could discuss *strategies of visibility*, which is the theme of this paper. These strategies cut across media, and in practice, they are often overlapping and amalgamated as different actors within the same project tend to favour different strategies.

Strategy is here understood as the way the combined interests behind a smart city initiative calculate it should be apprehended by various publics as something other than the surrounding city. Strategy is here adapted from de Certeau's distinction between strategy and tactic, where strategy is carried out by the powerful to define a territory of sorts (not necessarily geographical), where tactic instead is the position of the powerless who reacts to and acts in and against the territorialization constructed through strategy (Certeau 2002). A strategy of the visible is consequently a calculated act delineating the smart city from the not smart city through making the smart visible (or visual).

To complicate things: the visible is itself a complex category. Different groups are invariably noticing different aspects of the same urban situation. Therefore, we need to ask: for whom is the smart city made visible?

A second complicating factor is the nature of visibility: *how* is something visible? A long time ago, Benjamin distinguished between things observed in contemplation or distraction. The oil painting (with its aura) is typically experienced in contemplation, while our everyday environment is typically experienced in a state of distraction (Benjamin et al. 2008). There is, in other words, not only a 'for whom' the smart city is visible, but invariably also a 'how' it is visible. Both the seen and the unseen, that noticed and that which did not register constitute parts of the visible (Brighenti 2017).

A third factor is a necessary distinction between the visible and the visual, both of which are relevant in this discussion. A distinction between the two is made by Didi-Huberman to differentiate between that which can be pointed to (the visible) as opposed to something that is experienced in the encounter with an image, but which

cannot be identified in any specific object observed (the visual) (Didi-Huberman 2009). This distinction will be employed in discussing the distinctions between different forms of smart city visibility. Since the visibility of the smart city is optional rather than a collateral effect of its construction, I would argue that it makes sense to approach the question of visibility with a focus on underlying strategies to visibility.

A visualization is here understood as the act, process or artefact that makes something, in this case the concept of the smart city, become visible for a human observer (Halpern 2015, p. 22). The making visible of something includes making it into an image. Yet, the relationship between the image and that which is expressed through the image is not straightforward. Social theorist Brighenti has noted that: 'Images are not objects, but couplings between the actual objectivity and the virtual imageability' (Brighenti 2017, p. 5). Visualisations of the smart city thereby connect concept with reality and make the visualisation and smart city into a discernible entity.

As Rose has noted, there is a peculiar overlap in the case of the smart city between visualizations as 'representations' and as 'operative images' (Rose 2018a). The first category is a symbolic depiction of a smart city, whereas the second is based on the fact that the smartness is enacted through interfaces making data visible, including urban dashboards. I will in the following adopt Rose's categories but focus more squarely on the overlap between them. In most cases, I would suggest, these two categories are superimposed and the relationship between representation and operative image is more 'both/and' than 'either/or'.

The notion of real-time representation of the urban, in the form of digital twins or augmented reality does in theory dissolve any distinction between representation and operative image—real time representation is understood as relaying raw reality while it is at the same time highly selective in which aspects of reality are relayed (and, invariably, represented). Map and territory intertwine and overlap in a more complex way than Lewis Carroll's *Sylvie and Bruno Concluded* where a map the size of the country itself is made but never rolled out (as it would block the sunlight). Instead, they use the country itself as its own map (Picon 2015, p. 134). Rather than thinking of one as distinct from the other, it would seem more fruitful to pick up Brighenti's term of a 'prolongation', which he uses to describe the relation between the material and the immaterial in relation to new media (Brighenti 2010). Prolongation means there are '*zones of indistinction*' between two heterogenous yet intertwined categories (Brighenti 2010, p. 480). In this context, I will use prolongation to discuss the crossing over of the representational in the operative image and vice versa. The

relationship between the representation and the city is perhaps, as Picon suggests, best compared with the mind's image of its body, 'The map allows the spatialised intelligence of the city to represent itself to itself.' (Picon 2015, p. 136). To take one example: the urban control room is, if we follow this logic, a prolongation of operative image into representation of the smart city itself.

This prolongation has further ramifications, which should not be neglected. An abstract system is not only represented through visible signs, it is at the same time invariably also manifested by the visible, this is how any abstract system *takes shape* (Kaika 2011; Martin 2016). Bearing this in mind, to study the visible means studying the phenomenon and the taking shape of the concept itself.

There is an interesting paradox here: much of what we call scientific knowledge relies on observations by credible witnesses as Latour discusses in relation to Boyle's vacuum pump (Latour 1993, p. 18). Yet, the smart city (broadly speaking) should ideally manifest itself through its effects rather than made visible through objects. The control room, with its humans staring solemnly at its screens, seem to bridge this paradox and lend the invisible networked smart city a representative object, a sign that can be pointed at to show that the city is, indeed, smart. We believe our eyes, and to believe in the smart city, we need representations, especially those that are indistinguishable from operative images.

Three strategies of visibility

The following is a highly provisional taxonomy of strategies relating to visibility of smartness in the city. We could say that it offers something to build on, to depart from or to challenge. Each of the following strategies is situational, it emerges from the specifics of a city with its own issues, the configuration of a network of actors, legal opportunities, and restrictions in terms of data handling, politics, and a range of other actors. In spite of this, the strategies seem possible to repeat in other instances even if the particulars differ from place to place, as do the results. A control room in Rio de Janeiro is certainly different from one in Glasgow (Caprotti 2019) or from a never realised one in Nice (Veltz et al. 2019), but there are also common denominators. It is, as stated in the opening sentence to this paragraph, a highly provisional taxonomy that is on offer. It should not be taken at face value, but as a tool to use in reflection on smart city developments.

Symbolic presence of smart

The first strategy, symbolic presence of smart, entails the foregrounding of the technological object to the point where it becomes a fetish representing the smart

Fig. 1 Still from Eduardo Paes talk at TED in California 2012. From https://ted.com ©TEDtalks

(distributed) systems (Kaika and Swyngedouw 2000). This strategy remains common, it is the making institutional of the smart city, it renders the smart city visible to the public in the form of an institution, if only on a symbolic level.

One often analysed example of the smart city made visible, which is both representation and operative image, is the 'control room', the urban operations centre. This is habitually presented as a manifestation of the smart city—a room full of screens where white-coated operators monitor and steer the city's processes. The principal example here is Rio de Janeiro's Centre of Operations (COR), developed in collaboration with IBM and inaugurated in 2011 (Townsend 2013; McNeill 2015; Mattern 2015; Luque-Ayala and Marvin 2016; Wigley and Rose 2020).

In often repeated TED-talk given by Rio de Janeiro's then Mayor Paes, the speaker demonstrated the control room live in front of an audience (Paes 2012; Townsend 2013; McNeill 2015) (Fig. 1). Showing the answer to the question: 'what makes our city smart?' instead of telling is paradigmatic for the symbolic presence of smart. The control room becomes a symbol of control, and the extent to which this control is real is another matter.

> *By picturing what looks like a real place, where a city is in fact being managed, this photograph itself suggests that the smart city is a real possibility: here, it is being enacted! (Wigley and Rose 2020, p. 303).*

Luque-Ayala and Marvin (2016) note that the Rio de Janeiro control room is not hidden away (like the cold war predecessors it references), but instead features prominently in media. Interestingly, the control room

still maintains a certain placeless-ness in its dark cavern-like interior.

These rooms are meant to be understood as spaces of operation, where the smart city is enacted through operative images. Yet, as Halpern points out, in many of these control rooms, the screens are for the most part superfluous. The systems normally run themselves and algorithms respond to changing conditions rather than the operators (Halpern 2015, p. 31). They do, in other words, appear to be representations more than operative images. The control room is a visualisation of the smart city systems. The control room, as other symbolic presences of smart are, as Caprotti notes 'designed for city authorities to legitimise and justify their own power' (Caprotti 2019, p. 2474).

Symbolic presence of control has a long history, not least in architecture. Anthony Vidler argued, to take but one example, that a similar symbolic control room appeared in the location of the plant manager's villa in the saltworks of Chaux, designed by Ledoux at the turn of the nineteenth century (Vidler 1990). In the plan, the manager's villa was in the exact centre of the plant with the salt production organised radially around it. However, the salt-making was a large apparatus, and the control exercised by the manager's suggested omnipresence was symbolic and visible, but not effective. It was a visible appearance of control, and the present control rooms may be equally symbolic.

Although almost all images and analyses of the COR focus on the control room itself with its batteries of screens, it is worth taking a moment to register the building's exterior. The exterior of this institution is decidedly non-monumental. The only architecturally articulated façade is the one facing the street (Fig. 2), the side walls are essentially blank. The COR is clearly a building meant to be seen from a position in front of it, say as a background in a TV interview, rather than in passing. In this sense, it is a kind of media architecture. The street-facing façade consists primarily of a flush, scale-less glass curtain wall with mirrored windows resembling a screen with two small barely detectable doors on the ground floor. In the upper left corner of the screen, the white letters state the building's function in a font size and placing resembling the way a document title appears in, e.g., a PowerPoint. It is, however, not a screen to look at, but one that looks back; it is a curious twist of the understanding of the smart city as a screen or interface (Mattern 2014), standing outside, you find yourself on the wrong side of the screen. This is media architecture in another sense as well. The function is no different from mirrored windows everywhere: permitting the person inside to look out while preventing the person outside from looking in. As a screen, the COR façade is not necessarily a

Fig. 2 Photograph of COR in Rio de Janeiro

Fig. 3 Plusstaden, image

presence, instead it communicates a telemediated distance from the urban realm. The only prominent feature on the façade is a gridded globe that seemingly protrudes through the curtain wall, or rather, only the globe's gridding protrudes, implying an underlying globe. This globe tends to exacerbate the building's non-presence rather than provide any form of presence.

Rio de Janeiro's control room is far from the only symbolic presence of the smart city. Caprotti (2019) analyses two other: Bristol Data Dome and Glasgow Operation Centre, but we can add many more, including Siemens' The Crystal in London (Rose 2017).

Symbolic presence of smart is a strategy based on a desire to show some*thing*, a fetish. This desire is (almost) incompatible with the fundamental idea of ubiquitous invisible smart as it institutionalizes the smart city. It turns the distributed network into a centralized operation. In the case of the control room, it shows the smart city as a quasi-authoritarian enterprise with a semblance of centralized control, what Latour and Hermant (1998) called an 'oligopticon'. At the same time, by turning smart into an object, it could simultaneously be said to obfuscate the smart city's distributed system. The symbolic oligopticon provides an opportunity to show rather than tell.

Symbolic presence can possibly be understood as the way the smart city is visualised by mayors and politicians who want something to showcase. In the case of Rio de Janeiro, it appears that the idea to house the smart technology in a dedicated building was not IBM's, but the city's (McNeill 2015). In most cases, the urban control room, to stay with this example, becomes a symbol of a functioning government (Paes 2012; Luque-Ayala and Marvin 2016). The next generation of the urban control room is the 'digital twin', digital models of cities' space

overlaid with real-time data that permits the municipality not only to control the present, but also to simulate changes to predict how changes will affect the flows of things and people through the urban landscape.

Modelling smart

The model presents a different kind of visibility from the symbolic presence. The example here is 'Plusstaden', a Swedish smart city initiative developed by governmental initiatives that propose a 'world exhibition' of smart cities (Schylberg et al. 2020) (Fig. 3). The image depicts a slice of a total environment, a territorially delineated area which performs the smart city. All the above parameters are essential: it is a total environment in that it is of a different order than the rest of the city, referring only to itself. It is delineated so as to be distinguishable, and it has clear and often rather abrupt borders (Rose 2018b). Finally, the model *performs* the smart city for an audience, the model is there to be displayed, repeated and revered (Brighenti 2007). The model, in short, is intended as an exemplar. Model developments in relation to the smart city can be either built *ex nihilio* like, for instance, Songdo or Masdr City to repeat some of the most famous examples of what Halegoua calls 'smart-from-the-start cities' (Halegoua 2020), or, alternatively, they can be inserted into an existing urban fabric while remaining apart from context through its different order, as in the image (Schylberg et al. 2020). The model has a novelty value, it invites contemplation rather than to be experienced in distraction, but in order to make a difference in urban terms it must exist in a longer time-perspective as well. It must continue to perform after the crowds have moved on to be wowed by the next exemplar.

The model is in the case of the smart city intertwined with the logic of the zone, the tax-exempt international

territories earmarked for rapid development through what Easterling dubbed 'extrastatecraft' (Easterling 2016; Halpern et al. 2017). Zonal logic has a long history in the planning of cities in America, Europe and Asia, but has developed into a tool for international competition for investments not least through Special Economic Zones that China has set up from the 1980s onward, which have since spread around the world.

The aim of the model and the zone is the same. Both function as prototypes to ultimately be enacted in the urban realm generally (Halpern et al. 2017). Smart cities are often model and zone at the same time: they overlay the model with tax incentives and other similar subsidies effectively conflating the two. This also goes for models like Sidewalk Toronto (which is perhaps best construed as a hybrid between modelling smart and ubiquitous invisible technology, see below), where Alphabet sought to be exempted from a variety of legal constraints that applied to urban development in Toronto (Tusikov 2020).

Models have, as architectural theorist Choay (1997) noted, been common in architecture and city development at least since the Renaissance in Europe. Choay (1997) positioned the model, starting with More's 1516 *Utopia* as one of two 'instaurational texts' of modern architecture.[1] We can trace the model in: Renaissance ideal towns, such as Palma Nova; in residential exhibitions, such as the Weißenhof Siedlung in Stuttgart or the Stockholm Exhibition; in factory towns, like Fordlandia; in utopian socialist developments, such as New Lanark; in New Towns like Vällingby; in parliament cities like Chandigarh, Canberra or Brasília, and countless other projects. The model purports to show us another possible urban order or way of life. The model relies less on architectural or institutional symbols as the city itself becomes the symbolic object, sometimes, as in the case of Brasília, the city is shaped in a pictural way. The model showcases the system of systems in action rather than through one object where the systems meet. The model does not need a symbol since the model itself, with its clear delineation becomes the symbol.

The model as the smart city strategy of visibility is usually favoured by those selling packages of hardware and software to municipalities, such as IBM, Cisco or Siemens, and by national governments seeking new visions for urban development, responsible for establishing zones of exception, while it has so far been less popular on a municipal level.

---

[1] The other being the rule, according to Choay emerging for the first time in Alberti's *De re ædificatoria*. An instaurational text is, according to Choay:'writings which have the explicit aim of developing an autonomous conceptual apparatus in order to conceive and build new and unknown forms of space.' (6).

Fig. 4 Heatherwick Studio's impression of Sidewalk Labs, 2020. © Sidewalk Labs

Fig. 5 Heatherwick Studio's impression of Sidewalk Labs, 2020. © Sidewalk Labs

Ubiquitous invisible smart

Sidewalk Toronto, the now defunct project for urban development that was headed by Alphabet, Google's parent company, is one of the most analysed smart urban development projects (Sadowski and Bendor 2019; Dunn and Cureton 2020; Halegoua 2020; Listerborn and Neergaard 2021) (Figs. 4 and 5). The visualization images of the project are far less discussed. In the images we see people enjoying urban life, a shift from Moses to Jacobs, some remarked (Wieditz 2019; Champagne 2019). Technology is conspicuously absent in street life in these images. If the first two strategies were the immaterial prolonged into the material, this is almost the reverse: the material (technological 'things') portrayed as immaterial. The same goes for earlier incarnations of these visualizations (Figs. 6 and 7). It is, in this sense, a completely different strategy which aimed to make the technology visible. Alphabet, and Google, promise a city where technology is so deeply embedded that the interface cannot be categorised as within the visible but in the visual. In this sense, Sidewalk Toronto is more reminiscent of the earlier videos of what the smart city would be like (Hewlett Packard 2000; Microsoft Research 2015), where it is embedded in the everyday, ready to be called upon when needed but otherwise invisible.

Fig. 6 Artist's impression of Sidewalk Labs, 2017. © Sidewalk Labs

Fig. 7 Artist's impression of Sidewalk Labs, 2017. © Sidewalk Labs

From an architectural perspective, the visualizations of Sidewalk Toronto contain not-so-faint echoes of earlier eras. The city appears portrayed with two separate levels—an infrastructural one of larger structures and within this there is another, customizable level for personal creativity and adaptation: the protruding beams in the first image seemingly hinting at a possibility of further development through tectonic legibility. One example is the individuals in Fig. 5, who appear to be engaged in DIY right in the middle of the street, possibly refurbishing their own shop or café. The framework permits the individual creativity in these scenes – individuals control their own environment within the framework. This is an old Modernist dream, Le Corbusier's Plan Obus from 1930 did contain this type of tension between framework and individual change (Tafuri 1976, pp. 131–132; Mattsson 2004, p. 205), as did the Dom-ino House. This was a development that became increasingly emphasised after the war with e.g., Friedman's Mobile Architecture, and many others (Busbea 2007), not least through the adaptation of linguistic structuralism to architecture (Sigge 2017). In the context of Sidewalk Toronto, it is most likely signalling a responsive environment that can scale (up) on demand, giving budding entrepreneurs the alleged freedom of the gig economy. Transformability of the built environment has been emphasised throughout the visualizations of the Sidewalk Toronto project

(Figs. 6 and 7). The smart city's real-time-ness is here projected onto the built environment, technology is not only deeply embedded, but its logic is also informing the basic structure of the city, now permanently in beta-mode in ways that recall Price & Littlewood's Fun Palace, a never realized project often connected with smart city architecture, see (Townsend 2013; Figueiredo et al. 2020), but there are differences—where the Fun Palace was about enjoyment and leaving work and strife behind, Sidewalk Toronto would presumably be an environment for work in different forms, basically taking the 'Fun' out of Fun Palace.

Smart technologies are in these scenarios not directly visible. They are embedded to a point where all we see are the effects, like the flexibility to change the built environment for example. The smart urban development is ostensibly focused on the individual 'realizing her potential', to borrow a common phrasing in the networked economy, in different ways, where technology seems to form the underlying structuring element that is not visible as such but provides what is sometimes called affordances, the environment offers the individual certain possibilities (Gibson 1979). This is the fundamental premise of *ubiquitous invisible smart.* As Brighenti reminds us, the invisible is not the opposite of the visible, it is rather 'the visible *without a theme'* (Brighenti 2017, p. 2). In this sense, invisibility becomes a strategy of the visible, or, rather, the visual, particularly in the sense of unnoticed/overlooked.

This is not a new thing, McLuhan argued that the most efficient technology or media are those that are used without the user noticing s/he is using the medium, i.e., while the observer takes the medium for granted and sees content instead. As he put it, the most successful media were those that were like water to a fish, invisible (McLuhan 1969).

The naturalization of smart technology has long been a subject of experimentation. In 1991, Weiser opened his seminal text on ubiquitous computing with the following words: 'The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.' (Weiser 1991, p. 94). As a strategy for the smart city, ubiquitous computing envisions an integration of technological devices into every aspect of life, to make them our 'milieu', to be understood as medium, centre, and surroundings (Deleuze et al. 2004). This is ambition is expressed in video visualizations showing smart city futures (Hewlett Packard 2000; Microsoft Research 2015), something we do not even see as we are immersed in it (Brighenti 2010, p. 481).

It is possible to identify traces of ubiquitous invisibility in the examples already discussed. In Plusstaden, from

'Modelling Smart', the image hints at a tension between the model and ubiquitous invisibility, between the desire for material manifestation and the immaterial. The image is taken from the cover of a report; it sits on a white background. Interestingly, the technological objects (wind turbines, architectural structures, monorail) are rendered in white, they are only visible against the green grass or the blue sky. Sitting, as they do, on a white paper, they appear cut out of the image, they are quite (in)visibly part of the background, there, but out of focus. It is the image of a quasi-natural landscape that is in focus in Plusstaden, which can be compared with Sidewalk Toronto's happy urban life, but the strategy to dissolve the material aspects of technology is the same even if it is expressed differently.

There are differences though, Kaika and Swyngedouw point out that the hiding away of the material flows of the city renders the tension between city and nature invisible, and a similar argument could be forwarded in relation to Plusstaden's imagery (Kaika and Swyngedouw 2000). The image depicts a 'Cityscape with integrated food production and enhanced ecosystem services', a merger of a sorts precisely between a quasi-rural environment and an urban one (Schylberg et al. 2020, p. 2). The model of Plusstaden is a model of the utopian resolution of the tension between city and nature, this is its symbolic content. Sidewalk Toronto is taking a different approach, it is not the tension between the city and nature which is rendered invisible, but the tension between the urban and the digital.

The smart city differs from earlier urban ideals, which tended to be utopias of urban form (Harvey 2000; Söderström et al. 2014). The keywords of invisible technological ubiquity are *seamlessness*: the smart city blends with the existing without any visible seams, it is furthermore intended to enhance and blend the virtual and the actual without the observer finding the overlap uncomfortable, seamlessness requires real-time without gaps; *immediacy*, a concept I borrow from media theorists Bolter and Grusin (1999), where the medium disappears to leave the observer with the content,[2] which here is the service performed by the medium; and finally, *ubiquity*, if the smart service territory encompasses urban life, the experiencing subject will not note an outside.

We could surmise that ubiquitous invisible technology is the visual strategy of the software corporation's view of the smart city. Those who see their future profits as emerging from the data the city generates as opposed to those corporations that sell hardware and updated urban systems to municipalities.

Visualizing smart cities
Monument, territory, and saturation
The above taxonomy of strategies is highly provisional. It serves primarily to begin to understand the differences in different approaches. In many other discussions on smart city visibility, there is a tendency to focus on the visible while leaving out the visual. I have here argued that the invisibility in favour of the visual is a strategy that is readily combined with the others. Which strategies of visibility and how they are combined is most likely a question of who the principal actors' interests are and how they can be combined. Of course, there are plenty of national variations in smart city conceptualisations (Ylipulli and Luusua 2020), but it is fair to assume that different actors have different interests. If Siemens or Cisco is interested in selling a package to a municipal or national government, their strategy will differ from Alphabet's, where profit is extracted from smart city users. Alphabet is not necessarily interested in showcasing the technology more than necessary. Alphabet, like other software producers, primarily want seamless integration into the urban environment. Municipal leaders view smartness as competitive advantage in their Floridian races with other cities (Florida 2002), and consequently feel a need to show an object in front of which the mayor literally can point to a symbolic object as proof of the city's progressive nature. National governments, for their part, seek to attract corporations and try out different scenarios for the future, and consequently favour the model, a designated territory that can be evaluated and reproduced. Since smart city initiatives involve most, if not all, the above actors, hybridization of strategies is common, and the hybrid strategy will tilt in favour of the most influential actor's interests.

At the same time, the strategies work on fundamentally different levels. Symbolic presence of smart is in effect a monument, and the field of operations does not in any way correspond to the monument itself. Models of smart constitute territories, sharply delineated and where the field of operation coincides with the area of the model. Ubiquitous invisible smart cannot be considered neither monument nor territory, rather it is suffusion or, better, saturation of a background that slowly shifts from the old regime to the smart regime. The shift only becomes noticeable when it is combined with one of the other strategies, as in Sidewalk Toronto, which displays characteristics of the model through its territorial delineation. Monument, territory, and saturation make up three

---

[2] The authors contrast immediacy with hypermediacy, which is the making explicit of the medium itself. In terms of images, a montage (ordered through a perspective to convince us it is a real moment captured) is characterized by immediacy while a collage (of pasted parts into a clearly manufactured whole) is characterized by hypermediacy (Bolter and Grusin 1999).

entirely different ways of producing visibility. The first is an object, the second an area and the third a process.

A smart city for whom?

What forms of subjectivity is then encouraged for the user through these strategies of visibility? Each strategy arguably presents an idea of the subject inhabiting the smart city. These are on closer inspection surprisingly variated; they all seemingly promote a different kind of social space where subjects encounter one another in the street. The symbolic presence of smart with its monuments to control would presumably conjure up images of a militarized state apparatus, where the state monitors and intervenes where necessary. The 'smart' here would appear located in a realm beyond the subject herself, her contact with the COR is indirect, the system appears separate from the daily lives of inhabitants, and the municipality through smart technology becomes a kind of backseat driver.

Plusstaden, the example from modelling smart, is a different kind of city, with a different associated subjectivity. Here, the smart system itself is a planned totality, an integrated whole comprised of technology, people, agriculture, buildings, and transportation. It is the city as a green machine, urban life and urban spaces are reordered to fit within the larger systemic structure of the smart city. The principal 'thing' in the image is the sky and the green fields, and life seems to be organized around these things. On the lower left in the Fig. 2, there is a theatre troupe performing *en plein air* to an audience standing around them, thus bringing cultural events into the otherwise mainly productive landscape. If I read the image, the subjectivity proposed is one where the subject/user knowingly subjugates herself to the larger system of the smart green city, accepting its overall logic and lives her urban life in the spaces between the productive fields.

Sidewalk Toronto, here used to exemplify ubiquitous invisible smart is yet another city to its inhabitants. If the productive system is prioritized in Plusstaden, it is the entrepreneurial subject taking charge in Toronto. The smart system is neither a monitoring system nor the system that organises life but is presented as a system enabling and coaxing the entrepreneurial subject to develop her human capital continuously, an ideal associated with neoliberal society (Lazzarato 2014). In Plusstaden, the subject appears primarily as living in between the productive parts of the city, in Sidewalk Toronto she is on her own, but has the smart system to aid her and to extend her potential at a price. Social space here is urban—it is the street or the café—but it is also an act of working together to develop the physical environment so as not to restrain the individual's future productivity. The smart system is here not managed by the state, but by Alphabet.

This is also visible in the mutability of the physical environment; the growth imperative of the corporate world is here writ large onto the physical environment of the city.

In distinction from each other, the different strategies presuppose different relations between state, subject and corporation. They also outline three different approaches to the smart (monument, territory and saturation) which in effect are three different relations between smart technology and the physical urban realm.

A politics of visibility

Sometimes, the smart city is presented as a uniform corporate vision, at times juxtaposed with 'civic hackers' (Townsend 2013) or the 'social city' (Halegoua 2020), offering community-based non-corporate alternatives to the corporate smart city vision. The smart visions here discussed through their strategies of visibility cannot be neatly divided in this sense. Instead, the material suggests a bigger variation of smart city dreams—the municipal government (with IBM in Rio de Janeiro) vs the national Swedish platform proposed by Plusstaden and the corporate smart city of Sidewalk Toronto.

I am not arguing that one smart city strategy of visibility is necessarily preferable to others, it would seem to be too early to decide, nor that all models are good or bad. Rather, they present different problems to its inhabitants, not only through the different subjectivities encouraged but also in terms of experience and transparency. These problems need to be addressed through other measures, through policy and laws. The strategies of visibility themselves require different societal responses and the strategies' political effects will depend on these responses.

I am arguing for the need to differentiate the smart city discussion and bring it away from generic qualities to the specific ones that characterise each smart city program. This is not necessarily easy, discourse on the smart city is surprisingly homogeneous, the corporations implementing the smart city programs are the same, etc. but the smart city vision, if we take the word literally, is both different and informative in each respective incarnation.

In this text, I have investigated how the smart city is made visible. The approach produces a cross-section of affinities and differences between different strategies for smart cities. Approaching the smart city movement from other angles will presumably also produce other cross sections lifting forth not only the affinities of the different projects (on which there is a lot of research) but also the differences from one smart city project to another.

The three different strategies of visibility seem to be outlining three different relationships between state, smart system, and subject. Even if we cannot make any far-reaching conclusions based on this sample, we

should, I believe, say that visibility is connected to the different political imaginaries of the smart city.

How the smart is made visible (if it is) is a strategic question for all stakeholders in terms of what the smart city is and how it is to be implemented in the urban realm. This would render smart city visibility not a curious side product of smart solutions but would in effect present us with a differentiated set of different smart futures, where some may be more considered far more problematic than others.

Availability of data and materials
Not applicable.

Declarations

Competing interests
The author declare that they have no competing interests.

References
Alexander C (1965) A city is not a tree (pt 1 & 2). Arch Forum 122:58-62 (pt 1& 2)
Benjamin W, Jennings MW, Doherty B et al (2008) The work of art in the age of its technological reproducibility, and other writings on media. Belknap Press of Harvard University Press, Cambridge
Bolter JD, Grusin R (1999) Remediation: understanding new media. MIT Press, Cambridge
Brighenti A (2007) Visibility: a category for the social sciences. Curr Sociol 55:323–342. https://doi.org/10.1177/0011392107076079
Brighenti AM (2010) New media and the prolongations of urban environments. Convergence 16:471–487. https://doi.org/10.1177/1354856510375528
Brighenti A (2017) The visible: element of the social. Front Sociol. https://doi.org/10.3389/fsoc.2017.00017
Busbea L (2007) Topologies: the urban utopia in France, 1960–1970. MIT Press, Cambridge
Caprotti F (2017) Research in the invisible city: challenges for "knowing" the smart city. UGEC viewpoints. https://ugecviewpoints.wordpress.com/2017/04/20/research-in-the-invisible-city-challenges-for-knowing-the-smart-city/. Accessed 23 Apr 2021
Caprotti F (2019) Spaces of visibility in the smart city: flagship urban spaces and the smart urban imaginary. Urban Stud 56:2465–2479. https://doi.org/10.1177/0042098018798597
Champagne M (2019) Where the image flows: how sidewalk labs' public relations came to dominate journalism. Failed architecture. https://failedarchitecture.com/2019/10/where-the-image-flows-how-sidewalk-labs-public-relations-came-to-dominate-journalism/. Accessed 25 May 2021
Choay F (1997) The rule and the model: on the theory of architecture and urbanism. MIT Press, Cambridge
Cugurullo F (2021) Frankenstein urbanism: eco, smart and autonomous cities, artificial intelligence and the end of the city. Routledge, Abingdon
de Certeau M (2002) The practice of everyday life. University of California Press, Berkeley
Deleuze G, Guattari F, Massumi B (2004) A thousand plateaus: capitalism and schizophrenia. Continuum, London
Didi-Huberman G (2009) Confronting images: questioning the ends of a certain history of art. Penn State Univ Press, University Park
Dunn N, Cureton P (2020) Frictionless futures. In: Figueiredo SM, Krishnamurthy S, Schroeder T (eds) Architecture and the smart city. Routledge, Abingdon, pp 17–28
Easterling K (2016) Extrastatecraft: the power of infrastructure space. Verso, London
Figueiredo SM, Krishnamurthy S, Schroeder T (2020) Architecture and the smart city. Routledge, Abingdon
Florida RL (2002) The rise of the creative class: and how it's transforming work, leisure, community and everyday life. Basic Books, New York
Gibson JJ (1979) The ecological approach to visual perception. Houghton Mifflin, Boston
Halegoua G (2020) Smart cities. MIT Press, Camridge
Halpern O (2015) Beautiful data: a history of vision and reason since 1945. Duke University Press, Durham
Halpern O, Mitchell R, Geoghegan BD (2017) The smartness mandate: notes toward a critique. Grey Room 68:106–129. https://doi.org/10.1162/GREY_a_00221
Harvey D (2000) Spaces of hope. Univ. of California Press, Berkeley
Hollands RG (2008) Will the real smart city please stand up? Intelligent, progressive or entrepreneurial? City 12:303–320
Kaika M (2011) Autistic architecture: the fall of the icon and the rise of the serial object of architecture. Environ Plan D Soc Space 29:968–992. https://doi.org/10.1068/d16110
Kaika M, Swyngedouw E (2000) Fetishizing the modern city: the phantasmagoria of urban technological networks. Int J Urban Reg Res 24:120–138
Karvonen A, Cugurullo F, Caprotti F (2019) Introduction: situating smart cities. In: Karvonen A, Cugurullo F, Caprotti F (eds) Inside smart cities: place, politics and urban innovation. Routledge, Abingdon, pp 1–12
Kitchin R, Maalsen S, McArdle G (2016) The praxis and politics of building urban dashboards. Geoforum 77:93–101. https://doi.org/10.1016/j.geoforum.2016.10.006
Latour B (1993) We have never been modern. Harvard University Press, Cambridge
Latour B, Hermant E (1998) Paris ville invisible. La Decouverte-Les Empecheurs de penser en rond, Paris
Lazzarato M (2014) Signs and machines capitalism and the production of subjectivity. Semiotext(e), Los Angeles
Listerborn C, de Neergaard M (2021) Uncovering the 'cracks'? ACME 20:294–311
Luque-Ayala A, Marvin S (2016) The maintenance of urban circulation: an operational logic of infrastructural control. Environ Plan D Soc Space 34:191–208. https://doi.org/10.1177/0263775815611422
Martin R (2016) Financial imaginaries. The urban apparatus: mediapolitics and the city. Minnesota University Press, Minneapolis, pp 44–59
Mattern S (2014) Interfacing urban intelligence. Places. https://doi.org/10.22269/140428
Mattern S (2015) Mission control: a history of the urban dashboard. Places. https://doi.org/10.22269/150309
Mattsson H (2004) Arkitektur och konsumtion: Reyner Banham och utbytbarhetens estetik. B. Östlings bokförl. Symposion, Eslöv
Mceill D (2015) IBM and the visual formation of smart cities. In: Marvin S, Luque-Ayala A, Mcarlane C (eds) Smart urbanism: Utopian vision or false dawn? Taylor & Francis Group, London
McLuhan M (1969) Counterblast. Rapp & Whiting, London
McLuhan M (1994) Understanding media: the extensions of man. MIT Press, Cambridge
Microsoft Research (2015) Productivity future vision. Available via YouTube: https://www.youtube.com/watch?v=w-tFdreZB94. Accessed 10 May 2021
Hewlett Packard (2000) Cool town. Available via YouTube: https://www.youtube.com/watch?v=U2AkkuIVV-I. Accessed 24 May 2021

Paes E (2012) The 4 commandments of cities. TED available via TED.com. https://www.ted.com/talks/eduardo_paes_the_4_commandments_of_cities?language=en#t-555523. Accessed 10 May 2021

Picon A (2015) Smart cities: a spatialised intelligence. Wiley, Chichester

Rose G (2012) Visual methodologies. Sage Publications, London

Rose G (2017) Screening smart cities: managing data, views and vertigo. In: Hesselberth P, Poulaki M (eds) Compact cinematics: the moving image in the age of bit-sized media. Bloomsbury, London, pp 177–184

Rose G (2018a) Look InsideTM: corporate visions of the smart city. In: Fast K, Jansson A, Lindell J et al (eds) Geomedia studies: spaces and mobilities in mediatized worlds. Routledge, New York, pp 97–113

Rose G (2018b) Visualizing the smart city. Karlstad. Available via YouTube. https://www.youtube.com/watch?v=gNNUheDAdtA. Accessed on 29 April 2021

Sadowski J, Bendor R (2019) Selling smartness: corporate narratives and the smart city as a sociotechnical imaginary. Sci Technol Human Values 44:540–563

Schylberg K, Leideman C, Edstav J, Axelsson S (2020) Plusstad: Världsutställning 2030. Samordning för bostadsbyggande & Fossilfritt Sverige

Sigge E (2017) Architecture's red tape: government building construction in Sweden, 1963–1973. KTH, Stockholm

Söderström O, Paasche T, Klauser F (2014) Smart cities as corporate storytelling. City 18:307–320. https://doi.org/10.1080/13604813.2014.906716

Tafuri M (1976) Architecture and Utopia. MIT Press, Cambridge

Townsend AM (2013) Smart cities: big data, civic hackers, and the quest for a new Utopia. W. W. Norton & Co., New York

Tusikov N (2020) Privatized policymaking on Toronto's waterfront. In: Valverde M, Flynn A (eds) Smart cities for Canada: digital dreams corporate designs. James Lorimer, Toronto, pp 68–83

Veltz M, Rutherford J, Picon A (2019) Smart urbanism and the visibility and reconfiguration of infrastructure and public action in the French cities of Issy-les-Molineaux and Nice. In: Karvonen A, Cugurullo F, Caprotti F (eds) Inside smart cities: place, politics and urban innovation. Routledge, Abingdon, pp 133–148

Vidler A (1990) Claude-Nicolas Ledoux: architecture and social reform at the end of the ancien régime. MIT Press, Cambridge

Weiser M (1991) The computer for the 21st century. Sci Am 265:94–105

Wieditz T (2019) Let's not be dazzled by Google's master plan for Toronto. Toronto Star

Wigley E, Rose G (2020) Will the real smart city please make itself visible? In: Willis KS, Aurigi A (eds) The Routledge companion to smart cities. Routledge, Milton Park

Ylipulli J, Luusua A (2020) Smart cities with a Nordic twist? Public sector digitalization in Finnish data-rich cities. Telemat Inform 55:101457. https://doi.org/10.1016/j.tele.2020.101457

Publisher's Note