

LEARNING FROM THE MÉGAPHONE: DESIGN PRINCIPLES FOR INTERACTIVE PUBLIC SPACE DIGITAL INSTALLATIONS

Claude Fortin, SIAT, Simon Fraser University, Surrey, Canada; Alexandre Lupien, Moment Factory; Kate Hennessy, SIAT, Simon Fraser University, Surrey, Canada

ABSTRACT

What happens when a monumental interactive digital “Speakers’ Corner” is made available to city-dwellers as a new form of information and communication technology in real public space? We found out when we saw people from everywhere around the world creatively appropriate *Mégaphone*, an architectural-scale art installation deployed for the very first time from September 4 to November 4, 2013 in Montréal, Canada. For a period of ten consecutive weeks, we conducted an ethnographic field study to observe how local residents and tourists came together to create a new type of digital community, one that forms onsite instead of online. We found that people freely invested the space, gamed the system and subverted the art installation to adopt distinct roles based on their interests, motivations and needs. We also found that participants often used *Mégaphone* to reinforce existing online communities and bootstrap online participation, suggesting that offline locative media has the potential to bring people back into public space and help make the relationship between online and offline technology come full circle. In this paper, we propose four design principles derived from our research results that we believe might better support public interaction in smart cities.

A TWENTY-FIRST CENTURY POLIS

Until recently, the foremost digital infrastructure sustaining what Castells has dubbed the global “informational city” – and others, the “digital city” – was largely instantiated through the Internet: first, as a research network; second, as the post-industrial reorganization of the work force; third, as a global order through which capital, goods, labor, information and services could flow; and fourth, as an expanded cosmopolitan space in which the communal, social and cultural have been appended to all these. [1- 4] At the turn of the twenty-first century, in truly Arendtian fashion, the *polis* was being made and remade onto the World Wide Web as a rich diversity of human activity was slowly displaced onto an online public realm.

At the dawn of the third millennium, it seemed like virtual frontiers were now used to claim and chart new territory. Have these New Worlds served as simulacra of or substitutes for, the real public spaces that had borne the ebb and flow of modern city life since the nineteenth century? As digital practices reshaped the hermeneutics of action by enabling new forms of creative, social and civic interaction online, what role(s) have these real public spaces come to play? Can digital practices produce hybrid spaces? If so, how are these spaces configured? What criteria defines them? What forms of public interaction become possible in such spaces? These are but a few of the pressing questions that arise in the wake of smart cities. Our empirical research suggests that it is the nature of the relationship between interaction

that occurs online and offline that underpins new forms of civic engagement and city living. It is important to remember however that the online and the offline constitute two distinct sites of action that can either mesh in complex ways or not at all. We argue that the “emerging digital hybrid spaces” framework can help explain how virtual spaces of representation and real world places interconnect through digital practices. [5]

EXPANDING THE CONCEPT OF HYBRID SPACE

To explain how mobile computing enfolds digital space into physical space, De Souza e Silva offers a definition of hybrid space as being “a networked space, constituted by a mobile network of people and nomadic technologies that operate in noncontiguous physical spaces [...] the hybrid space is created exactly by the merging of different and discontinuous places within one another.” [6] This definition, however, is problematic, because it only applies to mobile devices that can support a permanent connection to the Internet and can “carry the digital space” around. [7] This implies that De Souza e Silva’s concept of hybrid space can be used to study mobile interfaces such as portables and wearables but not static interfaces such as media façades and situated digital public displays, because her model assumes that hybrid space is the product of connectivity. [8] Furthermore, she argues that, contra to popular belief, this type of hybrid space might actually strengthen relationships because mobile devices have the potential to bring more people together in public space. [9]

Is urban computing analogous to mobile computing? Or can it offer added value? If so, does it have the potential to also draw people together back into the city? Our research suggests that De Souza e Silva’s definition of hybrid space should be expanded to include interactive experiences that do not necessarily require connectivity. Using multi-sited ethnographic methods, we investigated this by taking a close look at how people make and use interactive digital situated displays to see the forms such a model might take.

DIGITAL DISPLAYS AS RELATIONAL PUBLIC INTERFACES

Although design research has been concerned with developing the potential of digital displays as shareable interfaces for as far back as the late 1980s, it is only really at the end of the century that this platform began to be studied, designed and engineered for public settings. [10] It would be difficult to establish exactly what factors initiated this gradual context shift from the personal and private use of screens in homes, offices and labs to their ubiquitous presence and purposes in the public realm of urban space, but research in this area seems to have been market-driven. Coterminously, the Urban Screens movement emerged in Europe and Australia to firmly push back against the commodification of

screen technology in public space. [11] This initiative – now known as the *Connected Cities* global network – advocates the idea that public displays be used for the purposes of place-making, community building and artistic creation. Accordingly, its objective is to encourage people to produce and exchange cultural content through situated public displays within their own city or between cities in order to reclaim public space for social interaction.

Most deployments featured in these contexts, however, require access to connectivity, as do many similar projects intended to “authenticate the public spaces of cities.” [12] Given that interacting through mobile devices tends to support social cocooning rather than group interaction, some designers have been looking at how displays could enable “shared collocated experiences” because, the argument goes, *shareable interfaces* produce other kinds of social experiences than point-to-point interaction. [13] Artists such as Krzysztof Wodiczko and Rafael Lozano-Hemmer anticipated this over fifteen years ago when they started using display technology to explore the “relational” potential of architecture in vast city plazas. [14] Yet design research labs are still just timidly poking at the idea that displays could be public interfaces made to be shareable and sociable, as well as support creative appropriation. [15]

Most public display prototypes are typically designed for interaction through mobile devices or else as intelligent kiosks with touch screens, keyboards or embedded input devices. Exceptions to this include some of the Urban HCI interventions that have supported *Shared Encounters*. [16] Another notable exception is the *Mégaphone*, a dual media façade installation designed to support digitally-augmented collocated onsite public interaction in real time and real space. It uses two large displays to engage people in creative, social and civic interaction, providing them with channels for information sharing, self-expression, discussion and feedback without an online connection.

MÉGAPHONE: A LIVE DIGITAL PUBLIC FORUM

In autumn 2013, Montréal's *Promenade des artistes* plaza saw over a thousand people from all walks of life taking turns to speak into the *Mégaphone*. This unique interactive artistic installation was produced in response to a call for projects issued in late 2012 by the Quartier des Spectacles Partnership and National Film Board of Canada. Selected as the finalist in this competition, a design team at Moment Factory drew its inspiration from the city's history of famed orators and popular assemblies, ancient agoras, the traditional soapbox and Hyde Park's “Speakers' Corner” to design an urban technology that would transform the downtown area into a digitally-augmented live forum.

A MULTIMODAL SPEAKERS' CORNER

First iteration of a system publicly deployed in-the-wild during a period of three consecutive months, *Mégaphone* consists of several input/output interfaces: a microphone, eight loudspeaker units, two media façades and four responsive stage lights. Its

most prominent design feature is a monumental media façade that projects the speakers' words after converting them into French or English written text via a speech recognition software that was custom-built by the Centre de recherche informatique de Montréal.

Mégaphone is designed to function in two distinct modes. Responding to voice input, its live mode and sleep mode coordinate the different output interfaces and define the two main purposes of the installation: it is either a live Speaker's Corner running in real time/space or else it is a monumental digital palimpsest that archives the concerns voiced by local residents and tourists to display them asynchronously. Live mode is automatically deactivated after 30 seconds of consecutive silence at the microphone; the system then reverts to sleep mode which is the default.

A LIVING WALL

In live mode, this multifaceted art installation is interactive in several ways. First, it amplifies the speaker's voice throughout the agora space. Second, it is one of the first public display systems to use speech recognition software to analyze the spoken word; The words are first filtered, then separated and finally individually displayed on the two media façades, with changes cycling through as data is processed – in real time on the small façade and with a 30-second delay on the large façade. Third, it projects on the two media façades a gamut of emergent visual graphic designs and colors generated from variations in the pitch and amplitude of the speaker's voice. Fourth, the large façade shown in figure 1 jazzes up the city with a colorful, dynamic giant graphic user interface (GUI) that displays key theme words to attract urbanites from blocks away. And fifth, it uses a single bright white spotlight aimed at the speaker and three red flood lights casting a warm glow on the audience to digitally augment and spatially define the agora space as an immersive, yet intimate setting.



Fig. 1. *Mégaphone* in live mode, 2013, Moment Factory and Étienne Paquette, art installation, ©2013 Claude Fortin.

A DREAMING WALL

All speech input is analyzed and cumulatively organized into a database according to how frequently or recently a word has been uttered over the course of the deployment. This database is queried in sleep mode in order to display recurring theme words on the large media façade in a grid of red, white and black rectangular boxes. Figure 2 shows that the size of these boxes is proportional to how often a word has been uttered, with bigger boxes containing the words that have recurred most often. Color is also used to visually represent frequency: red for words used most often; white for least often; and black, for those that fall somewhere between those two indexes. In sleep mode, the red ambient lighting floods the installation space evenly in warm mellow tones to divert one's attention towards the large façade, which is programmed to project a visual echo of highlights of the past speeches it dreams of when at rest.

LEARNING FROM THE MÉGAPHONE

Mégaphone was deployed in downtown Montréal during 37 evenings spread out over ten consecutive weeks. Every night, for four hours after dusk, we observed how people invested the space, creatively appropriated the system to meet their own needs and produced live emerging digital hybrid spaces through rich situated interactions offline. We counted over 4,800 participants either as interactants or as passive audience members. Onsite, we conducted short interviews with an average of two participants per night. After the deployment, 21 participants – of which 16 had interacted with the system while 5 had remained passive audience members – granted us one-hour semi-structured interviews. We also interviewed the technical maintenance staff, the producers and the onsite moderator.

To produce design knowledge around the making and the use of *Mégaphone*, we triangulated all this interview data with our onsite field notes and against the scores of video recordings and photographs that had been captured during live interventions. The recurring themes and core insights that emerged from this empirical data informed our analysis, which proposes key design principles to guide the making of similar public space digital installations.

Our results highlight the interactional aspects of the *Mégaphone*. First, we found that designing for creative appropriation had supported different levels of engagement but more importantly, it had allowed people to explore new forms of technology-mediated offline public interaction. However, much to our surprise, we also found that *Mégaphone* was often used by participants to form or bootstrap online communities, suggesting that locative media has the potential to bring people back into public space and help to make the relationship between online and offline technology come full circle in more than one way.

Second, by reflecting on the design process throughout the making of *Mégaphone*, its architectural integration, its deployment and five post mortem meetings, we identified four design principles

that we believe will help support and foster new forms of offline public interaction, but also might provide valuable ideas for smart cities in the future.

NEW FORMS OF DIGITAL ENGAGEMENT

Most people who used the *Mégaphone* told us that they really enjoyed the experience. Indeed, we saw scores of participants come back once to twice a week on a regular basis. Many interviewees reported that even on evenings with a small turnout, they felt the *Mégaphone* fulfilled needs that other digital tools did not. For instance, being able to see and hear people talk about themselves and their opinions in a live context, as well as having a chance to experience just being around real people in public space.



Fig. 2. *Mégaphone* in sleep mode, 2013, Moment Factory and Étienne Paquette, art installation, ©2013 Claude Fortin.

The installation also provided a context for them to meet strangers and to get to know them, which suggests that if the deployment had been longer, we might have seen new kinds of digital communities form around certain themes. The terms *digital community* or *virtual community* typically refer to online digital communication just as De Souza e Silva's definition of hybrid space implies digital practices in connection with the Internet. Our research, however, suggests that digital practices can take the form of technology-mediated communication in urban space without connectivity. As a result, an interactive installation such as *Mégaphone* not only expands the notion of hybrid space, it also calls for a rethinking of terms such as digital community, virtual community and networked community.

But how does the introduction of an interactive urban technology in public space trigger the emergence of new kinds of digital communities? One interviewee said, "With *Mégaphone*, digital technology is not getting in the way of people interacting; it is amplifying the communication process by making the speaker's voice louder and projecting their words onto a screen. It is a tool that slowly breaks down the barriers between people." This suggests that when communication between people is both

enhanced and mediated by digital technology onsite but offline, it can bear enough similarities with online digital practices to be considered in the same category (i.e. digital community), but warrant its own subcategory (i.e. offline).

A LIVE OFFLINE/ONSITE SOCIAL MEDIA PLATFORM

One of our most surprising observations, however, was that many people used *Mégaphone* to engage in dialogues in public space in a way that was much like social media is used online. For instance, people would announce their status and respond in thread-like conversations, bits of which would be displayed on the media façades. Typically, people in the audience would also clap to “like” speakers’ interventions. There were even “lurkers” who would watch hours on end, almost invisible in the shadows at the back of the installation space; they were generally quiet during their first visits, but sooner or later, after weeks of regular attendance, they would timidly try out the microphone on nights when attendance was low. Over time, many showed increased confidence by speaking before bigger crowds.

The installation was also often used by youth as a hangout, while tourists, pedestrians, cyclists and others just waiting for public transport would either briefly stop or else remain in the space for a while to actively listen when the topic was of interest to them. As previously noted, one of the big differences between *Mégaphone*’s live offline social media platform and online social media platforms is that the former confronts participants with strangers that they might otherwise not meet or friend over the Internet.

Our interview data led us to believe that this finding had great significance and implications. As an open forum used to exchange news, views and opinions, online social media platforms – especially the ones that include blogs – have often been compared to echo chambers. [17] In other words, rather than promote creative and rational debate over current issues, they tend to publicize existing content and intensify its impact by endlessly repeating it with little significant change. All of our interviewees said that being in a public space that exposed them to new people and ideas made the *Mégaphone* a special place. Paradoxically, we saw that it could also later reinforce online activity.

OFFLINE AND ONLINE MEET ON DIFFERENT TERMS

One interviewee said, “*Mégaphone*, is a Facebook™ wall but with a stage. I used the installation as a stage in the city to digitally record interventions and words on the façade and then post those images and videos online to connect the online digital world to the real world,” while another said, “The fact that our spoken words are inscribed on the façades and archived in the database gives the speakers’ interventions a material form in public space but it also leaves a visual trace we can then photograph.” Many photographed the words on the media façades or their performance at the Speakers’ Corner platform with their personal digital recording devices to keep them as a souvenir or to republish them online. In fact, this relay between the onsite real time/space experience

disconnected from the online world and its second life in the form of a historical archive circulating on the virtual spaces of the Internet for display on the screens of portable and desktop devices was a digital practice that was so routinely performed by participants that it underscores the potential for “offline” and “online” digitally-enhanced sites of representation to mesh in more motley ways than we typically imagine. Our field observations suggested that designing and studying an offline technology deployed in public space could help better understand ways in which the offline and the online might meet on different terms. For instance, tourists tended to photograph the façades to create “digital postcards” that they would instantly email to friends and family abroad, while local residents tended to repost their recordings on websites, blogs and social media. Most did so to capture Barthean evidence of their having-been-there. [18] Interviewees often stressed the fact that the added digital value of *Mégaphone* was that it was an onsite embodied digital experience: “I wouldn’t want the *Mégaphone* experience to go beyond real time and space. Its physical quality is what makes it special.”

PLIABILITY MEANS EASY TO USE AND EASY TO HACK

The interactive system had several affordances that were easy to use, but could also be hacked for fun. For instance, if a word was repeated over and over, it might appear bigger or else several times, which prompted many users to fill the façade with words like “love” or “happiness” or the name of a dear friend. And although the speech recognition system either ran in French or in English mode, a family from Argentina gamed the system one evening by speaking only in Spanish and then photographing the transcriptions on the large media façade. It seemed like the pliability of the system allowed people to appropriate the *Mégaphone* for a wide variety of purposes and make it theirs. For instance, field observations of *Mégaphone* showed that the digitally-augmented installation was used to make news announcements, offer social commentaries, present alternative views on news events, share personal insights on a social problem, engage in public debates with people sitting in the agora space and even stage several first-person news reports in public space. But mostly, we saw it used for free play and performing public space.

As a result, our hypothesis is that an open and flexible design creates the possibility for an interactive device to become multifunctional and thus enable people not only to interact with, but also through, an urban technology. Our fieldwork also strongly suggested that the installation was popular because it did not get in the way of people interacting with one another and let participants free to choose their level of engagement with the system and with the people in the installation space. For this reason, the issue of programming during the deployment was crucial.

OFFERING DIFFERENT OPTIONS IN THE PROGRAMMING

The public-private partnership that made the production of *Mégaphone* possible set up a website on which people could reserve one-hour long sessions to use the Speakers’ Corner.

Weeks before the launch and during the deployment, different activist groups, performance artists, poets, intellectuals, journalists and students could easily log on and reserve their session online well in advance. This offered everyone a guarantee that they would have their moment in the spotlight. The last hour and empty slots automatically became “open mike” sessions when anyone could just hijack the installation. And this was generally when free play with the *Mégaphone* occurred. After three months, we realized that programming is likely one of the main design challenges. On evenings when there were too many scheduled interventions, people tended to behave more like passive audience members than participants; they would observe the interventions without socially interacting or actively engaging with the system. Conversely, too little curating sometimes left visitors wondering what to do. When it was simply put at the disposal of the general public, the installation seemed intimidating to many. However, if a passerby started to use the installation, often with friends, within fifteen to twenty minutes, other pedestrians would stop and watch. Most would sit down for a while and some would want to take turns trying the installation too; this is when we would observe creative improvisations played to the audience.

HUMANIZING HUMAN-COMPUTER PUBLIC INTERACTION

For this reason, the presence of an onsite moderator proved to be an important factor in attracting people and motivating participation. Although he had initially been given the task of flagging inappropriate content and quickly intervening in cases of aggressive behavior, people tended to well behave. Over the ten weeks of deployment, there was only a single incident that involved one audience member shooing a speaker over a religious issue. Before the onsite moderator had time to say something through his handheld megaphone device, dozens of other audience members turned towards the heckler and stared her down until she stopped, got up and stomped off furiously.

As a result, the onsite moderator who had been hired for three hours every night of the deployment became a master of ceremony whose role was to introduce speakers during programmed interventions and encourage people to try out the system during open mike sessions. By demonstrating the different ways that users could interact with the system, he actually piqued curiosity. As a veteran interviewer, he was both skilled and experienced at making people feel welcome and at ease. And indeed, most people responded to his invitation to use the Speakers' Corner. This suggests that when it comes to public interaction with urban technology, adding a socially intelligent presence to the system may well bring added value to its design.

DESIGN PRINCIPLES FOR INTERACTIVE PUBLIC SPACE DIGITAL INSTALLATIONS

We derived four design principles for public space digital installations from our field observations of *Mégaphone*. We present them in the following section. As Hornecker et al. remarked, design principles are a set of abstractions that function

as high-level concepts “designed to sensitize the designer to different possibilities.” [19] They are therefore not intended to be prescriptive. Instead, they are meant to help designers reflect on possible entry points, affordances and trade-offs in relation to the design of urban technology.

DESIGN WITH COMPONENTS OF CONTRASTING SCALES

Although it was designed as a speakers' corner – essentially a digital soapbox which is typically a small pulpit in a park or on a street corner – most people associated the *Mégaphone* installation with the idea of a Greek agora. People described it as a social space and a space of action: “it made me think of Ancient Greece [...] we gather in a public space and debate together [...] it is civic in its very essence [...] watching interventions on television or online would take away from this lived experience.” Because it was monumental, impressive and intriguing, several interviewees told us that the large media façade had drawn them in, especially when they more than a block away: “you can't 'not notice it' even from afar and right away, you know what themes are being discussed.”

Others said that its architectural scale defined the space: “Because the façade is huge and impressive, it becomes a defining element of the installation. So instead of just listening to someone speak in a microphone – which is not something new – the big media façade makes *Mégaphone* an artistic and architectural object, it makes the intangible aspect of the digital become palpable in public space and it gives people another reason to speak.” From a design perspective, we would purport that, in fact, it was the interplay between all the input/output interfaces that were of different scale orientation and placement that restructured the public space either by creating real physical boundaries or else representational frontiers constructed through content and interactions. The life-size system components dynamically contrasted with the architectural-scale ones to produce an immersive environment that, unlike virtual reality, called for physical interaction with interfaces, urban furniture and real people.

DESIGN TO AMPLIFY AND PUBLICIZE PRESENCE

This notion of scale also speaks to the publicness of the *Mégaphone*. It is this aspect of the system that people made use of in order to self-represent through the spoken and written word. For instance, although the large media façade afforded a 30-second delay before displaying the speakers' words, its most common function was simply as a giant screen interface to self-publish in urban space.

While some people described this as an empowering experience: “I can put the word 'corruption' up on that façade!” and “I feel powerful when my voice is amplified throughout the plaza and my words appear big on the façade,” others saw it as a means to make a physical mark “it was a way for me to say I was here” and “while I read my poetry, I could see my words being projected as its own work of art [...] the façade allowed me to transform the space by leaving a material trace.”

Many interviewees used the words “trace” or “mark” to describe how the installation allowed them to inscribe their visible and audible presence in an urban space in which they usually felt anonymous, invisible and transient; one could argue that presence also can restructure public space.

DESIGN WITH A LIGHTING SETUP THAT SUPPORTS GOOD QUALITY DIGITAL RECORDINGS

As we have previously remarked, when we interviewed participants and observed people in the installation space, we noticed that a significant number of people would use their personal digital recording devices to document live interventions as well as words on the large media façade. Because many of our interviewees showed us where they reposted those images and videos online, we were able to follow the life cycle of some interventions from live recording to virtual reproductions on the World Wide Web. It became quite clear that some participants were using the *Mégaphone* as a visual context to stage or produce content that could later serve to bootstrap online initiatives.

Although *Mégaphone*'s responsive stage lighting was originally intended to create immersive effects that would help define the installation space and draw people's visual attention toward the Speakers' Corner during interventions, our field findings strongly suggested that many people also needed the lighting setup to support good quality digital recordings. According to participants these recordings were either used as a memento of their onsite experience, shared with friends by electronic means or else posted online to publicize their presence, the event or an agenda. By extending the representation of a live onsite event onto a digital archive or online webpages, these interaction strategies can also be said to be restructuring public space.

DESIGN FOR INCLUSIVENESS

Fischer proposed a *Cultures of Participation* framework to describe how people have the possibility of engaging in different levels of participation in any given sociotechnical environment. [20] He argues that people will transition from passive consumers of content to more active forms of interaction when a system is designed to help them do this at their own pace and with a sense of control. Certain factors seemed to facilitate this with the *Mégaphone*. First, the system itself supported a wide array of roles ranging from unengaged bystander – to active observer – to content contributor – to collaborator – to hacker that creatively appropriates the installation and thus redefines its possible purposes. Second, the schedule offered both “curated content” in the form of programmed speakers and “open mike sessions” that allowed for improvised free play. We believe that this allowed more people to engage with the system on their own terms: while some people preferred just sitting, watching and listening, others enjoyed being in the limelight or to game the system. Third, the fact that the installation had a simple input interface (i.e. the microphone) that could output content transduced into different modalities (i.e. sound, vision, proprioception) supported multi-

functionality and seemed to multiply the possibilities for creative appropriation. And finally, fourth, as people came back to be part of the installation space over the course of the 37-day deployment, they felt more comfortable with engaging in social interaction and meeting strangers. These regular clients gradually began to invest the site with personal meaning, form local publics and create onsite networks, thereby reconfiguring this public space into a social space.

CONCLUSION

Could *Mégaphone* be construed as a game changer? We believe it can because it provided an unprecedented example of how an interactive public space digital installation could expand the definition of hybrid space by showing new possibilities for onsite/offline public interaction. It also supported online presence by providing a live context for users to produce personalized good quality digital recordings and later repost them online. This study of the *Mégaphone* deployment has aimed to make a contribution to the literature by showing some of the ways that digital public displays could be used with voice recognition software in urban space. It has also proposed four design principles for interactive public space digital installations derived from our field observations.

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