# 11

# From real-time city to asynchronicity: exploring the real-time smart city dashboard

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## A plea for asynchronicity

In a thought-provoking 'design fiction' exercise, design researchers Bleecker and Nova invert the discourse of instantaneity in urban computing and digital cartography (Bleecker and Nova, 2009). Urban new media tend to promote a speeding up of time:

> there is here a conspicuous arms race towards more instantaneity, more temporal proximity between events, people and places. Communication is promoted to be 'just-in-time'; feedback to your activities should be in 'real-time' as if you were playing a video-game character. Speed is essential, and this never-ending battle with time – to eliminate it – makes things happen instantaneously. (Bleecker and Nova, 2009: 29)

By elevating 'real-time' to a prime design objective, urban new media in fact are geared to dispose of time – in the sense of duration – as a limiting factor altogether. Bleecker and Nova forward the notion of *asynchronicity* to explore how urban computing technologies might afford more diversified interactions than the efficiency-driven real-time model:

> there are many geographies, asynchronous because we have individual experiences of the world. Fixed things become flows, and flows become the fixed point of reference … Perhaps we learn from this that computing in an urban setting should first of all not be about data and algorithms, but people and their activities. What happens when time everywhere is not synchronised, when it floats and lags a bit? (Bleecker and Nova, 2009: 19)

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Bleecker and Nova argue that out-of-sync mapping reinserts serendipity into urban life by stimulating unexpected encounters. Asynchronicity allows citizens to appropriate the city by creating incremental maps that allow them to narrate their personal and collective 'sense of place'. The concept of asynchronicity also draws attention to the fact that systems tend to break and that underneath the myth of smooth 'always-on' availability of information there is the everyday messiness of technologies failing. Asynchronicity could be about doing something in a place and then getting back there to see what happened afterwards. This stimulates engagement with that place and other people. Bleecker and Nova (2009) refer to the Japanese urban game *Mogi*, where players had to hunt for treasures in the urban landscape but instead unexpectedly ended up using it as a social networking tool.

It remains, however, somewhat unclear what exactly the notions of real-time and asynchronicity mean and what their implications are. Bleecker and Nova make an implicit argument for a kind of 'slow mapping', yet the question remains: who or what needs to slow down, and what could be the implications of this? Is it about managing our lives at work, home, travel and so on in the slow lane? Do urban services need to be delivered more slowly? Is it a design imperative to create 'slow' situations and experiences, and what would that entail?[1] Bleecker and Nova note that the real potential of locative media and location-based services is 'the ability to find oneself relative to everywhere else' (Bleecker and Nova, 2009: 17). It is this people-centric relational view that I want to pursue here.

## Urban dashboards as interfaces to the smart city

The recent proliferation of work about urban dashboards seems to be almost canonising the field (Ciuccarelli, Lupi and Simeone, 2014; Kitchin, 2014; Batty, 2015; Holden and Moreno Pires, 2015; Kitchin, Lauriault and McArdle, 2015a; 2015b; Mattern, 2015; Wilson, 2015). Frequently invoked ancestors include: the automobile dashboard, the airplane cockpit, the space mission control centre, the financial boardroom and state-led industry monitoring. An iconic early urban dashboard was the Cybersyn control centre developed by the cybernetic Stafford Beer for the Allende government in Chile in 1970 (Medina, 2006; Morozov, 2014; Batty, 2015; Mattern, 2015).[2] The left-wing government nationalised many private companies and had the Cybersyn management cybernetics system developed; a system that 'would network every firm in the expanding nationalised sector of the economy to a central computer in Santiago, enabling the government to grasp the status of production quickly and respond to

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economic crises in real-time' (Medina, 2006: 572). Due to technical difficulties, the system only allowed companies to transmit data once a day and reminding workers to manually do so proved a source of frustration for the project team (Medina, 2006: 587). Chairman of the Centre for Advanced Spatial Analysis Michael Batty notes regarding the Cybersyn project that 'the data were always out of sync' because the age of real-time computing had not yet ushered in (Batty, 2015: 29). By contrast, he insists that today 'the most rudimentary of dashboards applicable to displaying the routine operation of the city do collect data in real-time that are comparatively neutral in their factual complexion' (Batty, 2015: 30). This epistemological claim is problematic and needs unpacking.

First, it is helpful to make a provisional typology of the city dashboard. Categories and subdivisions below – neither comprehensive nor static – are based on: the type of platform used to map and share data, the kind of data or indicators and what can be done with them, the way in which information is visualised, and the purpose for which they are being used.

## *Platform*

Real-time data can be delivered on various platforms. First, centralised physical control rooms are used for managing city processes and operations. Cybersyn fits here, as well as IBM's control room in Rio de Janeiro (Mattern, 2015).[3] Second, there are online platforms that display one or multiple processes.[4] Third, distributed mobile platforms deliver real-time data, for instance to enterprise employees, police squads, quantified selfers engaging in sustained self-tracking, and consumers.[5] Such platforms may be either open to the public – e.g. installed in public places or available online – or closed.

## *Data and uses*

Another subdivision consists of the kind of urban data or indicators and what can be done with them. Kitchin, Lauriault and McArdle (2015a) distinguish between single indicators or composite indicators that combine measurements. Second, they identify various uses: '*descriptive or contextual indicators*' used for insights; '*diagnostic, performance and target indicators*' used to assess performance; and '*predictive and conditional indicators*' used to anticipate future situations (Kitchin, Lauriault and McArdle, 2015a: 8–9, original emphasis). We may further differentiate between standardised and comparable data and local situation-specific data; quantitative data (e.g. temperature) and qualitative social and cultural data (e.g. levels of happiness) (Kitchin, 2014); user-generated data in often distributed ways and data generated by professionals and often kept in a central

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repository.[6] At the legal level, data may be open source or closed/proprietary data. For example, some projects allow raw data to be downloaded and/or use open APIs for others to reuse data (e.g. oscity.nl), while others are closed (e.g. real-time policing platforms).

## *Visualisation*

We may also differentiate between ways of displaying information on dashboards, via charts and graphs, diagrams or maps (Kitchin, Lauriault and McArdle, 2015a). Distinctions can further be made between indexical interfaces, with a direct reference to the measured object (e.g. a gas tank meter), and symbolic interfaces that involve a further translation (e.g. an alarm light indicating an empty tank) (Mattern, 2015), between fixed and interactive visualisations (Kitchin, Lauriault and McArdle, 2015a), and between dynamically refreshing or cumulative ones.

## *Purpose*

The intended purpose of urban dashboards and the associated agency attributed to stakeholders may vary widely, although in practice there is overlap. We can distinguish between dashboards providing accountability and legitimacy through transparency (Perez and Rushing, 2007: 11), collecting intelligence and providing cues for action, managing emergencies, benchmarking and comparison, surveilling and controlling (Kitchin, 2013: 15), offering democratising tools for civic empowerment and social change (Holden and Moreno Pires, 2015), and providing creative opportunities to hackers, artists, app makers and citizens, like creating data-narratives (de Waal and de Lange, 2014).

Like any media technology, real-time urban dashboards 'do not reflect the world as it actually is, but actively frame and produce the world' (Kitchin, Lauriault and McArdle, 2015a: 24). The asserted power of dashboards is that city managers (and citizens to a variable degree) receive instant, transparent and realistic information about urban processes under the presumption that one can 'know' the city '*as it actually is*' (Kitchin, Lauriault and McArdle, 2015a: 16, emphasis added). Urban dashboards have been critically questioned on the basis of their ontological, epistemological and political assumptions. On the one hand, dashboards may open up data to public consumption and use, yet on the other hand they cultivate a top-down, technocratic vision (Ciuccarelli, Lupi and Simeone, 2014: Mattern, 2015). Real-time mapping and dashboards provide a powerful realist epistemology (Kitchin, Lauriault and McArdle, 2015a; Mattern, 2015). An issue is the validity of the data. Mattern notes that the target

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audience 'likely has only a limited understanding of how the data are derived' yet will base actions on them unquestioningly (Mattern, 2015: no pagination). Similarly debatable is the assumption that cities 'consist of a set of knowable and manageable systems that act in "rational, mechanical, linear and hierarchical" ways' (Kitchin, Lauriault and McArdle, 2015a: 14). This realist epistemology drives a 'new managerialism' (Kitchin, 2013; Kitchin, Lauriault and McArdle, 2015a; see also Morozov, 2013). Decision-making is based on what can be measured and quantified – purported hard and realistic data. But what data are left out? The messy data that cannot be neatly quantified and visualised, Shannon Mattern argues (Mattern, 2015). Moreover, the politics of 'qualculation' (Callon and Law, 2003; Thrift, 2008: 24) runs counter to making decisions based on careful and necessarily slow rational deliberation or even on affect and emotion, the 'gut feeling' that have recently been resuscitated as an important driver of our actions (Gladwell, 2005; Levitt and Dubner, 2005; Ariely, 2008).[7] Affect and emotion, which have become more prominent in both urban studies and in computer research, remain largely absent from smart city visions of what makes a city liveable (for a discussion see de Lange, 2013).

## Time and the dashboard

From this discussion of dashboards, we can proceed to unpack the oft-invoked real-time adjective and attempt to modify the discourse by highlighting asynchronicities. To do so, I build on sociologist Barbara Adam's identification of seven elements constitutive of time (Adam, 2008). 'Temporal frames are not given but chosen', she asserts (2008: 2; see also Adam, 1990). This helps to unbox what is presented as real-time mapping beyond the merely discursive level, and aids in developing asynchronicity further as an alternative heuristics to scrutinise urban dashboards as a way to govern today's cities.

### *1 Time frame*

The first of Adam's structural features of time is the '*time frame*', which refers to a bounded unit with a beginning and an end, like a day, a year, a life time, a generation, or an epoch (Adam 2008: 2, original emphasis). Real-time dashboards are never really real-time. Information sampling and mapping ideally occupies an infinitely small time frame yet always has a certain 'refresh rate'. Technically, the encoding/decoding of digital information in bits and bytes occurs in discrete units, for example the sampling rate (time slice) and the bit rate (resolution) in encoding digital music. Time frames are also involved in the

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algorithmic processing of information. Any digital processing involves latencies incurred by among others memory buffering, CPU scheduling and process interrupts. Zero-latency is always an approximation. Furthermore, the actual visualisation can be temporally framed, for example the number of frames per second or when information is display cumulatively and the counter is reset at some point. Finally, people's response time to information and their potential ensuing actions take place within a certain time frame. Notions like real-time, immediacy, liveness and transparency blackbox the temporal dynamics between sensing and displaying. Asynchronicity – understood here as a measure of *latency* – raises questions about the rhetoric and subjective experiences of real-time. Within what time frame do people perceive information as immediate? What is an acceptable time frame for automated responsiveness? In line with Bolter and Grusin's argument about the 'double logic of remediation', prevailing claims to real-time involve both the erasure and the multiplication of media (Bolter and Grusin, 2000: 5). It is precisely the whiz-bang interfaces, multiple screens, rapidly alternating maps, graphs and stats in flashy colours and smooth effects of smart city dashboards that provide the suggestion of direct and transparent access and power over urban processes. Asynchronicity thus shifts our attention to the question how the design and medium-specific qualities of urban dashboards constitute the perceived governability of smart cities.

## 2 Temporality

*Temporality* asks how time unfolds and what direction it takes. It involves a procedural view of time as changing, ageing, growing and irreversible (Adam, 2008: 2). Real-time dashboards attempt to capture events transpiring as they happen, in an immediate 'now'. It has little eye for temporality. Real-time risks reducing events to isolates, to singularities. Algorithms identify the out-of-the-ordinary and at the same time routinise the responses to them. The exceptional becomes homogenised. Change is much harder to grasp. Indeed, Michael Batty notes that so far there has been only limited progress in terms of moving 'away from real-time monitoring of performance to some more abstracted interpretation of how the state of a city is changing over the longer term' (Batty, 2015: 31). The obsession with real-time, in my view, precludes more complex temporalities – e.g. from identifying correlations and patterns to weaving actual stories out of isolated events – that complement our understanding of urban dynamics. Michael Flowers, the former chief analytics officer of New York City, describes how data from different city agencies were integrated to make correlative fire-hazard analyses and risk-filters based on intelligence about illegal housing conversion (Flowers, 2013). This allowed officials to prioritise the

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inspection of potentially dangerous locations. The question remains whether these predictive analytics address the far less visible and more tenacious issues of immigration and housing shortage. Elsewhere, Flowers is quoted as saying: 'I am not interested in causation except as it speaks to action. Causation is for other people, and frankly it is very dicey when you start talking about causation … You know, we have real problems to solve' (Morozov, 2014: no pagination). It would not be impossible to do such a thing if real-time city data analytics take the relationships between events as the central unit.[8] Temporal relationality is crucial and asynchronicity – understood here as temporal unfolding and recurrence – helps to consider how out-of-sync events refer to one another but do not coincide. Temporal relationality stretches time and folds it back onto itself, creating connections and narratives out of disparate events. To illustrate this somewhat abstract point, a recent study suggests that designers of persuasive technologies (e.g. quantified self-tracking apps) falsely rely on the 'egocentric loop' (Balestrini, 2013: no pagination). The process from data collection, to visualisation, to self-awareness, does not smoothly nudge people towards actual behavioural change. Instead, intermittent feedback via affective relationships with other agents might be more helpful. Through vicarious social interactions and recursions, more meaningful relationships may arise with one's own data, and in due time, actual change may unfold.

## *3 Timing*

The moment of something happening is a matter of *timing*, that is, taking place at a specific time. Adam notes that many aspects of our lives are synchronised: clock time, body time, seasons and climates, social time (e.g. opening hours), task-related timing, and timing associated with using specific communication technologies (Adam, 2008: 3). Social synchronisation and questions about right or wrong timing for coordinated actions are context-dependent (Adam, 2008: 3). Timing thus is a highly normative notion. The 'just in time' of real-time mapping is unquestioningly equated with being 'right on time'. What's more, dashboards increasingly employ predictive algorithms to map potential futures in anticipatory ways. Examples of predictive mapping and pre-emptive action include: crime mapping, spotting potential terrorist attacks and detecting fraudulent patterns (Crang and Graham, 2007; Crandall, 2010). Timing subtly shifts from what happens now to what might happen, a kind of future forward asynchronicity. This raises various questions, such as: when is the time right to act towards an anticipated future? How can a potential future become an actual present context? How desirable is it when human agency is bypassed? Where does this leave the opportunity for action by the smart citizen? The idea that now

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is always the 'right time' to act is an extremely technocratic notion. Real-time cybernetics, in many ways, runs counter to democratic politics, as a deliberately slow-acting counterweight to whimsical and over-hasty decisions, as well as counter to the practical view of good governance at quite a few city halls as the art of doing as little as possible.

## *4 Tempo*

*Tempo* is about the speed at which something happens, the pace, rate of change and intensity. Tempo is often politically charged: who decides tempo for whom and why, and what frictions and clashes might occur? What expectations do people in different social domains have of certain activities in a certain time frame (Adam, 2008)? What happens, Adam wonders, when the speed of one domain like the internet percolates into other realms like family life? Speed and acceleration have been dominant themes in theorising metropolitan life, particularly in relation to emerging transport and communication technologies (de Lange, 2010). Scholars and commentators have looked at the speeding-up of the 'urban metabolism' (Townsend, 2000), and the new social and mental attitudes induced by rapid, plentiful and sustained information. Urban designers attempt to create legible cities that mitigate the risk of spatial disorientation and the looming psychological fear of getting lost (Lynch, 1960). Acceleration is a closely related trope. The current obsession with data governance parallels Williams and Srnicek's description of the neoliberal capitalist demand for acceleration and its claim to usher in an age of technological singularity (Williams and Srnicek, 2013). Paradoxically, urban dashboards are touted as providing stability and control while their added value for urban governance relies on ever-increasing acceleration in delivering information (Williams and Srnicek, 2013). Acceleration becomes an end in itself – with near real-time input for reactive or pre-emptive action – instead of a means towards better understanding our cities and empowering people's creativity. Creativity, asynchronous and slow in comparison to computerised systems, becomes ballast rather than a resource. Real-time technologies aspiring to infinitely speed up their own working quite literally preclude the *latent* potential of people to hack these technologies and use them for truly democratic collective self-mastery, governance and creation (Williams and Srnicek, 2013).[9]

## *5 Duration*

*Duration* asks how long. It is the temporal equivalent of distance and its opposite is instantaneity. Duration, like distance, is a subjective and affectively charged

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notion. Instantaneous real-time dashboards map information in an eternal 'now' without a sense of duration. Asynchronicity – taken here as referring to an extended stretch of time between an event, its representation and a possible action – would allow for the development of an affective and emotional relationship to an indicator that is being mapped. For example, a recent study in the field of decision-making psychology shows that people are more willing to drink recycled waste water when it has been stored in an aquifer for ten years, or when it had travelled a hundred miles instead of one mile. New technologies can clean water in five minutes, however, this near-instantaneity runs out of sync with the perceived 'spiritual contagion' of recycled waste water as something that needs time to become purified and 'natural' again (Rozin *et al.*, 2015: 56–57). Asynchronicity seems key in such truly transformative processes, shifting from pollution to purity, from dangerous to safe, and so on. In this case, it also emphasises the magical-thinking involved in many profound decision-making processes; that which seems to escape neat logic and rationality and needs due time to evolve.

## 6 Sequence

*Sequence* is about the order of things, about succession and priority. The absence of a sequence of events means they are conflated into simultaneity. A typical real-time urban dashboarding sequence involves continual capturing of source data as input (the measured thing or event), the algorithmic processing of data along multiple steps, for instance prioritisation, classification, association and filtering (Diakopoulos, 2014), and feeding the output back to an interface and/or decision-making agent.

Klauser, Paasche and Söderström describe this sequence as: (1) generating, gathering and processing data derived from digitised urban systems; (2) interconnecting and fusing various data about everyday life; (3) data analytics (Klauser, Paasche and Söderström, 2014: 869–870). In the attempt to do all this in real-time, the steps in the process and their order and priority are frequently obfuscated. If we think of urban dashboards through the lens of asynchronicity – taken in this case as separate steps that do not neatly fall together – we are drawn to raise important questions, such as what the order of processing entails, what the consequences of this sequence are, to what extent this is open to scrutiny and modification, and who are allowed to design or exert influence on this at what moment. Batty, for instance, notes that the 'manual override' is a major feature of urban interfaces (Batty, 2015: 30). As automated systems become normative forces, it would be very interesting to find out the actual dynamics of overriding the system. The lens of asynchronicity – taken

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here as indicating a consecutive order of separate phases – helps us to question the veracity of what is being measured and displayed by contextualising every step along the way as a situation. For instance, in gathering data, we must pay attention to the fact that experiences, desires and behaviours can vary widely in time, e.g. between day and night and between the seasons. Generic cookie-cutter algorithms trigger instant action without taking temporal situatedness into account.[10]

## *7 Temporal modalities*

*Temporal modalities* refer to the question when something happens, in the past, present or future (Adam, 2008: 2). Adam distinguishes between two standpoints towards the future: the future present and the present future (Adam, 2008). The present future approaches the future from the present, as 'mine to shape and create' (Adam, 2008: 7). The future present approaches present actions as seen from the future: the impact of present actions for future generations. This is the area of ethics. The first seems more individualistic, the other more collective. The real-time dreams of the smart city have a tendency to scoop up the future right now. It is potentially disenfranchising as it ignores the realm of ethics and the active role of citizens in shaping their city for posterity in sometimes conflicting or contradictory ways. Furthermore, Klauser, Paasche and Söderström (2014) observe how automated governing through code alters the relationship between past, present and future. Real-time regulation draws the different temporal modalities into a co-present state: it relies on designed and written code that is modelled on an analysis of the past and applied to the present to anticipate the future (Klauser, Paasche and Söderström, 2014: 877). Furthermore, they argue that governing through code performs the future, since code does not merely describe and analyse the present but also provides a grammar for action (Klauser, Paasche and Söderström, 2014). Asynchronicity here means inserting deliberate breaks into temporal modalities to learn from individual or collective displacements, for example by looking back in hindsight to continually reconstruct the past and learn from it, and looking forward into the future to understand how present actions matter.

From the above we see that asynchronicity always places something relative to something else, while real-time inflates relationships to an eternal here and now. The notion of asynchronicity creates room for understanding the relations and overlaps, so central to life in the city. It creates frictions and seams, rather than polishing them away into a smooth, seamless, efficient and optimised space. In the words of Adam, careful attention to time is needed to understand how 'the individual, the social, the institutional, the historical and the socio-economic,

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political and socio-environmental aspects of our lives are interconnected as well as mutually implicating and forming' (Adam, 2008: 4).

## The asynchronous smart city

Our breakdown of the notion of real-time according to Adam's typology and the lens of asynchronicity has teased out a variety of issues concerning real-time dashboards. In this concluding section, I highlight some elements that stand out: questions about representation, knowledge and politics.

The 'real' in real-time dashboards suggests a direct and unmediated view of the city as it really is, turning 'epistemology into ontology' (Mattern, 2015: no pagination). Furthermore, indicators are translated into actions. Dashboards, however, detach and decontextualise decision-making from the actual situation to which it pertains. 'Management at a distance' (Klauser, Paasche and Söderström, 2014: 870) – the spatial and social distancing between representation and action – derives its validity from the claim to temporal synchronisation between its various actors and operants. Impacts of these actions are only fed back insofar as they can be quantified and calculated as well. For quite some time, urban scholars and planning professionals have deployed media technologies to better understand cities. William H. Whyte for his long-running *Street Life Project* made the film documentary *The Social Life of Small Urban Spaces* (1979), in which he captured and analysed spatial and behavioural patterns of urbanites, combining a perspective from above with detailed on the ground observations. A more recent example is the use of GPS to track people's mobility patterns at the Technical University Delft (Van der Spek *et al.*, 2009). In these cases media technologies merely provide an added perspective of city life. But what happens when a technologically mediated view based on quantifiable indicators takes over and becomes the prime gateway to knowing about today's cities? Can everything be measured and quantified, what is being left out?

At the level of representation, asynchronicity draws attention to citizen-driven reprogrammability as a distinct feature of today's 'smart' cities. The modernist city was spatially preprogrammed to be used for single purposes: living, working, leisure, mobility, meeting (Hannerz, 1980). A city park equipped with WiFi (preferably with decent benches and good coffee) becomes an outdoor working place. Collaborative consumption platforms allow private goods to become pooled and collectivised. Urban facades allow outdoor spaces to become canvasses for artistic uses. Location-based urban games turn the city streets from a mobility infrastructure into a gameboard for leisure activities. In

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tackling pressing urban issues, being smart may in fact mean repurposing instead of reinventing the wheel. Innovation springs from these glitches in neat legibility. Mapping practices have evolved from making the city legible (Lynch, 1960), to writing the city with one's own experiences on annotated maps (Greenfield and Shepard, 2007), to contribute to what Marc Tuters and I – taking the UNIX metaphor a step further – have called 'executable urbanism' (Tuters and de Lange, 2013: 49). Action maps and participatory mapping practices can make the city 'hackable' for its inhabitants, that is, open to systemic change by everyone. Some of the ways in which this occurs are by providing an understanding of its inner workings, engaging people with the ongoing process, providing people with a horizon for action, and building collectives around shared issues of concern (de Lange and de Waal, 2013).

The underlying 'neat' systems perspective of the urban dashboard leaves out the messiness of mapping as a form of representation that necessarily involves generalisations, distortions, ambiguities, 'white lies' and so on (Walker, 2011: 63). Real-time mapping merely parses input into output. It precludes a learning trajectory. From the perspective of user centred design, instant gratification erodes the concept of value or what it takes to achieve something. Renaissance painters experimented with *anamorphosis*. They painted distorted images or elements that could only be seen from certain perspectives or with optical aids like cylindrical mirrors. *Anamorphosis* immobilised the onlooker to a particular vantage point (Bouman, 2013). Interesting for our discussion is that the technique deliberately aims to postpone understanding. Drawing attention to the medium itself, *anamorphosis* engages the spectator in a puzzle game to slowly expose secret layers of representation and meanings. Asynchronicity as a design parameter allows for a deferred sense of accomplishment in learning, feeling smart by piecing together an image out of the inherent distortions of the real-time map. The 'transparency' implied in dashboards means the opposite of experiencing the city viscerally, including its layers of secrecy, which can only slowly be unpacked yet never fully understood.

Second, I briefly dwell on some political implications. At the level of everyday politics, the real-time city appears a machine for delivering frictionless services. This runs counter to ideals of the city as a place of friction and dealing with otherness. At the level of politics as organised decision-making, asynchronicity highlights how smart city interfaces may provide horizons for action in spatial decision-making. Asynchronous maps, such as open data aggregator OSCity.nl, are always unfinished. They show their shortcomings and allow for ongoing processes of adaptation and mutation. They provide scripts rather than scenarios: affording diverging, iterative and open-ended play instead of singular, predefined, top-down planning narratives.

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If we think of politics as participation, we observe a tension between competition and collaboration in smart city governance. *Real-time* is used as the equivalent of *smart*, individual or collective.[11] Many smart apps frequently resort to competition. Klauser, Paasche and Söderström (2014), for instance, describe how an IBM *Smarter Energy* Executive believes that people can be encouraged to change their behaviour based on real-time feedback about other people's energy patterns, which fosters a competitive desire to optimise electricity consumption (Klauser, Paasche and Söderström, 2014: 878–879). At best they leverage collaborative citizen creativity to aid in governing the city rather than assuming a veritable new role as city hackers that challenge this system.[12] Hackability as an affordance of truly smart cities means breaking out of the neat confines of urban governmentality and opening up new possibilities for (re)use of infrastructures and services, and allowing for unsolicited, clever, collective citizen initiatives (see Wakefield and Braun, 2014).

Lastly, politics is a question of fair redistribution and including the excluded. There are places that are not in-sync across various domains, like: law, politics, media, social institutions, or with the rest of the world. While real-time suggests everything is included, in every place there are political vacuums, asynchronous blank spots on the map.[13] We need to be aware that all cities, or parts of some cities, are not algorithmically governed equally.

## Conclusion

Maps have enabled us to imagine and relate to places outside of our immediate surroundings. The 'liveness' of today's media connect us to global geographies. What seems to be lacking is a sense of long-term global temporalities.[14] In this contribution, I have attempted to approach real-time urban dashboards through the alternative notion of 'asynchronicity' as a way to reflect on temporality in mapping the city. Asynchronicity highlights latency, recurrence, deferred understanding and imperfections of the mediating process. It opens up a long-term, slow perspective of the future and a more citizen-centric view of the smart city.

The urban dashboard stands in a long tradition in which ideals of transparency and directness pervade discourses about communication (see for example Peters, 1999). In a sense, the real-time urban dashboard reconciles the space and time-transcending capacities of information and communication technologies with place-based, proximate and co-present urban life. The dashboard serves to solidify a still uneasy affair between the two and their differences in the spatio-temporal modalities of the localised actionable here and the dispersed informational elsewhere (see Rodgers, Barnett and Cochrane, 2014).[15]

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Future research may ask how the real-time city shapes subjectivity and identity though reflexive monitoring and the politics of quantification. The real-time city figures citizens as consumers seeking instant satisfaction or, as Jennifer Gabrys notes, as productive sensing nodes (Gabrys, 2014). How is our sense of self affected by our awareness of living a quantified life that is governed in anticipatory ways? To what extent can the eternal 'now' be reconciled with the careful self-reading and narrative emplotment that figures so prominently in many influential theories of identity (for example, Giddens, 1991; Ricoeur, 1992)? To what degree are transparency and univocality antithetical to heterogeneity, pretence and conceit, ambivalence and multiplicity that underlie personal and cultural identities in the city? How are subjectivities constituted through real-time modes of surveillance? Another line of research would be to focus on the actual design and production side of real-time mapping, for example by conducting ethnographic observations of actual processes of mapping and decision-making in smart city control rooms.

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## Notes

1 Their plea for slowness ties in with a recent call by Christoph Lindner for the slow smart city (Lindner, 2013). In Italy, *città slow* are positively conceptualised as prioritising quality of life over quantity of goods and services.
2 See the research and documentation website at: www.cybersyn.cl/ingles/cybersyn/ (accessed 4 December 2017).
3 See: http://cor.rio/ (accessed 20 December 2017).
4 An example is the London City Dashboard: citydashboard.org/london/ (accessed 4 December 2017).
5 An early example of a real-time city B2C dashboard was CitySense, which allowed its user to see what venues other users with similar consumer profiles were frequenting. An example of a mobile enterprise dashboard is Apple and IBM's *MobileFirst*: www.ibm.com/mobile (accessed 20 December 2017).
6 For more fine-grained typologies of data, see Kitchin (2014).
7 The urban dashboard is frequently described in terms of being the city's brain or operating system, in a striking parallel to popular research that sees the human brain as a supercomputer driving behaviour, experience and thought. This stands in stark contrast

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to research that focuses on affect as a relational and distributed kind of 'smartness' (Zeidner, Matthews and Roberts, 2009; Arvidsson and Colleoni, 2012; Buser, 2014).

8 Kitchin points out that *relationality* is actually a defining feature of big data (Kitchin, 2014: 68). But this seems to be equated merely with dataset *compatibility* and database *connectivity*.

9 Antonio Negri in a response to the Manifesto proposes 'latency' as a potentially revolutionary force: www.e-flux.com/journal/53/59877/reflections-on-the-manifesto-for-an-accelerationist-politics/ (accessed 4 December 2017).

10 For example, an open fire hydrant may be cause for concern during wintertime but may develop into a great community event during a heatwave when left untouched for a while.

11 For example, the Waze real-time traffic app payoff is: 'Outsmarting traffic, together': see www.waze.com (Hind and Gekker, 2014).

12 Currently I am involved in a series of research projects called 'The Hackable City'. See http://themobilecity.nl/projects/amsterdam-hackable-metropolis/ (accessed 4 December 2017).

13 This is an insight I took from DEAF 2014, where Jacob Burns and Steffen Kraemer presented their work for Forensic Architecture about drone strikes in Afghanistan that keep making civilian casualties without the world responding. See: www.forensic-architecture.org/case/drone-strikes/ (accessed 4 December 2017).

14 See Brian Eno's argument in his essay 'The big here and long now' (Eno, 2004).

15 Ironically, urban theorising moves away from place-based container views towards a networked epistemology of cityness (e.g. Brenner and Schmid, 2015), and media theory after the 'spatial turn' becomes increasingly location-specific and situational. Yet common ground remains shaky.

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