Chapter 3

Responsive public spaces: Five mechanisms for the design of public space in the era of networked urbanism

Martijn de Waal, Frank Suurenbroek, and Ivan Nio
Amsterdam University of Applied Sciences, Amsterdam, The Netherlands

Chapter outline

Introduction

In the last decade, various new interdisciplinary practices of urban design have emerged, using labels such as media architecture (Hespanhol et al., 2017) digital placemaking (Hespanhol, 2018) or urban interaction design (Brynskov et al., 2014) to describe themselves. What they have in common is that participants call for an approach to the design of urban space from an integrated or "hybrid" perspective (De Souza e Silva, 2006; Willis and Aurigi, 2011), combining the design of physical and digital infrastructures and experiences.

The Amsterdam-based research project Coreus (Cocreating Responsive Urban Spaces) aimed to contribute to this development by exploring how various disciplines can work together in the design of contemporary public spaces under conditions of what has been called "networked urbanism" (Blokland and Savage, 2008). Broader developments such as globalization, urbanization, shifting investment patterns, and the rise of digital technologies have led to the emergence of

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new urban typologies and practices, such as clusters of large-scale shopping, entertainment, and office complexes often located near multimodal access points, at the crossroads of highways and public transit. While these have been criticized as ill-fit for public space functions (e.g., Sorkin, 1992), we wanted to explore to what extent spatially designed responsive media could aid in bringing out public space qualities in the experiences of these places. What if urban design could integrate new digital instruments to reshape and activate public spaces? In the context of festivals and in controlled settings such as musea, interactive technologies have shown promise for the praxis of urban design. Yet their implementation in urban public space demands new strategies and above all new forms of cooperation between disciplines such as architecture, urban planning, and urban interaction design (Aurigi, 2013; Foth and Sanders, 2008).

In Coreus, we invited urban designers, interactive designers, landscape architects, representatives from the government of Amsterdam, and local stakeholders around the ArenA Boulevard—a mid-1990s development at the periphery of Amsterdam—to explore such an approach. We found that a first step needed was the creation of a common understanding of responsive technologies in relation to urban public space. In answer to that challenge, we have created a heuristic of five mechanisms that map possible applications of responsive technologies in relation to particular public space qualities and the affordances of networked urbanism (see also: Suurenbroek et al., 2019).

In the remainder of this chapter, we will discuss these five mechanisms in detail. To discuss the possible contributions of responsive technologies to the activation of urban public space, we will first set out the key qualities of public spaces that we find desirable as design objectives. This is followed by a brief analysis of networked urbanism as a particular contemporary condition. That will then have set the stage for a further in-depth exploration of our five mechanisms.

Qualities of urban public space

The difference between a city and a village, Jane Jacobs (1961) once famously wrote, is that in cities we always find ourselves surrounded by strangers. Strangers, as various urban sociologists have pointed out, with whom we somehow have to find a way to live together (Lofland, 1973, 1998; Hajer and Reijndorp, 2001). Public spaces have often been understood as the "mixing chambers" (Goldberger, 2003) that allow urbanites of different backgrounds to get to know each other at least categorically; exchange fashions, trends, ideas, and opinions; and create and experience shared understandings. In that line of thought, cities, Manuel Castells (2002) has argued, can be conceptualized as interfaces:

> *between individual and communal identities and shared social representations. It is their ability to organize this interface materially in forms, in rhythms, in collective experience and communicable perception that makes cities producers of sociability, and integrators of otherwise destructive creativity.*

In that light, many critics have theorized cities using the metaphors of the theater and the marketplace, with public space as the stage on which citizens perform their everyday lives, while at the same time forming the audiences for the performances of others (e.g., Mumford, 1937). Through these performances, citizens familiarize themselves with the rhythms of the city, the broad variety of cultural practices, and their fellow urbanites. Through these repeated interactions, for instance, strangers may become "familiar strangers," contributing to "public familiarity" and a broader sense of trust (Blokland, 2006; Van der Zwaard, 2010). As both Willis and Aurigi (2011) and Gumpert and Drucker (2001) have argued, building upon a large body of sociological research, public spaces on the one hand inspire and surprise us through their serendipitous encounters and playful interactions. On the other hand, they are places where social norms are produced and maintained, contributing to a sense of safety and control. Social relations and understandings thus come about through the numerous individual and collective activities and experiences that take place in public spaces.

It is through these repeated interactions that places themselves become meaningful as well and acquire a range of symbolic meanings that citizens can identify with. That is how spaces acquire a sense of place and bring out a feeling of being at home, meaning that citizens have the experience that they belong to that space while the space also belongs to them. Sennett (2018) theorizes this relation between the built environment and the experienced city as one between the *cité* (the infrastructures and built environment) and the *ville* (the layers of symbolic meanings, shared understandings, and imaginaries).

This relation can also be experienced more individually, as poets and theorists since Baudelaire and his infamous flaneur have repeatedly demonstrated. In this tradition, Walter Benjamin has extensively theorized the attitude of the flaneur as someone who wanders through the labyrinths of the city, exploring dialectical images that represent the sedimented complexities of urban life (Boomkens, 1998). More recently, Matos Wunderlich (2008) has described such an approach as a discursive way of walking, which she opposes to purposive walking.

The challenge then of urban design is to construct the conditions in the built environment that invite citizens to become inhabitants of the *ville*. In doing so, urban design has to deal with difficult trade-offs. For instance, public spaces are not only stages for social encounter but also an infrastructure for urban traffic. For public spaces to be successful as urban publics, urban design then has to focus on strategies that can (1) induce a sense of *belonging* through spaces that can be appropriated physically and symbolically by various publics and induce a sense of feeling at home. They must also—at least to a certain extent—feel safe and secure; (2) forge new *relations* by shaping spaces as stages for encounter, exchange, and confrontation; and/or (3) *provoking* inspiration, excitement, surprise, and a discursive and reflective orientation toward one's surroundings (Sennett, 1974; Giddens, 1984; Lofland, 1998; Boomkens, 1998; Hajer and Reijndorp, 2001).

Public space in the era of networked urbanism

Many of the theoretical points invoked above call for particular types of public space: those that function as meeting places for local communities. Typically, they offer a broad variety of functions that attract a broad variety of inhabitants to a central location. However, in the last decades, urban development and practices have taken a different direction. During these years, cities blurred into regional urban cityscapes, which scholars like Brenner and Theodore (2002) and Sassen (1991) addressed and analyzed as regional and postindustrial cities. Among others, Florida (2005) positioned these new cityscapes in a perspective of a global competition between cities, competing to attract new business and the creative class. As a result, in urban planning, cities started to develop new urban areas as nodes connecting local and global networks. Examples are the districts for professional service firms and developments with retail and leisure functions (de Hoog, 2012).

The rise of these sites has concurred with shifts in urban practices. Particularly, scholars with a focus on both the emerging blurring regional cityscapes and the influence of new technologies have argued for a new perspective on contemporary urban publics. Blokland and Savage (2008) described how "sociation" should no longer be understood as taking place in place-bound local communities centered around intensely used public spaces. Rather they see social relations in cities taking shape in a "decentralized diffuse and sprawling character which depends on multiple and myriad technological, informational, personal and organizational networks that link locations in complex ways" (Blokland and Savage, 2008). The authors use the label "networked urbanism" to describe this new pattern of urban usage. Their diagnosis is congruent with numerous analyses of the contemporary cityscape (Tordoir et al., 2015; Van Engelsdorp Gastelaars et al., 2006) that describe contemporary cities as pluralistic and polycentric, based on "more and more differentiated types of delocalized urban lifestyles" (Finka, 2006).

The ArenA Boulevard, developed in the mid-1990s at the periphery of Amsterdam, could be seen as an example of such developments. It contains a 50,000 seat stadium, a megaplex cinema, two concert halls, an array of big box stores, and a series of office towers and budget hotels. Adjacent to a train and subway station and in the vicinity of two major highways, it is easy to reach. Spatially the development is organized around a wide open pedestrianized public space that is designed to accommodate large crowds during events but can feel empty and deserted at other times. The ArenA Boulevard attracts different crowds of people—from soccer fans and concert attendees to office workers and tourists. In general the use of the space can be characterized as functional: visitors plan their visit purposely and don't linger much. Most of these groups have their own usage pattern, and there is little overlap between them. The Boulevard may be colonized by a flock of soccer fans on Sunday afternoon, while by Sunday evening, fans of a rock band have taken over, without much overlap between the two groups.

Digitalization plays an important role in the emergence of these new spatial practices. The rise of digital and mobile media started to personalize the use of the urban space in a subtle way. Wellman et al. (2003) has argued that networked media have enforced a broader sociological development of "networked individualism," in which citizens increasingly have the opportunity to self-select the social groups and networks they associate with (e.g., Tironi, 2010; de Waal, 2014). Each of these groups inscribes its own social geography on the urban space, where digital media function as the coordination centers for both physical meetups and online exchange. As Foth and Sanders have argued, these developments lead to a different understanding of urban publics and their usage of public space. Public space is much more than the central square in the geographical heart of a community, as "the contemporary interpretation of community is shifting from 'village' and 'neighbourhood' to 'social network' and 'urban tribe'" (Foth and Sanders, 2008).

More recently a number of authors have described how the rise of digital platforms such as Google Maps, Uber, or Airbnb has increasingly started to organize the interactions between citizens and their geographic activities. Critics have warned that such a "platform urbanism" as an interface to the city produces urban "filter bubbles" and practices of "software sorting" (Foth, 2017; Foth et al., 2018; Rabari and Storper, 2014; Widmer, 2016; Graham, 2005). Analysis of user data in social networks and mapping services could influence algorithms that recommend, reveal, or hide particular urban sites and networks, based on user profiles. These spatial, digital, and social developments could lead to a "networked parochialization" of urban space, with various urban publics shaping their own networked geographies of "parochial spaces" (Lofland, 1973), possibly decreasing the use of traditional public spaces as site where various publics temporarily overlap.

Such a personalized way of using urban space, in combination with the purpose-driven practices of visits to sites as the ArenA Boulevard, could undermine the vital social role of public spaces as the sites where citizens familiarize themselves with (and contribute to) the rhythms of the city and their fellow inhabitants. They may be experienced of what Auge (1995) has conceived of as "nonplaces," interchangeable sites without any local identity or grounding. Taken together, these developments could erode the necessary repetitive interactions that create a shared social fabric and the feeling of being at home among strangers, as well as the emergence of shared place-based symbolic meanings. Do these expressions of networked urbanism then break the link between *ville* and *cité* and undermine the qualities of public space, described earlier as belonging, relations, and provoking?

Perhaps, however ironically, these new frictionless urban spaces like the ArenA Boulevard may also hold the key to create new public domains in our spatially blurred and socially fragmented cities. As Willis (2016, p. 4) has argued, urbanites themselves do usually not perceive these sites as nonplaces, even though, as she summarizes, "places are increasingly becoming contingent

on interactions occurring within technological meshwork." Rather, they use digital media to select relevant places to visit and constantly shift their attention between the here and now and the mediated content accessed through their mobile devices. However, that doesn't mean that their spatial experiences are not meaningful to them. The fact that they make use of urban spaces in a more fleeting and networked manner may also lead to a preference for spaces that are easy to reach. Referring to a study of the locative media app Foursquare, she concludes that it is sites like airports, railways stations, cafes, and restaurants that are highly valued. "[these] are the places that become most valued in the meshwork, and they are also characterized by their urban publics; they are places where people converge and then disperse; brought into being for the time in which the networked links connect" (Willis, 2016, p. 5). Well-connected and functional sites like the ArenA Boulevard are frequented by diverse groups of people, albeit not always at the same time, and for a diverse range of functions. Could those cultural-geographical patterns hold the key to revive it as a public space and reconnect the relation between *ville* and *cite*? In the next section, we explore how responsive media in urban design could play a role in that process.

Responsive technologies: Five mechanisms for public space

Our starting assumption was that interactive technologies, wireless networks, sensors, smartphones, and technologies such as the Internet of Things offer an entirely new, complementary set of instruments for urban designers and the way we approach public spaces. Of course, interactive technology has already been applied a great deal for individual objects, especially in the arts. In museum exhibitions, responsive installations add new layers to the story, experience, and immersion—while at the same time reshaping the relationship between the object and the visitor. Open-air artworks such as those of Studio Roosegaarde or the annual light festivals in Amsterdam or Sydney offer visitors spectacular experiences, reshaping public space temporarily. Academia is contributing to the development of this interdisciplinary approach through international institutes such as the Institute for Advanced Architecture of Catalonia (IAAC) in Barcelona and MIT's Senseable City Lab. Much progress has been made in the operation and properties of interactive installations in disciplines such as media architecture (Hespanhol et al., 2017) and urban interaction design (Brynskov et al., 2014) and through the debates around smart cities. In parallel a number of researchers and practitioners have also started to explore interactive technologies as a tool to activate urban public spaces as placemaking (de Waal, 2014; Pop et al., 2016; McQuire, 2008). Various terms are being used to describe these experiments. Already in 2006 Frenchman and Rojas (2006) used the term "responsive" to describe physical installations in public space that are able to adapt to different circumstances. Others have used terms such as "augmented urban space," highlighting the complex layering of digital and physical spaces (Aurigi and Cindio, 2008), and "active

public space" (Markopoulou et al., 2017), referring to the notion that public space is not a given condition, but needs to be activated, for instance, by the use of digital technologies. Taken together the combination of interactive technology and urban design can be understood as an act aimed to invoke public domain qualities in new urban spaces—as well as an act of cocreation between multiple (design) disciplines. We have conceptualized these challenges as the *design of responsive public spaces* (Cantrell et al., 2015; Ratti and Claudel, 2016).

Such an integrated vision requires an interdisciplinary way of working, in which developers, urban designers, interaction designers, and local stakeholders collaborate toward the shared goal of establishing an active urban public domain. This means that these various parties need to have a shared understanding of the desired qualities of the public domain, as well as insights in the ways in which both spatial and interactive design can contribute to this.

Yet, as we found in our own 2-year action research on responsive spaces, these disciplines do not tend to have a tradition of pursuing this collaboration. Strikingly the need for such a shared frame of reference came to the light during a series of cocreation sessions in which various actors involved in the ArenA Boulevard were invited to start reflecting on the design of interactive installations. This resulted in a broad variety of perspectives and discourses on public space, different design practices, social interaction, and the use and meaning of technology, resulting in equally different design strategies and divergent expectations about the use of responsive technologies.

As a result, we worked with these various actors to construct a shared vocabulary. We constructed a heuristics meant to combine lessons learnt from existing interactive installations with the qualities of public space described earlier and the affordances of networked urbanism. How can we understand responsive media as an instrument in urban design to bring out these public space qualities in environments that attract various groups of citizens, albeit in different rhythms, and often in a purpose-driven mode?

Our heuristics was constructed in a number of cocreation sessions, where we discussed examples of existing responsive technologies. A number of studies were particular useful in introducing us to these projects, notably *What Urban Media Art Can Do* (Pop et al., 2016), *State of the Art and Best Practices Collection. Active Public Space* (Markopoulou et al., 2017); the proceedings from the Media Architecture Biennales held in Sydney and Aarhus (Dalsgaard and Fatah, 2014; Dalsgaard and Fatah gen Schieck, 2016); and the compendia and website archiving entries for the Media Architecture Awards (Hespanhol et al., 2017).[a] In addition, in other cocreation sessions, participants created paper prototypes of responsive media installations for the ArenA Boulevard, acting as conversation pieces for further discussion. Parallel, detailed spatial, and social analysis of the ArenA Boulevard was conducted, feeding the sessions with tangible problems and existing sociospatial properties.

a. Awards.mediaarchitecture.org.

This resulted in a set of five concepts that are meant to be used as point of departure in discussions between various stakeholders to discuss how public space qualities can be brought out in settings of networked urbanism with the aid of responsive technologies in urban design. We will now continue with the discussion of these mechanisms.

Sense of place

One of the functions of public space identified earlier is its ability to work as an interface between individual and communal identities or, to use Sennett's terms, to invite the users of the *cité* into the *ville*. Public spaces that fulfill these functions are sites where layers of symbolic meaning can emerge and where the rhythms of the city can be experienced. This can create a sense of belonging and provoke as a sense of excitement, curiosity, inspiration, and reflection. We identified "sense of place" as a mechanism that aims to activate these functions of public space. Responsive media in this category provide means to record, store, or attach meaning and associate these with a specific location and make these experienceable for others, who may or not be copresent at the same time and place. The sense of place mechanism attempts to capture and visualize a location's rhythms, to represent the collective identities and meanings of various publics that are connected with a location, and to make a location's stratified historical meaning accessible to individuals and collectives, both now and in the future. Conceptually, individual experiences are consolidated as collective experiences, and these collective stories, practices, and meanings are made experienceable again, so visitors to a location can learn about them, identify, or oppose them, even if the events they refer to are not occurring or immediately visible at that moment.

There are various ways to apply this sense of place mechanism. Rhythms and symbolic meanings can be traced through sensors in public space, the capture of data from other sources, such as social media, through crowdsourcing or by means of a curatorial practice of a designer, for instance, in collaboration with a local cultural institutions. In turn, these data, experiences, and stories can be brought back into public space in a variety of ways, ranging from the very prosaic (a measuring device that records exactly how many people passed by at specific points in time) to the very poetic (abstract images of rhythms that cannot be directly traced back to actual events). Some installations in this category show an "average"; others, by contrast, make a sequence of individual experiences visible that together add up to a unified whole. Sometimes the mechanism is invoked to make collective patterns visible or to reveal particular histories. It has also been applied to communicate experiences happening inside a particular building to passersby outside ("what happens inside") or to communicate experiences over time ("what happened yesterday").

The spatial positioning of these installations is also a mean to reshape urban space itself. The "sense of place" mechanism is a spatial stylistic device.

It shifts the built space from a neutral backdrop to a condition creating "enabler." Positioning the installation on a blind wall or inside a venue, for example, could instantly add cohesion and unity to a whole space. A central position in the middle of a square or two-thirds of the way up a space can create the same spatial effect as a fountain or statue, creating smaller subspaces and adding meaning along the way. The installation creates a shape and connects a space or differentiates it into subareas. The relationship with the user is also part of the spatial assignment. How does the object relate to the experience of arriving in the space: is it immediately visible or in fact waiting to be discovered "around the corner"?

There are by now many exemplary projects that have operationalized this mechanism, most of the time in the form of temporary art installations and at other times as more permanent fixtures in urban space. Many cities have featured "mood barometers" that in one way or another visualize various variables, from traffic movements to weather data in public space. In the field of culture, OKRA Landscape Architects used light projections in the city of Utrecht to highlight the outlines of a roman fort in the city center, relating its current urban form to its historic origins.[b] As an example of a contemporary and collaborative approach in her installation *Urban Alphabets*, Suse Miessner invited urbanites to use their mobile phones to make pictures of typefaces used in graffiti, shop signs, advertising and other texts found in the city. Taken together, these pictures create an alphabet that is projected on a screen in public space. As such, it encourages passersby to pay attention to typographic details in their surroundings as part of the development of a local identity.[c]

The sense of place mechanism can also be applied in a more critical or layered approach. For instance, the installation *Public Face* by Julius von Bismarck, Richard Wilhelmer, and Benjamin Maus measures the mood of a particular space by using video cameras with facial recognition software that captures the smile of passersby.[d] Their grins or grumpy faces are then assembled into a huge neon-lit smiley displaying the average mood of the day. Whereas this can be experienced as a collective rhythm or mood, it also brings its own mechanics to the attention. Is it acceptable that video cameras are used to measure people's moods in public space? Does it turn public space into an equivalent of Facebook where all our emotions are carefully datafied to be able to turn us into marketing targets? More directly critical is Nika Radić' *Office Cleaning*.[e] In this installation, Radić uses a "what happens inside" approach to project videos depicting office cleaners at work inside a building at the external façade. The installation makes the walls transparent, revealing a reality that is usually not visible in public spaces, featuring groups of people that are usually marginalized.

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b. Domplein, Okra Landscape Architects. https://www.okra.nl/en/projects/domplein/.

c. Urban Alphabets, Suse Miessner. http://www.ualphabets.com/.

d. Public Face, Julius von Bismarck, Richard Wilhelmer and Benjamin Maus. http://juliusvonbismarck.com/bank/index.php/projects/public-face-ii/.

e. Office Cleaning, Nika Radić, 2008.

(Playful) interaction

Following the metaphors of "theater" and "marketplace," the (playful) interaction mechanism highlights the relational qualities of public spaces. Playful interaction turns public space into a stage or "magic circle" on/in which urbanites can interact with each other. Whereas the sense of place mechanism can be experienced in an "ambient" way while passing by, (playful) interaction actively invites visitors to take part in a particular dramaturgy. Yet passersby can also watch the playful interactions of others, assuming a more passive role as spectators. (Playful) interaction is thus about connecting people in public space, in various degrees of intensity. This could vary from brief encounters to more prolonged and in-depth interactions. Also the type of interaction could vary, from playful and affective experiences to democratic debates and the construction of issue publics.

As such, it draws upon different types of conceptualization of public space. In the first, public space is mostly seen as a site that builds familiarity and trust between urbanites. Urbanites get to know each other by observing each other from a certain distance, overhearing conversations, or having a chat with someone. The playful interaction mechanism contributes to this process. The exchanges facilitated by this mechanism do not necessarily lead to new friendships or a close homogeneous community but rather to a fundamental trust that perpetuates the idea of the city as a community of strangers. This might involve playing a game together that has specific goals, rules, and scoring, often with a competitive element and high scores. Other installations invoke the principle of free play. Like in a playground, there are no specific rules or established goals but rather an environment or "world" that reacts to players and provides a number of expressive tools. And just as the seesaw or duo-swing in a real playground invite players to coordinate their activities, these projects also invite players to work together or coordinate, resulting in a brief, shared choreography. In some cases such an approach departs from a critical appraisal, addressing the commodification of public space and the emergence of a "society of the spectacle." These examples take inspiration from the situationist movement that in the late 1950s and 1960s staged artistic interventions aiming to undermine a dominant culture of consumption. Instead, they proposed a new type of relationships between urbanites and with their surroundings.

In another tradition, public space is seen as a space for (rational) political debate and struggle, a site where issues can be brought in and discussed. In turn the staging of what Marshall Berman (1987) called "recognition scenes" can lead to the formation of a public around these issues. Here, different approaches are taken. In some cases interactive installations invite passersby to contribute to a public discussion. They can vote, contribute arguments, or voice their opinion that is then usually projected on a screen or projection in public space. The installation itself functions as an arena for debate. In a different approach the goal of the installation is not so much to mediate the discussion itself, but to provoke debate among bystanders by visualizing a particular topic or issue. In

these examples the installation is not an arena for debate, but rather a conversation piece. A subgenre in this category concerns data visualization in public space. Data about, for example, electricity use or pollution are reproduced using an interface, not necessarily in real time, to raise awareness of an issue and help create "issue publics" (communities that concentrate on a defined issue such as sustainable energy, focusing on a particular issue; see, e.g., Claes, 2017). These responsive installations often revolve around the question of "citizen engagement": how can citizens become involved in social and local issues in new ways through responsive installations?

Spatially, these offer a different mechanism to shape the space. As their goals are much more orientated toward activating and lingering, the positioning of the installation helps to activate part of the spaces that had been overlooked or underserved, adding new nodes to the entire public space. Moreover, this kind of installation could be positioned as a "stepping stone" between the more remote areas and public transportation, enabling "safe passages," by clustering pedestrians and users.

Many responsive projects in this category have been employed as temporary installations in public space, often as part of festivals or events, sometimes also as a "guerilla" intervention. Others have been designed as an integral part of a building or public space. An example of this is *BruumRuum!*,[f] a large-scale interactive light installation at the Plaça de les Glòries Catalanes in Barcelona. Nearly 10,000 LEDs are integrated in the pavement of the square. They light up in reaction to sounds made at the square that are measured by sensors in large periscopes at the perimeter of the installation. This encourages passersby to experiment. By whispering, shouting, singing, or clapping, they can change the pattern of light on the square. It results in playful interactions, with passersby trying to control the pattern of light or enjoying the ability to influence it.

SMSlingshot is an example of an artistic intervention that addresses the commercialization of our everyday surroundings, leading to a domination of advertising messages instead of social or political interaction. In this installation, urbanites were given the opportunity to seize back their public space. Using a catapult, fitted with a mobile phone keyboard, they could type text messages and "sling" these onto the façade of an adjacent building.[g]

In some instances, the playground metaphor is used literally. The Canadian project *21 Balançoires*, for example, consists of a series of swings that make music when visitors move them back and forth. Coordinating their movements allows for particular compositions to emerge.[h] In other examples, variations on long-forgotten games and drama genres are used. Rafael Lozano-Hemmer's *Body Movies* installation, for example, uses the concept of 17th century shadow plays: passersby are invited to use their bodies to create silhouettes on a building's facade.

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f. BruumRuum! David Torrents & artec3; LEDsCONTROL. https://summalab.com/BruumRuum.
g. SMSlingshot, VR/Urban - Christian Zöllner, Patrick Tobias Fischer, Sebastian Piatza en Thilo Hoffman. http://www.vrurban.org/smslingshot.html.
h. 21 Balançoires Daily Tous let Jours. https://www.dailytouslesjours.com/en/work/musical-swings.

While this free play provides an easy entry into the installation, there is a game mechanic hidden in the installation that is not immediately obvious. Players have to make an effort and really look or talk to others who already understand it and coordinate their moves to bring out a fresh background image.[i]

Personalization

The mechanism of "personalization" aims to contribute to a sense of belonging. It provides urbanites with ways to appropriate a space and claim it as theirs. It aids in navigating cities by bringing out relevant themes, locations, and connections while filtering out the noises, nuisances, and unfamiliar elements that can make public space inhospitable. Whereas sense of place and (playful) interaction as mechanisms are concerned with bringing out urban publics and relations between citizens, personalization addresses the reverse issue: how can urbanites—either as individuals or as collectives—stand their ground; how can they feel at home among strangers?

For a long time, critics and researchers have laid out how urbanites have developed a number of "defense mechanisms" to cope with the (over)stimulation of urban life in the modern metropolis. In the early 20th century, German sociologist Georg Simmel (1969) discerned a blasé attitude ("Simmels' Mask"). He noted that as a reaction to the information overload, citizens tend to withdraw into their private world in the middle of the public domain. For instance when they hide behind their newspapers in public transport, using the printed broadsheets to carve out a niche of personal space in a crowded environment. More recently the mobile telephone has been analyzed in a similar way. Ito et al. (2006) have shown how this device too can function as a "territory device" that allows users to create a private space in the public domain.

Other observers have pointed to more "offensive" tactics that urbanites have developed. Already in the 19th century, the French poet Baudelaire introduced *flânerie* as an attitude that allows urbanites to more or less intuitively select inspirational elements from the abundance of impressions in the city. Various philosophers have further contributed to the development of the now mythical figure of the *flâneur*. Walter Benjamin, for example, referred to the *flâneur*'s capacity for "absent-minded attention" (Boomkens, 1998). We usually perceive the multitude of impressions in the city unconsciously. At the same time, we have the ability to draw meaning from them and to select from all those impressions those that are relevant to us.

This is what the personalization mechanism aims to do: to help urbanites make a selection from a plethora of impressions and at the same time aid urbanites in carving out a place for themselves amidst the multitude of experiences. From a perspective of responsive media, this often takes the form of an app. The smartphone is a personal technology par excellence. It allows urbanites to obtain personalized information about a city and its inhabitants and can filter out

i. Body Movies Rafael Lozano-Hemmer. http://www.lozano-hemmer.com/body_movies.php.

those aspects that are of interest for the user. The other way around, visitors can use their mobile phone and its camera to capture an experience, make it their own, and share it online as an act of appropriation. It is a way to connect themselves with a space symbolically. There are also installations in public space that can operationalize the personalization mechanism. There are various tools or installations that allow users to mentally or physically isolate themselves temporarily in public space. Digital displays in public space could also give out personal information, and technologies such as eye-beacons can recognize and welcome users with personalized information. Although such an approach is not without its controversy, as it could also undermine the feeling of being at home. If responsive technology directly addresses an individual in public space, he or she is no longer anonymous. An individual might then feel observed or controlled by an invisible force.

There is a certain tension at play in this mechanism in relation to the experience of public spaces. Personalization allows urbanites to personalize their experience of the city and to select from the overwhelming choices on offer. While this makes the polyphony of the city habitable, it may also contribute to the further privatization of public space and the formation of parochial domains that are frequented by specific groups of people. Although this is a risk with regard to the successful functioning of public space, it does not necessarily need to have a negative effect. Tactics of personalization not only can be understood as a porous boundary that is raised temporarily but also could easily be lowered again. Looking up from the newspaper or mobile telephone for an instant is enough to burst the bubble. The very experience of such a temporary private space can provide people with the confidence and foothold they need to feel at ease in the public space.

Perhaps the most important design issue raised by this mechanism is how it could be operated in the spatial design. The interaction between users and their surroundings mostly occurs on the screen of a mobile telephone. How can the spatial design of the public space facilitate this dynamic? On the one hand, it is important for spaces to be organized in such a way that they can be appropriated by a variety of groups. Is it then possible to temporarily appropriate part of the space? On the other hand, specific cues in a space can make the presence of diverse publics possible or encourage users to appropriate the space online too. Think, in this regard, of the various selfie spots that are frequently photographed and shared via social media. The photograph might be considered an act of appropriation; the online sharing possibly contributes to a sense of place for a particular location or alerts future visitors to the attractiveness of that location.

This mechanism can also make it possible for a variety of groups to simultaneously use the same spaces. Groups of people with a similar identity or purpose do not necessarily need the symbolically loaded spatial cues that tell them that they are among each other and at home on their own turf. When the software of responsive media can forge a connection between people, they can meet up anywhere that is convenient for them. Following this logic, linked

through an app or a website, various groups can arrange to meet at the same sites. A park becomes a meeting place for digitally organized and coordinated soccer teams, groups of friends having a barbecue, and parents with young children; a cafe becomes a venue where freelancers hold business meetings, school pupils do their homework, and two potential lovers encounter each other for the first time on a date arranged by a dating app. From within all these temporary bubbles, urbanites can in turn relate to each other. Through such a mechanism, also sites such as shopping centers or transit lounges that are often understood as nonplaces can be temporarily transformed into meaningful meeting places. Locations on or around transport hubs are particularly well suited for these sorts of digitally arranged meetings because they are easy to reach.

Routing and legibility

The routing and legibility mechanism addresses the ways in which responsive media can aid urbanites in their orientation on and navigation of public spaces. The term "legibility" refers to the seminal study *The Image of the City* by Kevin Lynch (1979), undertaken in 1960. In this study, Lynch looked at the ways in which city dwellers find their way through the city and make sense of their environments. Lynch found that urbanites construct mental maps of their cities, consisting of elements such as landmarks, edges, paths, and nodes. Legibility then is the extent to which these elements make the layout of and relation between places easy to grasp. This not only makes navigation easier but also opens up opportunities to make places more meaningful, as these elements become bestowed with symbolic meanings.

Ideally, Lynch argues that the design of such elements does not only make navigation easier, but also provides emotional security and a sense of (shared) identity.

In this, Lynch was not just interested in improving the ease of making routine trips. He also made the point that designers have a duty to encourage urbanites to explore new spaces outside their usual routines and familiar places. "The function of a good visual environment," wrote Lynch (1979, p. 109), "may not be simply to facilitate routine trips nor to support meanings and feelings already possessed. Quite as important may be its role as a guide and a stimulus for new exploration." In other words, making a location more legible should improve its quality as a public domain. A similar call has been made by Matos Wunderlich (2008), encouraging designers to invite urbanites to deviate from their purposive routes and engage them in a more discursively mode of exploring the city. As such the routing and legibility mechanism addresses all three public space qualities at the same time. It provokes inspiration and a reflective orientation and forges new relations by seducing urbanites to discover new territories, and it can induce a sense of belonging by the creation of landmarks and other visual elements that become meaningful over time.

Responsive media can activate the routing and legibility mechanism in a variety of ways. First, interactive installations can become meaningful landmarks themselves. *The Crown Fountain* in Chicago is an example of such an installation. The fountain, designed by Jaume Plensa, has become a central meeting point in the park at which people congregate. At the same time, it adds to the identity of the neighborhood, as the fountain displays brief, slow-motion video films of neighborhood residents.[j] Spatially the mechanism offers the possibility to link and familiarize a particular public space (i.e., square of street) to the quarters or cities larger network of public spaces, both visually and in terms of identification or orientation.

Other responsive media installations guide urbanites through the city, dynamically altering the routing information provided. This could vary from the prosaic traffic information systems to more poetic interventions in the spatial architecture highlighting a particular route through public space. Interactive kiosks and information pillars can offer suggestions and help visitors to orientate themselves in their surroundings. Experiments are taking place in Japan with robots that guide visitors around a shopping center. Studio Roosegaarde's *Van Gogh Path* is an example of a poetic approach. A cycle lane near the Dutch village of Nuenen (Van Gogh's residence during a part of the 1880s) is illuminated with thousands of reflective stones, highlighting the route itself and linking it to Van Gogh's painting Starry Night.[k]

Digital apps too play an increasingly important role as navigation tools. Apps such as Google Maps or TomTom navigation systems not only provide routing information but also can help urbanites to search for specific places like restaurants, museums, or shops. They often make use of live traffic data and public transport information to guide users in the most efficient way to these locations. However, this efficiency sometimes runs counter to the quality of the experience of public space. In our research, we found that tourists looking for a hotel at the ArenA Boulevard are guided through the unpleasant dark alleys at the rear side of the boulevard instead of along the spacious boulevard itself. This observation can be linked to a wider spread criticism of GPS, claiming that it could undermine our ability to get our bearings ourselves and build meaningful relationships with the spaces we traverse and make use of. Instead the argument went that people are slavishly following instructions, forgetting to look around.

Some apps and installations try to reverse such behavior. Many of these draw upon the rich legacy of the derive as a playful approach to navigating cities introduced by the situationists, a French avant-garde movement in the 1960s. Mark Shepard's *Serendipitor* for instance is a navigation app that provides users with interesting detours and playful interventions. Others use game mechanics to encourage people to explore public spaces. *Urban Code*, for instance, is a

j. Crown Fountain, Millennium Park Chicago, VS, Krueck + Sexton architects in collaboration with Jaume Plensa. 2004. https://jaumeplensa.com/works-and-projects/public-space/the-crown-fountain-2004.

k. Van Gogh Path, Studio Roosegaarde. https://www.studioroosegaarde.net/project/van-gogh-path.

game that encourages users to find specific art objects attached to walls in public spaces. Playing the game unfolds as taking a discursive walk through the city to complete one's collection.[l]

While the routing and legibility mechanism draws the attention to the affordances of responsive media to help people create meaningful relationships with their surroundings and can invite explorative and discursive modes of navigation, critics point out that these same affordances can also be used to undermine some of the qualities of public spaces.

To what extent are the algorithms guiding urbanites around controlled by commercial interests resulting in a focus on customized offers from these parties? And to what extent could this mechanism also contribute to "software sorting," a process in which people mainly link up with likeminded? These are important issues to address in the operationalization of this mechanism in the design of responsive media.

Control

Control is a rather controversial mechanism through which responsive media aim to control, regulate, or nudge social behavior in public spaces. This could contribute to better managed, safe, and more enjoyable places. At the same time, it could also severely limit the publicness of public space, by the introduction and enforcement of strict rules that may exclude particular behavior and groups and undermine values such as privacy. The use of this mechanism also raises serious questions. Who decides what constitutes desirable behavior? Is it not the essential quality of the public domain that it provides an enormous freedom for diverse lifestyles and political views to be represented? Doesn't such an approach contribute, above all, to even more privatization and commercialization of public spaces?

In a "light" version, this mechanism is operationalized in responsive media that stimulates particular behavior to keep public spaces clean and safe, often making use of "gamification" elements. For instance, *Street Pong*—also known as *ActiWait*—is a game that people can play while waiting at a red pedestrian traffic light. On both sides of the street, screens are installed at the traffic light, encouraging people to battle those at the opposite side of the street in a short game.[m] The goal of course is to encourage people to respect the red light. Similarly the project *Tetrabin* rewards people who throw away their garbage in the specifically designed trash cans. These are outfitted with screens on the outside, and when litter is thrown into the rubbish bin, Tetris-style blocks appear and animate.[n] As a last example in this category, *Northside beacons* was an installation deployed at the Northside festival in Denmark. Sixteen tall light

l. Serendipitor, Mark Shepard. http://serendipitor.net/site/?page_id=2

m. ActiWait, Indiegogo. https://www.indiegogo.com/projects/actiwait-a-smart-traffic-light-button#/

n. Tetrabin, Sencity Corporation. http://www.tetrabin.com/.

beacons spanning the entire length of the festival ground would flash when litter was deposed at the designated garbage cans, expressing a brief "thank you."[o]

A more extensive version of this mechanism can be found in the *Stratumseind* living lab. Cameras and sensors have been installed to map the behavior of nighttime visitors to the various restaurants and cafes in a bar street in the center of the Dutch city of Eindhoven. Various data are collected, ranging from the occupancy rate of the parking garages to the noise level on the street. Together, they provide an impression of the mood in the area. This is monitored from a central coordination point to take measures when necessary. For instance, research is currently under way whether these data can be used to adjust the color and intensity of the street lighting, with the aim of influencing the atmosphere in the area to reduce violence.[p]

Experiments using the control mechanism in China go much further. Cameras equipped with facial-recognition software record pedestrians who cross the street when the light is red. In Shenzhen, they are then publicly shamed: their photographs, together with their names and national identity numbers, appear on large screens in the public space. Next, offenders receive an automatic fine via SMS (Baynes, 2018). Similar experiments are being conducted in the Netherlands. Rotterdam's RET public transport operator was experimenting with facial-recognition software in trams and buses as early as 2011. If a camera recognizes a passenger who has been barred from using public transport due to previous misbehavior, RET staff receive an alert so that they can take action against the passenger (Van den Dool, 2011).

At the level of the city, this mechanism can be found in the many "urban dashboards" that have been introduced in various cities around the world (Kitchin et al., 2015). One of the best known examples in this category is the *Centro De Operações Prefeitura Do Rio*. This control room was set up by the city of Rio de Janeiro together with IBM in the run-up to the 2016 Olympic Games. Various information flows about the city—from the traffic situation on main roads to the weather forecast—are projected onto large screens in a hall. Officials from various municipal services monitor these data streams and can intervene if required.

Many of these measures are introduced to improve security in public spaces, but there is also considerable criticism of their use. They are part of a broader development that has seen public spaces increasingly dominated by control, with targeted groups often being excluded. Take, for example, "bum-proof" benches, designed to make lying on them uncomfortable. Critics argue that that these measures contribute to development in which public spaces are increasingly dominated by comfort and consumption; behaviors or publics that are thought to undermine these functions are discouraged from using the space. This could lead to public space losing its character as an inclusive meeting place, as a stage where all urbanites can be present, or as a place for political resistance. In short,

o. Kollision Northside Beacons. https://kollision.dk/en/northside-beacons.

p. Stratumseind Living Lab. https://www.tue.nl/universiteit/faculteiten/bouwkunde/onderzoek/smart-cities-program/collaboration/living-labs/stratumseind/.

this mechanism always involves a fine line between on the one hand enhancing the attractiveness of public spaces by making them safer and more comfortable and disciplining and even excluding visitors on the other.

Discussion

The perspective that we have taken carries a certain risk. We do not want to argue for an easy "solutionism" (Morozov, 2013) that through interactive technology we can restore the relation between *ville* and *cite*, magically transferring places that are referred to as "urban deserts" into vibrant public spaces, if only we had a responsive installation. Rather, we wanted to explore the qualities of responsive technologies as a new building block, unlocking and adding up to the traditional instruments of urban design. As such the point we want to make is that interactive installations or services should not be added as an afterthought, a quick patch to bring some liveliness to a lifeless place. Rather, we argue for urban design that starts from an integrated perspective and takes the notion of urban public space as its point of departure.

A prerequisite to the creation of responsive urban spaces that are able to animate public domain qualities in public spaces is the equal involvement of both spatial and interaction designers in the design process. Spatial design is necessary to embed the responsive technologies as a spatial element and spatial solution, instead of a singular object or artifact at a location. Similarly, interaction design is essential to design and materialize the mechanism of responsiveness. Moreover, as we found in our research, the involvement of local stakeholders and sociospatial analysis of the space in the design process are important as well, as the design takes place in existing urban spaces, building on top of memories, experiences, and realities. As a result the design process is one of cocreation. Yet, this blend of professions lacks a culture of collaboration.

Our five mechanisms are meant to help out here as a shared vocabulary, focused on public space qualities to which responsive media could contribute when integrally designed as part of the spatial design of the site. Again, they are not meant as easy solutions, but rather as a heuristic that can aid in the discussion on how public space qualities can be brought out in an integrated design approach. This is no easy process. As described earlier, many of the mechanisms carry a tension inside of them with regard to the qualities of public space. Control can make spaces more safe and pleasurable, but it could also exclude. Routing and legibility not only can help in the discovery of new territories but also can reify sociospatial stratifications. Playful interaction can bring out new social relations but also can play into an agenda that highlights public space as an exclusive leisure space for the creative class.

We hope that his heuristic can also contribute to future HCI research in relation to responsive public spaces and urban interaction design. It could complement a usability perspective with a framework that relates particular design patterns to their affordances in relation to public domain qualities.

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Author biographies

Martijn de Waal is a Lector (professor) in the Play and Civic Media Research Group at the Amsterdam University of Applied Sciences. His work focuses on the experience and design of public spaces in a networked society. He is the author of The City as Interface (Nai010 Publishers, 2014), The Platform Society (Oxford University Press, 2018—with Jose van Dijck and Thomas Poell), and with Michiel de Lange he edited The Hackable City (Springer 2018). He collaborated with Frank Suurenbroek and Ivan Nio in the research project Co-creating Responsive Urban Spaces (2017–19). With Frank Suurenbroek, Michiel de Lange, and Nanna Verhoeff, he is part of the executive committee and general chair of the Media Architecture Biennale 2020.

Frank Suurenbroek is a Professor (lector) of Spatial Urban Transformation at the Amsterdam University of Applied Sciences, Faculty of Technology. His chair conducts multiple action-research projects on urban transformation, with a focus on the relation between the physical and the social fabric. Recent research takes a neuro-architectural approach (sensingstreetscapes.com). He collaborated with Martijn de Waal and Ivan Nio in the research project Co-creating Responsive Urban Spaces (responsiveurbanspaces.amsterdam). With Martijn de Waal, Michiel de Lange, and Nanna Verhoeff, he is part of the executive committee of the Media Architecture Biennale 2020/21.

Ivan Nio is a Senior Researcher at the Amsterdam University of Applied Sciences (Faculty of Applied Social Sciences and Law). He obtained his PhD in social sciences at the University of Amsterdam. In his research and publications, he has explored diverse themes on the interface of urban design and urban sociology. He collaborated with Frank Suurenbroek and Martijn de Waal in the research project Co-creating Responsive Urban Spaces.

Chapter 4

Smart plays

Ben van Berkel[a,b,c,d,e], **Filippo Lodi**[a,f,g,h], **and Wael Sami Batal**[a,i,j]

[a]UNStudio, Amsterdam, Netherlands, [b]UNSense, Amsterdam, Netherlands, [c]Rietveld Academy, Amsterdam, Netherlands, [d]Architectural Association, London, England, [e]Harvard University Graduate School of Design, Cambridge, MA, United States, [f]MSc Civil Engineering and Architecture, Università di Bologna, Bologna, Italy, [g]Architecture, MA Advanced Architectural Design, HfBK Städelschule, Frankfurt am Main, Germany, [h]MBA, Universiteit van Amsterdam, Amsterdam, Netherlands, [i]University of California, Los Angeles, CA, United States, [j]University of Colorado, Boulder, CO, United States

Chapter outline

During the digital revolution in architecture roughly a quarter century ago, the influence of digital technology extended deeply into the structures of society. Through mass production and automated fabrication enabled by computational design, it fueled years of intense inquiry in the paradox between the virtual and the physical.

As in David Cronenberg's 1999 film *eXistenZ*, where characters plug into a video game environment that is a virtual construction of reality, virtual and physical space were put in paradoxical tension to a point of near collapse as one environment was indistinguishable from the other in a deceptive cinematic experience of reality. Beyond the more mainstream sci-fi of the legendary *Matrix* (1997), *eXistenZ* placed viewers in a world where the natural and artificial were not separate conditions. While the film remains one of the most important reflections on the cultural anxiety associated with this collapse, it was a reflection of a mere possibility in some distant future, only science fiction.

Today, in the wake of the Internet age, innovations in sensor-based technologies, artificial intelligence and machine vision, have thrust the world into a paradigm where this possibility is now an actuality. The gap between the digital and the physical world as we know it is all but entirely blurred.

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